



TEN-T Core Network Corridors Atlantic Corridor

Final Report





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Abstract

The Atlantic Corridor has an important maritime dimension and offers significant potential to increase its modal share of rail, especially for freight transport. There are also important opportunities in the field of innovation, especially related to alternative fuels, e-maritime/e-freight and Cooperative ITS (C-ITS). The main strategic goals of the development of the Atlantic Corridor are enhancing modal integration, further exploiting maritime connectivity, and addressing railway interoperability.

The Corridor has already achieved a high level of compliance with several TEN-T requirements. Remaining gaps expected to be filled by 2030 include electrification of rail, train length, availability of clean fuels at ports and along roads and the connection of the airport of Madrid to the high-speed rail network. TEN-T compliance is not expected to have been achieved by 2030 for track gauge (74% expected in 2030) and ERTMS deployment.

The total cost of achieving compliance with all TEN-T technical parameters is estimated between €45 and €50 billion, over €11 billion of which being on-going projects. A sum of €7-8 billion is then needed to achieve full rail interoperability in the Iberian Peninsula.

The implementation of these projects is expected to lead to an increase of GDP of a total of €419 billion (2015 basis) over the period 2016 until 2030. Further benefits will occur also beyond the year 2030. The investments will also stimulate additional employment. The direct, indirect and induced job effects of these projects are expected to amount to 1,092.437 additional job-years created over the period 2016 to 2030. It can be expected that also beyond 2030, further job-years will be created by the projects.

Executive Summary

As established in EU Regulations 1315/2013 and 1316/2013, the Atlantic corridor connects Europe's South-Western regions towards the centre of the European Continent, linking the Iberian Peninsula ports of Algeciras, Sines, Lisboa, Leixões (Porto) and Bilbao through Western France to Paris and Normandy and further east to Strasbourg and Mannheim. It covers rail, road, airports, ports, rail-road terminals (RRTs) and the river Seine inland waterway.

The Atlantic Corridor has an important maritime dimension with eight core seaports, and offers significant potential to increase its modal share of rail, especially for freight transport. There are also important opportunities in the field of innovation, especially related to alternative fuels, e-maritime/e-freight and Cooperative ITS (C-ITS).

The main strategic goals of the development of the Atlantic Corridor are enhancing modal integration (thus rebalancing the current modal split, highly relying on road for the inland component), further exploiting maritime connectivity, and addressing railway interoperability. The latter goal signifies a gradual migration of track-gauge to UIC standard within the Iberian Peninsula. This will eventually create a seamless connection from the ports of Algeciras, Bilbao, Sines, Lisboa and Leixões to France and Germany. Within this framework, the need to solve the current bottlenecks and missing railway links is still critical. Particular attention is devoted to the priorities stated by TEN-T guidelines: cross-border, bottlenecks, missing links, interoperability and multimodality, as well as to financing issues. In addition, the deployment of alternative fuels and of C-ITS have also become important focal points.

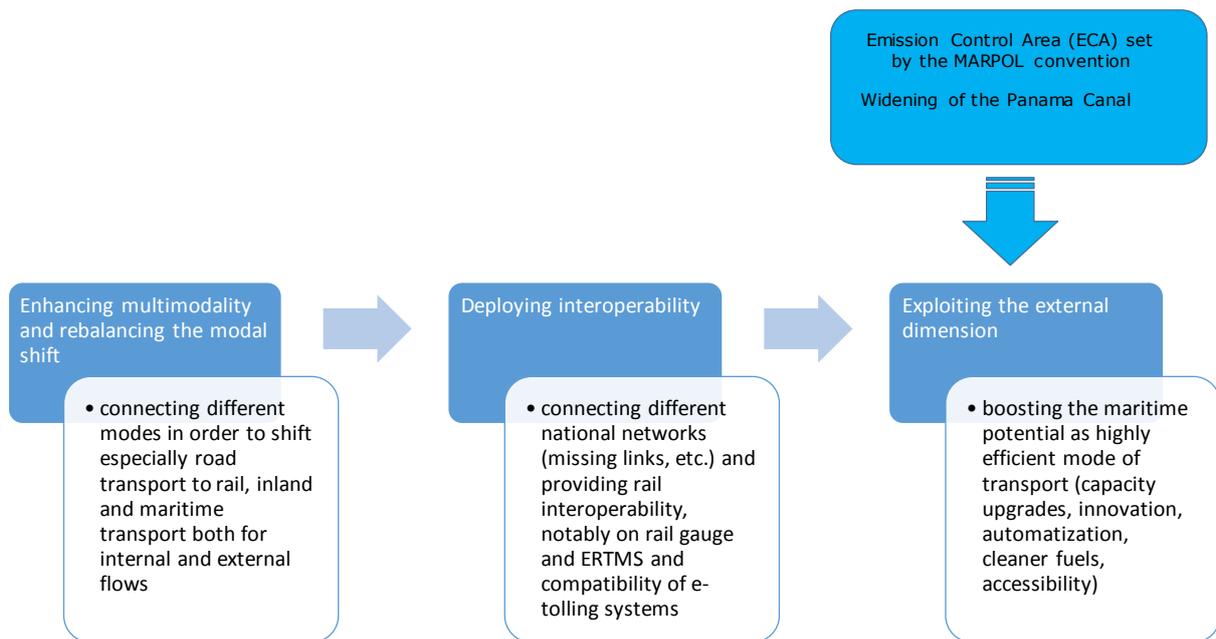


Figure 1 - Atlantic Corridor main goals

The Corridor has already achieved a high level of compliance with several TEN-T requirements. This is especially the case for road, for certain rail parameters including line speed and axle load, for inland waterways and for the most important parameters of seaports, i.e. connection to high speed rail and inland waterways. Remaining gaps expected to be filled by 2030 include electrification of rail, train length, availability of



clean fuels at inland ports and along roads and the connection of the airport of Madrid-Barajas Adolfo Suarez to the high-speed rail network. TEN-T compliance is not expected to have been achieved by 2030 for track gauge (74% expected in 2030) and ERTMS deployment. The positive development of the Corridor will continue to rely heavily upon inter-governmental working groups and agreements as well as regional and local cross-border cooperation, backed up, of course, by financial support.

The corridor has significant potential to increase its modal share of rail, although low oil prices are helping road transport to maintain its competitive advantage. Maritime freight transport is expected to continue growing, putting additional pressure on the port sector for increased capacity as well as for better connections of ports with rail and inland waterways especially in the first/last miles. As such, the increase of maritime is expected to lead to an increase of the volume and share of also rail and inland waterways, increasing the sustainability of the land-based part of the Corridor. Other remaining capacity issues lie especially in the urban nodes, on the rail network related to an insufficient deployment of ERTMS, restrictions for long trains, limited gauge of tunnels, differences in gauge in the Iberian Peninsula, border crossings between Spain and France, lack of electrification and the missing Évora-Merida cross-border link. However, most of these issues are expected to be addressed by 2030.

Of particular attention is the rail connection to the port of Sines, where due to the withdrawal of the only Core Network section linking Grândola with the Core port of Sines, following the outcome of the environmental studies, the only possible rail access to the port of Sines (3rd port in volume and 1st for rail intermodal connections) takes place through the existing TEN-T rail line Sines-Ermidas do Sado-Grândola (in Portugal). Addressing this connection to the port of Sines through the comprehensive network is a critical issue that should be mentioned and should exceptionally be addressed before the forthcoming revision of the network.

The effective integration of the seven urban nodes (Paris, Madrid, Lisboa, Mannheim, Bordeaux, Bilbao and Porto) in the corridors is a key and urgent issue. The importance of a global and integrated strategy from the Regions, aligned with the Member States and EU policies, to effectively address bottlenecks within urban nodes is accentuated. Looking towards a quick deployment of C-ITS day 1 (and as far as possible day 1.5 services) is a step forward and several of the corridor urban nodes are frontrunners in this respect.

The Atlantic Corridor's project list for 2017 includes 272 projects with an overall investment of €43.6 billion. Rail investments (including ERTMS) represent 60.47% of the total costs. In addition, the project list includes a further 63 projects corresponding to network branches connected to the corridor (additionally to corridor components) with relevant influence for the corridor. These non-CNC projects are presented in the annex to the work plan, but are not included in the analysis.

The implementation of these projects is expected to lead to an increase of GDP of a total of €419 billion (2015 basis) over the period 2016 until 2030. Further benefits will occur also beyond the year 2030. The investments will also stimulate additional employment. The direct, indirect and induced job effects of these projects are expected to amount to 1,092.437 additional job-years created over the period 2016 to 2030. It can be expected that also beyond 2030, further job-years will be created by the projects.

Innovation in the context of the Atlantic corridor is extremely relevant for its external dimension, with three key issues arising as priorities for deployment and further derivation of transport and economic/strategic consequences:

- Concerns that the long-term security of supply and the compliance with the two Emission Control Areas (ECA), set by the MARPOL convention and to which the Atlantic coastline is directly connected, will lead to a massive Liquefied Natural Gas (LNG) deployment: based on the pilot cases already present, a major plan for LNG deployment should be prepared for the Atlantic corridor, from which economic analysis can be evaluated;
- Boosting the maritime potential through innovation and simplification, notably by progressing on the systems and procedures to evolve e-maritime towards e-Freight and increasing the efficiency of the logistic chains using maritime transport (i.e. digitalization of freight transport), fields in which the Atlantic is already well advanced;
- The implementation of the so-called standard (UIC) gauge requires substantial works at the rail networks, which offers the opportunity to implement ERTMS as well. Therefore, the plans for ERTMS implementation will be looked at in detail.

Moreover, e-mobility corridors, road interoperability and collaborative ITS (as being deployed in ITS corridors with wide involvement of corridor countries) have a high innovation content in the Atlantic Corridor. Therefore, it is not surprising that the Atlantic Corridor does relatively well when it comes to innovation deployment. Nevertheless, there is room to go one step further in this area. The following common priorities can be identified for the whole sector:

- Greener transport through the adoption and implementation of alternative fuels that contribute to the decarbonisation of transport.
- Development and adoption of technology-based solutions such as ITS, C-ITS and other telematics applications as a means to achieving more effective information exchange more efficient management of transport networks.
- Further development of multimodal transport together with more efficient and sustainable freight logistics.

The corridor also does well in terms of CO₂ reduction (-33% of CO₂ equivalent), especially thanks to the expected modal shift to rail (+124% by 2030) as well as to maritime and inland waterways. Yet, adaptation to climate change must be paid more attention to by project promoters.

The exercise undertaken, based on the Reference Scenario and work plan scenario, shows that planned investments along the Atlantic corridor will allow for a better performance of the corridor, being still worth noting that (due to model limitations) the maritime modes, representing the better choice for the long distance are not captured in the current exercise. Nevertheless, and mainly based on the land modes, investments will contribute to nearly 33% emission savings, with modal shift to rail accounting for roughly half of the emission savings. The other half can be achieved by efficiency and alternative fuel deployment.

The positive impacts of the Corridor could also be maximized through a set of measures at European, national or local level, for example:

- Implementing the TEN-T core network as a whole with good interconnections between corridors, as we have seen how they are interdependent;
- Encouraging innovation for improving energy efficiency and decarbonisation of all transport modes;

- Lowering the level of CO₂ emissions for the production of electricity by encouraging the development of renewable energy sources: this would make the modal shift to rail more efficient for GHG emission reductions;
- Promoting modal shift for local and regional transport.

Like on all corridors, a careful allocation of public funding must be made to ensure the coverage especially of projects of EU added-value which do not have the capacity to attract private financing. Complementarily, the projects which generate revenues must be encouraged to seek as much leverage as possible from private financing or financial instruments.

The analysis to identify the funding sources of projects listed within the ATL Workplan shows that keeping a rate of 42% (similar to the rates found for projects with data available) for the whole investment demand, would result in €2,1 billion to €9,3 billion of EU funds deployed. The inclusion of private investors and the use of financing (properly favoured through financial instruments, when necessary) can strongly contribute to provide the resources the market needs. The assessment of the financial sustainability of the projects in the Atlantic Corridor list, highlights that 18% (49 projects) are not financially sustainable, 71.3% are potentially financially sustainable (194 projects) and 10.3% (or 28 projects) are financially sustainable. The total value of financially sustainable projects is € 28.7 billion. If 15% of CAPEX were financed with private capital/loans, the reduction in grant expenditure would be equal to € 4.3 billion.

At this point, it is worth highlighting the following projects along the Corridor, supported through innovative financial instruments, for their potential for cross-fertilization:

- A remarkable case of blending the use of grant funding and debt financing, for a large-scale greenfield project is the Tours-Bordeaux high-speed line (it has also highlighted that a careful approach toward the management of traffic risk is needed in greenfield projects);
- The ad-hoc platform for Spanish port accessibility, pooling several projects and port revenues, with financing by EIB and ICO (ES promotional bank) guaranteed by the EFSI (Juncker Plan financial branch);
- As a general case, several terminals in ports, airports, IWW ports and rail-road terminals are being supported by the EFSI and by commercial banks (including regional and city-logistics in Île de France).

The total cost of achieving compliance with all TEN-T technical parameters is estimated between €45 and €50 billion, over €11 billion of which being on-going projects. A sum of €7-8 billion is then needed to achieve full rail interoperability in the Iberian Peninsula. Still, the critical mass of investment needed to complete the corridor calls for greater certainty in relation to grant support up to 2030, following the successful outcome of CEF calls. Several projects needed to complete the corridor could not be endowed with adequate (or any) EU resources.

It is worth noting that during the coming years, the corridor will be affected by operational constraints and closure of sections for relevant periods due to the large number of works on rail infrastructure. Alternatives are being considered, notably by diverting some traffic through the Mediterranean corridor. Whereas these works are fundamental for upgrading of the rail infrastructure, they might cause the demand to remain static (or not increasing as expected) over the coming years.

The opportunity to apply for CEF co-funding and financial instruments for more ambitious projects aiming at implementing the EU transport policy through the TEN-T

was raised with corridor stakeholders. Overall, this exercise aimed to identify projects targeting more comprehensive approaches, not restricted to one location or one stretch of road/rail, enhancing the added value of the corridor approach.

Some of such potential projects in the Atlantic Corridor have been identified: they are focused on alternative fuels (inland on the one hand and maritime on the other hand) and on urban nodes (in this case a cross-border urban node) and logistics single windows and digitalization, as follows:

- Alternative fuels from Helsinki to Lisbon and the south of Spain: to offer seamless electric recharging, LNG/CNG refuelling and H2 refilling on a road-based route from Lisbon to Helsinki, in cooperation with the North Sea Baltic Corridor from Helsinki to Brussels, with the North Sea Mediterranean Corridor from Brussels to Paris and with the Scandinavian Mediterranean Corridor.
- LNG at ports on the Atlantic coast: to ensure that as many as possible core and comprehensive ports on the Atlantic coast have bunkering and possibly ship-to-ship infrastructure to refuel LNG-motored ships.
- Seamless Spain-France cross-border connection at Irun-Hendaye: to relieve the heavy road congestion at this connection by putting in place more sustainable local solutions involving rail and coaches/buses.
- Logistics single window from the Atlantic ports to inland corridor: to support efficient freight logistics, interlinking and supporting existing digital initiatives in the different modes of transport along the corridor and improve/ contribute to speed up the corridor digitalisation.

Important progress at corridor level, notably for cross border sections, has been noticed since the first work plan of the European Coordinator in early 2015. Key achievements at the corridor level include:

- The TGV East (to Strasbourg) entered in operation in September 2016;
- The Tours-Bordeaux HSL – the largest PPP on railway in the world (7.8 Bio. EUR) thanks to EU Guarantee (LGTT) and EIB Loan – was finished and the line entered in operation in July 2017 allowing the rail journey from Paris and Bordeaux to be made in only 2 hours. This has freed capacity on the conventional line for freight;
- The launch of the Port Accessibility Fund in Spain, supported by EFSI;
- The launch of investments in most ports (PT, ES, FR).

Relevant on-going projects are expected to be operational on time or with some delays:

- The Y Basque by 2023;
- The GPSO (Grand Projet Sud-Ouest): 2024 to Toulouse (not part of the corridor), 2027 to Dax and 2032 Dax-Spain if the project is confirmed by the French authorities;
- The construction of the missing rail link “Évora-Caia”, with completion foreseen by 2021;
- Electrification works (at 25Kv) on the Spanish border between Fuentes de Oñoro and Medina del Campo by 2019;
- Partial conclusion of works on the Spanish border between Badajoz and Plasencia (UIC gauge), mixed line for passengers and freight.

Advancements are also visible in terms of governance with the continuous cooperation between Portugal and Spain on interoperability and between France and Spain for rolling motorways. There is also a growing acceptance that strong territorial cooperation across borders increases the interest and facilitates cross-border projects.



Relevant stakeholders are taking part in different working group meetings, presenting successful projects and studies. The Euskadi-Nouvelle Aquitaine-Navarre Euroregion, the Macro-Region RESOE (Galicia, Asturias, Castilla y León, Norte and Centro), the coordinated services between Portuguese ports and logistic platforms in Extremadura or the Quattropole and Grande Region are excellent examples of the territorial cooperation in place in the Atlantic Corridor.

The analysis of the project list of the Atlantic Corridor, identifying all ongoing and planned projects, confirms that most of the remaining gaps towards the TEN-T requirements and the remaining capacity issues should be filled/removed by 2030. In addition, we can highlight that the navigation on the Seine will be improved, adding value to the ports of Rouen, Le Havre and Paris; that the alternative fuels, interoperability of e-tolling and C-ITS projects will make the road component of the corridor cleaner, more connected and “smarter”; that there is no clarity yet on the timings for the availability of alternative fuels at airports; and that there is still significant room for improving the first/last miles of travel, both passengers and freight, in the corridor's urban nodes.

Beyond signalling and electrification, special attention has to be paid to the track gauge issue in the Iberian Peninsula, where delivering interoperability means agreeing on the deployment of UIC gauge along the corridor lines, therefore going beyond the current planning and projects listed. It will be important to continue and progress the on-going work of the joint task force Spain-Portugal on interoperability which is delivering an accurate estimate of costs and benefits of different options to ensure the compatibility with UIC gauge in the Iberian Peninsula, to come with a shared long-term planning.

Regarding track gauges, the gaps will be mainly in Portugal on the North line connecting Lisboa and Porto. Other challenges are identified in relation to the respect of timings of certain projects (though nothing critical which would be postponed beyond 2030); the need to convince the private sectors to invest in alternative fuels recharging/refuelling/refilling and in C-ITS; the need to better connect the maritime ports to the inland logistics chains; the need to relieve the pressure of port activities on the urban environment; the general need to streamline procedures and permitting; and the need to ensure efficient connections to neighbouring (core and comprehensive) branches and territories.

However, there are many cases where there is a need to go beyond the TEN-T requirements. This is in particular the case for land access to the corridor's ports which calls also for qualitative and capacity improvements. For rail, we also need to address the issues related to the differences in voltage, the steep gradients and the non-harmonised loading gauges as not all routes permit the same vertical clearance, thus limiting the interoperability of trains. For roads, we need to address the issue of tolling interoperability, which is currently technologically ready but commercial services are still to be deployed.

Moreover, there is clear potential for the provision of better multimodal services and for improving multimodal connections on the corridor. However, an overall planning, implementation, and management model for rail-road terminals, notably in the Iberian Peninsula, is still missing. Finally, there is also a strong opportunity to deploy logistics single windows along the Corridor, extending the current port single windows towards the hinterland and integrating with e-maritime services and information technologies. Finding innovative solutions to enhance multimodality on the corridor is key to meet the continuous growth of maritime flows to the inland routes.



In the short-to-medium range (by 2023), Vitoria will be the key interconnecting point between Iberian and UIC gauge. Since capacity is being developed on the French side (which already consists of a double track electrified line compatible for 740m long trains) it is crucial to develop a plan to fully exploit its potential, also with reference to the branch of the RFC feeding the Atlantic Corridor (e.g.: Zaragoza-Pamplona-Vitoria).

The Jundiz platform is in a very good position to develop a strong case for intermodal services for hinterland and port traffic and transshipment between local/national and international rail transport using different gauges:

- for interconnection between maritime services in the hinterland of major Atlantic ports and continental intermodal rail services;
- for transshipment between Iberian and UIC gauge rail networks;
- for the launching of new rail motorway services for long distance transport between Spain, Portugal and northern Europe, including the Paris area, Belgium and The Netherlands.

Maritime connectivity along the Atlantic coastline continues to be enhanced: Motorways of the Sea, the de facto maritime component of the corridor, beyond being a corridor feeder, are already developed among the corridor's ports up to the EU's northern coast, but are still not fully exploited.

Investments have to be considered in a wide range, from infrastructure (port accessibility both land-side and sea-side) to terminal efficiency, and to systems and procedures to evolve e-maritime towards e-freight, increasing the efficiency of the logistic chains using maritime transport. Its environmental component, including the deployment of innovative fuels, ought to be brought further into the picture. In a wider perspective, the Atlantic coastline and all its core and comprehensive ports and logistic platforms should be seen as feeding the corridor and served by the corridor. The role of the Atlantic islands of Madeira, Azores and Canarias represent indeed the continuity of the Atlantic corridor overseas. Efforts to deploy LNG bunkering facilities and capacity to supply vessels in the islands is of utmost importance in enhancing the maritime dimension of the Atlantic Corridor. The foreseen flagship for LNG along the Atlantic corridor was designed considering the wider view that the initiative would allow the supply of LNG to vessels that depart from or arrive into the Atlantic corridor.

Résumé analytique

Ainsi qu'il est spécifié dans les directives Européennes 1315/2013 et 1316/2013, le corridor Atlantique connecte les régions du sud-ouest et du centre de l'UE, reliant les ports de la Péninsule Ibérique de Algésiras, Sines, Lisbonne, Leixões (Porto) et Bilbao, à travers l'ouest de la France, avec Paris et la Normandie, ainsi que, plus à l'Est, avec Strasbourg et Mannheim. Il intègre le rail, la route, les aéroports, les ports, les terminaux Rail-Route (RRT) ainsi que la Seine en tant que voie d'eau.

Le corridor Atlantique a une dimension maritime importante avec huit ports maritimes du réseau central, ainsi qu'un potentiel important d'accroissement de la part du ferroviaire, notamment pour le fret. Il montre aussi d'importantes potentialités pour l'innovation, et plus particulièrement pour le recours aux carburants alternatifs, le développement de l'e-maritime/e-fret et de solutions Collaboratives ITS (C-ITS).

Les principaux objectifs stratégiques du développement du Corridor Atlantique sont de favoriser l'intégration modale (et ainsi rééquilibrer le partage modal actuel reposant essentiellement sur la route pour ce qui est des modes terrestres), de d'avantage exploiter les connections maritimes, et de traiter le problème de l'interopérabilité ferroviaire. Ce dernier point comprend le passage progressif de la Péninsule Ibérique aux normes UIC. Ceci devrait permettre de relier sans rupture les ports d'Algésiras, Bilbao, Sines, Lisbonne et Leixões à la France et l'Allemagne. Dans ce contexte, le besoin d'éliminer les goulets d'étranglement, et l'existence de liens manquants ferroviaires restent toujours des points critiques. Une attention particulière est portée aux priorités définies dans les orientations pour les RTE-T : passage de frontières, résolution des goulets d'étranglement, liens manquants, interopérabilité et multi modalité. Parallèlement, le déploiement des carburants alternatifs et du recours au C-ITS est aussi devenu un point d'attention important.

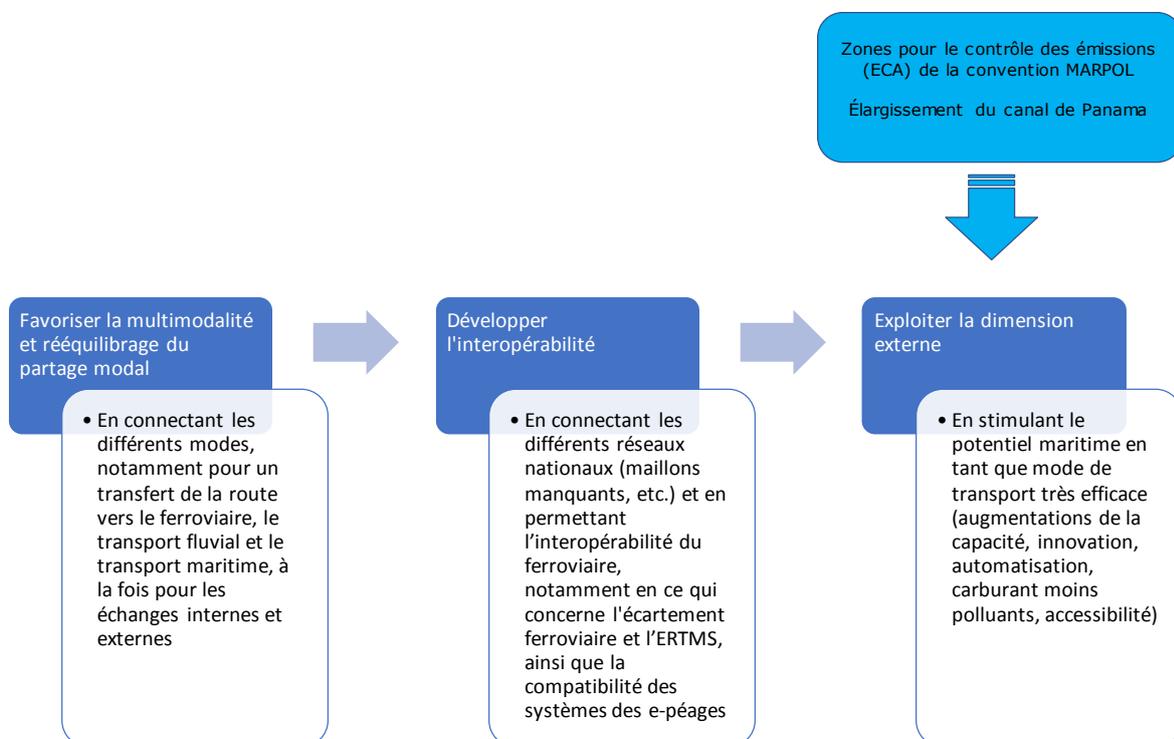


Figure 2 – Principaux objectifs du Corridor Atlantique

Aujourd'hui le corridor atteint déjà un niveau élevé de performance au regard de plusieurs critères exigés pour les RTE-T. Ceci est en particulier le cas pour la route, pour certains paramètres ferroviaires comme la vitesse en ligne ou la charge à l'essieu, pour la voie d'eau, et pour les critères les plus importants du maritime, c'est-à-dire la connexion avec les LGV ou bien le réseau fluvial. Les insuffisances qu'il reste à combler d'ici 2030 concernent l'électrification du rail, la longueur admise des trains, la disponibilité de carburants "propres" dans les ports intérieurs et sur les routes, ainsi que la connexion de l'aéroport de Madrid Barajas Adolfo Suarez au réseau à grande vitesse ferroviaire. La conformité aux critères ne sera pas satisfaite en 2030 pour l'écartement UIC (74% attendus pour 2030), et le déploiement de l'ERTMS. Un développement satisfaisant du corridor repose sur le travail de groupes intergouvernementaux, et la passation d'accords qui, avec la coopération transfrontalière, sont les clefs du progrès, conjointement avec le soutien financier.

Le corridor présente un potentiel important pour augmenter la part du rail, et ceci malgré une concurrence forte de la route et des prix bas du pétrole. Le transport maritime devrait continuer à croître, appelant une augmentation de la capacité des ports ainsi qu'une amélioration de leur connections ferroviaires et fluviales, notamment pour le premier/dernier kilomètre. De ce fait la croissance du transport maritime devrait entraîner une augmentation des volumes et des parts modales du fer et de la voie d'eau, favorisant un développement durable du transport terrestre dans le Corridor. D'autres questions de capacité qui demeurent, concernent essentiellement les centres urbains, ainsi que sur le réseau ferroviaire en liaison avec un déploiement insuffisant de l'ERTMS, des restrictions sur la longueur des trains, le gabarit limité de tunnels, des différences d'écartement ferroviaire dans la Péninsule Ibérique, et sur les sections transfrontalières avec la France, l'absence d'électrification, et l'absence de connexion transfrontalière entre Evora et Merida. Toutefois, la plupart de ces problèmes devraient être traités d'ici 2030.

Une attention particulière doit être apportée à la connexion ferroviaire du port de Sines au Portugal en raison du retrait de la seule section qui liait Grândola avec le port de Sines, faisant partie du réseau central, suite aux conclusions d'études environnementales, qui fait que le seul accès possible du port (le 3^{ème} port en volume, et le premier pour les connexions ferroviaires intermodales) est le passage par la ligne existante du réseau RTE entre Sines, Ermidas do Sado et Grândola. Traiter cette question d'accès au port de Sines en passant par le réseau global (et non le réseau central) est un sujet critique qui devait être rappelé, et devrait être traité exceptionnellement, avant la révision à venir du réseau.

L'intégration effective des sept nœuds urbains (Paris, Madrid, Lisbonne, Mannheim, Bordeaux, Bilbao et Porto) au sein des corridors est un sujet primordial et urgent. L'importance d'une stratégie globale et intégrée, à partir des Régions, alignée sur les politiques des États Membres et de l'UE, afin de s'attaquer de manière efficace au problème de la congestion dans les nœuds urbains est de plus en plus primordiale. S'attacher au développement rapide de systèmes de transports intelligents coopératifs avec service en 1 jour (et autant que possible des services en 1,5 jour) est un progrès et plusieurs nœuds urbains sont des précurseurs dans ce domaine.

La liste des projets du corridor Atlantique de 2017 comprend 272 projets appartenant au réseau central des corridors, représentant un investissement global de 43, 6 milliards d'euros. De plus la liste de projets comprend 63 autres projets correspondant à des sections de réseau connectées au corridor (en plus de celles définies pour le corridor), qui ont un impact pertinent sur le corridor, comme cela a déjà été souligné dans premier "plan de travail". Ces projets "non-CNC" (qui n'appartiennent pas au réseau central des corridors) sont présentés dans la Liste des Projets annexée au

"plan de travail", mais n'ont pas été pris en compte dans l'analyse. Globalement, le coût total des projets planifiés s'élève à 43 664, 79 millions d'euros (coûts disponibles pour 82% des projets). Le rail (avec ERTMS) représente 60,47% des coûts totaux.

La réalisation de ces projets est supposée induire un accroissement total du PIB de 419 milliards d'euros 2015 sur la période 2016 jusqu'en 2030. Des bénéfices supplémentaires seront générés au-delà de 2030. Ces investissements entraîneront aussi de nouveaux emplois. Les effets directs, indirects et induits sur l'emploi de ces projets devraient s'élever à 1 092,437 emplois-an supplémentaires, créés sur la période 2016 à 2030. On peut en outre supposer qu'au-delà de 2030, d'autres emplois-an supplémentaires seront créés par ces projets.

Le volet innovation dans le contexte du corridor Atlantique est aussi particulièrement pertinent, dans sa dimension externe, et ceci pour trois sujets essentiels qui deviennent des priorités au regard des effets attendus pour le transport et des conséquences économiques et stratégiques de manière plus générale :

- concernant la sécurité sur le long terme des approvisionnements et la conformité avec les règles édictées pour les 2 zones de contrôle des émissions (ZCE), définies dans le cadre de la convention Marpol, zones auxquelles les côtes de l'Atlantique sont directement connectées, conduisant à un déploiement massif du recours au GNL (Gaz Naturel Liquéfié) : à partir de projets pilotes en cours, un plan majeur pour le déploiement de GNL devrait être préparé pour le corridor Atlantique, plan dont l'évaluation économique peut être conduite ;
- stimulant le potentiel du transport maritime par le biais de l'innovation et de la simplification, avec en particulier l'amélioration des systèmes et des procédures pour faire évoluer l'e-maritime vers l'e-fret, et accroître les performances des chaînes logistiques ayant un maillon maritime (i.e digitalisation du transport de marchandises), domaine dans lequel le corridor Atlantique est déjà bien avancé ;
- avec la mise au gabarit UIC qui implique des travaux importants sur les réseaux ferroviaires, mais offre aussi une opportunité pour la mise en œuvre de l'ERTMS. C'est pourquoi les plans de mise en œuvre de l'ERTMS feront l'objet d'un examen attentif.

De plus, les concepts de corridors d'e-mobilité, l'interopérabilité routière, et les plateformes collaboratives de STI (comme ils sont actuellement déployés dans les corridors STI avec une forte implication des états traversés) ont un très fort contenu en matière d'innovation dans le corridor Atlantique. Il n'est alors pas surprenant que le corridor Atlantique se trouve en relativement bonne position lorsqu'il s'agit de déploiement de l'innovation. Toutefois il existe encore des marges de progrès à faire dans ce domaine. Les priorités communes pour l'ensemble du secteur peuvent être identifiées :

- un transport plus vert avec l'adoption et la distribution de carburants alternatifs qui contribuent à la décarbonisation du transport ;
- un développement et la mise en œuvre de solutions basées sur les nouvelles technologies, comme les STI, les STI-C et autres applications télématiques, en tant que moyens pour parvenir à un meilleur échange d'informations qui permet un management plus efficace des réseaux de transport ;
- -la promotion du transport multimodal ainsi qu'une logistique efficace et durable pour les marchandises.

Le corridor présente aussi de bons résultats en matière de réduction du CO₂ (-33% d'équivalent CO₂), en raison notamment de transfert attendu en faveur du rail (+124% d'ici 2030), ainsi que du maritime et de la voie d'eau. Cependant les

promoteurs des projets devront apporter une attention plus soutenue au changement climatique.

L'exercice réalisé, sur la base d'un scénario de référence et d'un scénario avec la réalisation du « plan de travail » pour le corridor montre que les investissements planifiés le long du corridor Atlantique permettront d'améliorer les performances du corridor, sachant que (en raison des limites du modèle de simulation utilisé) les modes maritimes qui représentent un meilleur choix pour les longues distances, n'ont pu être pris en compte dans cet exercice. Toutefois, et essentiellement sur la base de modes terrestres, les investissements contribueront à près de 33% de réduction des émissions, le changement de mode en faveur du rail en représentant environ la moitié. L'autre moitié provient d'une amélioration de performance et d'un déploiement de carburants alternatifs.

Les impacts positifs du corridor peuvent aussi être maximisés avec un ensemble de mesures prises au niveau européen, national et Local, comme par exemple :

- -mettre en œuvre le réseau central du RTE-T dans son ensemble, comprenant de bonnes interconnexions entre corridors, puisqu'il a été vu qu'ils sont interdépendants ;
- -encourager l'innovation pour améliorer l'efficacité énergétique et la décarbonisation de tous les modes de transport ;
- -baisser le niveau d'émission de CO₂ pour la production d'électricité en favorisant le développement des sources d'énergie renouvelables : ceci améliorerait le bilan du transfert sur le rail pour l'émission de GES;
- -promouvoir le transfert modal du transport régional et local.

Comme pour tous les autres corridors, une affectation adaptée des fonds public doit être faite pour s'assurer d'une prise en compte particulière de projets apportant une valeur ajoutée européenne mais qui ne sont pas suffisamment attractifs pour les investisseurs privés. De plus les projets susceptibles de dégager des revenus doivent être encouragés pour susciter des effets d'entraînement aussi importants que possible avec la mobilisation de fonds privés ou bien d'instruments financiers.

L'analyse pour identifier les sources de financement de projets qui sont retenus dans les listes du document de programmation du corridor (« Work Plan ») montre qu'en gardant un taux fixe de 42% pour l'ensemble de la demande d'investissement (taux comparable à ceux observés pour des projets dont les données sont disponibles), il en résulterait un engagement de fonds européens de 2,1 milliards à 9,1 milliards d'euros. La mobilisation des investisseurs privés et des canaux de financement (proprement privilégiés au travers des instruments financiers, lorsque nécessaire) peuvent contribuer fortement à offrir les ressources dont le marché a besoin.

L'évaluation de la viabilité financière des projets de la liste du corridor Atlantique montre que 18% (49 projets) ne sont pas viables sur le plan financier, 71,3% sont potentiellement financièrement viables (194 projets) et 10,3% (ou 28 projets) sont financièrement viables. Le montant total des projets financièrement viables est de 28,7 milliards d'euros. Il apparaît alors que si 15% de CAPEX sont financés par du capital privé ou des prêts, la réduction des attributions serait de 4,3 milliards d'euros.

À ce stade, il convient de souligner les projets suivants le long du Corridor, soutenus par des instruments financiers innovants, pour leur potentiel d'enrichissement mutuel :

- Un exemple remarquable de mélange des moyens mobilisables de financements - pour un projet nouveau à grande échelle est la ligne à grande vitesse Tours-

Bordeaux (cela a également souligné qu'une approche prudente de la gestion du risque de circulation est nécessaire pour les projets nouveaux) ;

- La plate-forme pour l'accessibilité des ports espagnols, regroupant plusieurs projets, avec un financement de la BEI et de l'ICO (banque publique espagnole de soutien) garanti par les fonds européens pour les investissements stratégiques (Plan Juncker) ;
- Et à titre d'exemple, plusieurs terminaux dans les ports, les aéroports, les ports fluviaux et les terminaux rail-route sont soutenus par l'EFSD et par les banques commerciales (y compris la logistique régionale et urbaine en Île-de-France).

Le coût total de la conformité aux paramètres de l'UE peut être estimé entre 45 et 50 milliards d'euros, dont plus de 11 milliards sont des projets en cours ; un montant considérable - 7-8 milliards d'euros - est nécessaire pour finaliser l'interopérabilité ferroviaire dans la péninsule ibérique. Néanmoins, la masse critique d'investissement nécessaire pour achever le corridor requiert une certitude en termes de soutien financier jusqu'en 2030. Plusieurs projets nécessaires pour achever le corridor ne pourraient pas être dotés de ressources adéquates (ou de toute autre) de l'UE.

Il est à noter que dans les années à venir, le corridor sera affecté par des contraintes opérationnelles et la fermeture de sections pour des périodes significatives en raison du grand nombre de travaux sur l'infrastructure ferroviaire. Des alternatives sont envisagées, notamment en détournant un peu de trafic à travers le corridor méditerranéen. Alors que ces travaux sont fondamentaux pour la modernisation de l'infrastructure ferroviaire, ils pourraient faire en sorte que la demande n'augmente pas autant que prévu au cours des prochaines années.

La possibilité de solliciter un cofinancement du MIE (Mécanisme pour l'interconnexion en Europe) et d'autres instruments financiers pour des projets plus ambitieux visant à mettre en œuvre la politique des transports de l'UE à travers le RTE-T a été abordée avec les parties prenantes du corridor. Dans l'ensemble, cet exercice visait à identifier les projets permettant de satisfaire à une problématique globale, c'est-à-dire non limité à un lieu ou une section de route / rail, améliorant ainsi la valeur ajoutée de l'approche par corridor.

C'est ainsi que des projets potentiels dans le Corridor atlantique ont été identifiés : ils sont axés sur le développement des carburants alternatifs (terrestre d'une part et maritime d'autre part), sur les nœuds urbains (en l'occurrence un nœud urbain transfrontalier) et sur les guichets uniques et la numérisation, comme suit :

- Une offre en carburants alternatifs d'Helsinki à Lisbonne et au sud de l'Espagne : offrir une recharge électrique sans rupture, un ravitaillement en GNL / GNC et un remplissage en hydrogène sur la route reliant Lisbonne à Helsinki, en coopération avec le Corridor Baltique - Mer du Nord d'Helsinki à Bruxelles, avec le Corridor Mer du Nord - Méditerranée de Bruxelles à Paris et avec le Corridor Méditerranée-Scandinavie.
- Offre en GNL dans les ports de la côte atlantique : veiller à ce que le plus grand nombre possible de ports principaux et secondaires de la côte atlantique disposent d'infrastructures de soutage et éventuellement d'infrastructures de de transbordement navire à navire pour ravitailler les navires à moteur GNL.
- Liaison transfrontalière sans rupture entre l'Espagne et la France à Irun-Hendaye: pour soulager la forte congestion routière de cette liaison en mettant en place des solutions locales plus soutenables impliquant le rail, les autocars / bus.
- Un projet de guichet unique logistique entre les ports maritimes sur la façade atlantique et le corridor intérieur, visant à soutenir une logistique efficace, soutenir

les initiatives numériques existantes dans les différents modes de transport le long du corridor, et améliorer / contribuer à accélérer la numérisation du corridor.

D'importants progrès à l'échelle du corridor, notamment pour les sections transfrontalières, ont été constatés depuis la fin des études de 2014 et du Plan de Travail du Coordonnateur en 2015. Les principales réalisations au niveau du corridor sont les suivantes :

- La phase 2 de la LGV Est (jusqu'à Strasbourg) est entrée en service en septembre 2016 ;
- La LGV Tours-Bordeaux - le plus grand partenariat-public-privé ferroviaire du monde (7,8 milliards d'euros) grâce à la garantie de l'EU (GPTT) et un prêt de la BEI - a été achevée et la ligne mise en service en juillet 2017, permettant de circuler entre Paris et Bordeaux en seulement 2 heures. Cela a libéré de la capacité sur la ligne conventionnelle pour le fret ;
- Le lancement du Fond d'Accessibilité Portuaire en Espagne, soutenu par le fond européen pour l'investissement stratégique (EFSI) ;
- Le lancement d'investissements dans la plupart des ports (Portugal, Espagne et France).

Les projets pertinents en cours devraient être opérationnels à temps ou avec quelques retards :

- Le Y Basque d'ici 2023 ;
- Le GPSO (Grand Projet Sud-Ouest) : 2024 jusqu'à Toulouse (ne faisant pas partie du corridor), 2027 jusqu'à Dax et la section Dax-Espagne en 2032 si le projet est confirmé par les autorités françaises ;
- La construction de la liaison ferroviaire manquante "Évora-Caia", dont l'achèvement est prévu pour 2021 ;
- Les travaux d'électrification (à 25Kv) à la frontière espagnole entre Fuentes de Oñoro et Medina del Campo d'ici 2019 ;
- La conclusion partielle des travaux à la frontière espagnole entre Badajoz et Plasencia (gabarit UIC), sur la ligne mixte passagers / marchandises.

Les progrès en termes de gouvernance sont également visibles, avec la coopération continue entre le Portugal et l'Espagne sur l'interopérabilité et entre la France et l'Espagne pour les autoroutes roulantes. On comprend de plus en plus qu'une forte coopération territoriale transfrontalière accroît l'intérêt et facilite les projets transfrontaliers. Les parties prenantes concernées participent aux différentes réunions des groupes de travail, présentant des projets réussis et des études. L'Eurorégion Euskadi-Nouvelle Aquitaine-Navarre, la Macro-Région RESOE (Galice, Asturies, Castille-et-León, Norte et Centro), les services coordonnés entre les ports portugais et les plates-formes logistiques d'Estrémadure ou le Quattropole et la « Grande Région » sont d'excellents exemples de la coopération territoriale en place sur le Corridor atlantique.

L'analyse de la liste des projets du Corridor atlantique, identifiant tous les projets en cours et prévus, permet de confirmer que la plupart des lacunes restantes concernant les besoins RTE-T et les problèmes de capacité restants devraient être comblés / éliminés d'ici 2030. En outre, on peut souligner que la navigation sur la Seine sera améliorée, valorisant les ports de Rouen, Le Havre et Paris; que les carburants alternatifs, l'interopérabilité des projets de télépéage et de C-STI rendront la composante routière du Corridor plus propre, plus connectée et «plus intelligente»; qu'il n'y a pas encore de certitude sur les périodes de disponibilité des carburants

alternatifs dans les aéroports; et qu'il y a encore une marge importante pour améliorer les premiers / derniers kilomètres de déplacement, tant pour les passagers que pour le transport de marchandises, dans les nœuds urbains du Corridor.

Au-delà de la signalisation et de l'électrification, une attention particulière doit être portée au problème du gabarit dans la péninsule ibérique, où la mise en œuvre de l'interopérabilité implique le déploiement du gabarit UIC le long des axes du Corridor, dépassant ainsi la planification et les projets actuels. Il sera important de poursuivre et de faire avancer les travaux en cours de la « task force » conjointe Espagne-Portugal sur l'interopérabilité, qui fournit une estimation précise des coûts et des avantages des différentes options pour assurer la compatibilité avec le gabarit UIC dans la péninsule ibérique, selon une planification de long terme qui est partagée.

En ce qui concerne le gabarit des voies, les écarts seront principalement au Portugal sur la ligne Nord reliant Lisboa et Porto. D'autres défis sont identifiés en ce qui concerne le respect des délais de certains projets (bien que rien de critique ne soit reporté au-delà de 2030); la nécessité de convaincre les secteurs privés d'investir dans les carburants alternatifs (rechargement / ravitaillement / remplissage) et dans les C-STI ; la nécessité de mieux connecter les ports maritimes aux chaînes logistiques intérieures ; la nécessité de soulager la pression des activités portuaires sur l'environnement urbain ; le besoin général de rendre les procédures beaucoup plus simples et plus rapides ; et la nécessité de prendre soin d'une connexion efficace aux territoires voisins et irriguant le corridor (réseaux central et secondaire).

Cependant, il existe de nombreux cas où il est nécessaire d'aller plus loin que les exigences du RTE-T. C'est notamment le cas pour l'accès aux ports du Corridor, qui nécessite également des améliorations qualitatives et de capacité. Pour le rail, nous devons également aborder les problèmes liés aux différences de tension, aux fortes pentes et aux gabarits non harmonisés qui font que toutes les itinéraires ne permettent pas le même dégagement vertical, limitant l'interopérabilité des trains. Pour les routes, nous devons aborder la question de l'interopérabilité des péages, actuellement prête sur le plan technologique, mais les services commerciaux devant encore être déployés.

En outre, il existe un potentiel évident d'offre de meilleurs services multimodaux et d'amélioration des connexions multimodales sur le Corridor. Cependant, un modèle global de planification, de mise en œuvre et de gestion des terminaux rail-route, notamment dans la péninsule ibérique, fait toujours défaut. Enfin, il existe également une opportunité forte de déployer des « guichets uniques logistiques » le long du Corridor, étendant les guichets uniques actuels des ports vers leur arrière-pays et de les intégrant aux services e-maritimes et aux technologies de l'information. Trouver des solutions innovantes pour améliorer la multimodalité sur le Corridor est la clé pour répondre à la croissance continue des flux maritimes vers les routes intérieures.

À court et moyen termes (d'ici 2023), Vitoria sera le point d'interconnexion clé entre le gabarit ibérique et le gabarit UIC. Puisque la capacité est développée du côté français (qui consiste déjà en une ligne électrifiée à double voie compatible avec des trains de 740 m de long), il est crucial de développer un plan pour exploiter pleinement ce potentiel, également en se référant à la branche du corridor de fret compétitif qui alimente le corridor atlantique (par exemple: Saragosse-Pampelune-Vitoria).

La plate-forme Jundiz à Vitoria est très bien placée pour devenir un argument en faveur des services intermodaux pour le trafic du port et l'arrière-pays, et le

transbordement entre le transport ferroviaire local / national et international, en utilisant différents gabarits :

- pour l'interconnexion entre les services maritimes dans l'arrière-pays des grands ports de l'Atlantique et les services ferroviaires intermodaux continentaux ;
- pour le transbordement entre les réseaux ferroviaires ibériques et UIC ;
- pour le lancement de nouveaux services d'autoroutes ferroviaires pour le transport longue distance entre l'Espagne, le Portugal et le nord de l'Europe, y compris la région parisienne, la Belgique et les Pays-Bas.

La connectivité maritime le long de la côte atlantique doit être considérée comme un élément de corridor à améliorer : en effet, les autoroutes de la mer, la composante maritime de facto du corridor, sont déjà développées entre les ports du Corridor jusqu'à la façade nord de l'Union Européenne, mais ne sont toujours pas pleinement exploitées.

Les investissements doivent être considérés selon une large gamme, de l'infrastructure (accessibilité portuaire à la fois côté terre et côté mer) jusqu'à l'efficacité des terminaux, et aux systèmes et procédures pour faire évoluer le e-maritime vers le *e-freight*, augmentant l'efficacité des chaînes logistiques utilisant le transport maritime. Son volet environnemental, y compris le déploiement de carburants innovants, devrait être pris en compte. Dans une perspective plus large, le littoral atlantique et tous ses ports principaux et secondaires ainsi que ses plateformes logistiques devraient être perçus comme alimentant le couloir / desservi par le corridor. Le rôle des îles atlantiques de Madère, des Açores et des Canaries représente en effet la continuité du corridor atlantique à l'étranger. Les efforts faits pour déployer des installations portuaires de soutage du GNL et la capacité d'approvisionnement des navires dans les îles sont de la plus haute importance pour améliorer la dimension maritime du corridor atlantique. Le projet phare prévu pour le GNL le long du corridor de l'Atlantique a été conçu en tenant compte du point de vue plus général selon lequel le déploiement de l'initiative pilote permettrait d'approvisionner le GNL en navires qui partent ou arrivent dans le corridor atlantique.

Zusammenfassung

Die EU Verordnungen zu den transeuropäischen Verkehrsnetzen (TEN-V) 1315/2013 und 1316/2013 definieren den Atlantik-Kernnetzkorridor als Verbindung zwischen dem Südwesten Europas mit dem Zentrum der EU. Der Korridor verbindet die Iberische Halbinsel mit ihren Häfen Algeciras, Sines, Lissabon, Porto (Leixoes) und Bilbao über das westliche Frankreich bis Paris und die Normandie und weiter östlich nach Strassburg und Mannheim. Zum Korridor gehören Verkehrswege der Bahn, der Straße, Flughäfen, Seehäfen, multi-modale Terminals sowie die Seine als europäische Binnenwasserstraße.

Der Atlantik-Kernnetzkorridor weist mit acht Seehäfen des TEN-T Kernnetzes eine wichtige Brückenfunktion für den Zugang zu internationalen Seeverbindungen auf. Er verfügt über ein sehr großes Potenzial, um mehr Verkehr auf die Schiene zu verlagern, insbesondere im Güterverkehr. Das Potenzial für die Einführung und Nutzung innovativer Technologien ist ebenfalls signifikant, insbesondere im Bereich der alternativen Kraftstoffe, intelligenter Logistiklösungen (e-maritime/e-freight) und kooperativer Verkehrssysteme (C-ITS).

Die strategischen Ziele der Entwicklung des Atlantik-Kernnetzkorridors sind die Verbesserung der multi-modalen Verknüpfung, um die Modalwahl, die heute noch sehr straßenlastig ist, ausgewogener zu gestalten, sowie die Vorteile der maritimen Konnektivität auszunutzen und die Interoperabilität des Bahnverkehrs entlang des Korridors herzustellen. Letzteres erfordert die graduelle Anpassung der Spurbreite auf der iberischen Halbinsel an die europäische Normalspur. Dadurch werden unterbrechungsfreie Verbindungen von den Häfen Algeciras, Bilbao, Sines, Lissabon und Leixoes nach Frankreich und Deutschland geschaffen. Dies erfordert die Beseitigung von wichtigen Engpässen und fehlenden Verbindungen im Bahnnetz. Hier ist die Prioritätensetzung der TEN-V Verordnung maßgeblich zu beachten: Auf- und Ausbau der grenzüberschreitenden Verbindungen, fehlender Verbindungen, der Interoperabilität und der Multi-Modalität, Beseitigung der Engpässe, sowie Vereinfachung der Finanzierungsmodalitäten. Weiter sind der Ausbau der Infrastruktur für alternative Kraftstoffe und kooperative Verkehrssysteme zu Schwerpunkten geworden.

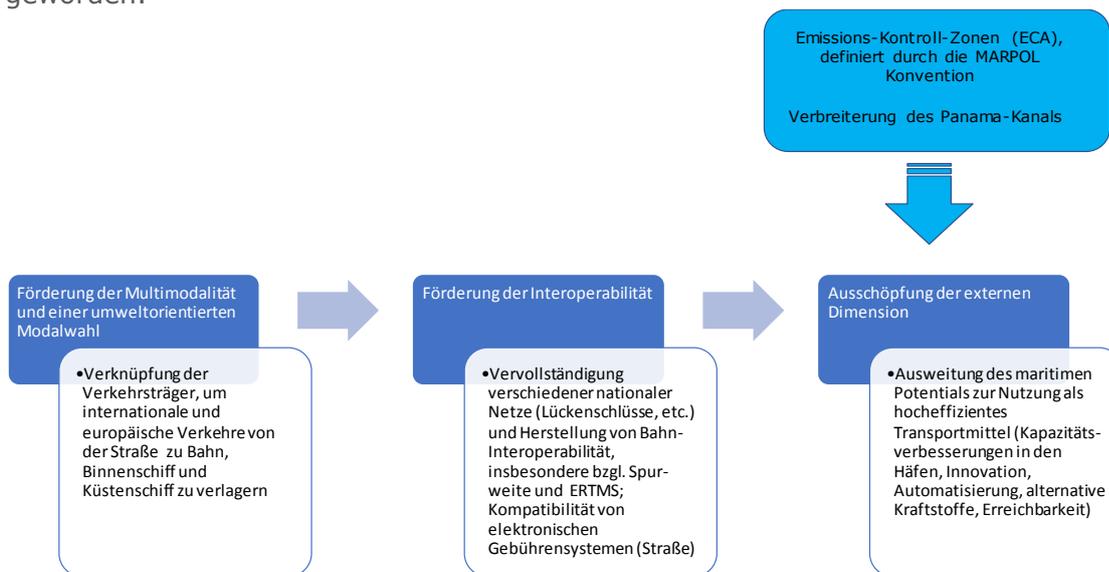


Figure 1 – Zentrale Ziele des Atlantik Kernnetzkorridors

Entlang des Korridors wurde bereits für mehrere technische Parameter von TEN-V Infrastrukturen ein hoher Grad der Zielerreichung realisiert. Insbesondere gilt dies für die Straßennetze, für ausgewählte Parameter des Bahnnetzes wie Geschwindigkeit und zulässige Achslasten, für die Binnenwasserstraßen, und für die wichtigsten Parameter von Seehäfen: Anbindung an das hochwertige Bahnnetz sowie die Binnenwasserstraße, wo dies möglich ist. Verbleibende Lücken, die bis 2030 geschlossen werden, umfassen die vollständige Elektrifizierung des Bahnsystems, die Kapazität 740m lange Güterzüge zu fahren, die Verfügbarkeit alternativer Kraftstoffe an den Binnenhäfen und an den Straßen sowie die Anbindung des Flughafens Madrid-Barajas Adolfo Suarez an das Hochgeschwindigkeitsnetz der Bahn. Dagegen dürfte es bis 2030 nicht gelingen, die UIC-Normalspur vollständig zu realisieren (erwarteter Realisierungsgrad: 74%) sowie das europäische Zugleitsystem (ERTMS) vollständig zu implementieren. Die erfolgreiche Entwicklung des Korridors wird auch weiter stark von länderübergreifenden Arbeitsgruppen und Vereinbarungen abhängen, sowie von regionalen und lokalen grenzüberschreitenden Kooperationen. Natürlich wird auch zukünftig finanzielle Unterstützung seitens der EU bei der Realisierung des Korridors erforderlich sein.

Der Korridor bietet großes Potenzial den modalen Anteil des Bahnverkehrs zu erhöhen. Allerdings verbessern die niedrigen Ölpreise die Wettbewerbsposition des Straßenverkehrs. Der Seetransport dürfte weiter anwachsen und wird den Druck zur Steigerung der Kapazitäten in den Häfen sowie zur Verbesserung ihrer Anbindung an Bahn und Binnenschiff erhöhen. Dies gilt insbesondere für die erste und letzte Meile der Transporte. Der Anstieg der Seetransporte wird auch zu einem Wachstum der Nachfrage und des Anteils der Schiene und des Binnenschiffs auf dem Korridor führen, wodurch sich die Nachhaltigkeit des bodengebundenen Verkehrs auf dem Korridor verbessern wird. Weitere Kapazitätsprobleme sind insbesondere für die großen städtischen Knoten zu erwarten, im Bahnnetz durch die unzureichende Ausstattung mit ERTMS, durch Beschränkungen der Länge von Güterzügen sowie bei den Tunnelquerschnitten, durch Unterschiede in der Spurbreiten auf der iberischen Halbinsel, eingeschränkte grenzüberschreitende Verbindungen zwischen Spanien und Frankreich, mangelnde Elektrifizierung und die fehlende Grenzverbindung zwischen Evora und Merida. Die meisten dieser Schwächen werden aber bis 2030 beseitigt sein.

Von besonderer Bedeutung ist die Bahnanbindung des Hafens Sines. Hier fiel die Umweltbewertung der einzigen Kernnetzanbindung zum ebenfalls zum Kernnetz gehörenden Hafen Sines negativ aus, so dass die Planung aufgegeben wurde. Damit wird Sines, immerhin der wichtigste Hafen für intermodale Transporte in Portugal und der dritt wichtigste nach Jahresumschlag, nur noch durch eine Verbindung auf dem erweiterten TEN-T Netz erschlossen. Dieser kritische Engpass verdient eine besondere Würdigung bei der geplanten Überarbeitung der TEN-V Verordnung und des Kernnetzes.

Die effektive Integration der sieben urbanen Knoten des Korridors (Paris, Madrid, Lissabon, Mannheim, Bordeaux, Bilbao und Porto) ist ein zentrales Anliegen für die Zukunft. Die Bedeutung einer umfassenden und integrierten Strategie der Regionen in Absprache mit den Mitgliedsstaaten und der EU-Politik, um Engpässe an den Knoten zu beseitigen, muss betont werden. Die schnelle Einführung von kooperativen Verkehrssystemen der ersten Generation ist ein erster und wichtiger Schritt. Mehrere der urbanen Knoten des Korridors gehören hier zu den Pionieren.

Die Projekt-Pipeline des Atlantik-Korridors von 2017 beinhaltet 272 Projekte mit einer Gesamtinvestitionssumme von 43,7 Milliarden Euro. Hinzu kommen 63 Projekte, die im Zulauf zum Korridor liegen, aber nicht auf dem Korridor und trotzdem für diesen

bedeutsam sind. Diese Projekte sind in einem Anhang zum Arbeitsplan aufgeführt, aber nicht in den Kostenschätzungen enthalten. 82% der Projekte sind mit einer Investitionsschätzung hinterlegt und ergeben so die mindestens erforderlichen Investitionen von 43,664 Millionen Euro. Investitionen in die Schiene inklusive ERTMS machen einen Anteil von 60,47% aus.

Die Umsetzung dieser Projekte bis 2030 würde akkumuliert für die Periode 2016 bis 2030 zu einer Erhöhung des Bruttoinlandsproduktes (BIP) von 419 Milliarden Euro (2015 Preisbasis) führen. Weitere Nutzen entstehen nach 2030. Die Investitionen führen auch zu zusätzlicher Beschäftigung. Die direkten, indirekten und induzierten Arbeitsplatzeffekte werden mit 1,092 Tausend zusätzlichen Beschäftigungsjahren beziffert. Auch nach 2030 ist mit zusätzlicher Beschäftigung durch die Projekte zu rechnen.

Für den Atlantik Kernnetzkorridor ist die Umsetzung von Innovationen sehr wichtig für den Erfolg der internationalen Dimension. Hier sind drei technische Innovationen als Prioritäten für die Umsetzung zu nennen:

- Die langfristige Sicherung der Versorgung mit Flüssigerdgas (LNG) sowie die Anforderungen an die Abgasreinigung in Emission Control Areas (ECA) definiert durch das MARPOL Umweltübereinkommen und in direkter Nachbarschaft zur Küstenlinie des Atlantikkorridors liegend wird zu einem massivem Ausbau der LNG-Infrastruktur führen. Daher sollte basierend auf den ersten Pilotanwendungen ein strategischer Plan zum Aufbau der LNG-Infrastruktur für den Korridor entwickelt werden. Anhand des Plans kann die ökonomische Bewertung durchgeführt werden.
- Das Potenzial der maritimen Anbindung des Korridors soll auch durch Vereinfachung der Logistik-Prozesse gehoben werden. Insbesondere durch Innovationen im Bereich der Weiterentwicklung der Digitalisierung der Prozesse hin zu einer e-Freight Plattform soll die Effizienz der Logistikkette verbessert werden. Auch hier weist der Atlantik Korridor bereits vielversprechende Ansätze auf.
- Der Ausbau des Kernnetzes in UIC-Standardspurweite erfordert umfangreiche Neu- und Ausbauten am Schienennetz, die gleichzeitig genutzt werden sollen, um die Ausrüstung mit ERTMS voranzutreiben.

Der Grad der Ausstattung mit Ladestationen, die Interoperabilität auf der Straße und die kooperativen und smarten ITS Lösungen weisen den hohen Innovationsstand des Atlantik-Korridors aus.

Der Atlantik-Korridor liegt bei innovativen Lösungen - verglichen mit anderen Korridoren - an vorderer Stelle. Dennoch gibt es weitere Herausforderungen. Dabei lassen sich die folgenden Prioritäten identifizieren:

- Verbesserung von Umweltverträglichkeit und Klimaschutz im Verkehr durch alternative Kraftstoffe.
- Weiterentwicklung und Anwendung neuer Informationstechnologien zur Verbesserung des Verkehrsmanagements.
- Weiterentwicklung des multi-modalen Transports zur Verbesserung der Gütertransport-Logistik.

Aufgrund der erwarteten Verkehrsverlagerung zu Bahn (+124% bis 2030), Binnenschiff und küstennaher Schifffahrt wird sich auch die Klimabilanz für den Korridor verbessern (-33% CO_{2equ}). Die Realisierung dieser Erwartung stellt hohe Anforderungen an die Projektbeteiligten.

Die obigen Daten wurden modellhaft mit Hilfe des Vergleichs zwischen einem Referenz- und einem Projekt-Szenario ermittelt, wobei die Möglichkeiten einer Verlagerung zur Seeschifffahrt noch nicht voll erfasst werden konnten. Dennoch können die vorwiegend im Landverkehr erzielbaren CO₂-Einsparungen rund 33% erreichen, wobei die Verlagerung auf die Bahn etwa die Hälfte beitragen kann. Die andere Hälfte resultiert aus Effizienzverbesserungen und dem Einsatz alternativer Kraftstoffe.

Diese positiven Auswirkungen des Korridors können durch eine Reihe von Maßnahmen auf europäischer, nationaler und lokaler Ebene gesteigert werden, zum Beispiel:

- Implementierung des gesamten transeuropäischen Kernnetzes wegen der Interdependenzen zwischen den Korridoren;
- Beschleunigung der Innovationen für Energie-Effizienz und De-Karbonisierung.
- Verminderung der CO₂-Emissionen der Energieproduktion durch verstärkten Einsatz von erneuerbaren Energiequellen; dies würde die modale Verlagerung zur Bahn noch klima-effizienter machen;
- Förderung modaler Verlagerungen im Nah- und Regionalverkehr.

Wie auf den übrigen Kernnetzkorridoren ist der Einsatz öffentlicher Finanzmittel sorgfältig zu planen, wenn keine Möglichkeit privater Finanzierung besteht. Zusätzlich sollten für Projekte, die finanzielle Rückflüsse generieren können, die Chancen der Privatfinanzierung so weit wie möglich genutzt werden.

Die Analyse der gewählten Finanzierungsoptionen im ATL Arbeitsplan weist für Projekte mit Angaben zur Finanzierung eine durchschnittliche Unterstützung durch EU-Zuschüsse in Höhe von 42% aus. Damit ergibt sich als minimale EU Finanzierung des Atlantik-Korridors der heute bereits zugesagte Wert von 2,1 Billionen Euro, und bei voller EU-Ko-Finanzierung der gesamten noch ausstehenden Projekte eine EU-Unterstützung von 9,3 Billionen Euro.

Die Einbeziehung der Beiträge privater Investoren kann nachhaltig zur Deckung des Finanzbedarfs beitragen, insbesondere wenn private und öffentliche Finanzierungsquellen innovativ kombiniert werden. Die finanzielle Bewertung für die Projekte des Atlantik Korridors zeigt, dass 18% (49 Projekte) nicht finanziell tragfähig, 71,3% (194 Projekte) potentiell finanziell tragfähig und 10,3% (28 Projekte) voll finanziell tragfähig sind. Die gesamten Ausgaben für potenziell finanziell tragfähige Projekte liegen bei EUR 28,7 Mrd. Wenn es gelingt, dass 15% der Investitionsausgaben durch privates Kapital finanziert würden, läge die Verminderung der Finanzierung durch öffentliche Gelder in einer Größenordnung von EUR 4,3 Mrd.

An dieser Stelle sind folgende Korridor-Projekte hervor zu heben, die bereits durch innovative Finanzierungsinstrumente unterstützt wurden:

- Das Großprojekt einer Neubaustrecke für die Hochgeschwindigkeits-Eisenbahn zwischen Tours und Bordeaux (das auch zeigt, dass ein sorgfältiges Risiko-Management für Neubau-Projekte erforderlich ist);
- Die ad-hoc Plattform für die Verbesserung der Zugänglichkeit spanischer Seehäfen, die mehrere Projekte und Hafen-Finanzierungen zusammenführt und aus Mitteln der Europäischen Investitionsbank und der spanischen Investitionsbank ICO finanziert wird, die über den EFSI-Fonds (Juncker-Plan) garantiert werden.
- Verschiedene Projekte für See- und Binnenwasser-Häfen, Flughäfen und Bahnhöfe werden über den EFSI-Fonds unterstützt und von Geschäftsbanken

ko-finanziert (darunter Projekte für die regionale und städtische Logistik in der Region Ile de France).

Die gesamten Kosten für die Herstellung der Kompatibilität technischer Parameter wird zwischen EUR 45 und 50 Mrd. geschätzt, davon mehr als EUR 11 Mrd. für begonnene Projekte. Allein EUR 7-8 Mrd. werden benötigt, um eine volle Interoperabilität für die Eisenbahnen auf der iberischen Halbinsel herzustellen. Gleichwohl steht noch ein kritisches Volumen an Investitionen aus und setzt eine größere Sicherheit bei der Förderung bis 2030, im Anschluss an die Ausschreibungen des CEF-Fonds, voraus. Allerdings konnten mehrere für die Korridor-Realisierung dringliche Projekte bislang nicht die erforderliche finanzielle Unterstützung finden.

Zusätzlich ist zu erwähnen, dass der Korridor in den nächsten Jahren von Einschränkungen des Bahnbetriebs bis hin zu Vollsperrungen von Streckenabschnitten betroffen sein wird, die durch die hohe Zahl von Baumaßnahmen bedingt sind. Alternative Routen werden untersucht, darunter Streckenführungen durch den Mittelmeer-Korridor. Während diese Bauarbeiten für die Verbesserung der Bahn-Infrastruktur unbedingt notwendig sind, können sie in den nächsten Jahren dazu führen, dass die Nachfrage stagniert oder sich zumindest nicht so dynamisch entwickelt wie prognostiziert.

Von interessierter Seite wurde die Frage aufgeworfen, ob die CEF-Kofinanzierung nicht auch für weitere ambitionierte Projekte der EU Verkehrspolitik erweitert werden könnte. Hier geht es um übergreifende Projekte, die nicht auf örtliche oder modale Investitionsmaßnahmen beschränkt sind.

Einige solcher potentiellen Projekte lassen sich für den Atlantik-Korridor identifizieren: Sie beziehen sich vor allem auf alternative Kraftstoffe (Land- und Seeverkehr) städtische Verbindungen (grenzüberschreitend) und Digitalisierung in der Logistik:

- Verwendung alternativer Kraftstoffe auf der Route von Helsinki nach Lissabon/Südspanien: Angebot eines dichten Netzes elektrischer Ladestationen, Tankstationen für Gas (LNG und CNG) und Wasserstoff, in Kooperation mit anderen Kernnetzkorridoren, wie Nordsee-Ostsee K. (Helsinki-Brüssel), Nordsee-Mittelmeer K. (Brüssel-Paris) und Skandinavien-Mittelmeer K..
- Angebot an LNG an Häfen der Atlantik-Küste: Vorhaltung von LNG-Bunkerstationen an Häfen für die Versorgung von Gas-betriebenen Schiffen.
- Nahtlose grenzüberschreitende Verbindung zwischen Spanien und Frankreich bei Irun-Hendaye: Entlastung der staugefährdeten Straßenverbindung durch Bahn und Bus-Verkehr.
- Logistische „single window“ Lösungen für den internationalen Datenaustausch mit einheitlichen Dokumenten von den Atlantik-Häfen zu den Hinterland-Korridoren: Verbesserung der Logistik, Verknüpfung existierender Initiativen zur Verbesserung der digitalen Information im Korridor.

Seit der erste Arbeitsplan des Europäischen Koordinators zu Beginn des Jahres 2015 veröffentlicht wurde, sind wichtige Fortschritte bei den grenzüberschreitenden Verbindungen zu verzeichnen. Die wichtigsten Verbesserungen sind:

- Der letzte Abschnitt der TGV Est-Verbindung (Paris-Straßburg) wurde im September 2016 eröffnet.
- Die HGV-Verbindung Tours-Bordeaux – das größte Eisenbahn PPP-Projekt der Welt (EUR 8,8 Mrd.), unterstützt durch die EIB und eine EU Garantie (LGTT) – wurde fertig gestellt und im Juli 2017 eröffnet. Die Reisezeit von Paris nach

Bordeaux verkürzt sich dadurch auf 2 Stunden. Die neue HGV-Strecke macht Kapazität für den Güterverkehr auf der konventionellen Bahnstrecke frei;

- Es wurde in Spanien ein „Hafen-Verbesserungs-Fonds“ gegründet, unterstützt durch den EFSI-Fonds.
- In vielen Häfen Portugals, Spaniens und Frankreichs wurden Investitionsprojekte begonnen.

Einige laufende Projekte werden wahrscheinlich im Zeitrahmen oder mit geringer zeitlicher Verzögerung realisiert:

- Die Y-Lösung für das Baskenland (2023);
- Das GSPSO (Grand Projet Sud-Ouest): 2024 nach Toulouse (nicht Teil des Atlantik-Korridors), 2027 nach Dax und 2032 von Dax zur spanischen Grenze, vorbehaltlich der Genehmigung durch französische Behörden;
- Bau der noch fehlenden Bahnverbindung Evora-Cara, mit vorgesehener Fertigstellung 2021;
- Elektrifizierung (25 kV) in der Nähe der spanischen Grenze zwischen Fuentes de Onoro und Medina del Campo, vorgesehene Fertigstellung 2019;
- Teilweise Fertigstellung der Bauarbeiten in der Nähe der spanischen Grenze zwischen Badajoz und Plasencia (UIC-Standardspurweite) für Personen- und Güterzüge.

Fortschritte sind auch sichtbar bei der Zusammenarbeit von Portugal und Spanien zur Verbesserung der Interoperabilität und zwischen Frankreich und Spanien bei der rollenden Landstraße. Auch wird die Bedeutung einer engen räumlichen Kooperation über die Grenzen hinweg im Rahmen von grenznahen Projekten zunehmend erkannt. Vertreter der relevanten Interessengruppen nehmen an den verschiedenen Treffen von bi-nationalen Arbeitsgruppen teil und präsentieren ihre Erfahrungen. Herausragende Beispiele dafür sind die Euroregion Baskenland-Neu-Aquitainen, die Makro-Region RESOE (Galizien, Asturien, Kastilien-León, Norte y Centro) die koordinierten Dienstleistungsangebote zwischen portugiesischen Häfen und logistischen Plattformen in Extremadura oder die Großregion Quattropole in der die Städte Luxemburg, Metz, Saarbrücken und Trier kooperieren.

Die Analyse der Projektliste mit allen laufenden und geplanten Projekten für den Atlantik Korridor zeigt, dass die meisten Rückstände gegenüber den TEN-V Anforderungen aufgeholt und die verbleibenden Kapazitätsverbesserungen bis zum Jahr 2030 erreicht werden sollten. Zusätzlich sei darauf hingewiesen, dass die Binnenschifffahrt auf der Seine verbessert wird, was sich positiv für die Häfen Rouen, Le Havre und Paris auswirken wird; dass der Einsatz alternativer Kraftstoffe, die Verbesserung der Interoperabilität bei elektronischen Gebührensystemen und kooperative intelligente Informationssysteme die Straßenverkehre im Korridore besser einbinden. Dagegen gibt es noch keine Klarheit über den Einsatz alternativer Kraftstoffe im Luftverkehr und es bleiben noch Verbesserungsspielräume für die Organisation der „letzten Meile“ im Personen- und Güterverkehr.

Über die Erneuerung von Signaltechnik und die Elektrifizierung von Strecken hinaus gibt es auf der iberischen Halbinsel vor allem das Problem der Spurweiten, die auf den UIC-Standard im Korridor umzustellen sind, was über die laufenden Projekte und Planungen hinausgeht. Hier kommt es darauf an, die angelaufenen Arbeiten einer Task Force zur Interoperabilität zwischen Spanien und Portugal zu beschleunigen. Die Task Force soll zunächst genaue Abschätzungen von Kosten und Nutzen verschiedener Alternativen zur Herstellung des UIC Spurweitenstandards erarbeiten und anschließend eine länderübergreifend abgestimmte Langfrist-Planung aufstellen.

Bei der Harmonisierung von Spurweiten für die Eisenbahnen gibt es noch Lücken, vor allem in Portugal zwischen Lissabon und Porto. Weiter existieren Probleme der zeitlichen Abstimmung für verschiedene Projekte (wobei dies nicht zur Verschiebung wichtiger Projekte auf den Zeitraum nach 2030 führen sollte). Herausforderungen sind ferner die Beteiligung privater Investoren bei der Bereitstellung alternativer Kraftstoffe, Ladestationen und Einrichtungen für kooperative intelligente Informationssysteme; die Notwendigkeit, die Seehäfen besser in die Hinterland-Logistik einzubinden; den verbesserten städtischen Umweltschutz in der Umgebung von Häfen; die allgemeine Notwendigkeit die Genehmigungsverfahren zu beschleunigen; die Notwendigkeit, benachbarte Regionen und Infrastrukturkorridore besser in die Planungen zu integrieren.

In vielen Fällen muss man aber über die TEN-V-Anforderungen hinausgehen. Dies gilt insbesondere für den Landzugang zu Seehäfen, der qualitative und quantitative (Kapazitäts-) Verbesserungen erfordert. Für den Eisenbahnbereich sind die Unterschiede bei Stromspannung, Steigungs-Gradienten und Lichtraumprofilen zu erwähnen, die nicht auf allen Routen gleich bzw. ausreichend sind. Für die Straßen gibt es die Anforderung einer einheitlichen Gebührenerhebungstechnik, die zwar technisch kein Problem aber organisatorisch noch umzusetzen ist.

Darüber hinaus gibt es ein hohes Potential für multi-modale Dienste und die Notwendigkeit einer Verbesserung multi-modaler Verbindungen im Korridor. Für die iberische Halbinsel fehlt es hierzu an einem abgestimmten Planungs-, Durchführungs- und Management-Konzept für Verladeterminals Bahn/Straße. Letztlich sind einheitliche Standards für Dokumente („single windows“) auszuarbeiten, um die Seehäfen informationstechnisch nahtlos mit dem Hinterland zu verbinden. Hier sind innovative Lösungen angezeigt, da die Multimodalität eine Schlüssel-Voraussetzung dafür ist, den wachsenden Verkehr von den Seehäfen zum Hinterland zu bewältigen.

In kurz- bis mittelfristiger Sicht (bis 2023) wird Vitoria der zentrale Verbindungsknoten zwischen iberischer und UIC Eisenbahn-Spurweite sein. Da die Kapazität auf der französischen Seite bereits ausgebaut wird (hier existiert bereits eine zweigleisige elektrifizierte Verbindung für 740m lange Güterzüge) ist es notwendig, unter anderem mit einer Verbindung zum Eisenbahn-Güterverkehrskorridor im Abschnitt Zaragoza-Pamplona-Vitoria, das volle Potential dieser Maßnahmen zu erschließen.

Die Jundiz-Plattform, die verschiedene Spurweiten aufweist, ist aufgrund ihrer geographischen Lage prädestiniert, intermodale Transporte für Hinterland- und Häfen, sowie den Umschlag zwischen regional/nationalen und internationalen Bahngütertransporten durchzuführen:

- Für die Verbindung zwischen maritimen Transportdiensten im Hinterland von größeren Atlantik-Häfen und kontinentalen intermodalen Eisenbahndiensten;
- Für den Umschlag zwischen iberischer Breitspur und UIC Bahnspurweiten;
- Für das Angebot neuer Angebote für die rollende Landstraße auf langen Transportverbindungen zwischen Spanien, Portugal und Nord-Europa, einschließlich der Region Paris, Belgien und den Niederlanden.

Die Seeverbindungen entlang der Atlantik-Küste sollten weiter gestärkt werden: Meeresautobahnen, die de facto die maritime Komponente des Korridors darstellen und deren Bedeutung über die von reinen Einspeisungskanälen für den Atlantik-Korridor hinausgeht, sind bereits auf der Seite der Korridor-Häfen bis zu den nördlichen Küsten der EU entwickelt, aber noch nicht voll genutzt.



Weit angelegte Investitionen werden erforderlich sein, die eine Bandbreite von Infrastrukturverbesserungen (Hafenzugänglichkeit von der Land- und Seeseite) bis hin zu Effizienzsteigerungen bei Terminals und bei Systemen und Prozessen einschließen, welche die Möglichkeiten digitaler Informationstechniken zur Optimierung logistischer Operationen im maritimen Verkehr nutzen. Dabei rückt die Umweltkomponente stärker in den Vordergrund, einschließlich der Nutzung neuer Kraftstoffe. In einer erweiterten Sicht sollte man die Atlantik-Küste mit ihren wichtigen Häfen und logistischen Plattformen als Quellen und Ziele für den Verkehr im Korridor betrachten. Die Atlantischen Inseln Madeira, Azoren und Kanaren stellen dabei maritime Erweiterungen des Atlantik-Korridors dar. Die Überlegungen zu LNG Bunker-Anlagen auf den Inseln unterstreicht die maritime Dimension des Atlantik-Korridors. Das geplante Leuchtturmprojekt zur Ausstattung des Atlantik Kernnetzkorridors mit LNG-Tankanlagen wurde auch mit der Perspektive angestoßen, Seeschiffe, die im Atlantik-Korridor ab- oder anlegen, hier mit Brennstoff zu versorgen.

Resumen Ejecutivo

Como se ha establecido en los Reglamentos 1315/2013 y 1316/2013 de la Unión Europea, el Corredor Atlántico conecta las regiones del sudoeste de Europa con el centro de la Unión Europea, enlazando los puertos de la Península Ibérica de Algeciras, Sines, Lisboa, Leixões (Oporto) y Bilbao a través del oeste de Francia con París y la Normandía y, más hacia el este, con Estrasburgo y Mannheim. Cubre ferrocarriles, carreteras, aeropuertos, puertos, terminales de transporte terrestre (carretera-ferrocarriles) y el canal navegable del río Sena.

El Corredor Atlántico tiene una importante dimensión marítima, con ocho puertos de la red básica, así como un significativo potencial para incrementar su cuota modal de ferrocarril, especialmente en lo que respecta al transporte de mercancías. También muestra importantes oportunidades en el campo de la innovación, especialmente relativa a combustibles alternativos, *e-maritime/e-freight*, y Sistemas Inteligentes de Transporte Cooperativos (C-ITS).

Los principales objetivos estratégicos del desarrollo del Corredor Atlántico mejoran la integración modal (así, reequilibran el actual reparto modal, que mayoritariamente se basa en la carretera como componente terrestre), aprovechan más la conectividad marítima, y abordan la interoperabilidad ferroviaria. Esto último incluye un cambio de ancho de vía gradual hacia el ancho internacional en la Península Ibérica. Con el tiempo, esto supondrá conectar sin discontinuidades los puertos de Algeciras, Bilbao, Sines, Lisboa y Leixões con Francia y Alemania. En este marco de referencia, la necesidad de resolver los cuellos de botella y los enlaces ferroviarios que faltan es todavía crítica. Se presta especial atención a las prioridades establecidas en las líneas maestras de la Red Transeuropea de Transporte (TEN-T): conexiones transfronterizas, cuellos de botella, conexiones pendientes, interoperabilidad y multimodalidad, así como cuestiones de financiación. Además, el desarrollo de combustibles alternativos y de los C-ITS se ha convertido también en un importante punto de interés.

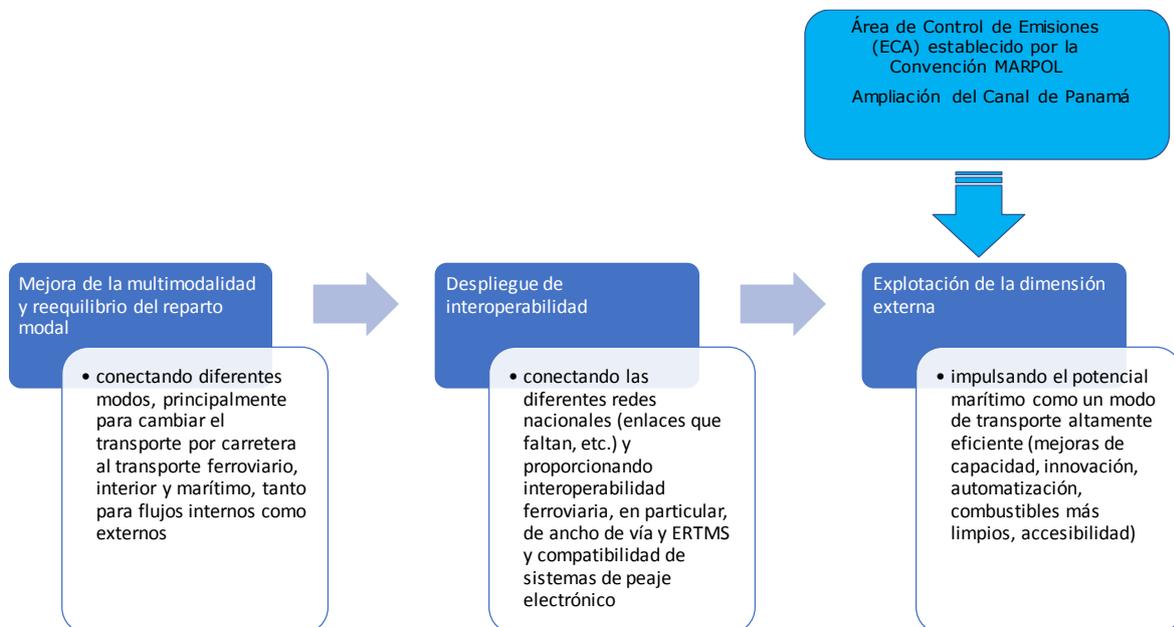


Figura 3 – Principales objetivos del Corredor Atlántico

El Corredor ya tiene al día un alto nivel de cumplimiento de varios requisitos de la TEN-T. Éste es especialmente el caso de la carretera, de ciertos parámetros del ferrocarril incluyendo la velocidad de la línea y la carga por eje, de los canales navegables y de los más importantes parámetros del modo marítimo, como, por ejemplo, la conexión al ferrocarril de alta velocidad y a los canales navegables. Las brechas subsistentes que se espera solventar en 2030 incluyen la electrificación del ferrocarril, la longitud de los trenes, la disponibilidad de combustibles alternativos en puertos fluviales y a lo largo de las carreteras y la conexión del Aeropuerto Madrid-Barajas Adolfo Suárez a la red ferroviaria de alta velocidad. Aquellos aspectos donde el cumplimiento no se alcanzará completamente en 2030 incluyen el ancho de vía (74% esperado en 2030) y el despliegue del *European Rail Traffic Management System* (ERTMS). El positivo desarrollo del Corredor evidencia que los grupos de trabajo y acuerdos intergubernamentales, así como la cooperación transfronteriza regional y local, son claves para el progreso junto con el apoyo financiero, por supuesto.

El Corredor tiene un potencial significativo para incrementar su cuota modal de ferrocarril, aunque la competencia con la carretera es importante y los bajos precios del petróleo suponen un factor obstaculizador. Se espera que el transporte marítimo de mercancías continúe creciendo, demandando un incremento de la capacidad de los puertos, así como mejores conexiones de los puertos con el ferrocarril y con los canales navegables, especialmente en sus tramos iniciales/finales (*first/last miles*). De este modo, se espera que el incremento del modo marítimo lleve también a un aumento del volumen y cuota del ferrocarril y de la navegación por canales, incrementando la sostenibilidad de la parte terrestre del Corredor. Otros aspectos pendientes de capacidad se encuentran especialmente en los nodos urbanos, en la red ferroviaria en lo que respecta al insuficiente despliegue del sistema ERTMS, en las restricciones para los trenes largos, en el gálibo limitado de túneles, en las diferencias de ancho de vía de la Península Ibérica y en las conexiones transfronterizas con Francia, en la falta de electrificación y en la conexión transfronteriza pendiente de Évora-Mérida. Sin embargo, se espera que la mayoría de esas cuestiones se resuelvan para el año 2030.

Se debe prestar particular atención a la conexión ferroviaria del puerto de Sines, donde debido al abandono del único tramo de red básica, que enlaza Grândola con el puerto de la red básica de Sines, como consecuencia de los estudios medioambientales, el único acceso ferroviario posible al puerto de Sines (3er puerto en volumen y 1º en conexiones ferroviarias intermodales) tiene lugar a través de la línea ferroviaria existente de la TEN-T Sines-Ermidas do Sado-Grândola (en Portugal). Abordar esta conexión al puerto de Sines a través de la red global es una cuestión crítica que conviene ser mencionada y que excepcionalmente debe ser solucionada en la futura revisión de la red.

La integración efectiva de los siete nudos urbanos (París, Madrid, Lisboa, Mannheim, Burdeos, Bilbao y Oporto) en los corredores es un tema clave y urgente. Se acentúa la importancia de una estrategia global e integrada de las Regiones, alineada con los Estados miembros y las políticas de la UE, para abordar eficazmente los cuellos de botella dentro de los nodos urbanos. Mirar hacia un despliegue rápido del día 1 de C-ITS (y en la medida de lo posible los servicios del día 1.5) es un paso adelante y varios de los nudos urbanos del corredor son los pioneros en este aspecto.

La Lista de Proyectos del Corredor Atlántico de 2017 incluye 272 proyectos pertenecientes a corredores de la red básica (CNC) con un volumen total de inversión de 43.600 millones de euros. Además, la Lista de proyectos incluye otros 63 proyectos correspondientes a los ramales conectados al corredor (además de los componentes del corredor) con influencia relevante para el Corredor, como ya se señaló en el primer plan de trabajo. Estos proyectos no pertenecientes a la red básica (CNC) se presentan

en la Lista de proyectos anexa al plan de trabajo, pero no se incluyen en el análisis. En general, el coste total de los proyectos planificados asciende a 43,664.79 millones de euros (datos de costos disponibles para el 82% de los proyectos). El ferrocarril (incluido ERTMS) representa el 60.47% de los costos totales.

Se espera que la implantación de estos proyectos conduzca a un aumento del PIB de 419 mil millones de euros de 2015 durante el período 2016 - 2030. También se producirán más beneficios más allá del año 2030. Las inversiones también estimularán el empleo. Se espera que los efectos directos, indirectos e inducidos en el empleo generados por estos proyectos suponga la creación de 1.092.437 empleos durante el período de 2016 a 2030. También se puede esperar la generación de empleos más allá de 2030.

La innovación en el contexto del corredor atlántico es extremadamente relevante para su dimensión externa, con tres cuestiones clave que surgen como prioridades para el despliegue y futuro desarrollo del transporte y las consecuencias económicas/estratégicas:

- Preocupación de que la seguridad del suministro a largo plazo y la conformidad con las dos Áreas de Control de Emisiones (ECA), establecidas por la convención MARPOL y a las cuales se conecta directamente la costa atlántica, conducirán a un despliegue masivo de Gas Natural Licuado (GNL): en base a los casos piloto ya presentes, se debe preparar un plan principal para el despliegue de GNL para el corredor Atlántico, a partir del cual se puede evaluar el análisis económico;
- Fomentar el potencial marítimo mediante la innovación y la simplificación, especialmente avanzando en los sistemas y procedimientos para evolucionar *e-maritime* hacia el *e-Freight* y aumentar la eficiencia de las cadenas logísticas utilizando el transporte marítimo (es decir, digitalización del transporte de mercancías), campos en los que el Atlántico ya está muy avanzado;
- La implantación del denominado ancho estándar (UIC) requiere trabajos importantes en las redes ferroviarias, lo que ofrece la oportunidad de implementar el ERTMS también. Por lo tanto, los planes para la implantación del ERTMS serán analizados en detalle.

Además, los corredores *e-mobility*, la interoperabilidad viaria y los ITS colaborativos (que se utilizan en los corredores de ITS con una amplia participación de los países del corredor) tienen un alto contenido de innovación en el Corredor Atlántico. Por lo tanto, no es sorprendente que el Corredor Atlántico destaque en lo que respecta al despliegue de la innovación. Sin embargo, hay espacio para dar un paso más en esta área. Las siguientes prioridades comunes pueden identificarse para todo el sector:

- Un transporte más ecológico a través de la adopción e implantación de combustibles alternativos que contribuyen a la descarbonización del transporte.
- Desarrollo y adopción de soluciones basadas en la tecnología como ITS, C-ITS y otras aplicaciones telemáticas como medio para lograr un mejor intercambio de información que contribuya a una gestión más eficiente de las redes de transporte.
- Fomentar el transporte multimodal y una logística eficiente y sostenible de mercancías.

El corredor también tiene buenos resultados en términos de reducción de CO₂ (-33% de CO₂ equivalente), gracias especialmente al cambio modal esperado hacia el ferrocarril (+ 124% para el 2030), así como a las vías navegables y marítimas. Sin embargo, los promotores del proyecto deben prestar más atención a la adaptación al cambio climático.

El ejercicio realizado, basado en el Escenario de Referencia y en el escenario del plan de trabajo, muestra que las inversiones planificadas a lo largo del corredor Atlántico

permitirán un mejor comportamiento del mismo. Merece la pena señalar que (debido a las limitaciones del modelo) los modos marítimos, que representan la mejor elección para la larga distancia, no se tienen en cuenta en el ejercicio actual. No obstante, y principalmente en base a los modos terrestres, las inversiones contribuirán a casi un 33% de ahorro de emisiones, siendo el cambio modal al ferrocarril el responsable de aproximadamente la mitad del ahorro de emisiones. La otra mitad se puede lograr mediante la eficiencia y el despliegue de combustibles alternativos.

Los impactos positivos del Corredor pueden también maximizarse a través de un conjunto de medidas a nivel europeo, nacional o local, por ejemplo:

- Implantando la red TEN-T básica en su totalidad, con buenas interconexiones entre corredores, ya que hemos visto cómo son interdependientes;
- Fomentando la innovación para mejorar la eficiencia energética y la descarbonización de todos los modos de transporte;
- Reduciendo el nivel de emisiones de CO₂ para la producción de electricidad fomentando el desarrollo de fuentes de energía renovables: esto haría que el cambio modal al ferrocarril fuese más eficiente en la reducción de las emisiones de efecto invernadero (GEI);
- Promoviendo el cambio modal para el transporte local y regional.

Al igual que en todos los corredores, se debe realizar una asignación cuidadosa de fondos públicos para garantizar la cobertura, especialmente en los proyectos europeos de valor añadido que no tienen la capacidad de atraer financiación privada. Complementariamente, se debería animar a los proyectos que generan ingresos a buscar el mayor apalancamiento posible de la financiación privada o de otros instrumentos financieros.

El análisis para identificar las fuentes de financiación de los proyectos enumerados dentro de la lista de proyectos del plan de trabajo del Corredor Atlántico muestra que mantener la tasa fija en 42% (tasa similar a las encontradas para los proyectos con datos disponibles) para toda la demanda de inversión, supondría de 2,1 mil millones a 9,3 mil millones de euros de los fondos de la UE. La inclusión de inversores privados y el uso de financiación (debidamente favorecida a través de instrumentos financieros, cuando sea necesario) pueden contribuir en gran medida a proporcionar los recursos que el mercado necesita. La evaluación de la sostenibilidad financiera de los proyectos de la lista del Corredor Atlántico, arroja que el 18% de los proyectos (49 proyectos) no son financieramente sostenibles, el 71.3% son potencialmente sostenibles (194 proyectos) y el 10.3% (o 28 proyectos) son sostenibles. El valor total de los proyectos financieramente sostenibles es de € 28.7 mil millones. Por lo tanto, es evidente que, si el 15% del CAPEX se financiara con capital / préstamos privados, la reducción en el gasto de subvenciones sería de € 4,3 mil millones.

En este punto, vale la pena destacar los siguientes proyectos del Corredor, apoyados a través de instrumentos financieros innovadores, por su potencial para el intercambio de ideas:

- Un caso destacable de *blending* - aportación de fondos y financiación - para un nuevo proyecto a gran escala es la línea de alta velocidad Tours-Bordeaux (también se ha destacado que es necesario a un enfoque cuidadoso hacia la gestión del riesgo del tráfico en proyectos *green-field*);
- La plataforma ad-hoc para la accesibilidad de los puertos españoles, agrupando varios proyectos e ingresos portuarios, con financiación del BEI y del ICO (Banco Público ES) garantizada por el Fondo Europeo para las Inversiones Estratégicas – FEIE- (rama financiera del Plan Juncker);

- Como un caso general, varias terminales en puertos, aeropuertos, puertos de vías navegables interiores y terminales ferroviarias cuentan con el apoyo del FEIE y de bancos comerciales (incluida la logística regional y urbana en Île de France).

El coste total del cumplimiento del parámetro de la UE puede estimarse entre 45 000 y 50 000 millones de euros, de los cuales más de 11 000 millones son proyectos en curso; se necesita una inversión importante (7-8 mil millones de euros) para lograr la interoperabilidad ferroviaria total en la Península Ibérica. Aun así, la masa crítica de inversión necesaria para completar el corredor requiere de una certeza en el apoyo en términos de subvenciones hasta 2030, después del éxito en el resultado de las convocatorias de ayudas CEF (Connecting Europe Facility). Varios proyectos necesarios para completar el corredor podrán no ser implementados si no fueren dotados de recursos adecuados (o algunos) de la UE.

Merece la pena señalar que, durante los próximos años, el corredor se verá afectado por limitaciones operativas y el cierre de secciones por largos períodos debido a la gran cantidad de obras de mejora en la infraestructura ferroviaria. Se están considerando alternativas, especialmente desviando parte del tráfico a través del corredor mediterráneo. Si bien estas obras son fundamentales para la modernización de la infraestructura ferroviaria, pueden ser la causa de que la demanda no aumente como se espera en los próximos años.

Se abordó la oportunidad de solicitar cofinanciación a través de fondos CEF y el análisis de los instrumentos financieros para proyectos más ambiciosos destinados a implantar la política de transporte de la UE a través de la RTE-T con las partes interesadas del corredor. En general, este ejercicio se dirigió a identificar proyectos que obtuvieran un resultado definido como un tema, no restringido a una ubicación o un tramo de carretera / ferrocarril, mejorando el valor añadido del enfoque del corredor.

Algunos de estos proyectos potenciales se han identificado en el Corredor Atlántico: se centran en combustibles alternativos (terrestres, por un lado, y marítimos, por otro lado) y en nudos urbanos (en este caso, un nudo urbano transfronterizo) y ventanillas únicas marítimas y en la digitalización, de la siguiente manera:

- Combustibles alternativos desde Helsinki a Lisboa y el sur de España: para ofrecer recarga eléctrica sin interrupciones, repostaje de GNL / GNC y recarga de H2 en una ruta por carretera desde Lisboa a Helsinki, en cooperación con el Corredor Báltico del Mar del Norte desde Helsinki a Bruselas, con el Corredor Mediterráneo del Mar del Norte desde Bruselas a París y con el Corredor Mediterráneo Escandinavo.
- GNL en puertos de la costa atlántica: para garantizar que la mayor cantidad posible de puertos de la costa atlántica de la red básica y complementaria cuentan con suministro de combustible y, posiblemente, infraestructura de barco a barco para reabastecer de combustible a los buques con motor de GNL.
- Conexión transfronteriza sin fronteras entre España y Francia en Irún-Hendaya: para aliviar la congestión de las carreteras en esta conexión mediante la implantación de soluciones locales más sostenibles en el ferrocarril, autocares y autobuses.
- Ventanilla única logística desde los puertos del Atlántico al corredor terrestre: para respaldar una logística de carga eficiente, interconectando y apoyando iniciativas digitales existentes en los diferentes modos de transporte a lo largo del corredor y mejorando / contribuyendo a acelerar la digitalización del corredor.

Desde la finalización de los estudios de 2014 y el plan de trabajo del Coordinador en 2015, se han observado progresos importantes a nivel del corredor, especialmente en las secciones transfronterizas. Como principales logros a nivel del corredor, destaca:

- El TGV Este (a Estrasburgo) en operación desde septiembre de 2016;
- La línea de alta velocidad Tours-Bordeaux – la mayor asociación público-privada (PPP) en ferrocarriles del mundo (7.8 Mil Million EUR) gracias a la Garantía UE (GPTT) y préstamo del BEI - fue finalizada y la línea entró en funcionamiento en julio de 2017 permitiendo viajar entre París y Bordeaux en sólo 2 horas. Esto ha liberado la capacidad en la línea convencional para el transporte de mercancías;
- El lanzamiento del Fondo de Accesibilidad Portuaria en España, con el apoyo del FEIE;
- Lanzamiento de inversiones en la mayoría de los puertos (PT, ES, FR).

Se espera que los proyectos en curso más relevantes estén operativos a tiempo o con algunas demoras:

- La Y Vasca para 2023;
- El GPSO (Grand Projet Sud-Ouest): 2024 a Toulouse (no parte del corredor), 2027 a Dax y 2032 Dax-España si el proyecto se confirma por las autoridades francesas;
- La construcción del enlace ferroviario "Évora-Caia", cuya finalización está prevista para 2021;
- Trabajos de electrificación (a 25 kv) en la frontera española entre Fuentes de Oñoro y Medina del Campo para 2019;
- Conclusión parcial de obras en la frontera española entre Badajoz y Plasencia (ancho UIC), en línea de tráfico mixto para pasajeros y mercancías.

Los avances también son visibles en términos de gobernanza con la continua cooperación entre Portugal y España en materia de interoperabilidad y entre Francia y España para las *autopistas ferroviarias*. También existe una creciente aceptación de que la fuerte cooperación territorial a través de las fronteras aumenta el interés y facilita los proyectos transfronterizos. Las partes interesadas están participando en las reuniones de los diferentes grupos de trabajo, presentando proyectos y estudios con éxito. La Euroregión Euskadi-Nouvelle Aquitania-Navarra, la Macro-Región RESOE (Galicia, Asturias, Castilla y León, Norte y Centro), los servicios coordinados entre puertos portugueses y plataformas logísticas en Extremadura o la Región Quattropole y la Región Grande, son excelentes ejemplos de la cooperación territorial en el Corredor Atlántico.

El análisis de la Lista de Proyectos del Corredor Atlántico, que identifica todos los proyectos en curso y los planificados, permite confirmar que la mayoría de los elementos pendientes con respecto a los requisitos de la RTE-T y los problemas de capacidad restantes deben completarse o eliminarse para 2030. Además, podemos destacar que se mejorará la navegación en el Sena, añadiendo valor a los puertos de Rouen, Le Havre y París; que los combustibles alternativos, la interoperabilidad de los proyectos e-peaje y C-ITS harán que el componente viario del Corredor sea más limpio, más conectado y "más inteligente"; que aún no están definidos los tiempo para la disponibilidad de combustibles alternativos en los aeropuertos; y que todavía hay una significativa área de mejora en el primer/último tramo del viaje, tanto de pasajeros como de carga, en los nodos urbanos del Corredor.

Más allá de la señalización y de la electrificación, se debe prestar especial atención al problema del ancho de vía en la Península Ibérica, donde la interoperabilidad significa acordar el despliegue del ancho UIC a lo largo de las líneas del Corredor, yendo más

allá de la planificación y los proyectos actuales. Será importante continuar y avanzar en el trabajo en curso del grupo de trabajo conjunto España-Portugal sobre interoperabilidad que ofrece una estimación precisa de los costes y beneficios de las diferentes opciones para garantizar la compatibilidad con el ancho de vía UIC en la Península Ibérica, con una planificación compartida a largo plazo.

En cuanto a los anchos de vía, las lagunas se encontrarán principalmente en Portugal en la línea norte que conecta Lisboa y Oporto. Se identifican otros desafíos en relación con el respeto de los tiempos de ciertos proyectos (aunque nada crítico que se posponga más allá de 2030); la necesidad de convencer a los sectores privados para que inviertan en la recarga / reabastecimiento de combustibles alternativos y en C-ITS; la necesidad de conectar mejor los puertos marítimos con las cadenas logísticas del interior; la necesidad de aliviar la presión de las actividades portuarias en el entorno urbano; la necesidad general de simplificar y agilizar procedimientos; y la necesidad de encargarse de una conexión eficiente con los ramales y territorios vecinos (principales y globales).

Sin embargo, hay muchos casos en los que es necesario ir más allá de los requisitos de la RTE-T. Este es, en particular, el caso del acceso terrestre de los puertos del Corredor que también requiere mejoras cualitativas y de capacidad. Para el ferrocarril, también tenemos que abordar los problemas relacionados con las diferencias de voltaje, las pendientes pronunciadas y los medidores de carga no armonizados que hacen que no todas las rutas permitan la misma separación vertical, lo que limita la interoperabilidad de los trenes. En el caso de las carreteras, debemos abordar la cuestión de la interoperabilidad de los peajes, que actualmente está tecnológicamente preparada, pero los servicios comerciales aún no se han desplegado.

Además, existe un claro potencial para la provisión de mejores servicios multimodales y para mejorar las conexiones multimodales en el Corredor. Sin embargo, aún falta un modelo general de planificación, implementación y gestión para las terminales ferroviarias, especialmente en la Península Ibérica. Finalmente, también hay una gran oportunidad para desplegar ventanillas únicas logísticas a lo largo del Corredor, ampliando las ventanillas únicas del puerto actual hacia el interior y la integración con los servicios *e-maritime* y las tecnologías de la información. Encontrar soluciones innovadoras para mejorar la multimodalidad en el Corredor es clave para satisfacer el crecimiento continuo de los flujos marítimos hacia las rutas del interior.

En el corto y medio plazo (alrededor de 2023), Vitoria será el punto clave de interconexión entre el ancho ibérico y el ancho UIC. Dado que la capacidad se está desarrollando en el lado francés (que ya consiste en una línea electrificada de doble vía compatible con trenes de 740 m de longitud) es crucial desarrollar un plan para explotar plenamente su potencial, también con referencia a la ramal de la Rail Freight Corridor (RFC) que alimenta el corredor atlántico (p. ej. : Zaragoza-Pamplona-Vitoria).

La plataforma logística de Jundiz se encuentra en una muy buena posición para el desarrollo de un caso sólido de servicios intermodales para el tráfico interior y portuario y del transbordo entre el transporte ferroviario local / nacional e internacional utilizando diferentes anchos de vía:

- para la interconexión entre los servicios marítimos en el interior de los principales puertos del Atlántico y los servicios ferroviarios intermodales continentales;
- para el transbordo entre redes ferroviarias de ancho ibérico y ancho UIC;
- para el lanzamiento de nuevos servicios de autopistas ferroviarias para el transporte de larga distancia entre España, Portugal y el norte de Europa, incluida la zona de París, Bélgica y los Países Bajos.

La conectividad marítima a lo largo de la costa atlántica debe verse como un componente del corredor que debe mejorarse: de hecho, las Autopistas del Mar, el componente marítimo de facto del Corredor, más allá de ser un alimentador del corredor, ya se han desarrollado entre los puertos del Corredor hasta la costa norte de la UE, pero aún no están completamente explotados.

Las inversiones deben considerarse en una amplia gama, desde la infraestructura (accesibilidad del puerto tanto desde tierra como desde el mar) hasta la eficiencia del terminal, y los sistemas y procedimientos para desarrollar la *e-maritim* hacia la *e-Freight*, aumentando la eficiencia de las cadenas logísticas usando el transporte marítimo. Su componente ambiental, incluida la utilización de combustibles innovadores, debe tenerse en cuenta. En una perspectiva más amplia, la línea costera del Atlántico y todos sus puertos principales y plataformas logísticas deben considerarse como alimentadores del Corredor / receptores del Corredor. El papel de las islas atlánticas de Madeira, Azores y Canarias representa efectivamente la continuidad del corredor atlántico en el exterior. Los esfuerzos para desplegar instalaciones de suministro de combustible de GNL y la capacidad para abastecer a las embarcaciones en las islas son de la mayor importancia para mejorar la dimensión marítima del Corredor Atlántico. El proyecto previsto para el GNL a lo largo del corredor atlántico se diseñó teniendo en cuenta la opinión mayoritaria de que el despliegue de la iniciativa piloto permitiría el suministro de GNL a embarcaciones que salen o llegan al corredor Atlántico.

Sumário Executivo

Tal como estabelecido nos regulamentos comunitários 1315/2013 e 1316/2013, o Corredor Atlântico faz a interligação das regiões do sudoeste da Europa com o centro da Europa continental ligando os portos da Península Ibérica de Algeciras, Sines, Lisboa, Leixões (Porto) e Bilbao a Paris e à Normandia, através do oeste da França, e às regiões de Estrasburgo e Mannheim, mais a leste. O corredor cobre os modos ferroviário, rodoviário, aéreo, marítimo, os terminais rodoferroviários (RRTs) e o Rio Sena como via navegável interior.

O Corredor Atlântico tem uma dimensão marítima importante com oito portos marítimos na rede principal e um elevado potencial de crescimento na quota modal do modo ferroviário, sobretudo no segmento do transporte de mercadorias. O corredor dispõe igualmente de oportunidades no campo da inovação, especialmente na área dos combustíveis alternativos, *e-maritime/e-freight* e sistemas de ITS cooperativos (C-ITS).

Os principais objetivos estratégicos do desenvolvimento do Corredor Atlântico prendem-se com a promoção da integração modal (e consequente reequilíbrio da repartição modal atual, largamente dependente do modo rodoviário para a componente terrestre), aproveitar mais e melhor a conectividade marítima e incrementar a interoperabilidade ferroviária. Este último objetivo inclui a mudança gradual para bitola standard UIC na Península Ibérica, mudança que permitirá interligar sem descontinuidades os portos de Algeciras, Bilbao, Sines, Lisboa e Leixões com França e Alemanha. No quadro desta estratégia, a necessidade de resolver os atuais estrangulamentos e as ligações em falta na ferrovia é crítica. É dada especial atenção às prioridades expressas nos regulamentos da RTE-T: ligações transfronteiriças, estrangulamentos, ligações em falta, interoperabilidade e multimodalidade, assim como questões de financiamento. Adicionalmente, o desenvolvimento e promoção de combustíveis alternativos bem como dos sistemas ITS colaborativos tornaram-se também temas de importância central.

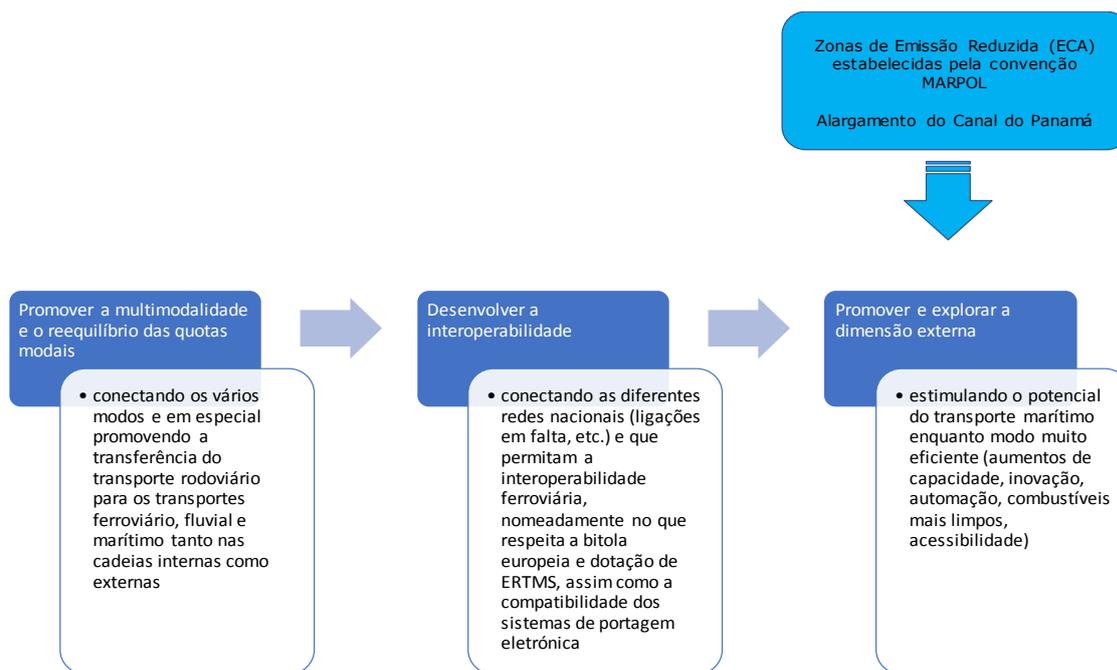


Figura 4 – Principais objetivos do Corredor Atlântico

O Corredor já apresenta atualmente um nível elevado de cumprimento dos vários requisitos aplicáveis à RTE-T, o que se verifica especialmente no modo rodoviário, em certos parâmetros ferroviários, como seja a velocidade e carga por eixo, nas vias navegáveis interiores e nos parâmetros mais importantes do modo marítimo, como é o caso da ligação dos portos à rede ferroviária e às vias navegáveis interiores. Os restantes parâmetros, que espera serem implementados até 2030, incluem a eletrificação da ferrovia, a preparação da infraestrutura para comboios mais longos, a existência de combustíveis limpos nos portos marítimos e fluviais e na rede rodoviária principal e a ligação do aeroporto de Madrid-Barajas Adolfo Suarez à rede ferroviária de alta velocidade. Os requisitos que ficarão por cumprir até 2030 incluem a implementação da bitola UIC (que estará implementada a 74% em 2030) e a do sistema europeu de gestão de tráfego ferroviário (ERTMS). O desenvolvimento do Corredor continuará a ser muito suportado nos grupos de trabalho e acordos intergovernamentais estabelecidos bem como na cooperação transfronteiriça ao nível regional/local, e onde, naturalmente, o apoio financeiro é fundamental.

O corredor dispõe de um elevado potencial para o aumento da quota modal do modo ferroviário, muito embora a redução dos preços do combustível esteja a contribuir para que o modo rodoviário mantenha vantagens competitivas. Espera-se que o transporte de mercadorias por via marítima mantenha níveis elevados de crescimento, o que coloca pressão no setor portuário ao nível da necessidade de aumento de capacidade bem como de melhores ligações ao modo ferroviário e fluvial, especialmente na primeira/última milha. É expectável que o aumento verificado no modo marítimo resulte também num aumento do volume e peso da repartição modal nos modos ferroviário e fluvial, contribuindo assim para uma maior sustentabilidade da parte terrestre do Corredor. Outros problemas de capacidade ainda existentes encontram-se especialmente nos nós urbanos, na rede ferroviária, estando relacionados com a implementação insuficiente do ERTMS, com as restrições a comboios de comprimento elevado, com a limitação de gabarito nos túneis, diferenças de bitola na Península Ibérica e nas ligações transfronteiriças com França, e com a falta de eletrificação bem como com a ligação em falta no troço transfronteiriço de

Évora-Mérida. Contudo, espera-se que a maioria destes problemas sejam resolvidos até 2030.

É de realçar que a ligação ferroviária ao porto de Sines, onde em resultado do parecer negativo dos estudos de impacte ambiental, a única secção da rede principal que ligaria Grândola ao porto de Sines foi abandonada. Assim sendo, o único acesso ferroviário possível ao porto de Sines (o 3º porto em volume e o 1º em ligações ferroviárias intermodais) é realizado através da linha ferroviária RTE-T existente Sines-Ermidas do Sado-Grândola (em Portugal). A ligação ao porto de Sines através da rede global é, pois, uma questão crítica que deve ser mencionada, e que, deverá ser excecionalmente objeto de análise e decisão ainda antes da revisão prevista da rede.

A integração eficaz dos sete nós urbanos (Paris, Madrid, Lisboa, Mannheim, Bordéus, Bilbao e Porto) nos corredores é uma questão chave e urgente. A importância de uma estratégia global e integrada, realizada a partir das Regiões, alinhada com os Estados Membros e com as políticas comunitárias, contribuindo para endereçar de forma mais eficaz o estrangulamento nos nós urbanos, deverá ser reforçada. De igual modo, uma rápida implementação dos serviços inteligentes de transportes colaborativos (C-ITS) de dia 1 (e, sempre que possível, dos serviços de dia 1.5) representam também um passo neste sentido, sendo de evidenciar que vários dos nós urbanos do corredor se encontram na linha da frente neste tema.

A lista de projetos do corredor Atlântico inclui 272 projetos com um volume de investimento global de 43.6 mil milhões de euros. Adicionalmente, a lista inclui mais 63 projetos correspondentes a outros ramos da rede conectados com o corredor (adicionalmente aos componentes do corredor) e com influência relevante para este. Estes projetos não integrantes do corredor são anexos à lista de projetos, mas não estão considerados na análise que se apresenta. No global, o custo total dos projetos planeados ascende a 43,664.79 milhões de euros (estes dados de custos são relativos a cerca de 82% dos projetos). A ferrovia (incluindo o ERTMS) representa 60.5% do total de custos.

Estima-se que a implementação destes projetos leve a um aumento no PIB de 419 mil milhões de euros (ano base 2015) entre 2016 e 2030, para além dos benefícios adicionais que ocorrerão no período posterior a 2030. Os investimentos estimularão também a criação de emprego: os impactos diretos, indiretos e induzidos que estes projetos terão no emprego estão estimados em 1,092.437 empregos-ano, criados no período de 2016 a 2030, perspetivando-se também empregos-ano adicionais para o período posterior a 2030.

A inovação no contexto do Corredor Atlântico é de extrema relevância para promover a sua dimensão externa, destacando-se três questões-chave como prioritárias para implementação e desenvolvimento futuro do transporte e subsequente avaliação económica e estratégica:

- Preocupação que a segurança de abastecimento a longo prazo e a conformidade com as duas Zonas de Emissões Reduzidas (ECA) estabelecidas pela convenção MARPOL e às quais a costa Atlântica está diretamente ligada, conduzam a um uso massivo do GNL. Com base nos casos piloto já apresentados, um plano abrangente para a implementação do LNG deve ser preparado para o corredor Atlântico, a partir do qual se poderá avaliar a sua racionalidade económica;
- Promoção do potencial marítimo pela inovação e simplificação, particularmente através do progresso nos sistemas e processos para evoluir do *e-maritime* para *e-Freight* e aumentar a eficiência das cadeias logísticas que usam o transporte

marítimo (por exemplo através da digitalização do processo de transporte de mercadorias), áreas nas quais o Atlântico já está bastante avançado;

- A implementação da designada bitola standard (UIC) que irá obrigar a trabalhos substanciais nas redes ferroviárias, o que também cria a oportunidade de implementar o ERTMS. Em consequência desta realidade, os planos para a implementação do ERTMS serão analisados em detalhe.

Adicionalmente, corredores de mobilidade elétrica, interoperabilidade rodoviária e ITS colaborativos (tal como estão a ser implementados nos corredores ITS com grande envolvimento dos países dos corredores) apresentam um nível elevado de inovação no Corredor Atlântico. Como tal, não surpreende que o Corredor Atlântico tenha um desempenho relativamente positivo no que respeita a inovação. Ainda assim, existe espaço para progredir mais nesta área. As seguintes prioridades comuns podem ser identificadas para todo o setor:

- Um transporte mais ecológico, através da adoção e implementação de combustíveis alternativos que contribuam para a descarbonização do transporte.
- Desenvolvimento e adoção de soluções de base tecnológica como os ITS, C-ITS e outras aplicações telemáticas como forma de conseguir uma melhor partilha de informação que contribua para uma gestão das redes de transporte mais eficiente.
- Encorajamento do transporte multimodal e uma logística de mercadorias eficiente e sustentável.

O corredor apresenta também um bom desempenho em termos de redução de CO₂ (-33% de CO₂ equivalente), especialmente por via da potencial alteração modal em favor do modo ferroviário (+124% até 2030), bem como do modo marítimo e das vias navegáveis interiores. Ainda assim, a adaptação às alterações climáticas deverá ser objeto de maior foco por parte dos promotores de projetos.

O exercício realizado, tendo por base o Cenário Europeu de Referência e um cenário adicional considerando o plano de trabalhos do corredor, demonstra que os investimentos planeados ao longo do corredor Atlântico irão proporcionar um melhor desempenho do mesmo. É, no entanto, relevante mencionar que os modos marítimos, representando a melhor escolha para a longa-distância, não são totalmente capturados no presente exercício. Ainda assim, e sobretudo com base nos modos terrestres, os investimentos previstos permitem uma contribuição de quase 33% nas poupanças de emissões, com a alteração modal a favor do modo ferroviário a contribuir com aproximadamente metade das poupanças de emissões. O restante poderá ser atingido através de ganhos de eficiência e da implementação de combustíveis alternativos.

Os impactos positivos do Corredor podem também ser maximizados através de um conjunto de medidas a nível Europeu, nacional ou local, como por exemplo:

- Implementação da rede principal RTE-T na sua totalidade, com boas interligações entre corredores e considerando as suas interdependências;
- Promoção de inovação para a melhoria da eficiência energética e descarbonização de todos os modos de transporte;
- Redução do nível de emissões de CO₂ na produção de energia elétrica através da promoção e desenvolvimento de fontes de energia renováveis: tal desenvolvimento iria tornar a mudança modal a favor da ferrovia mais eficiente em termos de reduções nas emissões de GEE;
- Promoção da alteração modal a favor do transporte local e regional.

Tal como em todos os corredores, uma alocação cuidada dos fundos públicos deve ser prosseguida por forma a assegurar a cobertura financeira em especial nos projetos com valor acrescentado para a EU e que não têm capacidade para atrair financiamento privado. Complementarmente, os projetos que gerem receitas devem ser encorajados a procurar o maior nível de alavancagem possível de financiamento privado ou instrumentos financeiros.

A análise das fontes de financiamento de projetos listados no plano de trabalhos do corredor ATL demonstra que a manter-se uma taxa de financiamento de 42% (semelhante à verificada) o investimento europeu necessário variaria entre 2,1 e 9,3 mil milhões de euros para o corredor. A inclusão de investidores privados e o uso de financiamento (adequadamente providenciado através de instrumentos financeiros, quando necessário) pode ter uma contribuição forte para a disponibilização dos recursos que o mercado necessita. A avaliação da sustentabilidade financeira dos projetos na lista do Corredor Atlântico mostra que 18% (49 projetos) não são financeiramente sustentáveis, 71.3% são potencialmente sustentáveis (194 projetos) e 10.3% (28 projetos) são financeiramente sustentáveis. O valor total de projetos financeiramente sustentáveis é de 28.7 bilhões de euros. Assim, se 15% do CAPEX for financiado por capital privado/empréstimos, a redução nos gastos com subvenções seria cerca de 4.3 mil milhões de euros.

É importante nesta etapa destacar os seguintes projetos ao longo do Corredor, apoiados através de instrumentos financeiros inovadores, pelo seu potencial para fertilização-cruzada:

- Um caso notável de *blending* – uso sinérgico de *funding* e *financing* – para um projeto *greenfield* de grande escala relativo à linha de alta velocidade Tours-Bordéus (que também evidenciou que uma abordagem cuidada à gestão do risco de tráfego é necessária em projetos *greenfield*).
- A plataforma *ad-hoc* para acessibilidade portuária em Espanha, combinando vários projetos e receitas portuárias, com financiamento atribuído pelo BEI e pelo ICO (banco promocional espanhol) e com garantias EFSI (braço financeiro do Plano Juncker);
- Como um caso geral, vários terminais em portos, aeroportos, portos de vias navegáveis interiores e terminais rodoferroviários estão a ser apoiados pelo EFSI e por bancos comerciais (incluindo logística regional e urbana na Île de France).

O custo total necessário para o cumprimento dos vários parâmetros da UE pode ser estimado entre 45 e 50 mil milhões de euros, dos quais mais de 11 mil milhões de euros dizem respeito a projetos em curso; um valor significativo – 7-8 mil milhões de euros – é ainda necessário para atingir a total interoperabilidade ferroviária na Península Ibérica. Ainda assim, o grosso do investimento necessário para completar o corredor requer certezas no apoio financeiro através de subvenções até 2030, mantendo o sucesso das chamadas do programa CEF. Vários dos projetos que são necessários para completar o corredor não conseguirão ser implementados se não forem complementados com (alguns) recursos europeus.

É importante realçar que, durante os próximos anos, o corredor irá ser afetado por várias restrições operacionais e pelo fecho de secções por períodos de tempo consideráveis, resultantes do elevado número de trabalhos a realizar na infraestrutura ferroviária. Estão a ser consideradas alternativas, com particular destaque para o desvio de parte do tráfego para o corredor Mediterrânico. Apesar da sua importância para o melhoramento da infraestrutura ferroviária, estes trabalhos podem fazer com que a procura não aumente em linha com as expectativas nos próximos anos.

A oportunidade de candidatura a cofinanciamento pelo CEF e por instrumentos financeiros no caso de projetos mais ambiciosos que visem a implementação das políticas de transportes da UE através das RTE-T foram abordadas com os *stakeholders* dos corredores. No geral, este exercício teve por objetivo a identificação de projetos de largo espectro (*flagship initiatives*) orientados para atingir objetivos específicos, que não sejam restritos a uma única localização ou um único trecho de rodovia/ferrovia, promovendo assim o valor acrescentado da abordagem de corredores.

Alguns destes potenciais projetos no Corredor Atlântico foram identificados e respeitam a promoção de combustíveis alternativos (terrestres por um lado e marítimos por outro), nós urbanos (neste caso um nó urbano transfronteiriço) e janelas únicas e digitalização.

- Combustíveis alternativos de Helsínquia a Lisboa e ao sul de Espanha: por forma a possibilitar o recarregamento elétrico de forma integrada, o reabastecimento LNG/CNG e reenchimento de H2 num trajeto rodoviário desde Lisboa até Helsínquia, em cooperação com o Corredor do Mar Báltico desde Helsínquia a Bruxelas, com o Corredor do Mar do Norte de Bruxelas a Paris e com o Corredor Escandinavo Mediterrânico.
- LNG em portos na costa Atlântica: por forma a assegurar que o máximo número de portos da rede principal e da rede global na costa Atlântica disponham de infraestruturas de armazenagem e abastecimento (incluindo navio para navio) para reabastecer navios com motor de GNL.
- Ligação transfronteiriça integrada Espanha-França em Irun-Hendaye: por forma a aliviar o forte congestionamento nesta ligação, através da implementação de soluções locais mais sustentáveis envolvendo ferrovia e autocarros ao nível urbano.
- Janela única logística desde os portos do Atlântico até ao corredor terrestre: por forma a promover uma logística de mercadorias eficiente, interligando e apoiando iniciativas digitais nos diferentes modos de transporte ao longo do corredor, e melhorar/contribuir para a aceleração do processo de digitalização do corredor.

Progressos importantes ao nível do corredor, particularmente em secções transfronteiriças, foram alcançados e vindo a ser reportados desde o final dos estudos de 2014 e do 1º plano de trabalhos do Coordenador em 2015. Realçam-se como as mais importantes conquistas ao nível do corredor as seguintes:

- O início da operação do TGV Este (para Estrasburgo) em 2016;
- A finalização da linha de alta velocidade ferroviária Tours-Bordéus – a maior PPP ferroviária do mundo (7.8 bilhões de euros) beneficiando de garantias da UE (LGTT) e empréstimo do BEI, e, que iniciou a sua operação em julho de 2017, possibilitando viajar entre Paris e Bordéus em apenas 2 horas. Esta linha permitiu libertar capacidade na linha ferroviária convencional para mercadorias.
- O lançamento do Fundo de Acessibilidade Portuária em Espanha, apoiado pelo EFSI;
- O lançamento de investimentos na maioria dos portos (PT, ES, FR).

É ainda expectável que projetos relevantes em curso estejam operacionais dentro do prazo previsto, ou com alguns atrasos:

- O Y Basco até 2023;
- O GPSO (Grand Projet Sud-Ouest): 2024 até Toulouse (não faz parte do corredor), 2027 até Dax e 2023 Dax-Espanha, se o projeto for confirmado pelas autoridades francesas;
- A construção da ligação ferroviária em falta “Évora-Caia”, com conclusão prevista em 2021;

- Trabalhos de eletrificação (a 25 Kv) na fronteira Espanhola entre Fuentes de Oñoro e Medina del Campo até 2019;
- Conclusão parcial dos trabalhos na fronteira entre Badajoz e Placência (com recurso a travessas polivalentes na transição para a bitola UIC), linha mista para passageiros e mercadorias.

São também visíveis avanços em termos de governança com a cooperação contínua entre Portugal e Espanha no que toca à interoperabilidade, e entre França e Espanha no que diz respeito a autoestradas ferroviárias. Regista-se também uma crescente perceção de que uma cooperação territorial forte aumenta o interesse e facilita a realização de projetos transfronteiriços. *Stakeholders* relevantes estão a participar em reuniões de grupos de trabalho diferenciados e a apresentar projetos bem-sucedidos e estudos.

A análise da lista de projetos do Corredor Atlântico, que identifica todos os projetos em curso e planeados, revela que a maioria das lacunas existentes no cumprimento dos requisitos da RTE-T, e dos restantes problemas de capacidade, serão resolvidos/removidos até 2030. Adicionalmente, é possível sublinhar que a navegação no Sena será melhorada, acrescentando valor aos portos de Rouen, Le Havre e Paris; que os combustíveis alternativos, interoperabilidade dos sistemas de portagens (*e-tolling*) e projetos de C-ITS irão tornar a componente rodoviária do Corredor mais limpa, mais interligada e mais “inteligente”; que ainda não existe clareza relativamente ao calendário para a implementação de combustíveis alternativos em aeroportos; e que existe espaço suficiente para a melhoria das primeira/última milhas de viagem, tanto em passageiros como em mercadorias, nos nós urbanos do Corredor.

Para além das questões de sinalização e eletrificação, especial atenção precisa ser dada à questão da bitola na Península Ibérica, onde a persecução da interoperabilidade significa chegar a um acordo relativamente à implementação da bitola UIC ao longo das linhas do Corredor, o que vai mais além do atual plano e projetos listados. Será importante assegurar a progressão dos esforços em curso através do grupo de trabalho para a Interoperabilidade ferroviária constituído entre Espanha-Portugal, o qual tem vindo a produzir estimativas precisas dos custos e benefícios de diferentes opções para assegurar a compatibilidade com a bitola UIC na Península Ibérica, através de uma estratégia de longo-prazo.

No que diz respeito ao requisito de bitola europeia, as lacunas ocorrerão sobretudo em Portugal e na linha do Norte, ligando Lisboa ao Porto. Outros desafios identificados relacionam-se com a calendarização de certos projetos (embora não haja situações críticas a ser adiadas para depois de 2030); a necessidade de persuadir o setor privado a investir em combustíveis alternativos, recarregamento /reabastecimento/reenchimento e nos C-ITS; a necessidade de melhorar a conectividade entre os portos marítimos e as cadeias logísticas terrestres; a necessidade de aliviar a pressão causada pelas atividades portuárias no ambiente urbano; a necessidade geral de tornar os procedimentos e licenças muito mais simples e rápidos; e a necessidade de conseguir ligações eficientes a territórios vizinhos (rede principal e rede global).

No entanto, existem casos em que é necessário ir para além dos requisitos da RTE-T. Tal verifica-se particularmente no caso dos acessos terrestres aos portos do Corredor, o que também requer melhorias qualitativas e de capacidade. Para a ferrovia, é também necessário abordar as questões relacionadas com as diferenças de voltagem, as inclinações elevadas e os gabaritos estruturais não-harmonizados que fazem com que nem todas as rotas permitam o mesmo nível de folga vertical, limitando assim a interoperabilidade ferroviária. No caso da rodovia, é necessário abordar a questão da

interoperabilidade dos sistemas de portagens, para a qual a tecnologia já se encontra disponível atualmente, mas os serviços comerciais ainda não foram postos em prática.

Adicionalmente, existe um claro potencial para a prestação de melhores serviços multimodais e melhorias nas ligações multimodais no Corredor. No entanto, é ainda necessário um modelo geral de planeamento, implementação e gestão para terminais rodoferroviários, em particular na Península Ibérica. Por último, é de referir a forte oportunidade que existe para a implementação de janelas únicas logísticas ao longo do Corredor, estendendo as atuais janelas únicas portuárias ao *hinterland*, integrando com os serviços *e-maritime* e tecnologias de informação. A pesquisa por soluções inovadoras para a melhoria da multimodalidade no Corredor é uma ação-chave para dar resposta ao crescimento contínuo dos fluxos marítimos para as rotas terrestres.

No curto-médio prazo (2023), a plataforma de Vitória-Jundiz será o ponto-chave de ligação entre a bitola ibérica e a bitola UIC. Uma vez que a capacidade está a ser desenvolvida no lado francês (e que consiste desde já numa linha dupla, eletrificada e compatível com comboios com 740 metros de comprimento) é crucial desenvolver um plano para a exploração de todo o seu potencial, também com referência ao ramo do Corredor Ferroviário de Mercadorias que alimenta o Corredor Atlântico (ex.: Saragoça-Pamplona-Vitória).

A plataforma de Jundiz encontra-se bem posicionada para promover a implementação de serviços intermodais para o *hinterland* e tráfego portuário bem como para transição entre transporte local/nacional, usando diferentes bitolas:

- Para a ligação entre serviços marítimos e o *hinterland* dos principais portos Atlânticos e os serviços continentais ferroviários intermodais;
- Para a mudança de redes ferroviárias de bitola ibérica e de bitola UIC;
- Para o lançamento de novos serviços de autoestradas ferroviárias para o transporte de longa distância entre Espanha, Portugal e a Europa do Norte, incluindo a área de Paris, a Bélgica e a Holanda;

A conectividade marítima ao longo da costa Atlântica tem de continuar a ser promovida: as Autoestradas do Mar, a componente marítima *de facto* do Corredor, que, apesar de já estarem desenvolvidas nos portos do Corredor até à costa norte da EU, não estão ainda a ser exploradas por completo, de modo a retirar todo o seu potencial.

O investimento necessário tem de ser visto em larga escala desde as infraestruturas (acessibilidade portuária tanto no lado terra como no lado mar), à eficiência dos terminais, e ainda aos sistemas e procedimentos que permitam evoluir do *e-maritime* para o *e-freight*, aumentando assim a eficiência das cadeias logísticas que usam o transporte marítimo. A sua componente ambiental, incluindo a implementação de combustíveis inovadores, deve ser tida em conta. Numa perspetiva mais abrangente, a costa Atlântica e todos os seus portos da rede principal e da rede global, bem como todas as plataformas logísticas, devem ser encaradas como alimentadoras do Corredor / servidas pelo Corredor. O papel das ilhas Atlânticas da Madeira, Açores e Canárias representa de facto a continuidade do corredor Atlântico no exterior. Os esforços para a implementação de estações de abastecimento de combustível e de capacidade para abastecimento de navios nestas ilhas é da maior relevância para melhorar e promover a componente marítima do Corredor Atlântico.

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Acronyms and Abbreviations

ATL	Atlantic Corridor	LNG	Liquefied Natural Gas
BMVI	German Ministry of Transport	MED	Mediterranean Corridor
CAPEX	Capital Expenditure	MoS	Motorways of the Sea
CBA	Cost Benefit Analysis	MS	Member State
CEF	Connecting Europe Facility	Nat	National
CF	Corridor Forum	NPV	Net Present Value
CNC	core network corridor	NSMED	Nord Sea Mediterranean Corridor
DE	Germany	NUTS	Nomenclature of territorial units for statistics
DG-MOVE	Directorate General for Mobility and Transport (European Commission)	O/D	Origin / Destination
EC	European Commission	OMCGIS	Open Method of Co-ordination of Geographic Information Systems
EGTC	European Grouping for Territorial Cooperation	OPT	Operation Programme of Transport
EIB	European Investment Bank	PaP	Pre-arranged path
ERTMS	European Rail Traffic Management System	PPP	Public Private Partnership
ES	Spain	PR	Progress Report
ESTAT	Eurostat	PT	Portugal
ETCS	European Train Control System	PU	Public
ETIS	European Transport policy Information System	RALP	Rhine Alpine Corridor
EU	European Union	RFC	Rail Freight Corridor
FR	France	RIS	River Information System
GDP	Gross Domestic Product	RRT	Rail-Road Terminal
GHG	Greenhouse Gas	SESAR	Single European Sky ATM Research Programme
GIS	Geographic Information Systems	SSS	Short Sea Shipping
GPSO	Grand Project du Sud-Ouest	TENtec	Information system of the European Commission to coordinate and support the TEN-T Policy
HAROPA	Le Havre, Rouen and Paris Ports	ToR	Terms of Reference
HSR/ HS	High Speed (rail)	TMS	Transport Market Study
IM	Infrastructure Manager		
INEA	Innovation and Networks Executive Agency		
IRR	Internal Rate of Return		
ITS	Intelligent Transportation System		
IWT	Inland Waterway Transport		
IWW	Inland Waterway		
KPI	Key Performance Indicator		

1. Introduction

This document corresponds to the Final Report for the Atlantic Core Network Corridor study.

It reflects the expert review activity (task 4) set forth in the contract specifications, summarising the conclusions from all the previous tasks. Furthermore, it includes the overview of the corridor achievements vs. the TEN-T Regulation and in more detail the progress since December 2015.

The report takes as starting point the 2nd and 3rd generation of the Coordinator Work Plan and endows it with the main developments from the study, notably:

- The 2017 project list report (task 2)
- The updated report on elements of workplan (task 3a) and report on the wider elements (task 3b)
- The proposal for the mapping / clustering of corridor projects (task 4)
- The analysis of the market uptake and recommended activities for modal shift and state of cooperation with RFC (task 4)
- The follow up of Corridor Forum and Working group activities (task 5)
- The flagship pilot initiatives, impacts on growth and jobs and infrastructure investments and financing (task 6)

As such, the main elements included in this report are:

Summaries and conclusions:

- An executive summary of the analysis undertaken in the previous tasks.
- Conclusions and analysis from previous tasks.
- Conclusions providing for the further development of the corridor.

Mode specific analysis:

- Analysis of potential market uptake for modes with highest unused capacity
- Identification of measures to fulfil this potential
- Analysis of further development of co-operation with the Rail Freight Corridor.

Clustering or mapping of projects:

- Objective criteria to prioritise investments on the corridor, based on the characteristics of the corridor, taking into consideration outcomes of Task 3 (wider elements).
- Proposals for a prioritisation of projects or their groups/categories (task 4).

Corridor accomplishments:

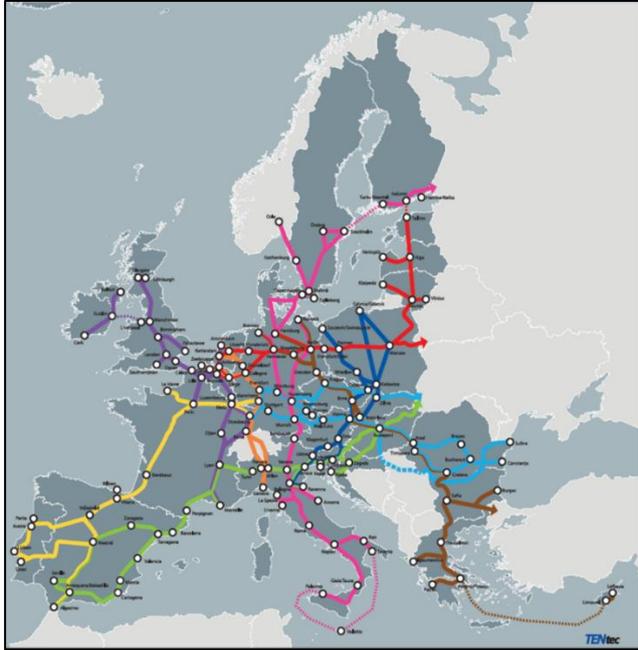
- Summary of actions accomplished since TEN-T regulation.
- Actions accomplished since 2015.

Flagship initiatives

- New types of projects enhancing the added value of the corridor approach

1.1. Background

Core Network Corridors should help to develop the infrastructure of the core network in such a way as to address bottlenecks, enhance cross-border connections and improve efficiency and sustainability. They should contribute to cohesion through improved territorial cooperation.



Source: TENtec, DG-MOVE.

Figure 5: Overview of Core Network Corridors

The **current studies** aim to develop the corridor Work Plan and to provide technical support to the European Coordinator. The study will start from the 2014 study results, develop the project list further, and prepare the way for an updated corridor work plan. The economic impacts of individual projects at corridor level, synchronised implementation of projects, notably cross border ones, environmental impacts, such as noise and greenhouse gas (GHG) emissions as well as sustainability, cohesion, innovation and innovative financing have been identified as areas that require further attention in the 2015-2017 corridor studies.

As before, the process is guided by regular Corridor Forum (CF) meetings and Working Group meetings. The meetings of the Corridor Forum are used to receive feedback on draft results, further input and to validate consolidated results. Overall, studies aim to provide technical support to the European Coordinator to develop the corridor Work Plan.

The work took stock of the results of the 2014 study, further developing the projects' list, and paving the way for an updated corridor work plan addressing all the elements foreseen by Article 47 of EU Regulation 1313/2015. Elements such as economic impacts of individual projects at corridor level, synchronised implementation of projects, notably cross-border ones, environmental impacts (e.g.: noise and greenhouse gas emissions), cohesion, innovation and innovative financing required further developments.

The studies should also provide the European Coordinator with the basis for quantifying the benefits lost if a project is not carried forward. Thus, it is necessary to



provide frameworks for estimating the likely impacts of a project, and the network benefits arising from projects applied in combination.

Topics as (1) innovation deployment; (2) impact of climate change on existing infrastructure; and (3) impacts of corridor deployment on GHG emissions, noise and other negative environmental impacts of transport have been object of specific analysis along corridor studies.

Such wider approach also benefits and feeds the ongoing consultation exercises in the so-called “Issues Papers” of European Coordinators, which aim at stimulating and supporting forward-looking transport policy solutions along topics of multi-modal and efficient freight logistics, intelligent transport systems, innovation - including alternative fuel infrastructure -, urban nodes and cooperation with third countries, whose projects may broaden the range of potential cases for the use of new financial schemes.

Innovation in the context of the Atlantic corridor is extremely relevant for its external dimension, with three key issues arising as priorities for deployment and further derivation of transport and economic/strategic consequences:

- concerns that the long-term security of supply and the compliance with the two Emission Control Area (ECA), set by the MARPOL convention and to which the Atlantic coastline is directly connected, will lead to a massive Liquefied Natural Gas (LNG) deployment: based on the pilot cases already present, a major plan for LNG deployment should be prepared for the Atlantic corridor, from which economic analysis can be evaluated;
- boosting the maritime potential through innovation and simplification, notably by progressing on the systems and procedures to evolve e-maritime towards e-Freight and increasing the efficiency of the logistic chains using maritime transport (i.e. digitalization of freight transport), fields in which the Atlantic is already well advanced;
- the implementation of the so-called standard (UIC) gauge requires substantial works at the rail networks, which offers the opportunity to implement ERTMS as well. Therefore, the plans for ERTMS implementation will be looked at in detail.

Moreover, e-mobility corridors, road interoperability and collaborative ITS (as being deployed in ITS corridors with wide involvement of corridor countries) have a high innovation content in the Atlantic Corridor.

The 2015-2017 Core Network Corridor Studies consisted of six tasks to be carried out by December 2017:

- Task 1: Review of 2014 Corridor Study
- Task 2: Development of the Project List
- Task 3: Preparation for the Update of the Work Plan
- Task 4: Expert review of preceding tasks, leading to input for Updated Work Plan
- Task 5: Forum and Working Groups
- Task 6: Unforeseen Items

This study ran in parallel with the other eight (geographic based) Core Network Corridor studies, each following the same structure and objectives. Specific methodologies and approaches were agreed between corridors to ensure coherence amongst them.

The overall building blocks of corridor studies is depicted in the figure below.

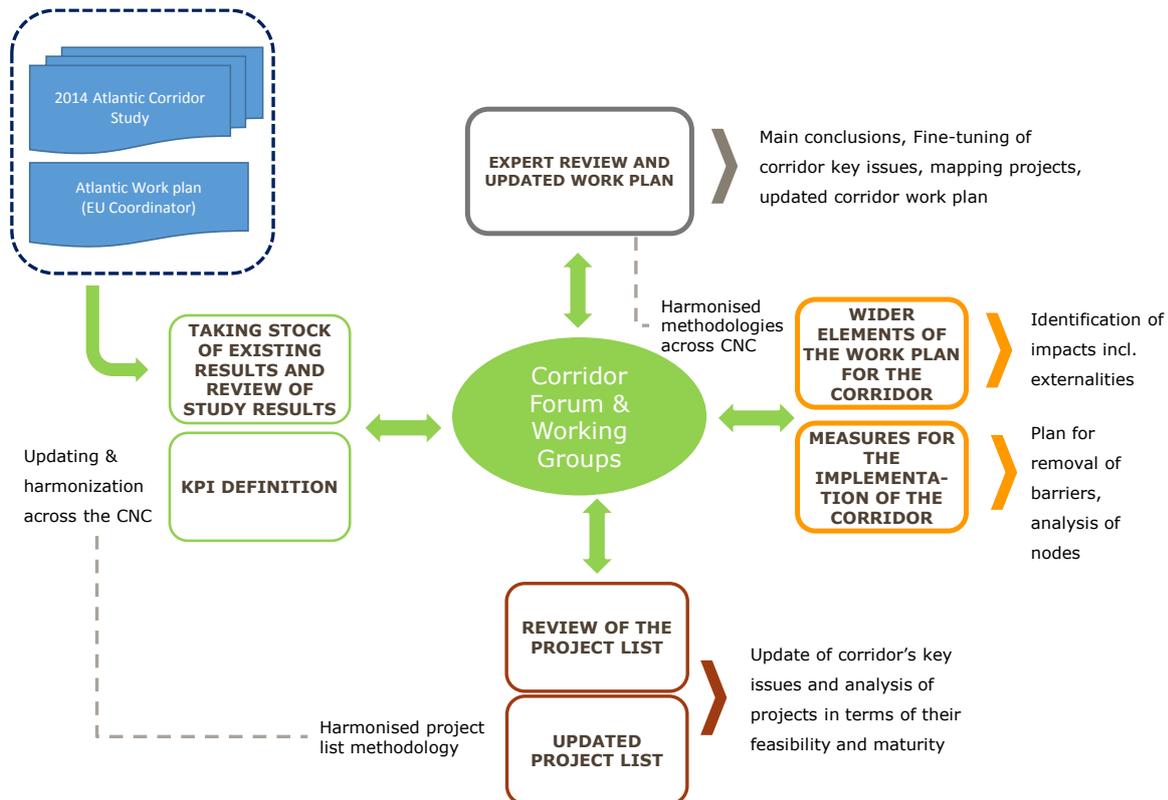


Figure 6: Main blocks of the Corridor studies approach

1.2. Atlantic Corridor objectives

The Atlantic corridor, as established in the EU Regulations 1315/2013 and 1316/2013 connects the Europe's South-Western regions towards the centre of the EU, linking the Iberian Peninsula ports of Algeciras, Sines, Lisboa, Leixões (Porto) and Bilbao through Western France to Paris and Normandy and further east to Strasbourg and Mannheim. It covers rail, road, airports, ports, Rail-Road Terminals (RRTs) and the River Seine inland waterway.

The Corridor has an outstanding maritime dimension given its positioning in the crossroads of global maritime routes which should be further exploited, namely through deploying Motorways of the Sea (MoS) and Short Sea Shipping (SSS) along corridor ports (and feeder ports).

Amongst strategic goals for the Atlantic corridor, together with enhancing modal integration (thus rebalancing the current modal split, highly dependent of road for the inland component), further exploiting the maritime connectivity, and addressing railway interoperability, including by a gradual track gauge change to UIC standard on the Iberian Peninsula. This would eventually connect seamlessly the ports of Algeciras, Bilbao, Sines, Lisboa and Leixões to France and Germany. Within this framework, the need to solve the current bottlenecks and missing railway links is still critical.

Objectives and opportunities identified in the 2014 and 2015 work plans are depicted in the figure below. Currently, studies are being developed to identify the key activities towards their achievement. Particular attention was devoted to the priorities

stated by TEN-T guidelines: cross-border, bottlenecks, interoperability and multimodality, as well as to financing issues.

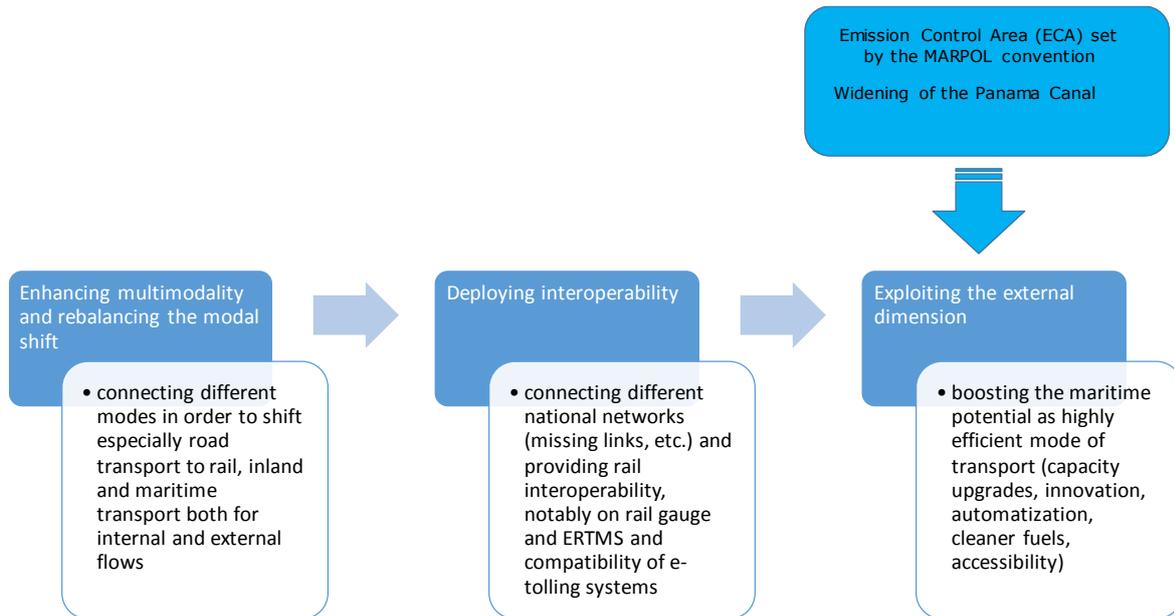


Figure 7: Atlantic Corridor main objectives

1.3. Consortium information

Our consortium includes all the partners who successfully undertook the 2014 Atlantic Core Network Corridor Study (TIS, INECO, EGIS and PANTEIA) and brings two additional partners (M-Five and BG) adding value to the corridor team both geographically (covering the four corridor countries) and thematically (widening the competence areas).

In brief, the consortium partners are:



TIS - consultants in Transport, Innovation and Systems, is a Portuguese independent consultancy (SME) dedicated to developing knowledge and providing advice on policy, planning and design of transport and mobility related systems. Founded in 1992, TIS has a large background in carrying out research and consultancy on transport fields, including transport infrastructure, transport economics, modelling, market studies, covering all transport modes both as individual modes and cross modal.



INECO is one of the most relevant Spanish Specialized Transport Consultancy and Engineering Company. Founded in 1968, it has nearly 50 years of experience. It is 100% owned by the main Spanish Public Transport administrators and operators: Adif, Adif High Speed; Renfe and Enaire. INECO has an overall range of services taking in all forms of transport and covering everything from feasibility studies for a particular course of action to integrated project management and operational readiness assistance.



EGIS is a French consultancy, specialising in transport and urban infrastructure, water, energy and the environment. Egis France has fifty offices and over 700 employees, covering all transport modalities. It is part of Egis Group, an international group offering engineering, project structuring and operations services. In engineering and consulting, its sectors of activity include transport, urban development, building, industry, water, environment and energy.



M-Five GmbH Mobility, Futures, Innovation, Economics i.G. is a specialised scientific consultancy providing systemic scientific & consultancy advice in the fields of mobility and economics. M-FIVE expertise covers the linked fields of emerging new mobility services and technologies, economics and innovations.



Panteia B.V. is a Netherlands-based consultancy, formerly NEA Transport Research and Training, with extensive experience in undertaking European transport and policy studies on behalf of DG-MOVE, with a well-established network of contacts, both in the Netherlands and across Europe. Panteia will offer a team of consultants, including native English and Dutch speakers with expertise in all modes of transport, and with technical expertise related to TENtec, GIS, transport data and network modelling.



BG INGÉNIEURS CONSEILS, founded in 1954, is a firm of consulting engineers in the fields of infrastructure, environment, building and energy, with subsidiaries in Switzerland, France and Algeria. BG's native French speaking experts from the transport planning team (formerly NESTEAR) offer extensive experience in France, especially the Mediterranean and Alpine regions, in waterborne. Maritime and rail/intermodal transport, as well as national and European modelling and GIS.

All corridor countries have a dedicated country manager as follows:

Country	Company	Contact person
Portugal	TIS	Daniela Carvalho Faustino Gomes
Spain	INECO	Esther Durán Eva Hitado
France	EGIS	Estelle Morcello
Germany	M-FIVE	Wolfgang Schade

1.4. Overview of WPs progress

1.4.1. Coordinator Workplan

Following the first Work Plan of the Corridor, the Coordinator recommendations have been updated and integrated to take stock of the progress of the Corridor and of the evolution of the Strategic framework. The main issues concerning the second Coordinator Workplan have been presented during the TEN-T days in June 2016, including corridor maps with the compliance status. During TEN-T days also some high level Ministerial meetings with the Coordinator took place.

This was followed by a consultation period with the four Member States until October 2016 after which a final version of the Workplan has been published.

One of the main novelties of the second Workplan was the inclusion of a chapter on Infrastructure funding and innovative financial instruments. The screening exercise on the projects' list has highlighted the following projects for their potential for future development through the Innovative Financial Instruments - the main targets being Terminals (Ports, inland waterway ports, airports and rail-road terminals), Port capacity enhancement, Dedicated connections, e.g.: on High-Speed for passengers to airports.

An on-going development of the Corridors' Work Plan is to appraise the mutual impact of climate change in the corridor, and to characterise its overall contribution of safeguarding the environment from local pollution and noise.

Furthermore, the dedicated cross-border working groups established following a recommendation of the Coordinator in his first Workplan, such as Spain-Portugal on interoperability and Spain-France on rolling motorways, maintained regular meetings and its progress is regularly reported to the Corridor Forum.

The third Workplan, currently under consultation with the four Member States has been elaborated during 2017. The main novelties brought by the current document are related with the mapping of investment, wider elements notably innovation deployment, climate change mitigation measures and decarbonisation as well as with the assessment of jobs and growth in each of the corridors. Moreover, the third Workplan gives a more prominent role to the other connected sections with a large potential for the corridor. Taking as start the new wider approach brought by the Coordinators, an important part of the Workplan is dedicated to flagship initiatives, which are aiming to bring wider views complementing and enhancing the infrastructure investments. The third Workplan also dedicates a particular attention to the future challenges for the corridor, notably remaining bottlenecks.

1.4.2. Corridor Fora and Working Groups

In 2014, four Corridor Fora have been successfully held. With the restarting of activities in September 2015 and until September 2017 other seven Corridor Fora meetings were held. A dedicated session for the Atlantic corridor has been promoted during the TEN-T days in June 2016. Moreover, bilateral meetings with MS and corridor stakeholders took place during the Connecting Europe Conference in Tallinn in 2017.

Several Working Group meetings were also convened by the Coordinator:

- a working group dedicated to the cross-border dimension held in Bordeaux in October 2015
- a working group on ports together with the 5th CF meeting
- a working group on regions together with the 6th CF meeting
- two joint WG meetings with the Nord Sea Mediterranean Corridor, one focused on ports, inland waterways and logistic facilities held in Paris (March 2016) and one on regions and logistic platforms in Metz and Strasbourg (September 2016)
- a working group meeting on urban nodes and regions held in Madrid in April 2017
- the last working group meeting on ports is planned for February 2018 in Algeciras, together with the Mediterranean corridor.

As in 2014, Corridor Forum stakeholders fall into four main categories:



- Member States (MS) – Transport Ministries.
- Infrastructure Managers (IM) – for each mode of transport. Rail-road terminals' stakeholders started to be involved in Forum activities from the 7th meeting onwards.
- Corridor Regions (CR) – equivalent to NUTS2 regions.
- Atlantic Rail Freight Corridor.

In addition to the Forum members, a wider group of stakeholders is engaged in the corridor activities through the participation in the WG meetings. That is the case for euro-regions, specific cross-border logistic projects along the corridor, innovation projects as well as the municipalities, metropolitan regions and transport consortia in the corridor urban nodes.

1.5. Document Structure

The report is structured as follows:

- **Chapter 1** lays out the main information on the Study;
- **Chapter 2** presents the summary of the study, notably the achievements for the various tasks;
- **Chapter 3** depicts in more detail some key aspects from the analysis, in particular market analysis, urban nodes, innovation deployment and climate change mitigation
- **Chapter 4** is focused on modal shift and decarbonisation potential along the corridors;
- **Chapter 5** elaborates on mode specific aspects, in special the cooperation with the Rail Freight Corridor including modes of cooperation as well as recommendations for future potential improvements and potential market uptake of IWW;
- **Chapter 6** presents the methodology and results for the mapping exercise;
- **Chapter 7** presents the overview of results achieved for the financial sustainability and jobs and growth exercises in the Atlantic corridor;
- **Chapter 8** is dedicated to innovative flagship initiatives;
- **Chapter 9** summarises the corridor actions / main achievements since 2014; and,
- **Chapter 10** highlights the main conclusions and open issues for the next years up to the completion of the corridor.

In the Annexes, the following material is provided:

- Annex 1: Implementation of Atlantic KPI, updated for 2017;
- Annex 2: Corridor Fiches;
- Annex 3: Alternative fuels for four corridors combined into one: Helsinki to Lisbon Flagship Initiative

2. Summary of main results from the Atlantic corridor study

2.1. Taking stock of existing results and KPI Identification

Although the 2014 studies achieved the set of objectives, time restrictions and limited data availability did not permit an in-depth analysis and adequate coverage of certain topics.

To this end, the first work package of the Study's 2nd phase aimed at a critical assessment of the 2014 Study to identify the main issues encountered and related limitations, as well as a detailed assessment of the information collected. Additionally, a final set of common Key Performance Indicators for measuring the Corridor evolution were defined. Finally, a number of solutions and related actions to address the above shortcomings in order to fine-tune the analysis of the Study's 2nd Phase were identified.

Key Performance Indicators (KPIs) were used within the 2015-17 Core Network Corridor (CNC) studies to assess and monitor the evolution of the corridors and the potential effects of individual projects or groups of projects upon infrastructure interoperability and performance. A common or 'generic' KPI framework has been developed for all nine Corridors, in order to permit comparability across the entire network.

The design of the KPI structure has been approached by building upon initial steps made by the nine CNC Studies' consortia during 2014. The 2014 Corridor Studies generally applied performance indicators, focusing on infrastructure characteristics and compliance to the TEN-T Regulation N. 1315/2013. In 2015, the definition of KPIs was initially discussed at the kick-off meeting (September 9th, 2015), and a dedicate Working Group was established involving representatives of all nine Corridors.

A detailed proposal was made by the Working Group, which was discussed with DG MOVE and then presented at the fifth Corridor Forum meetings. Forum stakeholders then provided extensive feedback, from which a revised structure was proposed as the final outcome of this task.

The KPI framework consists of two parts:

- A main part, consisting of generic KPIs, which primarily describe the supply-side (infrastructure) together with selected demand-side characteristics, to be used in all nine Corridors;
- An additional corridor-specific part, tailored to the specific characteristics of a Corridor, and contributing to the assessment of the Corridor evolution. These should not be new indicators, but rather higher target levels applied to generic KPIs, in cases where there is an initiative to achieve a higher level of performance than the minimum specified in the Regulation.

The defined generic KPIs are divided into supply-side indicators and demand-side indicators. The generic part comprises of the following elements:

- Mode (rail network, IWT network, road network, airport, seaport, inland port, rail-road-terminal),
- Type of transport (passenger, freight),
- The general objective it addresses (efficiency, cohesion, sustainability, user benefits),
- The Corridor objective it addresses,



- The name of the Key Performance Indicator,
- The measurement unit,
- The year of baseline information (and possibly follow up years),
- The target by 2030 and 2050 and,
- The source of information (the data sources should be publicly available).

For the Atlantic corridor, two corridor-specific KPIs with a subset of measurement methods were defined, which reflect strategic issues at corridor level:

- the progress in terms of rail interoperability, notably for UIC gauge deployment, and,
- the specificity of the Atlantic maritime dimension, which can be seen as almost a sea corridor-wide route parallel to the land corridors.

The KPI for Atlantic updated in 2017 are included in the Annex 1.

2.2. Main results from Project List

Task 2 focuses upon the list of projects. Each corridor is maintaining a list of corridor projects, following a common Excel template, recording information about the project locations, their objectives, their costs, timescales, and financing structures. In the recent phase of the study, the team has compiled inputs and updates from the corridor Member States during the first quarter of 2017. Between March and mid-April, the list was refined and sent for approval to the European Commission.

The Atlantic Project List 2017 includes 272 projects belonging to CNC with an overall investment volume of 43.6 billion euro. In addition, the Project List includes other 63 projects corresponding to network branches connected to the corridor (additionally to corridor components) with relevant influence for the Corridor, as already pointed out in the 1st work plan. These not CNC projects are presented in the List of Projects annexed to the work plan, but not included in the analysis below.

Therefore, Atlantic Project List includes a total number of 335 projects:

- 272 of them belonging to CNC Atlantic Project List.
- 63 projects corresponding to sections not CNC but with relevant influence in the ATL Corridor.

Additionally, 14 horizontal projects affecting ATL Corridor have been identified. These horizontal projects are included in current Project List but their data are not considered in the evaluation results of the Atlantic Corridor presented in this report.

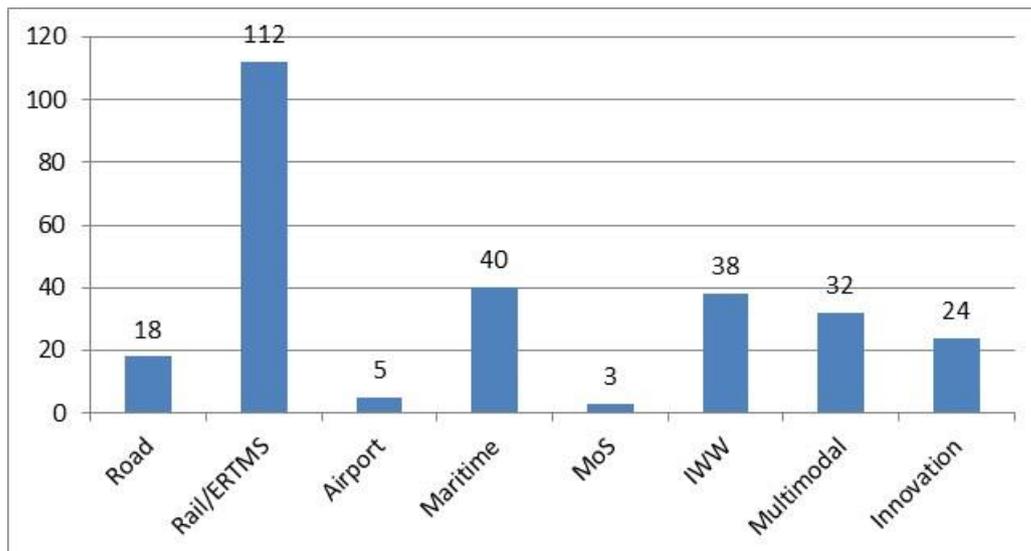


Figure 8: Total number of corridor projects per category

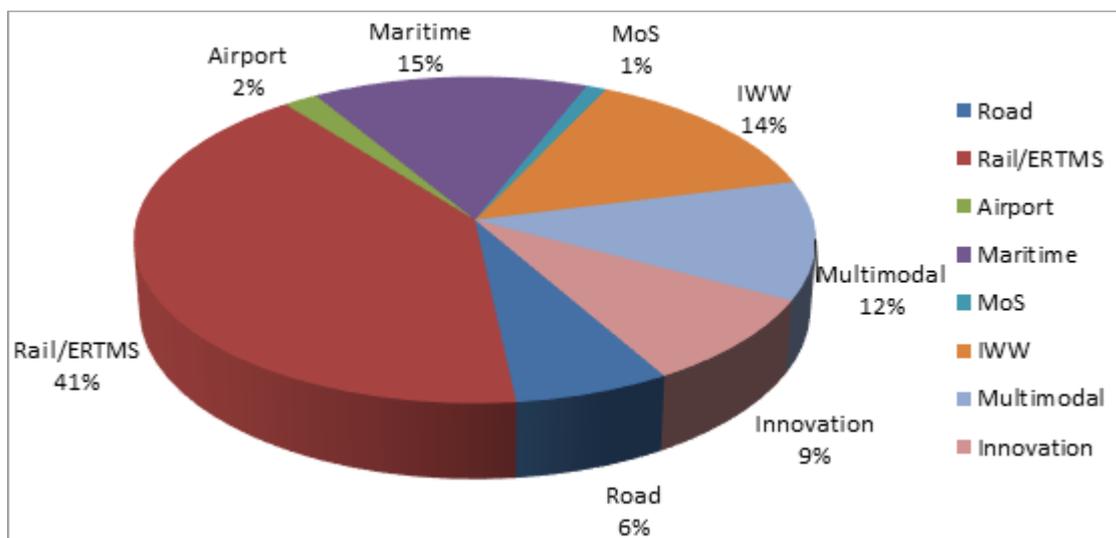


Figure 9: Corridor projects per category (% of total)

Overall, the total cost of the planned projects amounts to 43,664.79 Million € (available cost data for 82% of the projects). Rail (including ERTMS) represent 60.47% of the total costs. About 9% refer to projects on the maritime domain, almost 3% to multimodal projects, notably inland connections to ports, and nearly 25% refer to inland waterway projects. Innovation represent about 0.9% of the costs and MoS more than 4% in the Atlantic. Such minor share at corridor level results from the fact that those projects are predominantly horizontal and not directly affected to one CNC and consequently costs are also not captured by each corridor.

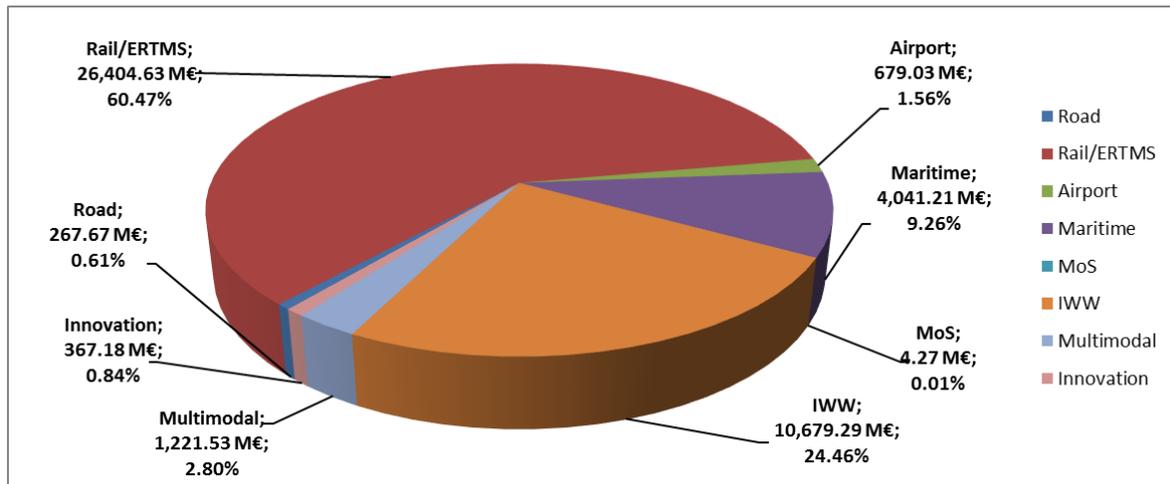


Figure 10: Costs (M€) of corridor projects per category

Worth noting that 40 projects of the 272 CNC projects (14.7%) have a cross border dimension. They are divided by affected boundaries as follows:

Table 1: Cross Border Projects

Cross-border Projects							
	PT/ES	ES/FR	FR/DE	PT/ES/FR	PT/ES/FR/DE	ATL+OTHER	TOTAL
Number	10	7	13	1	1	8	40
%	25.00%	17.50%	32.50%	2.50%	2.50%	20.00%	100.00%

As acknowledged before, some relevant projects have been concluded since 2016. This include four rail projects, two MoS actions and one IWW project located in the other sections feeding the corridor.

The actions collected in the projects that make up the 2017 Project List represent a step forward towards the fulfilment of Atlantic Corridor objectives, notably in terms of compliance with Regulation criteria. Nevertheless, there are still sections of not full compliance, already identified in 2016 and for which the 2017 project list still doesn't provide an answer.

The current project list 2017 represents the status of projects as of May 2017 and is the basis for various analysis in course, as it is the case for innovation assessment (task 3b), mapping (task 4), financing (task 6).

The Report also showed the preliminary analysis realized for the urban nodes belonging to the corridor, notably for Paris and Madrid representing critical bottlenecks at the corridor level, with relevant progresses being noticed. The assessment was conducted both in terms of identification of node barriers and proposed interventions for node-related projects. Benefitting from the WG meeting on urban nodes it was also highlighted some innovation measures being deployed at the level of the nodes, notably with the planned deployment of C-ITS measures.

2.3. Urban nodes

According to Regulation EU N° 1315/2013, urban node means "an urban area where the transport infrastructure of the trans-European transport network, such as ports including passenger terminals, airports, railway stations, logistic platforms and freight terminals located in and around an urban area, is connected with other parts of that

infrastructure and with the infrastructure for regional and local traffic”. Requirements applicable to urban nodes are those established in the Articles 30 (Urban nodes) and Article 41 (Nodes of the core network) i.e.:

- Modal interconnections for freight and passenger transport in cities;
- Adequate connections between airports and railway stations;
- Seamless connections between local and national networks at logistics centres;
- Mitigation of negative externalities.

Our seven core urban nodes include the three capital cities (Paris, Madrid and Lisboa) and four other main agglomerations: Mannheim (Germany), Bordeaux (France), Bilbao (Spain) and Porto (Portugal).

The analysis realized for the urban nodes belonging to the corridor is presented with more detail in chapter 3. The assessment was conducted both in terms of identification of node barriers and proposed interventions for node-related projects. Benefitting from the WG meeting on urban nodes it was also highlighted some innovation measures being deployed at the level of the nodes, notably with the planned deployment of C-ITS measures.

2.4. Accomplished actions in the Atlantic corridor

Of main significance are the conclusion of the LGV East to Strasbourg in September 2016 and Tours-Bordeaux entering in operation from July 2017.

Table 2: Major projects concluded since 2014

Project ID	Project Name	Category
7084	LGV Est (East high speed rail line) phase 2	Rail
7417	Bordeaux northern rail bottleneck: Quadrupling track between Benauges and Cenon	Rail
7105	Bordeaux-Poitiers line upgrade (adapting gauge to 4m high trailers)	Rail
7106	Dax-Hendaye line upgrade (adapting gauge to 4m high trailers)	Rail
7903	Biscay Line - Multiple port Finland-Estonia-Belgium-Spain long distance MoS, relevant to many core network corridors	MoS
7438	Atlantic Interoperable Services (ATLANTIS)	MoS
7275	Douro's Inland Waterway 2020 -Phase I (other sections of the corridor)	IWW

2.5. Proposed measures for the implementation of the corridor

Task 3 aimed at establishing the basis for an updated corridor Work Plan, focusing on the development of its various elements as defined in the Article 47, notably dealing with:

- plans for removal of barriers (physical, technical, administrative and operational) – task 3a);
- wider elements as innovation deployment and impacts of climate change – task 3b).

TEN-T Regulation defines the transport infrastructure requirements for the Core network, contextually stating that the objectives need to be met by 2030 at the latest.

Application of TEN-T standards appears to be a priority whenever feasible. In this regard, the foremost subjects on the Atlantic corridor are: the deployment of UIC track gauge on the Iberian Peninsula; electrification of cross border sections and of

the railway lines connecting to the port of Algeciras and Le Havre (the largest seaports by volume in the corridor); connection for 750-m long trains to all corridor ports as well as the completion of rail corridor missing link. Indeed, while all corridor ports connected to rail, the removal of above barriers is critical to boost the corridor maritime dimension.

However, there is in many instances a need to go further than the strict respect of TEN-T requirements. This is in particular the case for land access to ports of Atlantic corridor which in many instances calls for qualitative and capacity improvements. For rail, different forms of rail electrification in and within MS, steep gradients, non-harmonised loading gauge along corridor, meaning that not all routes permit the same vertical clearance, thus limiting the interoperability of trains carrying intermodal units. For roads, progress in terms of road tolling interoperability.

More attention is given to the assessment of potential administrative and operational barriers considering that removal of these barriers can be as effective as infrastructure projects in promoting free movement of goods and passengers while being less costly. Environmental considerations are also at stake since the most environmentally friendly modes (rail, sea, IWW) often tend to be the most hindered by such barriers due to their greater reliance on intermodal nodes. Strong simplification of Custom and Reporting operations (e-maritime / e-Freight), reduction of lag times and inland shipping will be crucial factors.

2.5.1 Current compliance with the technical infrastructure parameters of the TEN-T guidelines

Rail Infrastructure

The core railway network covers an extension of 7634 km, of which 6105 km (79,9%) are in operation. Important stretches of the corridor have been concluded in 2016 (Remilly – Strasbourg) and 2017 (Tours-Bordeaux). The Y-Basque is under construction with end of works foreseen to 2023 and works are starting for the missing link Évora-Caia, close to the border PT-ES, notably in the section Elvas to the border.

Due to the withdrawal of the only Core Network Section linking Grândola with the Core Port of Sines, following the outcome of the environmental studies, it shall be acknowledged that the only possible rail access to the Port of Sines takes place through the existing TEN-T rail line Sines-Ermidas do Sado-Grândola (in Portugal), although it belongs to the comprehensive network. It was therefore necessary to include it in the network analysis for the sake of consistency with the Core Network methodology, and to ensure the achievements of the Corridor's objectives.

High speed passenger lines belonging to the corridor include the stretches Madrid-Córdoba-Antequera, Madrid-Valladolid-Venta de Baños, Tours-Bordeaux, Tours-Paris-Strasbourg (LGV Est) and Metz (Saarbrücken)-Mannheim as well as the Y Basque (under construction) and the GPSO (planned). It is worth noting the relevance of the ongoing works in the Y-Basque, whose conclusion will ensure gauge continuity for passenger flows from Germany towards Spain.

Regulation 1313/2015 established several infrastructure-related parameters: gauge, electrification, train length, axle load and line speed as well as ERTMS in operation. Mixed lines are considered for compliance with the whole set of freight-related parameters. The assessment of compliance for 2014 is performed only for the corridor sections in operation as showed below.



Electrification

Core rail network complies with the electrification criteria in 87% of its extension. Sections still not electrified are located in both cross-border connections Spain to Portugal (both with works ongoing), on the non-electrified section of the conventional railway Bobadilla-Algeciras (planned to be ready before 2030) and in France for the Gisors – Serqueux section (the electrification project has received CEF funding and is planned to be ready before 2030)¹.

Although just 13% of the core network is not electrified, various types of voltage (25 kV AC in Portuguese network and HS lines of Spain and northern France; 3 kV DC in conventional lines in Spain; 1,5 kV DC in conventional lines in the South of France and 15 kV in Germany) coexist, requiring the use of multi-tension rolling stock changing locomotives at borders, thus reducing transport efficiency. It should however be noted that ongoing electrification of cross-border sections in Spain is at 25 kV, adopting the same standard as in Portugal and in high-speed lines in Spain and France.

Track gauge

Harmonised planning for UIC gauge deployment on the Iberian Peninsula represents one of the key actions established in the 2014 Work Plan; the start-up of an intergovernmental cross-border working group on interoperability is a major step in the right direction.

Currently, only 56% of Atlantic core railways dispose of a standard European gauge. Planned interventions will allow extending this coverage to nearly 74% by 2030, connecting all border crossing in UIC gauge.

ERTMS

Overall, ERTMS implementation in the corridor is very low, with just 12% of the rail network fulfilling the criteria. The Work Plan on ERTMS provides further information on this aspect and targets to be achieved.

Line speed > 100km /h for freight lines

Line speed above 100 km/h for freight lines is accomplished on 96% of the corridor extension. Currently, non-compliant sections are present in France (Motteville – Montérolier-Buchy and some short links in the Paris node), in Spain (Bilbao - Puerto de Bilbao) and in Portugal (sections connecting the core ports of Leixões and Lisboa). It is expected that interventions planned will ensure full compliance by 2030 with few exceptions; for the remaining cases, a careful assessment of the costs and benefits for the Corridor of their potential upgrade has to be made case-by-case.

Axle Load

The Corridor is fully compliant in all its extension (on its freight component) with minimum axle load of 22.5 tonnes.

Train Length

The compliance rate with the 740-m train length on rail freight lines equals 57%, therefore representing a clear limiting factor for freight operation in the Iberian Peninsula, notably in Spain. Currently, the maximum freight train length in the Spanish Atlantic Corridor sections is 550 m and it is reduced to 400-420 m in several stretches, e.g. in the Badajoz- Aljucén section. In Portugal, all sections connecting to

¹ Additionally, interoperable catenary isn't available between Bordeaux and Bayonne: catenary renewal is planned at short and medium term

the core ports as well as the “Beira Alta” line are non-compliant. Ongoing and planned interventions along the network will ensure full compliance of this criteria by 2030. Despite the fact that all the French and German sections comply with these criteria, timetable related / operational restrictions may have influence on the possible train length.

Other limiting factors

Loading gauges limit the size of wagons and containers that could be conveyed on the railway sections. Along the corridor, different loading gauges coexist, acting as a constraint towards a harmonised rail network and impacting on rail freight performance. The Bordeaux and Poitiers tunnels do not meet gauge requirements (B+) for rolling motorways and for transport of high cubes containers. Therefore, for the deployment of rolling motorways services, the use of the non-electrified line through Saintes and Niort is being planned; in addition, some single-track sections constrain the operation performances. Works for the enlargement of tunnels cannot start before the achievement of the new line between Bordeaux and Tours, due to an important passenger transport along the line.

Gradient

Although the track gradient is not included in the requirements for core network rail by 2030, sections of the corridor in Portugal (i.e. Pampihosa- Guarda with 18‰, Sines – Ermidas Sado 21‰, Contumil-Leixoes with 18‰) and Spain (i.e. Bobadilla-Algeciras line with 24‰, Fuentes de Oñoro – Salamanca with 18‰, Madrid-Ávila 18‰, Vitoria-Irún 18‰) present this constraint.

Being the deployment of UIC gauge a strategic issue, **corridor specific KPI’s** were defined to closely follow the progress, as presented below.

Mode	KPI	Unit	2014	2020	2030	2050
Rail network	Core Nodes connected in UIC gauge*					
	Freight	Nr	8	9	17	19
	Passengers		12	13	15	19
	Border crossing points connected in UIC gauge	Nr	1	2	4	4
	Cross border extension connected in UIC gauge					
	Freight	index	100	105,7	166,8	
	Passengers	$\frac{(\text{km year } x)}{(\text{km } 2014) \times 100}$	100	120,7	181,8	

Road infrastructure

The Atlantic Corridor is characterised by the high quality of the existing road network, 99,8% of which fulfils the TEN-T class requirements (motorways or express roads). The exception for full compliance is the cross-border stretch ES-PT through Vilar Formoso, to be upgraded in short term on both sides of the border, benefitting from a joint project between Portugal and Spain under CEF 2016.

Actions for road LNG deployment in the Corridor are currently ongoing, and it is expected that the actual compliance rate for LNG (about 13%) and electric charging (about 18%) will increase soon, as deployment is starting in beginning 2018, ensuring the accomplishment of the target by 2025. Availability of electric charging along the corridor is also being planned: nevertheless, electric charging is already available at large scale in urban nodes as well as along the main cities crossed by the Corridor.



Moreover, interoperability of tolling systems is not yet fully achieved at corridor level despite a significant progress since 2014. Technologically there is already a full achievement of interoperable solutions, but commercial services are not yet in place.

Inland waterways and Inland Ports

The Seine River, comprising the whole sections Le Havre – Paris, is the only inland waterway integrating the Atlantic Corridor. North of Paris, the Corridor is linked with the planned Canal Seine-Scheldt, included in the North Sea – Mediterranean Corridor.

The Seine river section, included in the Atlantic Corridor, already reaches higher standards than the minimum established by Regulation (EU) 1315/2013, with only a partial completion of RIS implementation along all sections to be achieved (ongoing activity). Although the Seine is compliant from Paris to the sea, there is an issue of low bridges in Paris limiting the height of container barges. This issue can't be solved due to the historic value of Paris bridges.

Despite this, several local bottlenecks were identified, notably on locks and port access, and a set of measures were planned to address those critical issues. It is worth recalling that the broader TEN-T includes, within the NSMED corridor, the navigable waterway from Paris via the Seine/Oise and Scheldt rivers to connect to the Benelux countries. This is expected to substantially increase waterborne freight traffic related to Paris and the River Seine. Co-ordination between the work plans of the Atlantic and NSMED corridors has been an important point in the elaboration of the current project list identification.

This section includes three core network ports; Le Havre, Rouen (which are both Sea and IWW ports) and Paris, presented as HaRoPa ports. Other inland ports in the Atlantic are Bordeaux, Strasbourg, Metz and Mannheim. In total, the corridor counts with seven inland core ports.

With regard to inland waterways, ports are already compliant with the minimum criteria established in the Regulation. All ports are connected to IWW class Vb and to the rail network.

Nevertheless, there are still critical limitations in those inland connections, such as the electrification of the Gisors-Serqueux rail stretches connecting the ports of Le Havre and Rouen, or the IWW connectivity to the new Port XXI in Le Havre, which are being addressed in ongoing and planned projects.

The availability of clean fuels, currently limited to Mannheim, is being object of several studies and works and compliance might be achieved before 2030.

The Atlantic Maritime Infrastructure and Motorways of the Sea

The maritime dimension is of utmost importance in the Atlantic Corridor. The joint throughput of the 8 core seaports in the Atlantic (Algeciras, Sines, Lisboa, Leixões, Bilbao, Bordeaux, Le Havre and Rouen) reached more than 300 million tonnes in 2016, with an overall magnitude of more than 420 million tonnes if considering all seaports along the Atlantic front.

The importance of complementarity between the seaports along the coastline (Core and Comprehensive) must be stressed, in synergy with the deployment of maritime links through Motorways of the Sea (e.g.: Atlantis MoS project) that can help tackling inland bottlenecks and provide energy-efficient transport operations.



Intra corridor maritime flows (country level) represented, in 2015, nearly 123 million tons, clearly demonstrating the importance of ports in the Atlantic.

The connection of ports with other modes, in particular rail (and inland waterways) is critical to guarantee the capacity for freight traffic to and from the economic regions along the corridor and to promote port competitiveness and strengthen hinterland connections. The main limiting factors and bottlenecks in the port areas, which need to be overcome for further growth, relate to four main issues: capacity, connectivity, multimodality and availability of alternative fuels. Several projects in the corridor work plan address these bottlenecks.

Many ports are operating near capacity, thus facing the need to expand their facilities and upgrade port infrastructure and maritime accesses to cope with the expected growth in demand. The ports sector is showing fairly consistent growth expectations. This is in line with the necessary upgrade and reinforcement of terminal extensions for logistic and industrial platforms and intermodal terminals. Furthermore, most ports also need to adapt facilities and equipment to the new standards required by the use of bigger ships, a trend that is expected to be continued in the future due to the Panama Canal widening.

As such, all the interventions included in the Corridor project list aims at meeting TEN-t requirements for Core Seaports, which are the main Freight traffic generator of the European Transport Network. As for the other core transport nodes, most relevant requirements set by TEN-t Regulation mainly comprise the upgrading of railway as well as IWW links, as well as the development of the maritime dimension of the Atlantic thorough MoS-related projects.

Connection to rail

Although all ports in the corridor are connected to rail, improvements in land access and last mile connections to ports are needed: both in Portugal and Spain, the upgrade of rail connections and rail freight terminals to allow 740 m trains to access the ports is critical. Similarly, as previously stated, electrification is missing along the railway line connecting to the Core port of Algeciras (the largest seaport by volume in the corridor), as well as the section Gisors-Serqueux serving the Core port of Le Havre.

Moreover, rail connection to the port of Sines (third port in volume in the corridor and the first in terms of rail share for container hinterland traffics) is currently done through the comprehensive sections Sines – Ermidas -Grândola, in a single track line, limited train length and 20 ‰ gradient. Building a new line has been rejected on environmental impact ground; it is therefore critical for Sines to maintain and reinforce the present modal shares, enhancing the existing line.

Connection to IWW

All French ports have an inland waterway connection, class Vb. The port of Leixões also has an indirect connection to the inland waterways of the Douro river (class IV), however, in regards to cargo, these are not exploited to their potential, namely due to existing navigation bottlenecks along the Douro River (core IWW but not in corridor), which are being addressed in ongoing projects. Additionally, the port of Lisbon is studying the navigability of the Tagus estuary to Castanheira do Ribatejo.

Availability of clean fuels

LNG deployment is taking place along the corridor with several projects running (such as *Core LNG Hive* in the Iberian Peninsula), but actual compliance is just 13%. Full compliance is expected by 2025 as foreseen in the MS action plans for deployment of clean fuels. Moreover, a possible pilot initiative for LNG along the Atlantic coast may accelerate this deployment. Viability studies for the availability of ship to shore



electricity are also planned in some Core ports. The port of Le Havre already offers electric charging limited to cruises.

Availability of at least one open terminal

Article 22.1.b) highlights that ports should ensure that at least one terminal is open and there is no discriminatory access. All ports currently meet this criterion.

Facilities for ship generated waste

All ports have some kind of Port Reception Facilities available and there is no indication of a lack of fulfilment of this requirement (Article 22.2).

Motorways of the Sea

The MoS development is particularly relevant to the Atlantic Corridor, though its potential is not yet fully exploited. Nevertheless, a reasonable number of successful MoS and SSS regular lines from the Atlantic ports are already in operation, as noted in 2014 Work Plan.

Moreover, since March of 2016, the study on the TEN-T MoS Horizontal corridor started to be developed and a series of workshops have been / are being promoted along the three key priorities established: environment, integration of maritime transport in the logistics chain and human element, safety and traffic management.

The progress of MoS studies, notably in view of guaranteeing consistency of analysis for the ports, particularly considering its global business and flexible character, will be closely followed. A presentation on the MoS study has been done by the study team in the 9th Corridor Forum.

The Atlantic Air Transport Infrastructure

Airport infrastructure on the Atlantic Corridor is extremely important, with seven core airports ensuring international and intra-European connectivity. Due to long distances, in particular for Spain and Portugal, the vast majority of intra-EU passenger journeys takes place via airplane.

Four of the airports are considered main airports, notably Paris-Charles de Gaulle (the 2nd EU Airport), Madrid-Barajas (6th EU airport), Paris-Orly and Lisbon. As such, they are subject to the provisions of Art 41(3) of Reg. 1315/2013, which require them to have connections to both TEN-T road and rail and, where feasible, to include a high-speed rail network, by 2050. Bordeaux, Porto and Bilbao are other core airports on the corridor.

Among the larger airports – Paris-CDG, Paris-Orly and Madrid-Barajas – only the first is currently connected to high speed rail (as well as with a suburban train connection to Paris - RER B); Paris Orly is connected to Paris with a suburban rail connection: the "Orlyval" links the airport to the RER B; Madrid-Barajas airport is linked through commuter rail ("Cercanias" line C1) and fast metro connections. Lisbon and Porto have metro connections, while no rail connection exists for Bordeaux and Bilbao airports.

Paris, Madrid and Lisbon airports are required to have a connection with core rail network by 2050, which is already planned through the foreseen new high speed UIC access from Chamartín railway station to the airport in the case of Madrid.

The compliance perspective on the alternative fuel availability in airports by 2030 (air side) is not clearly defined yet, although a feasibility study for the 2030 horizon is

under development. Moreover, all corridor airports already have alternative clean fuels available for airport ground services and in airport parking stations.

The Atlantic Rail-Road Terminals (RRTs)

The planning of the Atlantic rail-road terminals was one of the important topics addressed in our 7th Corridor Forum meeting. While the present situation is characterised by a very low modal share of rail along most of the corridor, and notably for long distance transport across the Pyrenees, the increase of rail traffic expected (already triggered by the Rail Freight Corridor) leads to a situation where further development of efficient RRT is needed.

As pointed out in the 2014 Work Plan and reinforced in the 2nd and 3rd Workplans, bottlenecks are mainly relevant for intermodal connectivity, of both road and rail, the latter being largely affected in Spain and Portugal as a consequence of limits on train lengths.

Moreover, additional rail-road terminals in the Atlantic Corridor are being defined, to take stock of the Corridor development, and to fully exploit the progressive deployment of UIC gauge network in the Iberian Peninsula, as it is for instance the terminal of Jundiz.

RRT planning elements along the corridor have been discussed, focusing on the need for a common evaluation framework, so that the potential for these terminals can be assessed in relation with possible implementation of services between terminals, and between terminal and ports.

Together with the infrastructure related measures, a strong emphasis on the deployment of logistic single windows along the corridor, extending the current port single windows towards the hinterland and integrating with e-maritime services and information technologies, could have a strong impact.

2.6. Compliance maps for 2030

At corridor level, the aggregation of the information provided by the Stakeholders in the mapping exercise of the projects along the corridor allows for the drawing of geographical-based compliance maps for 2030 for rail and for IWW, considering the following stages of implementation:

- Green: compliant (status of 2015)
- Green dotted: works ongoing, compliance expected
- Yellow: works still to start, compliance expected
- Yellow dotted: works foreseen but delayed, compliance doubted
- Red: works not yet planned / agreed for completion

The map for rail refers to an aggregate result considering four compliance criteria: track gauge, electrification, axle load and speed. An aggregate result in this context means that if one of the criteria is not accomplished, then the section is non-compliant.

The map for IWW brings together the Atlantic, NSMED and Rhine Alpine corridors and considers the following four compliance criteria: CEMT class, RIS, draught and height under bridges. As noted above, the key issues are related with the height of bridges in Paris, an aspect that can't be currently solved due to historical value of bridges.

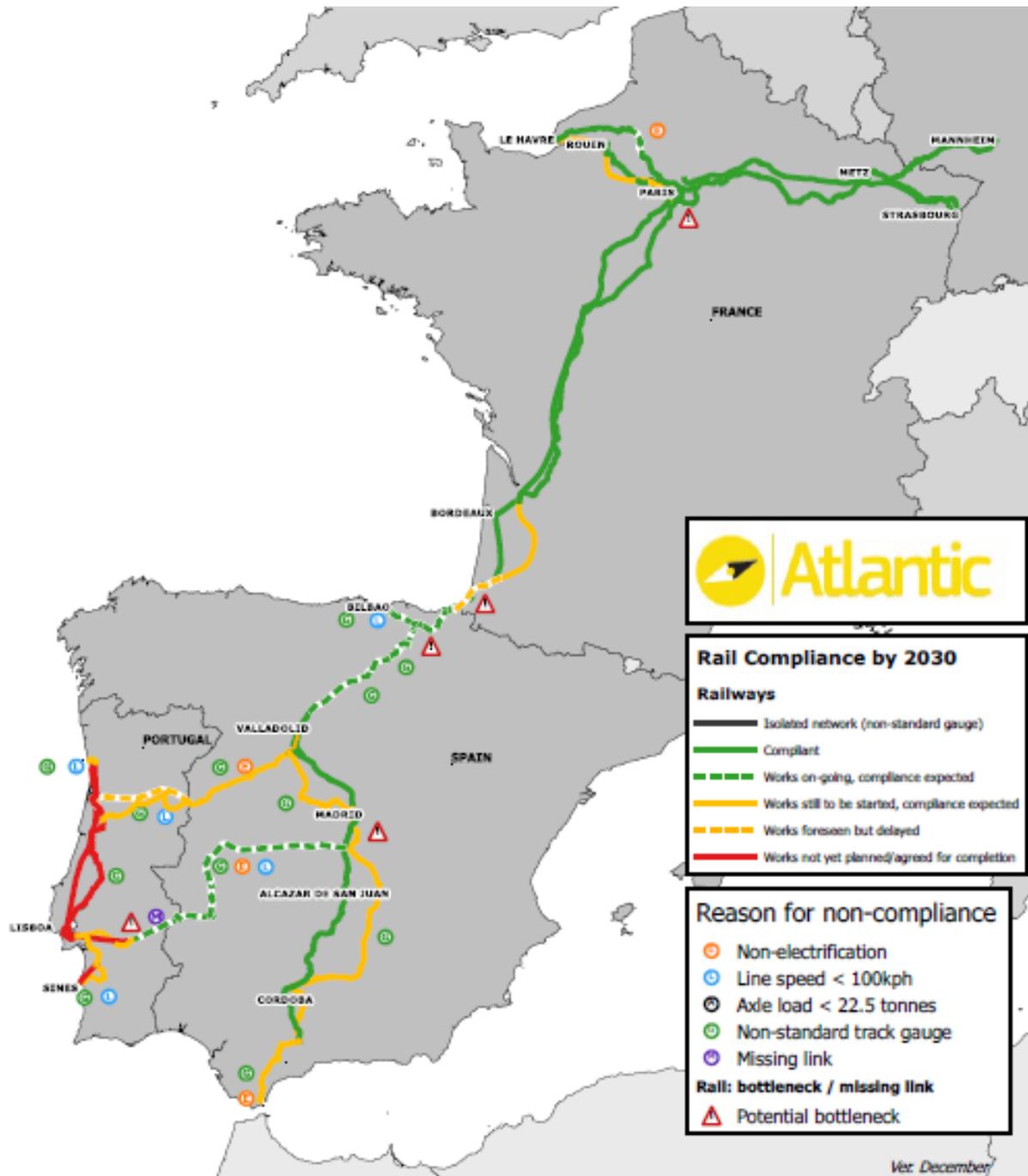


Figure 11: Rail compliance by 2030: all criteria

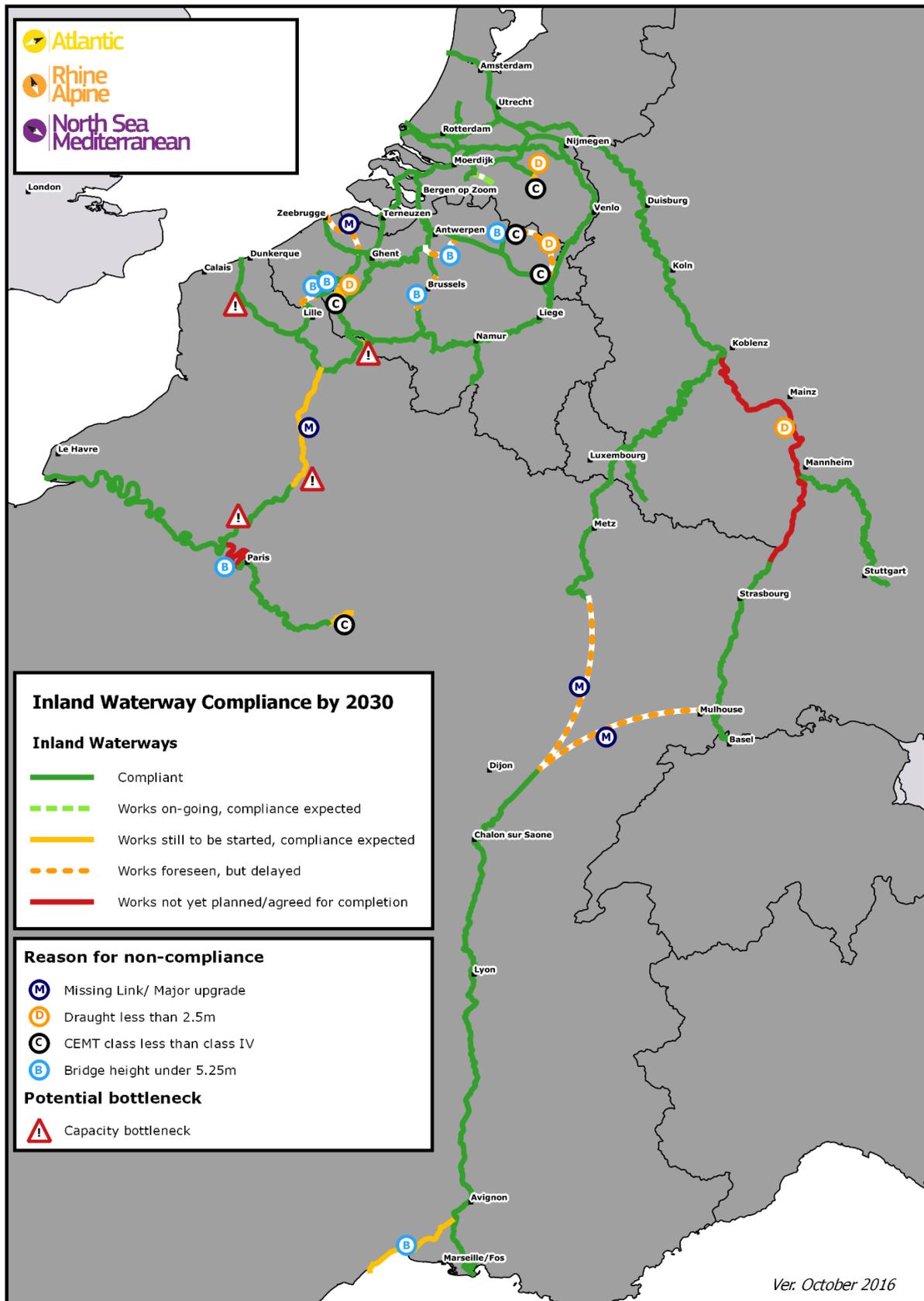


Figure 12: IWW compliance by 2030: all criteria

2.7. Critical issues

The Atlantic Corridor is characterised by an outstanding maritime dimension which is not yet fully exploited. Critical factors hindering interoperability and the seamless connection of modal networks lead to a situation of an unbalanced hinterland modal split, hindering the growth of the most efficient modes for long-distance transport.

Important critical issues were identified at corridor level, largely related to the rail infrastructure, and notably:

- the missing link between Évora and Caia, close to the border Portugal-Spain;
- different track gauges,
- electrification missing / mismatches
- and limited train lengths.

Moreover, improvements in landside access and last mile connections to ports are needed, with the majority of existing bottlenecks being related to rail. The interconnecting nodes are also affected by limitations, thus artificially broadening the role and market share of roads. Airport connectivity with TEN-T rail is also limited.

Although the IWW section (Seine river) reaches higher standards in its key parameters than the minimum levels set from Regulation (CEMT Class IV), some important local bottlenecks were identified, notably on locks and port access. Additionally, the lack of LNG availability at Ports might limit the role of some Atlantic corridor ports in the near future, if a proper plan is not rolled out. Furthermore, the need for an overall planning for Rail-Road terminals, notably in the Iberian Peninsula, was also standing out as a critical issue.

These aspects are below discussed.

2.7.1. Port hinterland connections

As seen above, the core requirements of the Regulation (EU) 1315/2013 on ports are fulfilled by all the core ports regarding maritime and hinterland transport infrastructure.

However, several limitations are present in the interconnection between sea and rail transport: in fact, although all core ports in the corridor are connected to rail, both in Portugal and Spain, the upgrade of rail connections and rail freight terminals to allow 740 m trains to access the ports is needed, as well as the electrification of the railway line connecting to the port of Algeciras and Le Havre, the largest seaports by volume in the corridor. Improving the rail hinterland connections is therefore critical to increase possibilities for modal shift.

Addressing the connection to the port of Sines through the comprehensive network is a critical issue that should be mentioned. Besides belonging to CEF annex I of pre-identified sections (Sines/Lisboa – Madrid - Rail Ports – Studies and Works ongoing, upgrading of (existing...) modal interconnection ports of Sines/Lisboa), there is no other way to accede this core port.

The maritime / riverside access to Ports / port terminals is constrained in several cases along the Seine, in Le Havre, Bordeaux, as well as in the current terminals in Lisbon. Beside the infrastructural and structural limiting factors, the deployment of the National Maritime Single Window and limited integration with the inland logistic chain



still limit the role of most corridor ports. Moreover, the lack of LNG availability at Ports might limit the role of some Atlantic corridor ports in the near future, if a proper plan is not rolled out., Open issues related with port concession, notably in view of enhancing the role of private investments, should also be addressed so as to facilitate rollout plans.

All inland ports are connected to IWW class Vb and to the rail network. Nevertheless, there are still critical limitations in those inland connections, such as the electrification of Gisors-Serqueux rail stretches connecting the ports of Le Havre and Rouen or the IWW connection to the new Port XXI in Le Havre, which are being addressed in ongoing and planned projects.

Moreover, as noted before, TEN-T includes, within the NSMED corridor, the navigable waterway from Paris via the Seine/Oise and Scheldt rivers, to connect to the Benelux countries. This is expected to increase waterborne freight traffic related to Paris and the River Seine substantially. Co-ordination between the Atlantic and NSMED corridors is therefore called for.

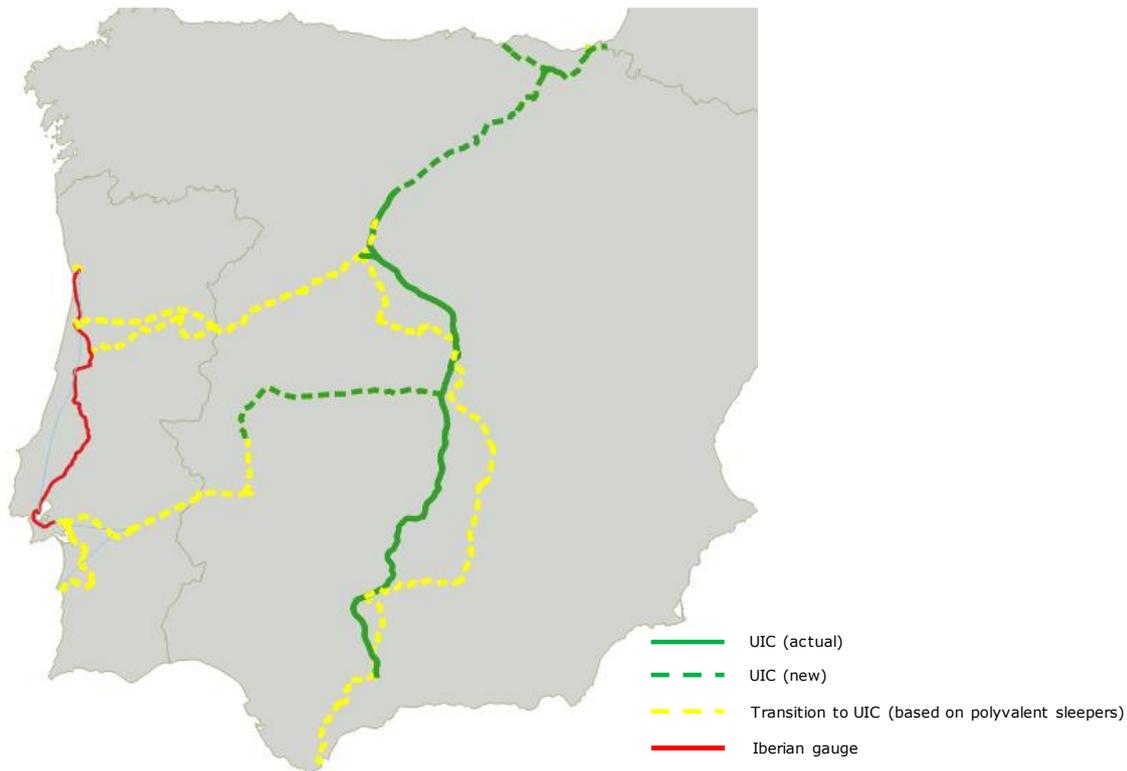
2.7.2. Interoperability constraints

Railway interoperability

The historic differences in track gauge between the Iberian Gauge (1668 mm) and the UIC Gauge (1435 mm) are being addressed by several projects, however full compliance won't be achieved until 2030. Nevertheless, with planned projects' implementation, the Iberian branch of the corridor will increase its interoperability, with the exception case of the North line in Portugal. More important, the cross-border sections will be interoperable or ready to become fully interoperable not only in terms of gauge but also of electrification and train length. Polyvalent sleepers will, finally, be the technical solution to be adopted to prepare the transition of Portuguese network² for the UIC track gauge, in consonance with the technical solutions in Spain for cross-border sections.

The figure below highlights the sections in Portugal and Spain where polyvalent sleepers are already installed or will be installed for its future upgrade into UIC.

² The third rail option is left to circumstantial cases if technical and economic analysis demonstrate to be a more cost-efficient solution.



As noted in previous sections, other interoperability parameters such as electrification or the 740 m freight train length will reach full compliance against the planned and ongoing projects. The criteria for 22,5 tons per axle load is already fulfilled at the corridor level.

As far as signalling is concerned, several of the ERTMS implementation projects are planned for a horizon beyond 2030. Nevertheless, it is worth noting that all cross-border sections are included in the set of projects to be implemented until 2030.

Notwithstanding this progress, interoperability will remain a critical issue, with relevant sections of Portuguese network, such as those in the North line connecting the nodes of Lisbon and Porto, will continue for the next period in Iberian gauge.

Although not a Regulation requirement, it is also worth noting the loading gauge of tunnels north of Bordeaux which is limiting the potential for the Rolling Motorways.

ERTMS is one of the most important and complex tools of interoperability: next to technical problems, often political, operational or project management/implementation related difficulties can hamper the progress. In order to overcome those difficulties, the European ERTMS Coordinator established in cooperation with the railway sector a so-called Breakthrough programme for ERTMS that is described with details in his Work Plan. This programme consists of a limited number of objectives to be reached by 2016. One of those objectives is the review of the currently valid European Deployment Plan (EDP). The ERTMS section of the Work Plan for the Corridor will be further developed in cooperation with the European Coordinator for ERTMS in his Work.

Road interoperability

Compliance with TEN-T parameters (highways or express roads) is very high within the corridor; in spite of this, compatibility of road e-tolling is not yet fully achieved, although relevant progress is noted.

Moreover, the upgrade to motorway of the last stretch between Portugal and Spain in the north cross border is still to be implemented (included in the project list).

2.7.3. Intermodality constraints

The interconnecting nodes are also affected by limitations, thus artificially broadening the market share of roads.

There is a clear potential for the provision of better multimodal services along the corridor and improvement of multimodal connections; making a seamless transition between modes could further improve this aspect, however an overall implementation, planning and management model for Rail-Road terminals, notably in Iberian Peninsula, stands out as a critical issue, with the core network of terminals still to be deployed, an issue that might be addressed as well in the context of the overall interoperability planning.

Together with the infrastructure related measures, notably through the supply of efficient access by trains with required parameters (≥ 740 trains length, electrified, ...), which is being addressed in several projects, a strong emphasis on the deployment of logistic single windows along the corridor, extending the current port single windows towards the hinterland and integrating with e-maritime services and information technologies, could have a strong impact to connect with other modes more efficiently.

Large efforts are being allocated to interoperability in the corridor, and the Y Basque completion will represent an important milestone in this respect. Nevertheless, to promote modal shift in the coming years along the corridor, it is of utmost relevance to take the maximum benefit from investments already completed, as it is the case of Y Basque and Bilbao node and to find innovative solutions to enhance multimodality at the corridor level able to answer to the continuous growth of maritime flows to the inland corridor.

The Jundiz platform is in a central position along the Atlantic corridor to develop a good case for intermodal services organization within hinterlands of ports and transshipment between local/national and international transport, using different gauges:

- for interconnection between, maritime (MOS and maritime containers) services in the hinterland of major western Atlantic ports and continental rail intermodal services,
- for transshipment between Iberian and UIC gauge rail network,
- and for the launching of new Rail Motorways Services, for long distance transport between Spain, Portugal and northern Europe, including Paris area, Belgium and Netherland.

Airport connections

According to EU priorities, only airports having direct rail services linking the airport with high-speed lines or long distance TEN-T railway lines shall be considered as properly “connected with rail”. Local or regional/suburban rail connections, although improving accessibility, are not sufficient for the full compliance with the Regulation.

Among the larger airports – Paris-CDG, Paris-Orly and Madrid-Barajas – only the first is currently connected to high speed rail (as well as with a suburban train connection to Paris - RER B); Paris Orly is connected to Paris with a suburban rail connection: the “Orlyval” links the airport to the RER B; Madrid-Barajas airport is linked through

commuter rail ("Cercanías" line C1) and fast metro connections. Lisbon and Porto have metro connections, while no rail connection exists for Bordeaux and Bilbao airports.

Feasibility studies of the connection of HS railway network to Madrid-Barajas airport are ongoing and comprehend the analysis of different alternatives:

- Extending the HS trains to Terminal 4 of Madrid-Barajas Airport
- Shuttle services of HS trains from Atocha to T4
- Transfer from the HS trains in Atocha to "Cercanías" commuter trains that connect with the airport

2.7.4. Crossing of major urban nodes

A key factor for the Atlantic corridor to succeed is to ensure an efficient crossing, for both freight and passengers, of two high-complexity core urban nodes it passes through, i.e.: Paris and Madrid, as above shown.

A major ongoing project is the Finalisation of the new Atocha - Chamartín standard gauge tunnel.

The UIC tunnel will allow direct connection between the north (Madrid - Chamartín) and the south (Madrid - Puerta de Atocha) HS rail stations, providing a unified HS national network, enabling direct HS services connecting the regions in the north-west/north with the regions in the north-east/east/south through this UIC tunnel.

This tunnel will also represent an upgrade on rail operation, an increase of functional possibilities of new services and a significant increase of the capacity of Puerta de Atocha and Chamartín HS stations.

Several studies will also to be developed in order to upgrade the current Atocha and Chamartín rail stations to future needs and objectives:

- Putting into value the new standard gauge tunnel Atocha-Chamartín
- Transfer of new high-speed traffic between stations (mainly to Chamartín)
- Upgrade the functional capacity of commuter traffic that share station with HS traffic.

Planned improvements for the Paris node include:

- Rail capacity: Several projects aim at increasing capacity on rail links in the Paris area or upgrading the alternative route between Paris and seaports of Normandy through Serqueux with more available capacity. These projects will reduce delays for freight trains crossing the node and improve the competitiveness of rail on the overall corridor.
- Inland waterways: Work planned on the Seine in the frame of the Seine- Scheldt project will improve infrastructures and navigation on the Seine axis both on the downstream Seine (ATL corridor) and on the upstream Seine (not ATL corridor).

Addressing potential administrative and operational barriers

In addition to physical and technical barriers, also administrative and operational barriers hinder the full implementation of the Atlantic Corridor, impacting on the attractiveness of transport routes and modes and thus influence transport demand and modal share.

Many of them are general issues affecting transport all over Europe and a number of them are being addressed in various initiatives, such as the study on Permitting which DG MOVE conducted two years ago. The objective of that study was to identify barriers in the regulatory and administrative processes that impact the effective and efficient planning and implementation of TEN-T core network projects, and to deliver recommendations on how to address these barriers. The study presented a set of proposed policy options to be considered for an eventual Commission proposal for a legislative instrument. As a follow-up, an impact assessment was launched in 2017 to identify the best policy option to simplify the administrative and regulatory framework in the field of permitting, procurement and other relevant procedures necessary for the implementation of TEN-T projects. The Commission will release that best policy option in the second half of 2018.

The Rail Freight Corridor Implementation Plan, 2017, dedicates a chapter on the cross-border requirements both in terms of the necessary documentation, changes of locomotive or drivers, etc.

It is highlighted the implementation of a coordination scheme for works in cross border sections, where all rail infrastructural and equipment work that might restraint the capacity available is coordinated at the level of the corridor and subject to an up to date publication. Particularly for cross border sections the overall goal is to have same maintenance periods on both sides, ensuring more capacity for international traffics.

Moreover, in its study on Assessment impact of the infrastructure constraints on railway undertakings, Rail freight Corridor, March 2016, it is referred to "singular" points for rail operations where the rail operating constraints apply. These points are mainly related with:

- Cross-border points with a stop at the border between Spain and France, Spain and Portugal, with a difference of gauge between France and Spain.
- Points for change of locomotive or driver due to electrification or driving/resting cycles for the driver
- Points of reinforcement of traction due to slope
- Points of decomposition/ decomposition of trains due to train length constraints

Clean fuels deployment

Deployment of e-mobility and LNG along the corridor is progressing at the studies level, with implementation projects still to start. It is unlikely that the public sector will itself finance all necessary infrastructures (i.e. filling stations) and the same applies to other road requirements, as availability of safe parking areas, being expected that the private sector could take a major role in its implementation. This situation is required to be addressed (taking into account the progress on ITS Directive and National Action Plans) in the context of existing concessions (i.e. in Portugal), as well as against the expectations of private sector on financial benefits as condition for direct involvement. The ongoing C-Roads projects in France and now Spain and Portugal will be also a step forward for ITS and particularly C-ITS deployment at the corridor level, notably in its core urban nodes.

In September 2014, the Directive on the deployment of alternative fuels infrastructure was adopted, leading to improved interoperability and common standards for recharging and refuelling technologies. This Directive stipulates that there should be an "appropriate" number of refuelling and recharging points and a more precise planning of clean fuels infrastructure inside the corridor, particularly roads and ports. A priority in Atlantic refers to the deployment of LNG facilities, considering the two

operational Emission Control Areas (ECAs) of the MARPOL convention. As per the study undertaken by SDG³ on clean power for transport, the Atlantic corridor, the needs for infrastructure at the corridor level is established as below

Table 3: Infrastructure needs clean power for transport

Electric High Power Charging	Nodes	Corridor		
		Greenfield	Brownfield	Total
Number of stations	18	5	163	168
CNG	Nodes	Corridor		
		Greenfield	Brownfield	Total
Number of stations	18	-	61	61
LNG	Nodes	Corridor		
		Greenfield	Brownfield	Total
Number of stations	37	-	39	39
Hydrogen	Nodes	Corridor		
		Greenfield	Brownfield	Total
Number of stations	18	-	61	61

Source: Steer Davies & Gleave, 2017

In the annex 5 a more detailed analysis of clean fuels along the corridor, performed in the context of the flagship “Alternative fuels Helsinki-Lisboa”, is presented.

2.8. Summary of Wider elements of the workplan

Task 3b covers three main areas: (1) innovation deployment; (2) impact of climate change on existing infrastructure; and (3) impacts of corridor deployment on GHG emissions, noise and other negative environmental impacts of transport.

This summary provides an overview on the results achieved till now in relation to:

- Analysing innovation deployment in the Atlantic corridor
- Assessing how the Atlantic CNC projects are addressing the issue of adaptation to climate change
- Estimating the contribution of the implementation of the CNC Atlantic Corridor workplan to the reduction of environmental impacts of transport, in particular its emissions of GHG

2.8.1. Innovation deployment

Regarding innovation deployment it was observed that 30% of the projects being financed within the Atlantic Corridor were classified as ‘innovative’, most promoting catch-up innovations (i.e. addressing the transferability of innovative approaches from other projects, e.g. CEF or Horizon 2020), followed by incremental innovations (i.e. relate to the implementation of known and tested technology in a way that a substantial increase of performance can be achieved) and radical innovations, which account for 5 projects (i.e. introduction of new technology which can generate a step-change of attractiveness for the users). Within these projects addressing radical innovation four refer to LNG for trucks or ships and one in innovative safety technologies for rest and parking areas in road transport). However, innovation

³ Clean Power for Transport: Infrastructure Deployment, Final Report, 2017 available from <https://bookshop.europa.eu/en/clean-power-for-transport-infrastructure-deployment-pbMI0416273/>

projects represent only roughly 6% of total investment in the CNC, which implies that these projects have relatively lower budgets than non-innovation projects.

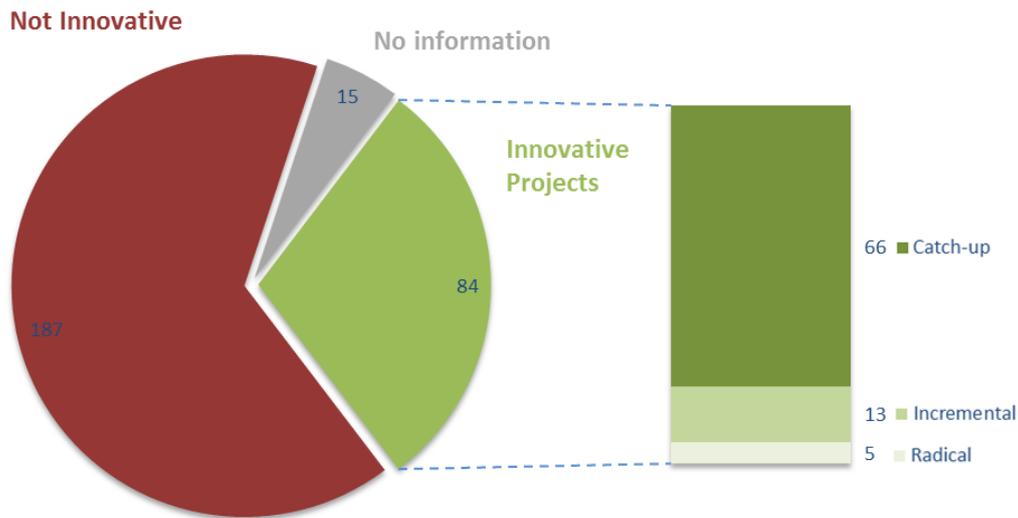


Figure 13: Overview of the assessment of innovation for the project list

Innovation is of paramount importance for the achievement of the different strategic goals set for the transport sector in Europe, across all modes. The number of innovation projects for the Corridor is relatively small and of those only 34% have a direct contribution to transport decarbonisation. It is however important to note that there are many other projects which are not classified as Innovation but which also contribute to decarbonisation. Also, some projects not classified as Innovation are in essence technological innovations: for example, the articulation of two gauges for still several years has in itself a strong innovation character.

2.8.2. Climate change adaptation

On what concerns adaption to climate change, a complete overview of potential impacts, vulnerabilities and exposure is provided.

It is not surprising to note that across all countries there are several very significant risks emerging from climate change. The analysis of how CNC projects are addressing this challenge and increasing their resilience is still incipient as the information supporting this analysis is not easily accessible.

From the analysis undertaken it is noted:

- The identification of relevant impacts across all countries and modes
- Transport is now part of climate adaptation strategies
- Most problems associated with extreme weather events, which damage infrastructure and cause traffic disruptions

As main recommendations deriving from the analysis, two emerge as critical and where particular attention should be devoted:

- To consider adaptation plans: infrastructure projects with financing from TEN-T/CEF shall pay adequate consideration to the existing plans for adaptation to climate change. Be it at national, regional or local levels these plans provide identification of current and future vulnerabilities and with a set of adaptation

- measures. Accordingly, the alignment of TEN-T projects with them shall be an important step to ensure increased resilience of the transport infrastructure;
- To address resilience in project planning and development: by analysing the climate adaptation plans, project developers will have access to information about the characteristics of future climate realities in the territories and their potential impacts. This should be taken into account in project development. For example, bridges in areas where the river flows are expected to change shall be designed to avoid bridge scouring; ports need to adapt their investment projects to potential increase in sea storms and sea level rise.

2.8.3. Modal shift and decarbonisation

To calculate modal shift and impact to decarbonisation, a modelling exercise for six corridors (ATL, NSMED, RALP, RDAN, OEM and NSB) was done considering a baseline scenario for 2030 without the Project Lists and a scenario where the Project Lists are fully implemented. The traffic forecast for the Corridor is pre-calculated from the EU Reference Forecast published in 2016. Noteworthy, by lack of data, maritime traffic is not included as well certain smaller categories such as air-freight and passenger/recreational inland waterway traffic. This is of course an important limitation of the calculations considering that maritime is estimated to take more freight traffic away from road than rail does. Moreover, the measurement of CO2 reductions does not take into account how electricity is produced, which can be more or less CO2 emitting. Therefore, the results must be considered more as indications than certainties.

According to the modelling exercise, the Atlantic Corridor will have 3.1% more traffic by 2030. This growth will mainly come from rail with a significant modal shift to rail of +124%, and to a lesser extent from inland waterways with a modal shift of +17%. Road will decrease its share by -21%:

Table 4: ATL Corridor Traffic

Transport modes	Corridor volumes (bTKm)		
	EU Reference scenario	Work Plan Scenario	Comparison EU Reference with Work Plan
Road	59.278	46.904	-20,9%
Rail	11.502	25.756	123,9%
Water	2.536	2.966	17,0%
Total	73.317	75.626	3,1%

This shift to more sustainable modes will lead to a net decarbonisation effect of the Corridor: by 2030, it is expected that CO2 equivalent will decrease by 33% thanks to the modal shift to rail and inland waterways as well as improved vehicle fuel consumption efficiency and expected development of the share of alternative fuels:

Table 5: ATL Corridor GHG 2030

Transport modes	CO2 equivalent (2030)		
	EU Reference scenario	Work Plan Scenario	Comparison EU Reference with Work Plan
Road	5665392	4482768	-35,6%
Rail	125361,3	280716,8	40,3%
Water	74177,29	86754,67	-9,8%
Total	5864930	4850240	-33,1%

In the Project List, 43 projects have been identified as contributing directly to decarbonisation. Most of them (23 projects) are related to alternative fuels, first LNG/CNG followed by electricity and hydrogen.

2.9. Projects financial sustainability

The analysis aimed to identify the funding sources of the projects in our Corridor Project List. The objective of the exercise was to determine the presence of funding gaps and the potential for other-than-public-grants forms of support.

As stated before, the Corridor Project List contains 272 projects, accounting for €43.6 billion. Of these, 61% present complete financial information and are hence eligible for the analysis. The corresponding amount, approx. €26.8 billion, is divided into the following financial sources:

- MS/ Public grants: €16.5 billion, or 61% of the total,
- EU Grants (CEF, ESIF): about €5.7 billion, or 21,2% of the total,
- Private/own resources: nearly €2.8 billion, or 10,5% of the total,
- EIB/Bank loan & others: about €1.9 billion, or 7% of the total.

The EU grants share of the total is then further divided into subcategories related to their origin:

- CEF/ TEN-T: €2.1 billion, or 37,5% of the total,
- ESIF: €1.7 billion, or 30,5% of the total,
- Other: €1.8 billion, or 32% of the total.

The analysis is further broken down considering the “potential” and “approved” share of funding, when available (e.g. when not specified, funding has been considered as potential):

Atlantic Corridor Work Plan Funding sources and financing

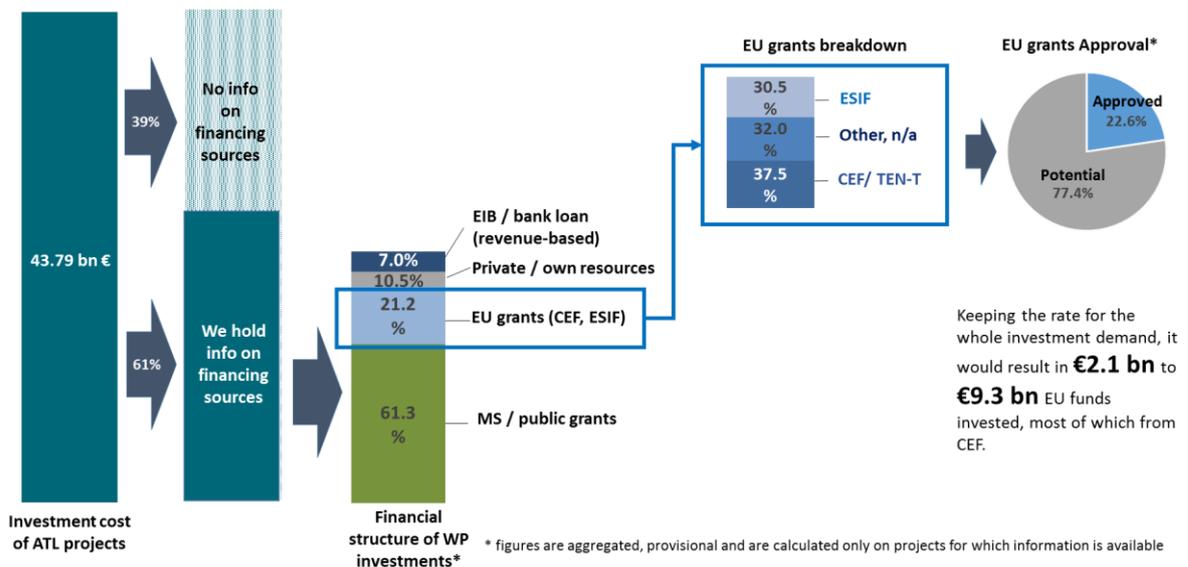


Figure 14: Funding sources and financing in the Atlantic workplan

Approved funding accounts for 22.6% of the total, while the remaining 77.4% of the total is still potential.

If we keeping the rate fixed to 42% for the whole investment demand, it would result in €2.1 billion to €9.3 billion of EU funds deployed. The inclusion of private investors and the use of financing (properly favoured through financial instruments, when necessary) can strongly contribute to provide the resources the market needs.

Following the analysis of financially sustainable projects in the Atlantic Corridor list, the results show that about 18% (49 projects) are not financially sustainable, 71.3% are potentially financially sustainable (194 projects) and 10.3% (28 projects) are financially sustainable.

The total value of financially sustainable projects is € 28.7 billion. We can therefore see that, if 15% of CAPEX were financed with private capital/loans, the reduction in grand expenditure would be equal to € 4.3 billion.

Looking for EIB/EFSI support potential - A preliminary assessment of Atlantic WP pipeline

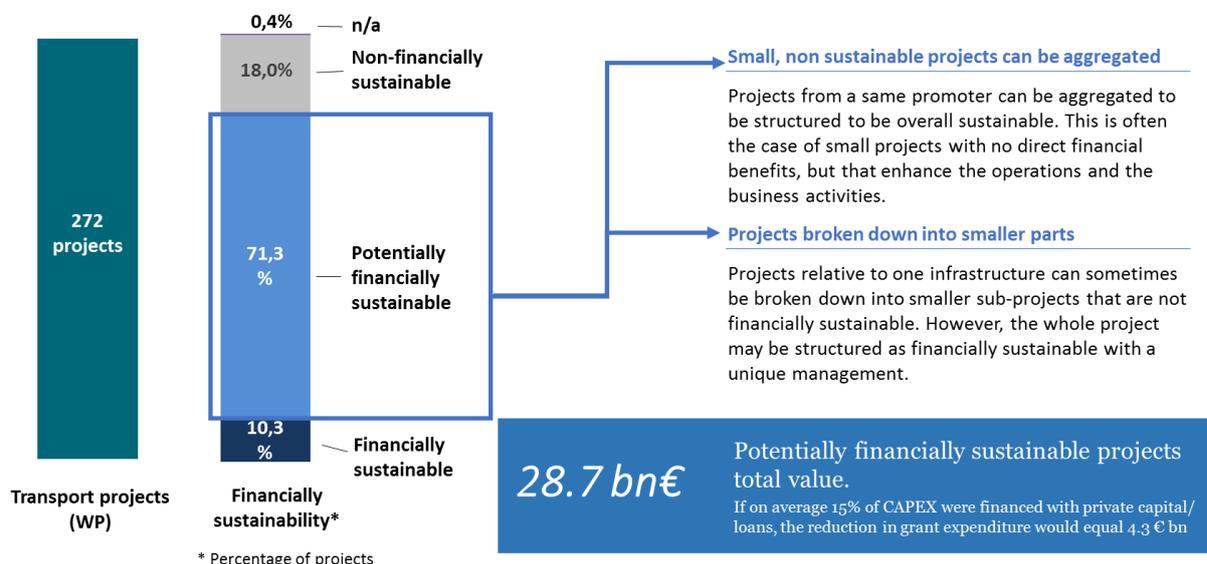


Figure 15: Preliminary assessment of EIB / EFSI support potential

Within the Atlantic Corridor, a screening exercise on the Project List has highlighted the following projects for their potential for future development through the Innovative Financial Instruments:

- Terminals (Ports, inland waterway ports, airports and rail-road terminals),
- Port capacity enhancement,
- Dedicated connections, e.g.: on High-Speed for passengers to airports,
- Clean fuels deployment (bunkering, electric charging, etc). Worth noting this is not limit to infrastructure, i.e. it foresees equipment for ship to ship operations: barges, bunkering ships, etc.

2.10. Impacts on Jobs & Growth

An analysis of the jobs and growth impacts of the Corridor, applying a multiplier methodology based on the findings of the study "Cost of non-completion of the TEN-T⁴" has been carried out.

For the analysis, we classified the projects contained in our 2017 Project List into three mutually exclusive categories:

- Cross-border projects;
- Innovation projects;
- Other and thus average projects.

The three categories also present a hierarchy. It is first looked whether a project belongs to the cross-border category; if not it is checked whether it belongs to the Innovation category. If not, it is regarded as an average project. Mixed rail and ERTMS projects are counted with 10% as Innovation project and the remaining 90% as average project. Only the projects not completed before 2016 were taken into the analysis. For each of the three categories we aggregated the projects' investments and thus obtained the total investments planned for the period 2016 until 2030.

The projects for which cost estimates are available and that are planned to be implemented over the period 2016 until 2030 amount to a total investment of 43,6 billion €2015. The implementation of these projects will lead to an increase of GDP over the period 2016 until 2030 of 419 billion €2015. Further benefits will occur also after the year 2030.

The investments will also stimulate additional employment. The direct, indirect and induced job effects of these projects will amount to 1.092.437 additional job-years created over the period 2016 to 2030. It can be expected that also after 2030 further job-years will be created by the projects.

2.11. Flagship initiatives

The opportunity to present for CEF co-funding and financial instruments also more ambitious projects aiming at implementing the EU transport policy through the TEN-T were addressed with corridor stakeholders. Overall, they aim to identify new types of projects targeted at achieving an objective defined as a theme, not restricted to one location or one stretch of road/rail, enhancing the added value of the corridor approach.

Some such potential projects in the Atlantic Corridor have been identified. They are focused on alternative fuels (inland on the one hand and maritime on the other hand) and on urban nodes (in this case a cross-border urban node) and maritime single windows and digitalization. Stakeholders were encouraged to embrace this approach and come up with more proposals to boost the integration of infrastructure and transport policy.

For Atlantic, we have identified four pilot cases with high added value for the Corridor:

- Alternative fuels from Helsinki to Lisboa and South of Spain: to offer seamless electric recharging, LNG/CNG refuelling and H2 refilling on a road-based route from

⁴ Schade W., Krail M., Hartwig J., Walther C., Sutter D., Killer M., Maibach M., Gomez-Sanchez J., Hitscherich K. (2015): "Cost of non-completion of the TEN-T". Study on behalf of the European Commission DG MOVE, Karlsruhe, Germany



Lisboa to Helsinki, in cooperation with the North Sea Baltic Corridor from Helsinki to Brussels and with the North Sea Mediterranean Corridor from Brussels to Paris as well as with Scandinavian Mediterranean Corridor.

- LNG at ports on the Atlantic coast: to ensure that as many as possible core and comprehensive ports on the Atlantic coast have bunkering and possibly ship-to-ship infrastructure to refuel LNG-motored ships.
- Seamless Spain-France cross-border connection at Irun-Hendaye: to relieve the heavy road congestion at this connection by putting in place more sustainable local solutions for both passengers and freight, involving for example rail and coaches/buses.
- Logistics single window from the Atlantic ports to the inland corridor: to support efficient freight logistics, interlinking and supporting existing digital initiatives in the different modes of transport along the corridor and improve/ contribute to speed up the corridor digitalisation.

Stakeholders are encouraged to proceed with the further development of this initiatives, notably in view of the next CEF blending call in April 2018.

3. Conclusions and key aspects from the analysis

3.1 Results of the Multimodal Transport Market Study (MTMS)

The transport market study has been developed by consultants in 2014. For methodological information, the reader is referred to the 2nd Work Plan pages 22-23.

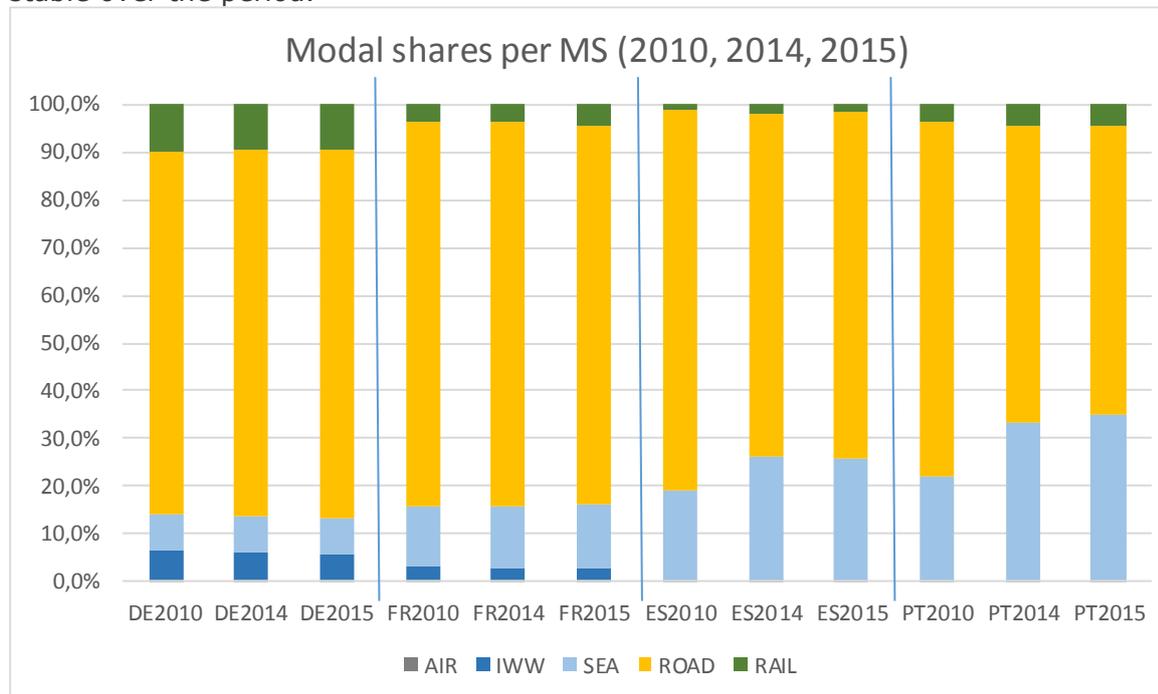
This section is a summary of the data already presented in more detail in the 2nd Work Plan, highlighting notably the main evolutions occurring at the corridor level:

General parameters

From 2010 to 2016, population in the Corridor regions saw a very moderate growth from 54 million to 54.5 million in 2014 and to 55.4 in 2016, with corridor regions representing about 11% of the EU population and nearly 12% of the EU GDP. Employment on the corridor regions shows a global recuperation almost to the values of 2010, after the 5% decrease observed from 2010 to 2014. Also, tourism in the Corridor regions continuously grows with the number of bed-places increasing by around 5% since 2014, with several regions showing rates over 15%, confirming the relevance of the Atlantic as a touristic destination.

Modal share

As in 2010, road remains the preferred mode for the transport of goods, however its share in Iberian countries, and particularly in Portugal, highlights a continuous reduction in favour of more sustainable modes, notably of maritime transport, and in lower rate of rail transport. In France and Germany, the modal shares remain rather stable over the period.

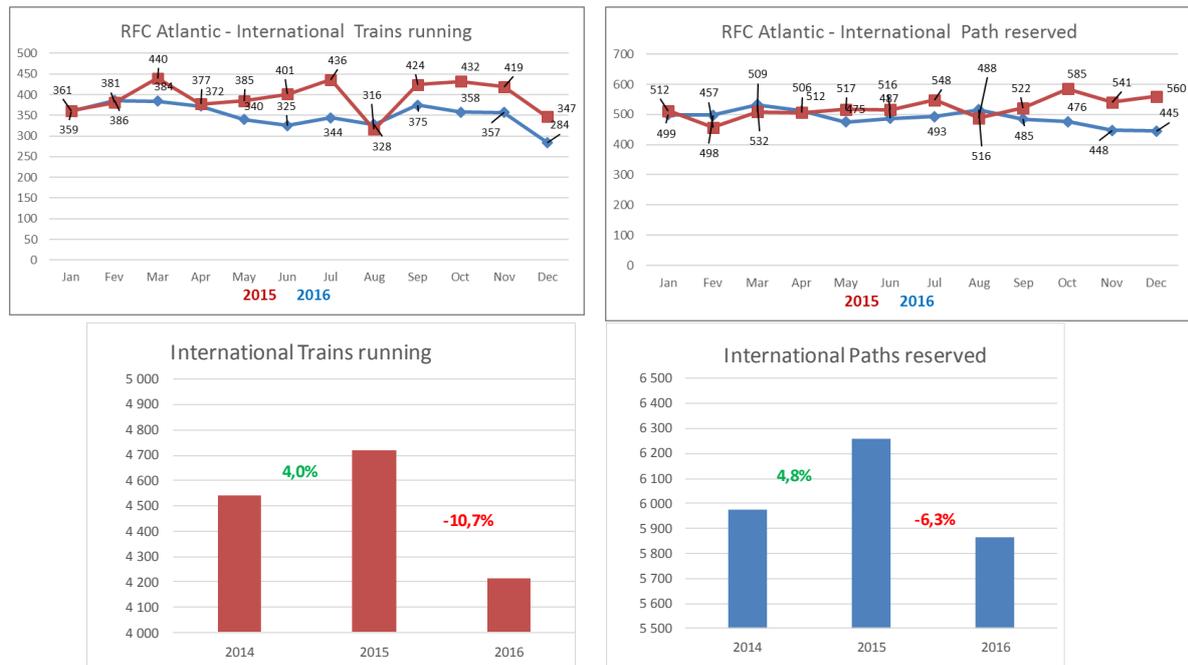


Source: Eurostat, Goods transported, by type of transport (2010, 2014, 2015)

Figure 16: Freight modal shares per Member State (not limited to the corridor)

Market

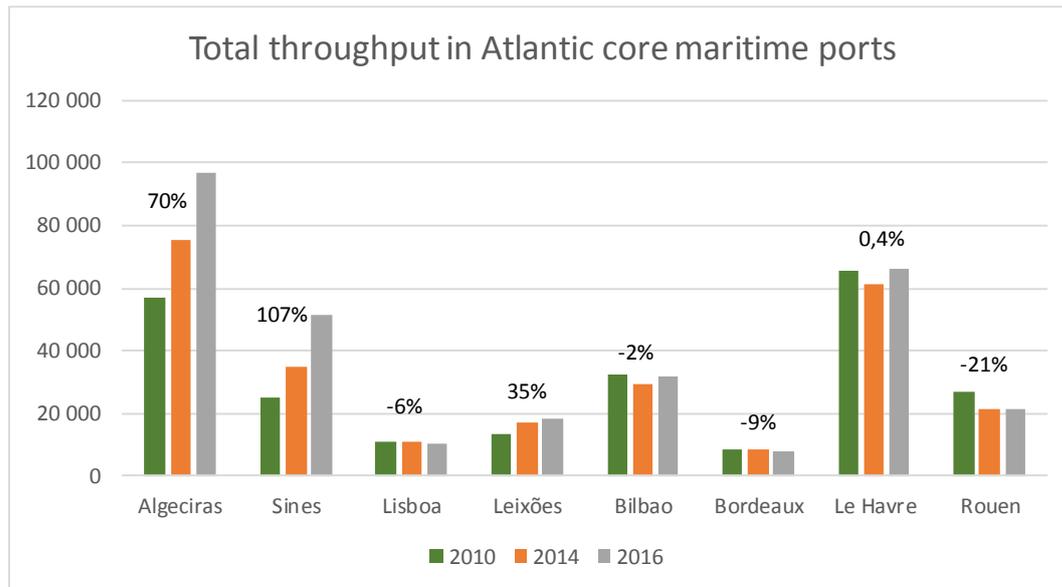
- Looking at the international *rail freight traffic*, as monitored by the Atlantic Rail Freight Corridor in 2014 and 2015, we observe that the number of international trains running, which showed an increase of 4% in 2015, decreased by nearly 10% in 2016. This is very much related to strikes and urgent works in France which impacted also the competitiveness in Portugal and Spain. For the borders ES-PT and ES-FR, in the first half of 2017 an important decrease of traffic (-20%) is again observed in France, linked to the cancelation of rail-road traffic between Woippy/Valenton and Hendaye (better competitiveness of road traffic for the full trip). On the positive side, a better punctuality is observed for the 3 countries. However, it is worth noting that capacity wishes for 2019 are significantly higher than for 2017/2018 so traffic and probably modal shift are expected to increase.



Source: Atlantic Rail Freight Corridor, 2017

Figure 17: Rail Freight Corridor Indicators

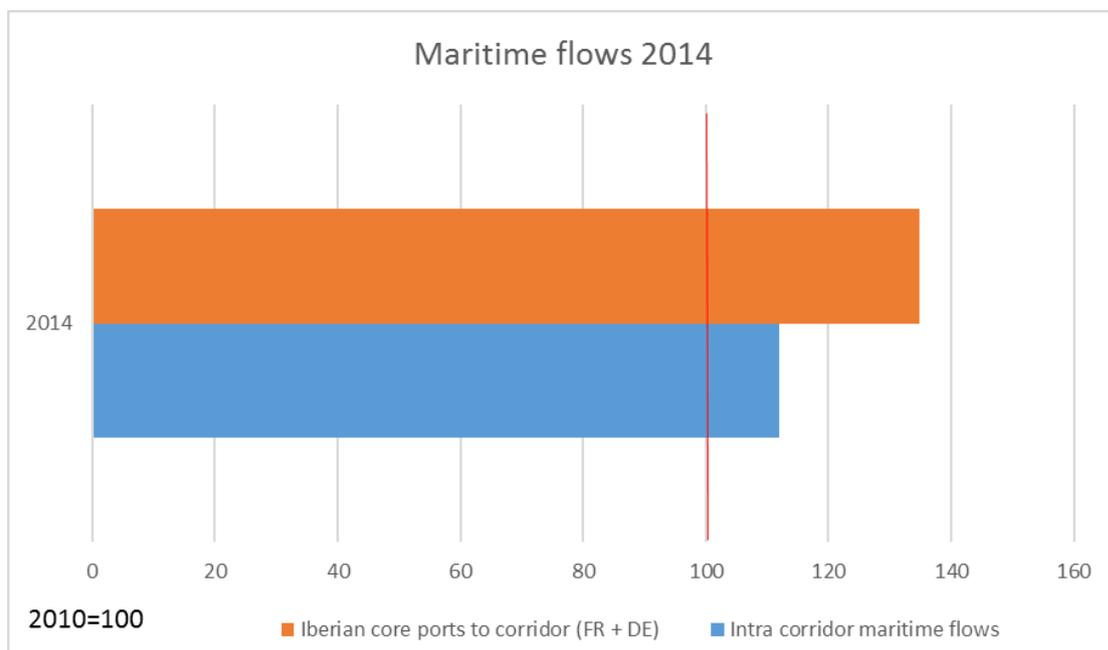
- For the *maritime mode*, a sharp increase was observed in 2014 and further reinforced in 2016. The total freight volume passing through the Atlantic Core ports increased by 27% since 2010, reaching in 2016, 303.5 million tons (it was 239 million tons in 2010). The considerable growth of Algeciras (70%), Sines (107%, more than doubling the total volumes in 2010) and Leixões (35%) largely contribute to this result. Considering all core and comprehensive ports of the Atlantic coast, the total freight volume reached 420 million tons in 2015 compared to 291 million tons in 2010. A similar trend is also visible for maritime passengers in the Atlantic ports notably Algeciras and Lisboa and to a less extent Bilbao and Leixões.



Source: Eurostat, Port statistics

Figure 18: Total throughput evolution in Atlantic core maritime ports

Intra corridor maritime flows grown at a good pace from 2010 to 2014, this trend being particularly remarkable when looking to the flows from the five Iberian core corridor seaports towards France and Germany, as presented in the next figure. Worth noting that intra corridor maritime flows were collected as one of the corridor specific KPI:



Source: Eurostat

- With regards to *inland waterways*, total inland ports throughput on the Atlantic amounts to 46.5 million tons, falling nearly 5% compared to 2014. From 2014 to 2016, Mannheim and Paris ports grow about 1% while all the other inland ports lost traffic with the ports de Moselle (including Metz) showing the highest loss with almost 28%

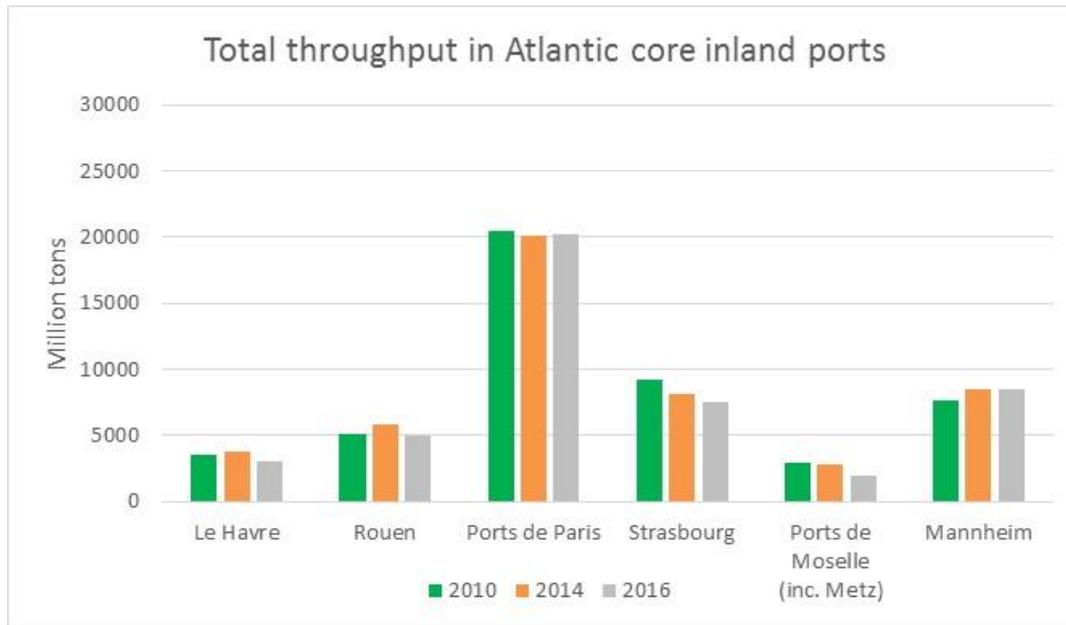


Figure 19: Total throughput evolution in Atlantic core inland ports

With regards to the Seine River, freight traffic has slightly decreased with an overall volume of 21.2 million tons in 2016 (compared with 21.5 in 2014 and 22.4 in 2010). Despite so, it is worth noting that the River's container activity from the inland ports of Rouen and Le Havre has increased: +11% for Le Havre and +26% for Rouen in 2016 compared to 2015.

3.1.1. Progressing with the MTMS

A study developed in 2015 for the RFC on the "Impact of Atlantic ports' development on international rail freight traffic" showed that rail traffic represents a hinterland market share of 12% (13 MT), with the highest share observed in Portugal (19%), Spain (10%), and the weakest in France (8%), and that, on the whole Atlantic Corridor, rail pre-post haulages concern mainly dry bulk and container traffic (5 MT each of them) for two thirds of its market. The main container rail services are operated in Sines (2 MT), where the handled volumes permit economies of scale and intermodal services despite the high transshipment rate. Le Havre and Bilbao reach nearly 1 MT each and, to a lower extent, Algeciras, Leixões and Lisboa dispatch 0.5 MT each on rail intermodal services.

However, for reasons of flexibility and ability to adapt more quickly to the demand of freight clients, most of the traffic in volume on short distances is captured by the road mode, due also to the barrier existing in cross-border railways. The potential of rail remains significant for mid- or long-distance destinations, where it could benefit from multi-client intermodal services for containers and trailers (Algeciras, Le Havre).

For the Atlantic Corridor, it must be kept in mind that major changes are indeed expected since:

- For the base year, alternative modes do not perform very well against road due to major interoperability problems;
- Part of these problems are expected to be solved with major investment projects for alternative modes, including development of new techniques such as Rail Motorways and MoS services, while others can be overcome with operational arrangements between infrastructure managers and with innovative administrative tools;



- and that the relative importance of very long distance international transport along the Corridor, compared to other Corridors, calls for innovative organisational solutions, with the development of transport hubs and multimodal logistic platforms.

For instance, the Traffic Market Study (TMS), realised by the RFC in 2014/2015 showed a high demand level for new rolling motorway services on the Atlantic Corridor of 2 million tons per year (equivalent to 4000 trains) by 2020 and 5.877 million tons (10.000 trains) by 2030. In this respect, the ongoing study "Feasibility Study of Rolling Motorway Service on the Atlantic Corridor at Short, Medium and Long Term" for the Rail Freight Corridor will bring further insights on its potential, notably between Spain and Portugal.

Another example is the maritime transport of containers. The study for the Atlantic RFC shows that an average moderate growth of 2%/year can be expected, which is much lower than the expected growth for rail traffic (containers 10%/year, dry bulk 5%/year, general cargo 4%/year) but could be higher if ports accessibility is improved.

The Corridor's added-value will also be influenced by its potential to improve the logistics chains to/from the EU in the global framework. When assessing this potential, two additional key elements also need to be considered:

- The deployment in the near future of LNG as maritime fuel in the North Sea-Baltic and North America's East coast, following the establishments of ECAs according to the MARPOL convention (operational since 2015), being noted in particular the effects in terms of competition that might affect the port of Le Havre, the only Atlantic port included in a ECAs;
- The enhanced role of the Atlantic area following the openings of the new Panama lock system and Suez Canal widening and, gradually, the growth of the polar route between the Far East and the North Sea.

While this set of factors call for enhanced capacity on ports, ensuring adequate inland connections for long-range transport, to the rail freight corridor, and to inland waterways, where available, is also critical.

In this respect, it is worth mentioning that in the short range (by 2023), Vitoria will be the key interconnecting point Iberian-UIC gauge, while capacity is being developed on the French side (which already consists of a double track electrified line compatible for 740-m long trains). It is therefore crucial to develop a plan to fully exploit its potential, also with reference to branch of the RFC feeding the Atlantic Corridor (e.g.: Zaragoza-Pamplona-Vitoria).

Additionally, the different corridors with inland waterways developed a joint macro analysis for container shift potential study for inland waterways, which objective was to identify individual transport flows that, brought together, could bring enough volume to operate a liner service between two (or more) Inland Terminals. A top-down approach has been used to determine the multimodal market potential. The assessment conducted highlights a low potential for container shift growth along the Seine river basin in the Atlantic corridor. The Douro inland waterway was not considered in the exercise, although it could play an important role in the future by connecting relevant industrial zones to seaport.

3.2. Urban nodes

The Atlantic corridor counts with seven core urban nodes including the three capital cities (Paris, Madrid and Lisboa) and four other main agglomerations: Mannheim (Germany), Bordeaux (France), Bilbao (Spain) and Porto (Portugal).

Table 6: Atlantic corridor urban nodes

Country	Urban Node	Other CNC	Connection with modes		
			Rail	Road	IWW
Germany	Mannheim	RDAN RALP	x	x ⁵	X ¹
France	Paris	NSMED	x	x	x
	Bordeaux	-	x	x	x
Spain	Madrid	MED	x	x	
	Bilbao	-	x	x	
Portugal	Lisboa	-	x	x	
	Porto	-	x	x	x

2.3.1 Madrid

Overview of the node

The following figure depicts Madrid urban node, common for Atlantic Corridor (yellow colour) and Mediterranean Corridor (green colour), in terms of core infrastructures, that according to Regulation (EU) N° 1315/2013 are the following:

- Madrid-Barajas airport
- Madrid RRT (Norte y Sur)

It is worth mentioning that the picture depicts Madrid RRT as shown in the TEN-Tec system and that the Regulation contains a single RRT in Madrid. However, in reality Madrid articulates rail freight traffic mainly through four different RRT, each one in a different geographical location:

- Coslada dry port
- Abroñigal RRT
- Vicálvaro RRT
- Villaverde Complex RRT (Villaverde - San Cristóbal)

Adif manages additional rail facilities in Madrid (Aranjuez, Santa Catalina and others), but they are used only as technical installations, not for train loading/unloading. Dry port of Azuqueca, which is located in Guadalajara (Region of Castilla-La Mancha), is functionally linked to the rail freight corridor Madrid-Barcelona (belonging to Mediterranean Corridor), despite not belonging to Madrid node.

⁵ There are no IWW and Road networks components in Germany for the Atlantic corridor

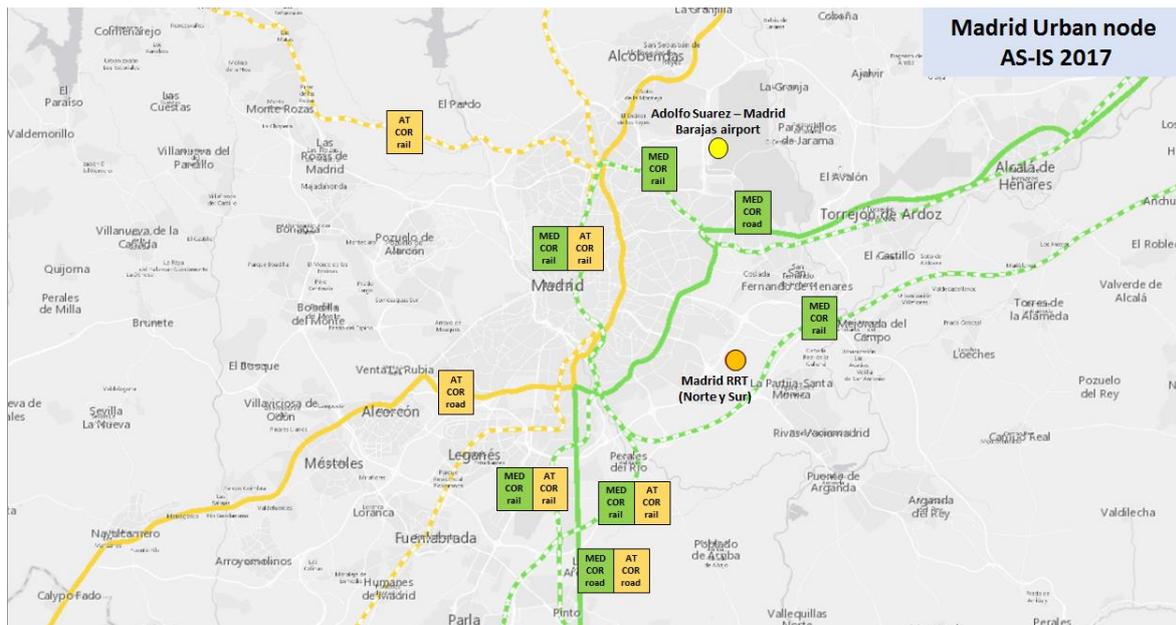


Figure 20: Madrid urban node

As shown in the figure above, Madrid node shares sections of roads and rail infrastructure with Mediterranean Corridor (labels in green and yellow colours).

Analysis of current barriers

Madrid urban node is characterised by the following main issues:

- a) Strongly heterogeneous rail traffic sections due to overlapping of metropolitan, regional, long distance and freight traffic. This mixed use of infrastructure affects negatively node performance requirement for freight traffic, especially during the periods of higher commuter train frequencies, and may risk constituting a bottleneck to the smooth functioning of the corridor.
- b) In regard to the high-speed rail network, there is a lack of connectivity in UIC gauge between the north station (Madrid Chamartín) and the south station (Madrid Puerta de Atocha), which avoids direct services connecting the regions in the north-west/north with the regions in the north-east/east/south through Madrid.
- c) Madrid rail freight traffic is mainly articulated through the dry port of Coslada and the RRTs of Abroñigal (containers) and Vicálvaro / Villaverde (conventional freight). These facilities lack of capacity to absorb the expected rail freight traffic demand mainly due to limited number of tracks and usable track lengths. Additionally, the lack of UIC gauge may reduce rail competitiveness in the future transport market. Currently, the RRT of Abroñigal is considered to be a operational constraint for freight movement. Abroñigal RRT is located in the central urban area, and represents a bottleneck in the Madrid node, as is connected to congested roads (M-30) and it takes a lot of time for trucks to enter/exit this terminal at peak traffic hours. The existing infrastructure in Abroñigal only allows for 410-500 metres long trains and, due to its location, its expansion is not possible.
- d) Main access roads suffering from traffic congestion in Madrid are the M-30 and M-40 ring roads. M-30 problems are specially located at the eastern arch, on the section between the A-2 (Madrid-Barcelona) and A-3 (Madrid-Valencia) radial accesses; and M-40 problems are located at the eastern and southern arches, where traffic congestion on peak hours is mainly related to accessibility

to the economic areas located in these city sectors (Ribera del Loira, Villaverde, Julián Camarillo, etc.).

In terms of last mile connection, Madrid airport is not connected to long-distance rail, which impedes the realisation of journeys from other Spanish cities connected with Madrid by HS rail. This means that at present, passengers travelling by train to Madrid to catch a flight from Madrid airport need to change at either Madrid Chamartin or Madrid Puerta de Atocha HSR stations. According to recent studies about HSR – aeroplane complementarity in Madrid city, passengers doing these changes would add up to 600,000/year.

Main upcoming projects

A major ongoing project in Madrid is the finalisation of the new Atocha - Chamartín standard gauge tunnel. The UIC tunnel will allow direct connection between the north (Madrid - Chamartín) and the south (Madrid - Puerta de Atocha) HS rail stations, providing a unified HS national network, enabling direct HS services connecting the regions in the north-west/north with those in the north-east/east/south.

This tunnel will also represent an upgrade on rail operations, an increase of functional possibilities for new services and a significant increase of the capacity of the Puerta de Atocha and Chamartín HS stations. Several studies are planned to upgrade these stations to meet future needs:

- Putting into value the new standard gauge tunnel Atocha-Chamartín
- Transfer of new high-speed traffic between stations (mainly to Chamartín)
- Upgrade the functional capacity of commuter traffic that share station with HS traffic.



Figure 21: Atocha-Chamartin connection

Moreover, the enhancement of the existing infrastructure in Vicalvaro RRT to international standards for freight trains would allow this terminal to become a state-of-the-art logistic node, integrated in the TEN-T.

2.3.2 Paris

Overview of the node

The Paris node is at the junction of the ATL Corridor, with branches heading from Paris to the Iberian Peninsula, Mannheim and Le Havre, and the NSMED Corridor linking the Paris area with North of France, the UK and the Benelux. For freight, rail infrastructures on the Corridor include conventional lines to Strasbourg in the East, Bordeaux in the South, Rouen and Le Havre in the North-West through Mantes-la-Jolie or through Serqueux for freight trains (opening in 2020). Additionally, the ATL Corridor includes the Grande Ceinture Ferroviaire (Large Rail Belt) bypassing Paris and

connecting all 4 aforementioned branches. Passenger rail lines include the East HSL to Metz and Strasbourg, the Paris-Bordeaux HSL and the high speed interconnection line linking the East HSL to the Paris-Lyon HSL (not in the ATL corridor).

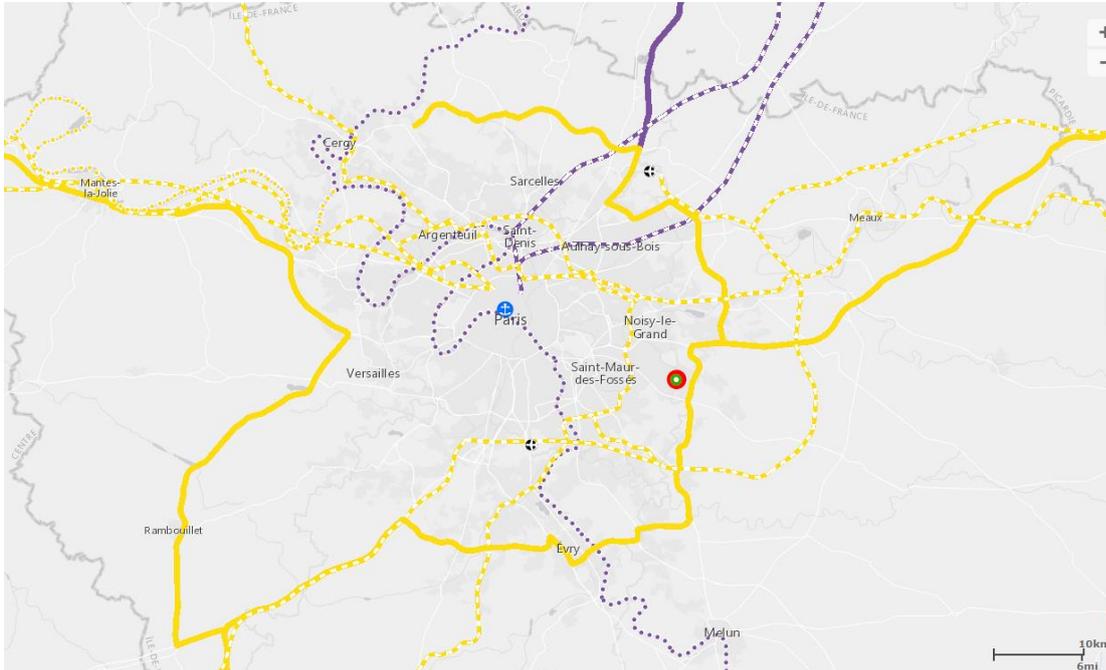


Figure 22: Paris urban node

Two airports managed by Paris Airports:

- Roissy CDG airport in the North,
- Orly airport in the South,

Ports of Paris (member of HAROPA): operates over 20 different ports, terminals and urban quays in the Paris area, the two main ports in terms of volumes and intermodality are the following:

- Genevilliers on the Seine downstream from Paris,
- Bonneuil-sur-Marne upstream from Paris.

RRTs: apart from ports, Paris node is composed of two RRTs belonging to SNCF Réseau:

- Valenton in the South,
- Noisy-le-Sec in the North-East.

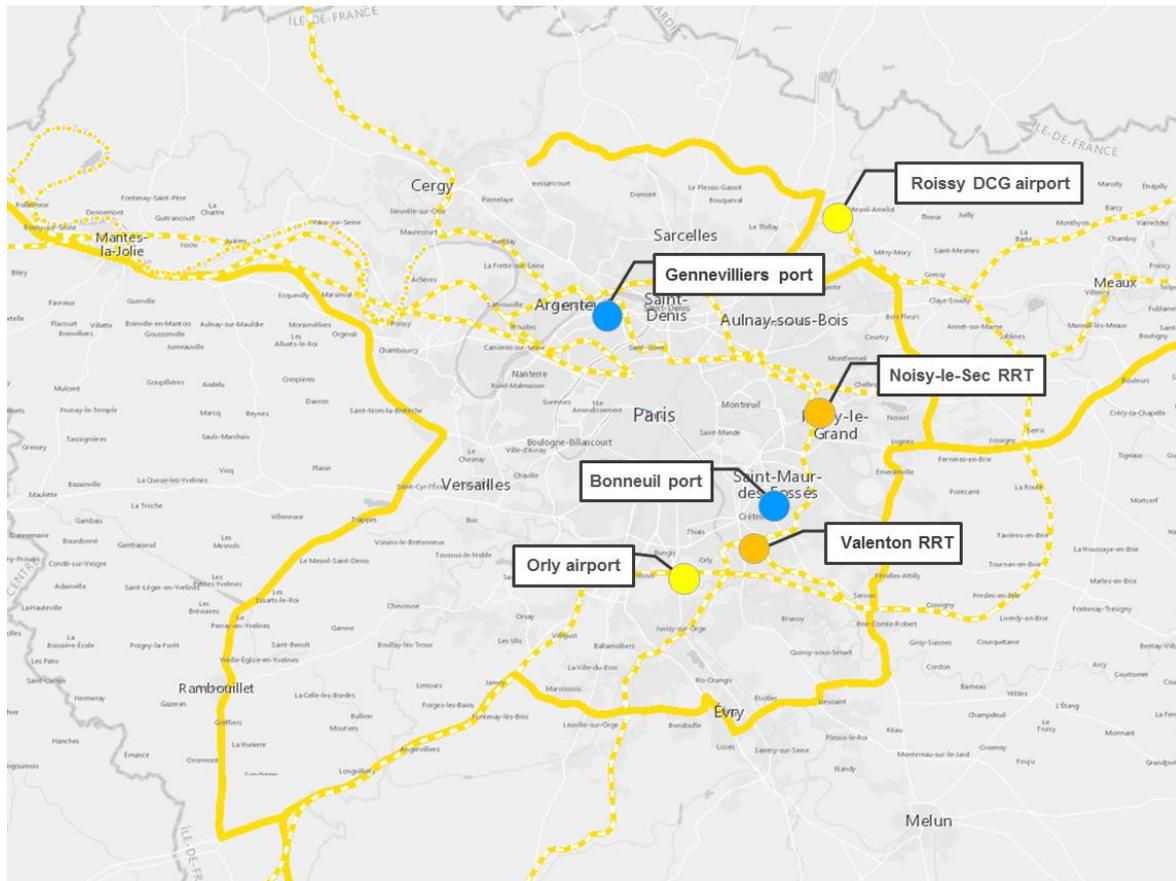


Figure 23: Inland port and RRT in Paris urban node

At the Paris node the ATL corridor is composed of the following motorways:

- A10 to the South,
- A4 to the East,
- A13 to Normandy,
- N104 "Francilienne" around the Paris area.

Analysis of current barriers

The Paris node is characterised by the following issues:

- a) Important concentration of traffic generated by the Paris agglomeration, and by transit traffic along the Atlantic axis, national and international transit from Spain and Portugal to northern Europe, and along East/West axis from Normandy to Germany.
- b) Limited capacity on rail lines to Paris due to an extensive rail traffic mixing local trains, long distance trains and freight trains. These capacity issues often play to the disadvantage of freight trains which have difficulties crossing the node during day time and can be impacted by work during night time.
- c) Limited capacity for intermodal terminals in the area of Paris and limited number of intermodal services offered for international traffic towards Southern and Northern Europe; Paris area plays a limited role as major hub of intermodal service organization in France and western part of Europe
- d) Congestion on roads revealing the preponderance of the road mode for both passengers and freight. On the corridor, the A4 and A13 are the most impacted by congestion.



- e) Ports at Paris offer limited supply of available land to cope with the demand and IWW traffic growth. Port of Bonneuil is also located downstream from Paris limiting the height to two levels of containers carried by barge between Bonneuil and the sea ports of Normandy.
- f) Old or obsolete infrastructure, including locks and dams, on the Seine reducing efficiency, viability and capacity for waterway traffic on this important river axis.

Main upcoming projects

Still missing on the HSL network at the Paris node are the Interconnection Sud project, joining the Paris-Tours-Bordeaux line to the Paris-Lyon, Paris-Strasbourg and Paris-Lille lines, as well as the Paris-Normandy line.

Several projects aim at increasing capacity on rail links in the Paris area or upgrading the alternative route between Paris and the seaports of Normandy through Serqueux. These projects will reduce delays for freight trains crossing the node and improve the competitiveness of rail on the overall Corridor.

The works planned on the Seine in the frame of the Seine-Scheldt project will improve infrastructures and navigation on the Seine axis both on the downstream Seine (ATL corridor) and on the upstream Seine (not ATL corridor). Several projects by Ports de Paris will develop the network of platforms on the Seine (Paris Seine Métropole, Triel-sur-Seine, extension of Limay) or improve multimodal access to existing platforms (in particular RN406 to the port of Bonneuil-sur-Marne), thus enhancing multimodality at the Paris node.

Moreover, two metro projects conducted by Société du Grand Paris aim at improving access to Paris core network airports.

2.3.3 Lisboa

Overview of the node

Within the urban node of Lisboa, the following components of the core network are included:

- Lisbon Airport (Humberto Delgado), managed by Ana Aeroportos de Portugal
- Port of Lisboa (Lisbon Port Authority) with its port activities taking place on both banks of the Tagus estuary.

The urban node is connected with following sections of the core road network:

- A1 to the North
- A12 (Vasco da Gama bridge) to the south

The core rail network includes the Cintura line (around Lisboa) connecting the south bank (section Lisboa-Pinhal Novo through the 25th April bridge) to the North line (section Lisboa-Setil). Core rail network includes also the planned connection Lisboa – Madrid, highlighted in red in the following figure.

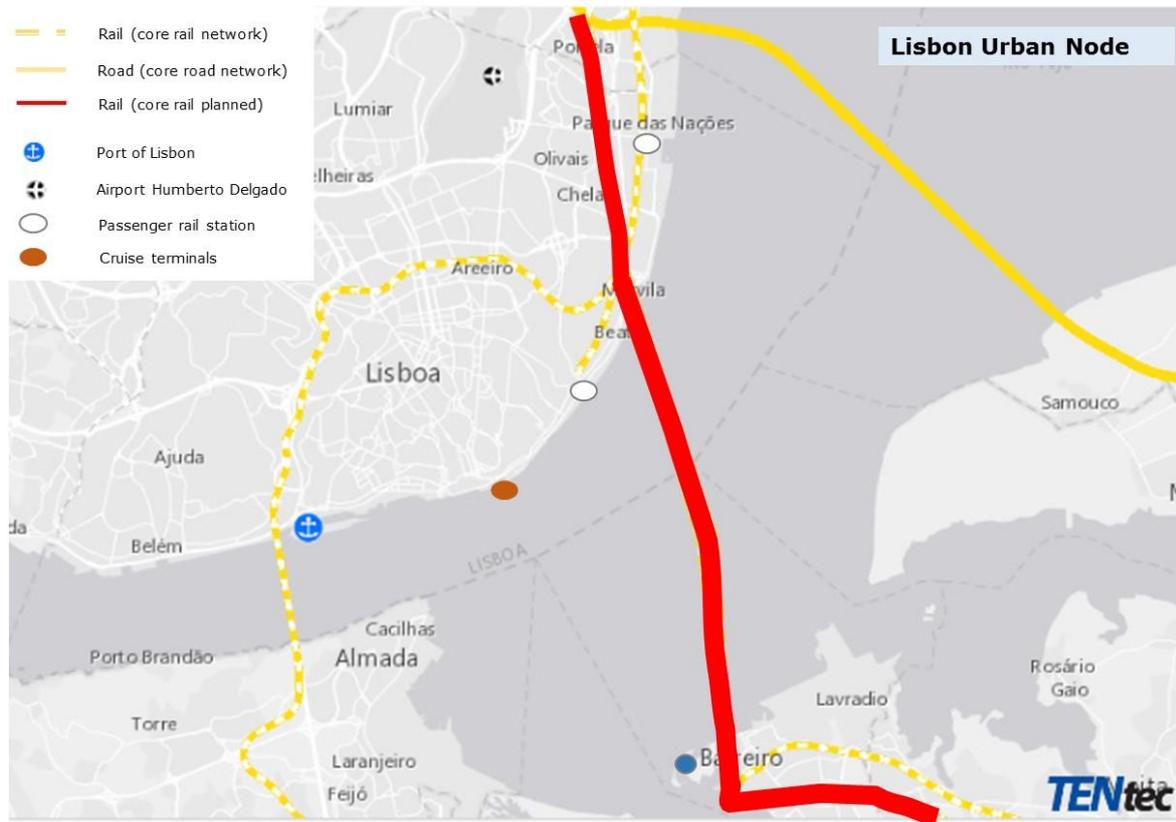


Figure 24: Lisboa urban node

Analysis of current barriers

In the Lisboa node, the main issues relate to last mile connections: the terminals belonging to the maritime port of Lisboa are located on both sides of the Tagus, with different modal connections: the north shore focuses on containerized cargo, Roll-on / Roll-off and other general cargo and cruises. The different specialised terminals in liquid and solid bulk are positioned on the south shore. Of these terminals on the south shore, only the terminal of Barreiro has railway connections. Container facilities include three terminals located on the north bank of the river. These terminals have railway connections, but there are severe bottlenecks for the terminal of Alcântara, the most critical ones being the urban level crossing (with several conflict points) of major roads and the converging of freight traffic into the *Cintura line*, a highly saturated line where three main suburban lines converge. An overall study planning on the rail infrastructures and services in the Lisboa node is foreseen. Studies for the Lisboa multimodal platform including a revamped terminal on the South bank (Barreiro) are ongoing; its results could lead to a potential concentration of main freight services in the south bank of the Tagus in a revamped container terminal at Barreiro, where rail has enough capacity to cope with additional flows (but where last mile connections to the port will be necessary) thus reducing the pressure of freight transport in the urban node.

As mentioned above, the Lisboa airport is currently served by the underground. However, by 2050, the airport should be connected to the core railway network, if possible with high speed line. The current Project List doesn't plan any measure to address this requirement.

Main upcoming projects

On the other hand, important ongoing projects with relevant impact on the functionality of the urban node as a smart, clean, inclusive and connected city, which go beyond infrastructure deployment, include the development of a Municipal Integrated Operational Centre Municipal (COI) which will integrate with the National Single Access Point. Moreover, a C-ITS pilot case in the Lisbon Urban node will deploy a relevant set of C-ITS day 1 and day 1,5 services.

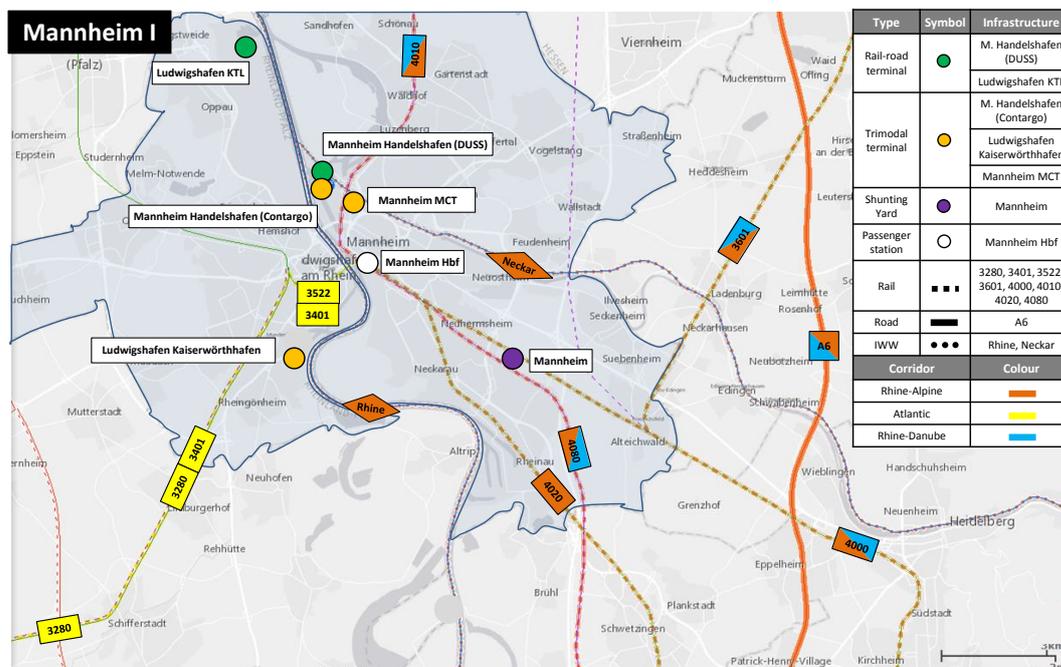
The conclusion of the Port Cruises Terminal in summer 2017 and its connection with other modes (metro, light rail, buses and railways, both long distance and suburban lines) reinforces the relevance of the Lisbon node from the tourism perspective (523 thousand passengers/ 311 ships in 2016).

In terms of alternative fuels, the Electric Mobility program foresees a wide coverage of charging points in the Lisbon urban node. New fast charging points on major motorways connecting Lisbon to the north and the south are foreseen under the "CIRVE_PT" and "Deployment of Autogas refuelling stations in metropolitan areas in Spain and Portugal" projects.

2.3.4 Mannheim

Overview of the node

Mannheim is the third-largest city in the German federal state of Baden-Württemberg and it is one of the twenty largest cities in Germany. Three corridors run through the urban node of Mannheim, the Rhine-Alpine, Atlantic and Rhine-Danube Corridors. The motorway A6, passing next to the node, as well as many corridor rail lines are part of the Rhine-Danube network while the Rhine and the Neckar, that flow together in Mannheim, belong to the Rhine-Alpine core network. Two rail-road terminals (M. Handelshafen (DUSS) and Ludwigshafen KTL) and three trimodal terminals (M. Handelshafen (Contargo), Ludwigshafen Kaiserwörthhafen and Mannheim MCT) characterise the urban node area of Mannheim.



Source: HaCon

Figure 25: Overview on Mannheim urban node

Analysis of current barriers

Except from the rail section “Mannheim-Waldhof – Lapertheim” (on the north of the urban node on the rail line 4010), which is afflicted by overstressed capacity, the corridor core network in Mannheim is totally compliant. On the above mentioned section a project to solve the bottleneck has been already planned. Moreover, a project for the “Node extension Frankfurt, Hamburg, Köln, Mannheim, München + Hannover, Bremen”, partly affecting the Atlantic Corridor, has been foreseen to eliminate current or potential capacity bottlenecks within the whole node.

2.3.5 Bordeaux

Overview of the node

The Bordeaux urban node, located along the Atlantic coast halfway between Paris and Madrid, hosts a population of 1.1 million inhabitants in its urban area (source INSEE 2012). It is connected to Paris by the A10 motorway and to Spain by the A63 motorway, both part of the core network. Bordeaux is positioned on the Paris-Orléans-Tours-Bordeaux-Dax-Hendaye core network conventional rail line and connected to Paris by high speed line after the opening of the LGV SEA line between Tours and Bordeaux in July 2017.



Figure 26: Bordeaux urban node

The previous figure depicts the relevant infrastructures composing the Bordeaux Urban node according to Regulation (EU) N° 1315/2013):

- Merignac airport,
- Hourcade RRT owned by SNCF Réseau; Hourcade has also been an important marshalling yard for the western part of France, and has rail equipment which is still used for traffic management and composition of train in the whole area of

Bordeaux, over short distances as well as for planning longer distance trains to/from Spanish border.

- Port of Bordeaux, including the following terminals from the Atlantic Ocean to the city (see figure below):
 - Le Verdon a deep sea terminal specialised in containers,
 - Pauillac for fuel storage as well as Airbus logistics,
 - Blaye dedicated to liquid and dry bulk,
 - Ambès specialised in petrochemical and chemical products,
 - Grattequina for heavy lift cargo such as elements for wind mills,
 - Bassens which handles most of the goods passing through the port (bulk, containers and heavy lift cargo),
 - Bordeaux for cruise ships.

Analysis of current barriers

The Bordeaux node is characterised by the following issues: important congestion on the Bordeaux bypass, notably in the Eastern part connecting Merignac airport and in the South on the part from A63 to the Garonne belonging to the ATL corridor; public transport access to Merignac airport which is currently not connected by any rail mode; limited capacity of rail infrastructure to allow for expected passenger and freight traffic increase due to the development of the high speed network (Tours-Bordeaux, Bordeaux-Toulouse expected for 2024 and Bordeaux-Spain planned for 2032) and upgrades of the conventional network in Spain and France. Furthermore, waterway access to terminals furthest from the ocean is limited to some time-windows due to a natural draught of 8.80 meters and a decreasing natural dredging by the river.

Main upcoming projects

Notable improvements are foreseen for the Bordeaux node: several projects aim at increasing capacity in or near Bordeaux on the Paris-Spain rail line. These projects will allow trains induced by coming network developments such as the GPSO HSL and the deployment of the UIC gauge on the Iberian Peninsula. The Gironde XL project by the port of Bordeaux aims at dredging and promoting innovative solutions to allow larger vessels at terminals furthest from the ocean. A public transport project by Bordeaux Métropole aims at connecting by light rail the Merignac airport to the city centre.

2.3.6 Bilbao

Overview of the node

The following figure shows the core infrastructures in Bilbao urban node, that according to Regulation (EU) N° 1315/2013 are the following:

- Bilbao airport
- Bilbao maritime port
- Bilbao RRT

It is worth mentioning that the picture depicts Bilbao core infrastructures as shown in the TEN-Tec system and that the Regulation contains a single RRT in Bilbao. However, in reality Bilbao articulates rail freight traffic through the following RRTs:

- Terminals of port of Bilbao (trimodal): there are different areas with specialized terminals in different types of traffic:
 - Liquid bulk
 - Dry bulk

- Containers
 - General cargo
 - Ro-Ro
- Jundiz RRT in Vitoria, mainly used for containers.
 - Dry Port of Azuqueca (Bilbao Port Authority owns 7% of shares): located in Guadalajara (Region of Castilla-La Mancha), it is functionally linked to the rail freight corridor Madrid-Barcelona, which belongs to Mediterranean Corridor.

The planned Dry Ports of Arasur and Pancorbo, currently under development, will be another two key RRTs for the operation of freight traffics within the hinterland of Bilbao Port.



Figure 27: Bilbao urban node

Analysis of current barriers

The urban node of Bilbao is constrained by some relevant bottlenecks: the rail line between Bilbao and Bilbao Port does not reach the minimum speed of 100 km/h. Moreover, due to the high heterogeneity of rail traffics in the access to Bilbao city, linked to overlapping of metropolitan, regional, long distance and freight traffic, the node performance for freight traffic is rather low, especially during periods of higher commuter train frequencies. Mainly as a result of this overlap of commuters' trains and freight trains, the current RRTs linked to the activity of the Bilbao Port cannot cover all the expected needs. Currently there is no rail connection to the Bilbao airport.

Main upcoming projects

With the projects currently foreseen in the Project List, the majority of existing issues in the node will be addressed. Notable projects include the creation of a new direct connection to the Bilbao Port through the existing Serantes tunnel in UIC gauge (South rail bypass) which will contribute to enhance intermodal transport between Bilbao Port and the centre of the Iberian Peninsula and the rest of Europe, allowing avoiding the circulation of freight traffic through Bilbao's urban area. Also the creation

of the new HS access to Bilbao within Y Basque in UIC gauge, independent from the current Iberian gauge network, will grant direct rail access to the city of Bilbao. It will be at Bilbao-Abando station where intermodality will be set for underground, commuters, regional and long distance trains .

2.3.7 Porto

Overview of the node

Within the urban node of Porto, the following components of the core network are included:

- Porto Airport (Francisco Sá Carneiro), managed by Ana Aeroportos de Portugal
- Port of Leixões, managed by APDL - Port Authority of Douro, Leixões and Inland Waterway
- Not included in the corridor, but belonging to the core network, the Port of Douro (inland port) and the Douro inland waterway also managed by APDL

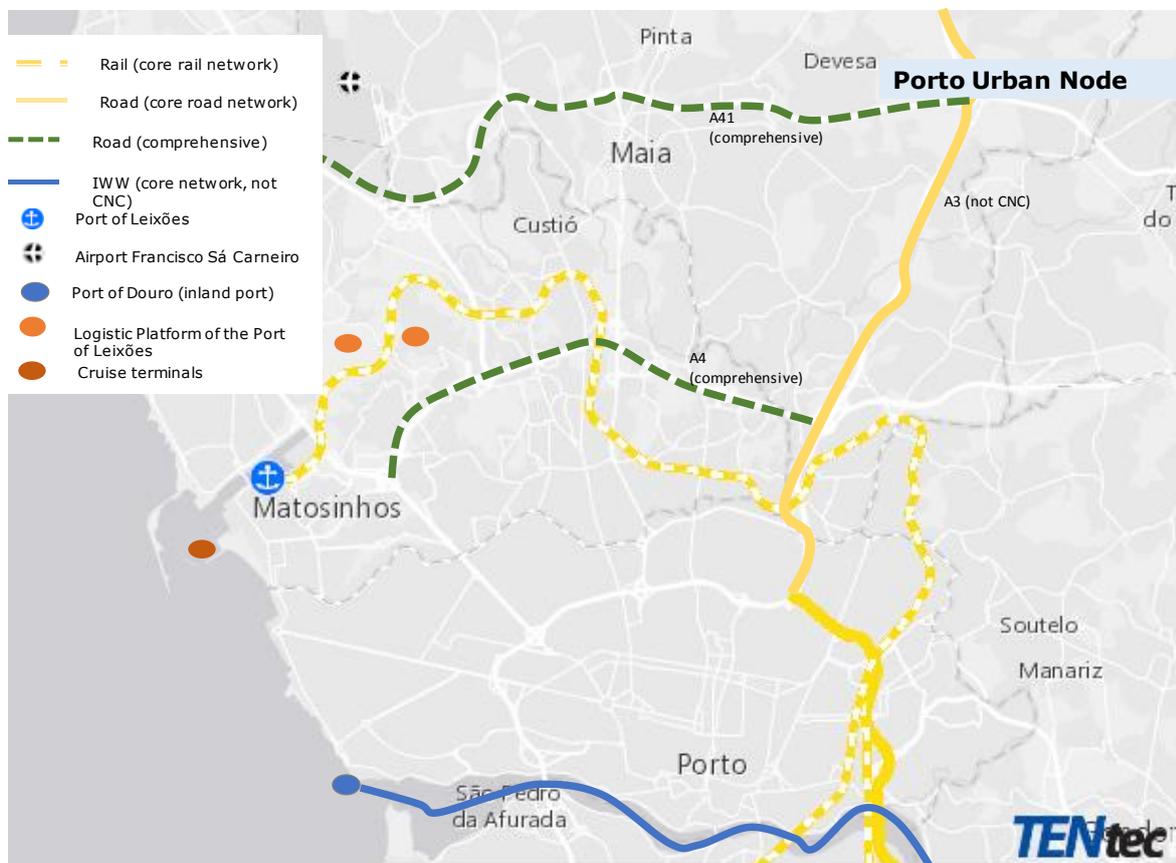


Figure 28: Porto urban node

The urban node is connected with following sections of the core road network:

- IP 1 (A1 and A3)

The core rail network includes the section Contumil-Porto de Leixões, an electrified single-track branch with an extension of 18.9 km.

Analysis of current barriers

The Porto node is characterised by several bottlenecks:

- The *rail connection to the port of Leixões* presents several limitations as previously acknowledged. The studies for the improvement of the rail connections to the port and the logistic platform have been concluded, but the project implementation is delayed due lack of financial resources. The port of Leixões is located in a very densely populated and industrialised area, which severely limits its growth potential. Moreover, this also raises issues related to the sustainability of the operations, notably in terms of noise and emissions, even more so as the port operates on a 24/7/365 basis.
- The *port of Leixões* also has *inland connection* (class IV), however it is not exploited to its full potential due to bottlenecks along the Douro River (core IWW).
- The *airport* is connected to urban transport (bus/metro) but not to *rail*.

The *lack of high speed rail connection from Porto to Lisbon and to Spain*, for which projects are delayed for decision after 2030, affects the long-distance connections from Porto. Moreover, besides the connections to Spain through Salamanca for which improvements are ongoing, the connection to Northern Spain (Galicia) is even more critical due to strong economic relations. Some ongoing projects co-funded by the structural funds are addressing this issue, notably the electrification of the Minho line.

Main upcoming projects

On the *innovation side*, with the ongoing CEF projects CIRVE-PT and Autogas, the continuity from the urban node (already with a good coverage level of electric charging points) to the Corridor is being put in place. We also note the deployment of an automated and connected vehicle pilot on the A28 connecting Porto to Galiza (cross-border) in the framework of the CEF "Scoop" project, as well as relevant progress in terms of freight digitalisation with the continuous widening of the port single window deployed also to the Douro inland waterway and to the Viana do Castelo pole.

Last but not least, Porto is showing a constant pressure in terms of tourism growth, both air and cruises, therefore better and smooth *intermodal connections for passengers* (in addition to freight) needs to be planned.

3.3. Innovation deployment

Innovation is of paramount importance for the achievement of the different strategic goals set for the transport sector in Europe, across all modes. The number of innovation projects for the Corridor is relatively small and of those only 34% have a direct contribution to transport decarbonisation. It is however important to note that there are many other projects which are not classified as Innovation but which also contribute to decarbonisation. Also, some projects not classified as Innovation are in essence technological innovations: for example, the articulation of two gauges for still several years has in itself a strong innovation character.

The methodology to assess the deployment of innovation in the TEN-T core network corridors was organised in five methodological steps, which are represented in the Figure below. The detailed methodology was presented in deliverable D5 – Report on all elements of the Workplan.

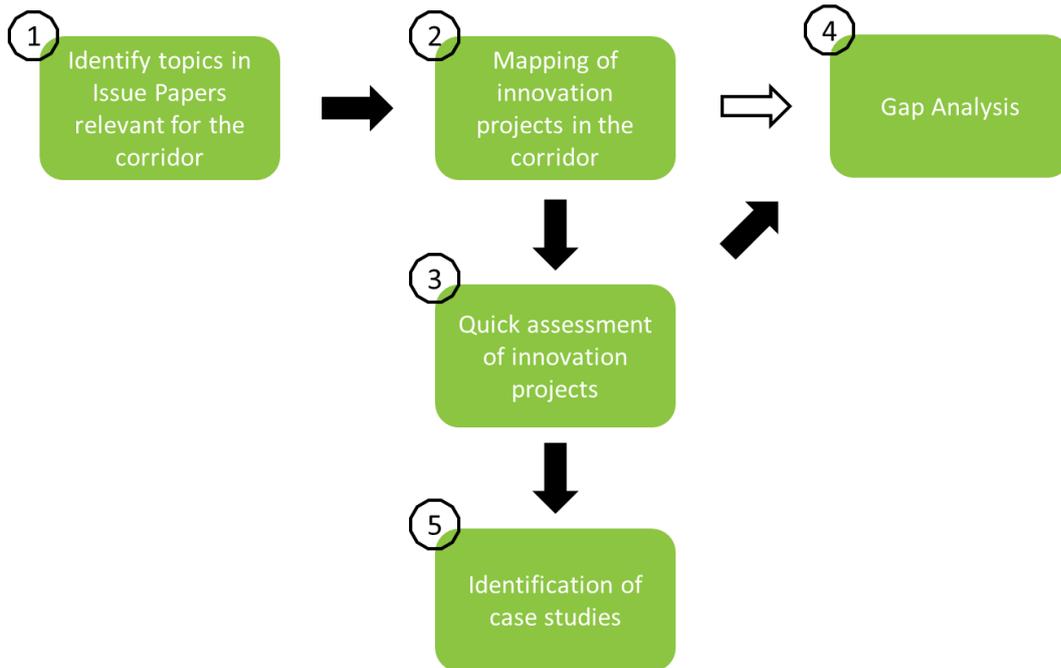


Figure 29: Methodological steps for assessing innovation deployment

The Figures below provide a more in-depth review of the results of the analysis on innovation deployment along the Atlantic Corridor, looking at the results obtained per Country and per Project category.

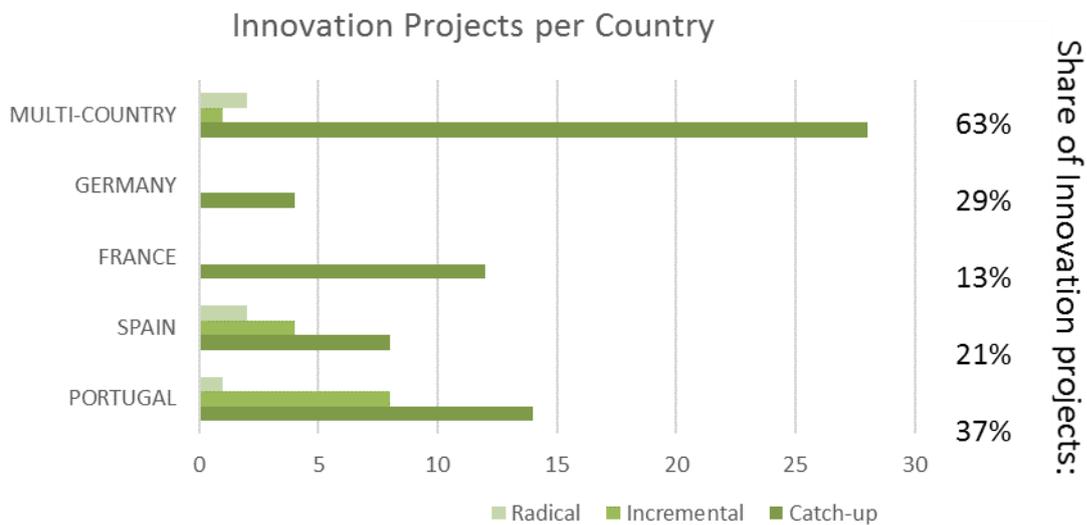


Figure 30: Analysis of innovation deployment per country

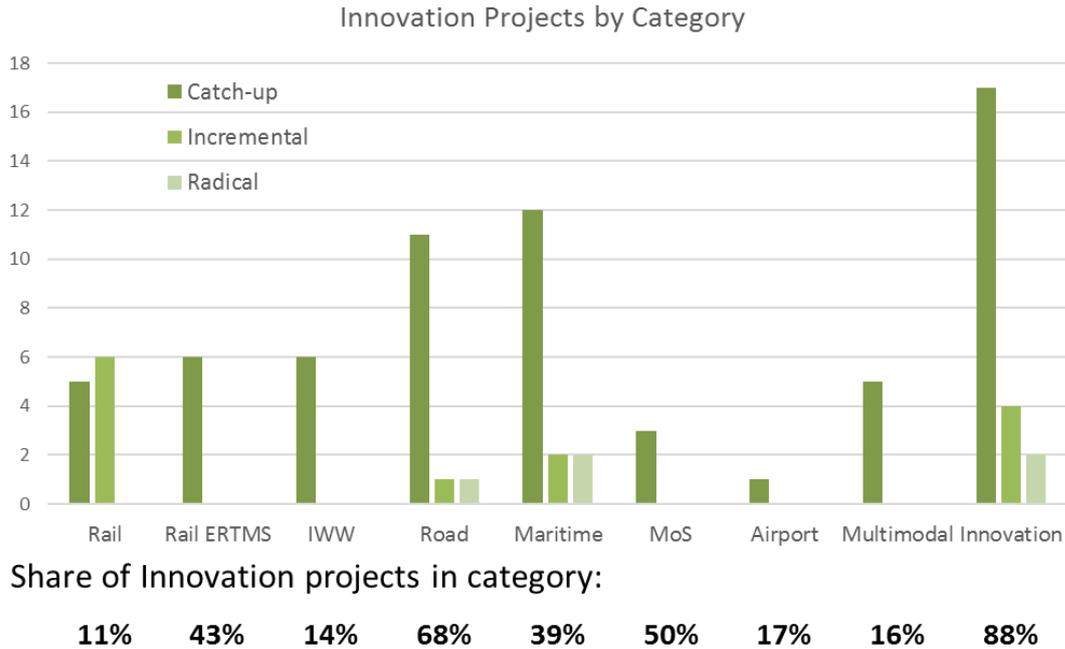


Figure 31: Analysis of innovation deployment per project category

The assessment of innovation deployment also analysed the impacts of the innovation projects and provided some hints on barriers and enablers of innovation.

The assessment of impacts refers to the project's expected contribution to achieve EU's transport policy objectives through innovation and/or their contribution to the European technological industry and jobs creation. The following five impact categories were identified: Transport digitalisation, Safety improvement, Transport decarbonisation (both direct or indirect impacts), Transport efficiency improvement through data sharing, and Contribution to development of European technological industry. The results of this analysis are summarized below.

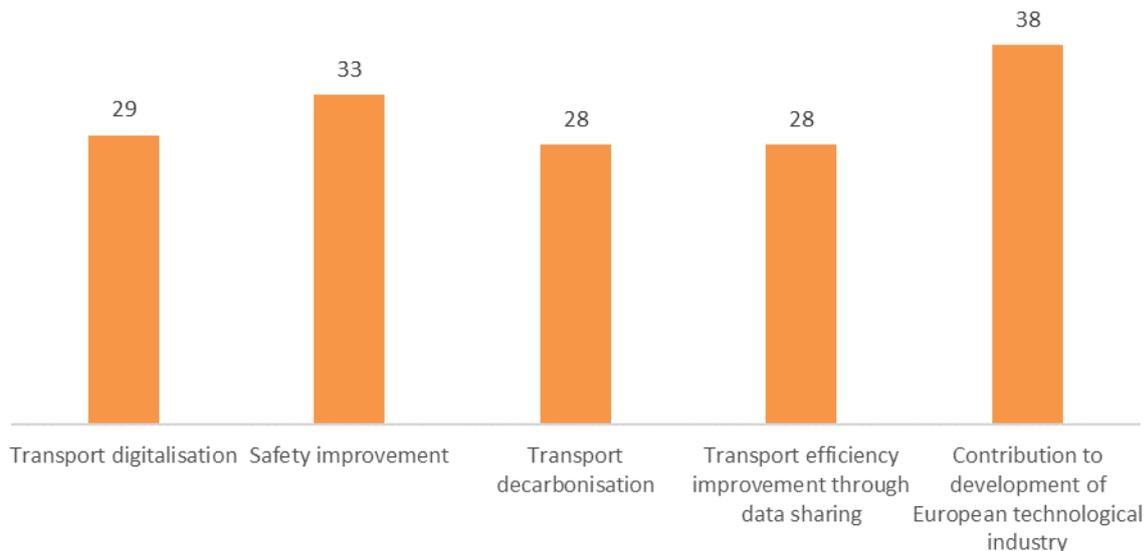


Figure 32: Assessment of impacts of transport innovation projects – results per impact area

Finally, the assessment also included an analysis of whether the project could directly contribute to transport decarbonisation. The results are presented in the Figure below.

Direct contribution to decarbonization

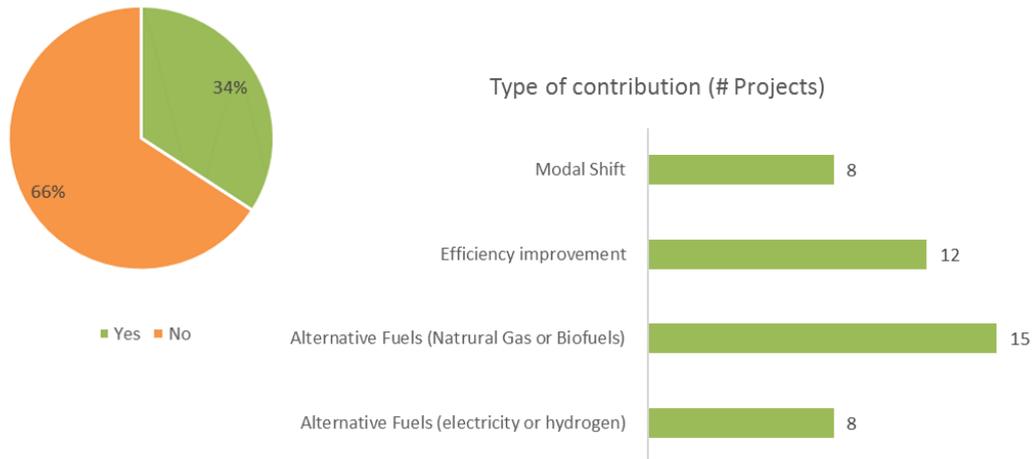


Figure 33: Assessment of contribution to transport decarbonisation of innovation projects

It is somewhat surprising that only one third of the innovation projects are assessed as having a direct potential to reduce transport GHG emissions. Of these projects the most common are those targeting alternative fuels, while efficiency improvements and modal shift are also common occurrences.

The analysis of innovation in the Atlantic shows that:

- Compliance with the Regulation and coverage of Issue Papers seems to be assured
- However, general perspective is that most projects and most budget is NOT allocated to innovative projects
- Most innovative projects refer to catch-up innovation, which would be expected
- There seems to be margin to increase the number of projects targeting transport decarbonisation through innovation deployment

A final activity developed was the selection of set of innovative projects to be used as case studies to estimate the potential reduction of transport GHG emissions arriving from innovation. To perform this selection two main criteria were applied:

- Whether the project was considered as an 'innovation project'
- Whether the project had an impact on GHG emissions

After considering these two criteria there were 17 potential projects in the Atlantic Corridor. Of those, considering that the main information source for the assessment is to be the project proposals which are not available for projects starting in 2016/2017 a checked for this criterion was performed, further reducing the group to 8 projects.

Considering the need to focus on projects from various modes and countries 5 projects were identified for further analysis:

- Implementing clean fuels in all ports (ES)
- LNG Technologies and Innovation for Maritime Transport for the Promotion of Sustainability, Multimodality and the Efficiency of the Network (GAINN 4 SHIP INNOVATION) (ES)
- Boosting Energy Sustainable fuels for freight Transport in European motorWays (BESTWay) (ES/FR)
- CORE LNGas hive - Core Network Corridors and Liquefied Natural Gas (ES/PT)



- Sustainable LNG Operations for Ports and Shipping - Innovative Pilot Actions (GAINN4MOS) (ES, FR, HR, IT, PT, SI)
- CIRVE Project and its sister project CIRVE-PT (ES/FR/PT)

From the five projects, two have been selected for a more detailed assessment of innovation deployment. Those are:

- Boosting Energy Sustainable fuels for freight Transport in European motorWays (BESTWay) (ES/FR)
- CORE LNGas hive - Core Network Corridors and Liquefied Natural Gas (ES/PT)

It should be noted that the above-mentioned project LNGas Hive represents a large opportunity for further deployment, which is expected to have continuity as one of the Atlantic flagships on LNG for maritime.

Project Title	Boosting Energy Sustainable fuels for freight Transport in European motorWays (BESTWay)
Member States	Spain, France
Short Description	The general objective of the project is to conduct a feasibility study, implement and demonstrate highly interoperable LNG refuelling stations with advanced cost-effective infrastructure solutions and smart communication technologies, across the Spanish and French Atlantic Corridor. BESTWAY action will also contribute to expand and reinforce the network of LNG/CNG stations in Europe by implementing 9 new LNG/CNG refuelling stations between Le Havre and Algeciras.
Start/End Dates	01/09/2014 to 30/06/2018
Total cost (Million €)	7,71 Million Euros
Types of impacts on GHG emissions	The project is expected to address the climate impacts of transport through the deployment of alternative fuels infrastructure for road transport, namely Natural Gas.
Direct impacts on GHG emissions	According to the documentation seen Natural Gas contributes to reduce GHG emissions from road freight between 20% to 30%, when compared with diesel or gasoline engines. However, the project did not provide any concrete evidence on the impact in this specific case. The project adds that because CNG fuel systems are completely sealed, CNG vehicles produce no evaporative emissions. It is also important to note that relative to new model gasoline-fuelled vehicles, natural gas-powered vehicles can reduce exhaust emissions of carbon monoxide (CO) by about 11%, volatile organic compounds (VOCs) by 55% and nitrogen oxides (NOx) by 54%, while producing an insignificant amount of ground-level ozone. Hence, NGVs can also reduce the emission of relevant air pollutants.
Notes on Scalability and Transferability	This initiative aims to build a minimum level of Natural Gas recharging stations, hopefully leading to wider adoption of this fuel in road transport. Accordingly, it is highly scalable and transferable.
Notes on abatement costs	There is not enough information to assess abatement costs.
Other information	The project does not estimate the number of vehicle.km in conventionally fuelled vehicles replaced by Natural gas-powered vehicles. This limits the possibility of preparing an estimate of impact in GHG emissions. There are no references to the potential uptake of natural gas within the timeframe of 2030 or 2050, nor information on eventual impacts of this fuel switch on modal split or increased transport volumes.



Project Title	CORE LNGas hive - Core Network Corridors and Liquefied Natural Gas
Member States	Portugal, Spain
Short Description	<p>CORE LNGas hive focuses mainly on LNG deployment for maritime transport and ports along the Spanish and Portuguese sections of the Atlantic and Mediterranean core corridors of the Transeuropean Transport Network aiming at support the implementation of Directive 2014/94 on the deployment of alternative fuels infrastructure besides the monitoring of Directive 2012/33 regarding sulphur content of marine fuel.</p> <p>The project can be described briefly as the start up for the future roll out of LNG as fuel for maritime transport and port services in the Spanish sections of the Atlantic and Mediterranean core network corridors by means of piloting at first place the market viability for innovative LNG supply and consumption solutions, including logistics, while developing the LNG subset of the Spanish National Policy Framework as provided in the Directive 2014/94 on the deployment of alternative fuels infrastructure. CORE LNGas hive proposes 16 studies and 11 pilots.</p>
Start/End Dates	01/01/2014 to 31/12/2020
Total cost (Million €)	33,30 Million Euros
Types of impacts on GHG emissions	- <i>Alternative fuels: Projects that promote Natural Gas or Biofuels in transport</i>
Direct impacts on GHG emissions	The project will allow for a development of maritime transport in a manner consistent with ensuring transport that is sustainable and economically efficient in the long term (Article 4 (c), (i)), contribute to the objectives of low greenhouse gas emissions, low-carbon and clean transport and reduction of external costs (Article 4 (c), (ii)), and contribute to the promotion of low-carbon transport (Article 4 (c), (iii)). However, the project does not quantify impacts on emissions. LNG is presented as LNG, an alternative and low carbon energy source and propulsion system but no concrete numbers are detailed.
Notes on Scalability and Transferability	This initiative will be enabling for the uptake of natural gas as fuel for the shipping industry. To be successful it requires take-up in other ports, not only in Europe and beyond. In conclusion, the activity has high transferability – in particular for Portuguese ports involved in the project – but no scalability.
Notes on abatement costs	There is not enough information to assess abatement costs.
Other information	By proposing a harmonised and coordinated approach at national level to LNG deployment in the field of maritime transport and ports, the Action not only contributes effectively to the implementation of the Directive 2014/94 and final completion of the WPs of the Atlantic and Mediterranean core corridors, but to their own objectives, in particular the ones that have to do with sustainability of the transport system.

3.3.1. How Atlantic compares with the other CNC

The picture below shows a large variation on the total number of projects – with the ScanMed corridor having 666 projects which more than double the 286 of the Atlantic Corridor (ATL) – but a rather balanced share of innovation projects – ranging from 29% for ATL to 16% in Rhine-Danube (RD). In terms of the number of innovation projects ScanMed remains the corridor with the largest number of projects (174) whilst the 67 projects in the Nord Sea-Med corridor (NSMED) make it rank as the lowest in number of innovation projects.

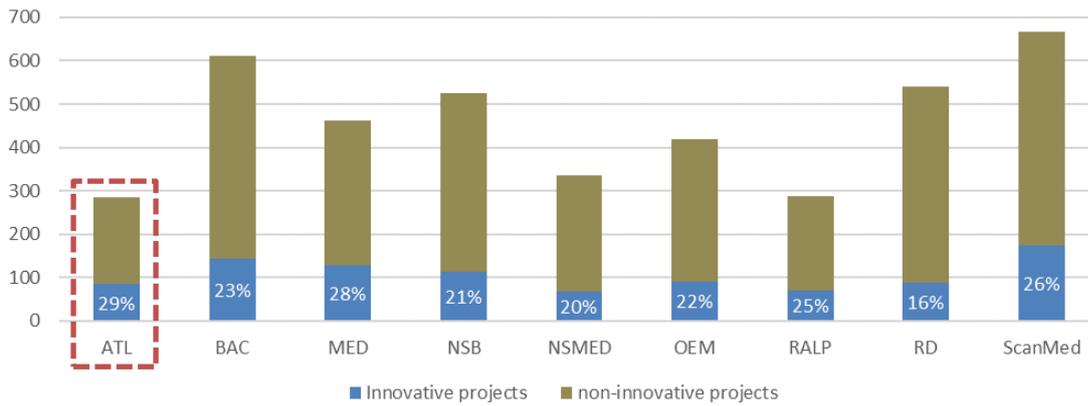


Figure 34: Overview of the number and share of innovative projects across the CNC

Figure 35 provides further insights on the share of innovation projects for the corridors.

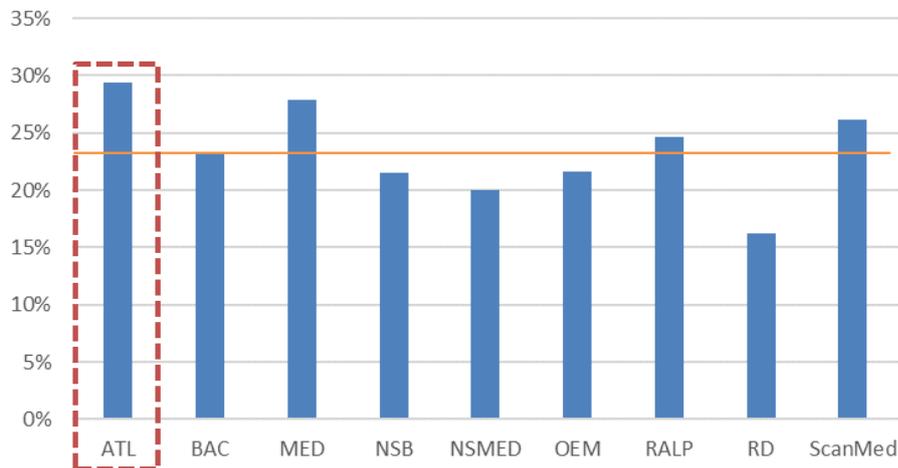


Figure 35: Share of innovation projects (in terms of number of projects)

The Figure show a certain balance in terms of the share of innovation projects, with most projects being 2-3% away from the average of 23%. The exceptions are ATL, RD and MED which appear a bit more distant from this average.

When deepening this analysis to cover the type of innovation being promoted in the projects classified as 'innovative', to distinguish 'catch-up', 'incremental' and 'radical' innovation, the results show much bigger differences between the Corridors (Figure 36).

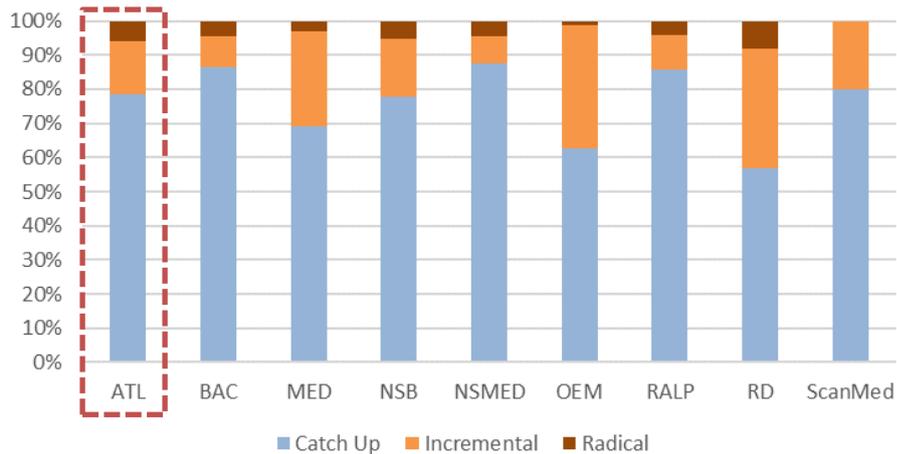


Figure 36: Classification of the innovative projects according to the type of innovation

It can be seen that for all CNC the dominant type of innovation projects refers to catch-up innovation. This is not surprising, if one considers that the TEN-T funding targets large scale activities, more to implement innovation than to develop 'basic' research. However, when looking to the share of projects classified as incremental or radical innovation (black line), one can observe that three corridors with a clearly 'high' share of incremental or radical innovation projects (MED, OEM and RD), three corridors which are close to the average of 24% (ATL, NSB and ScanMed) and three corridors that have a higher share of catch-up innovation projects (BAC, NSMED and RALP). The share of 'radical' innovation projects is always below 10%, which reflects the fact for most corridors there are about 5 projects with this classification.

The innovation projects were categorized according to their classification in the framework of the TEN-T regulation as: telematic applications, Sustainable freight transport initiatives or Other new technologies and innovation projects. The results are presented in Figure 37.



Figure 37: Categorization of innovation projects according to the TEN-T Regulation⁶

In general, it can be observed that all corridors seem to be implementing innovation projects in all three categories. The most visible exception (and though possible 'gap') is the low number of sustainable freight transport initiatives in the BAC corridor and,

⁶ The same project could be classified in more than one category, implying that the 'total' number of projects is not related with the total number of innovative projects in **Error! Reference source not found.**

to a lower extent, the same category on ScanMed and the telematic applications projects in NSMED or RALP. In terms of the relative contribution of each category the major visible imbalance occurs in the MED corridor, where roughly 2 in each 3 innovation projects addresses sustainable freight transport initiatives.

The analysis also looked at the impacts of the innovative projects being implemented across the CNCs. Figure 5 summarizes the results of this analysis, showing the share of projects addressing 5 key policy areas.

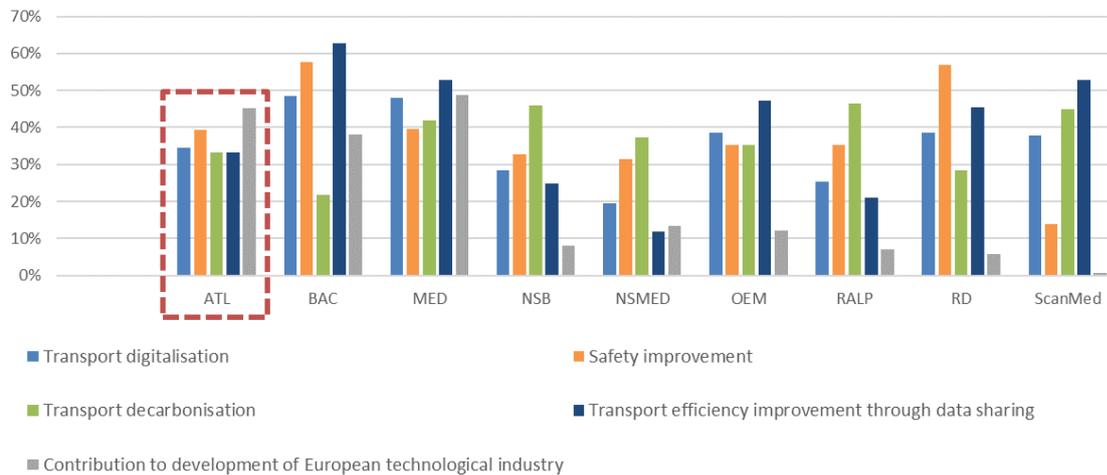


Figure 38: Share of innovative projects contributing to key policy areas

The first element that comes from the Figure is that all 5 policy objectives are being addressed by projects in all corridors. With the exception of the issue of 'Contribution to the development of European technological industry' most policy issues are addressed by at least 10% of the innovative projects in most corridors. So, one can conclude that there are no major 'gaps' identified, only CNC where increased attention to specific topics may be considered:

- Transport decarbonisation in BAC
- Contribution to the development of European technological industry in NSB, NSMED, OEM RALP, RD and ScanMed
- Transport Digitalisation in NSMED
- Transport efficiency improvement through data sharing in NSMED and RALP
- Safety improvement in ScanMed

On the other hand, is worth visiting each corridor and conclude about the possible 'policy' orientation of its innovative projects:

- ATL: All policy areas are very balanced, being the only CNC where 'Contribution to the development of European technological industry' has the highest share of projects
- BAC: A lot of focus on 'Transport efficiency improvement through data sharing' and 'Safety improvement' and a low attention to decarbonisation.
- MED: All policy areas are very balanced, with transport efficiency improvement through data sharing appearing with the highest share of projects.
- NSB: A focus on transport decarbonisation as well as a low attention to the Contribution to the development of European technological industry is well visible in the results.
- NSMED: A focus in decarbonisation and safety contrasts with low attention on the development of European technological industry and on efficiency improvement through data sharing.

- OEM: Quite balanced results, with two exceptions: quite a large attention to Transport efficiency improvement through data sharing and low attention to the Contribution to the development of European technological industry.
- RALP: Similarly to NSB and NSMED, there is a focus on decarbonisation and little attention to the contribution to the development of European technological industry.
- RD: With high variations across policy areas, the focus seem to be in safety improvement and transport efficiency improvement through data sharing; little attention is being placed on the contribution to the development of European technological industry.
- ScanMed: There is a clear focus on transport efficiency improvement through data sharing and decarbonisation which is in sharp contrast with the very little attention being placed on the contribution to the development of European technological industry and, to a lower extent, safety improvement.

It is interesting to note that three corridors have rather balanced policy focus in their innovation projects (ATL, MED and OEM) and three corridors have very similar distributions (NSB, NSMED and RALP).

Regarding the specific issue of the contribution of innovation projects to transport decarbonisation a more detailed assessment was performed. Figure 6 presents the share of innovative projects in each corridor that are reported to contribute to transport decarbonisation.

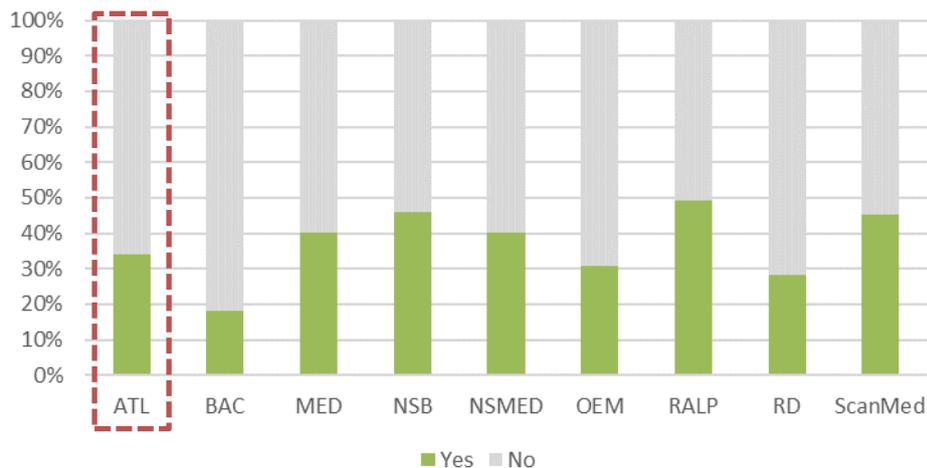


Figure 39: Share of projects contributing to transport decarbonisation

The share of innovation projects that contribute to decarbonisation varies across corridors, from the roughly 20% of BAC to the close to 50% share in RALP. Figure 7 deepens this information by depicting how the projects contribute to low or zero carbon transport.

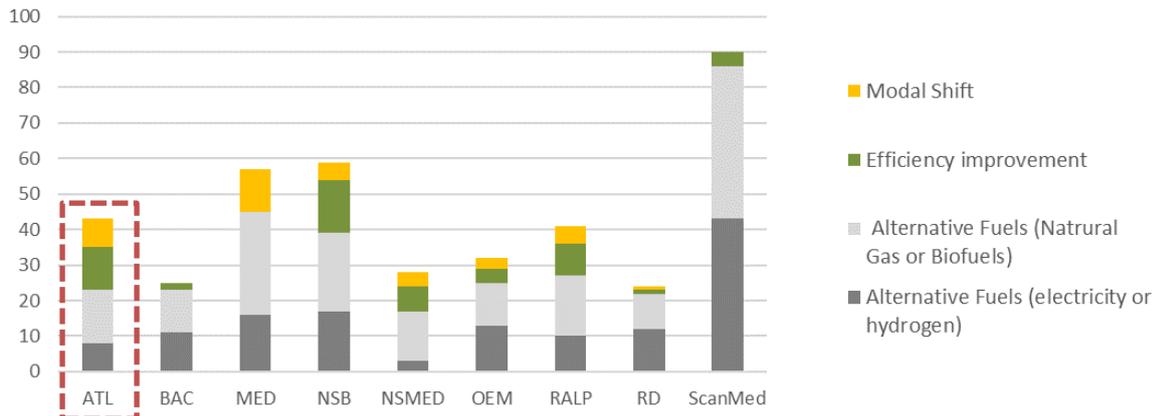


Figure 40: Identification of the processes by which innovation projects contribute to transport decarbonisation

The results are somehow surprising. Whilst many people associate TEN-T completion to decarbonisation based on modal shift, the results show that most innovation projects that have an impact on transport GHG emissions actually do so through the deployment of alternative fuels. This Figure makes it very clear that innovation projects in all CNC are leading efforts for the use of Natural Gas and Biofuels in transport, and that a large number of projects for electricity and hydrogen are also being implemented.

Finally there was an assessment of the scalability and transferability of the innovation projects. The results are shown in.

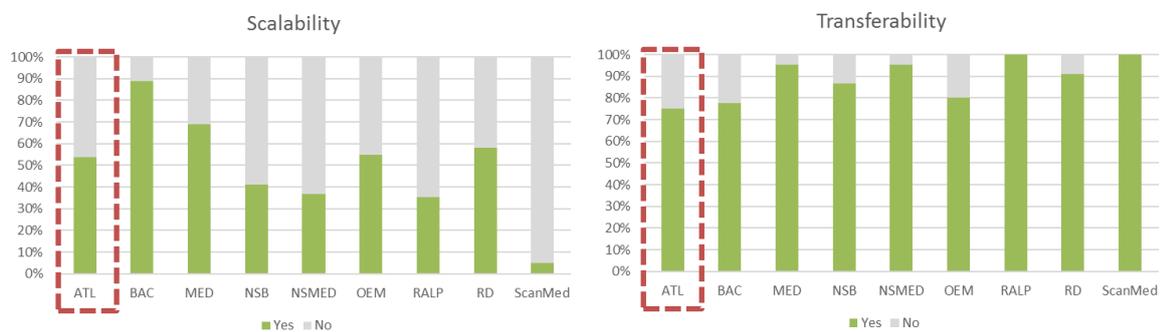


Figure 41: Analysis of scalability and transferability

The results show very large variations in terms of scalability but a clear message in terms of the high transferability of the projects. A very large majority of the learnings of innovative projects in the CNC can be useful for application in other locations or realities, but the ability to further develop the projects within the CNC varies substantially. These results suggest that the CNC have the potential to complement other Community programs in deployment of innovation.

There is a large variation the number of total projects across corridors but some consistency in terms of a share of innovative projects around 23%. The vast majority refers to 'catch-up' innovation; however, there are significant differences across corridors, with some having about one third of projects classified as 'incremental' or 'radical' innovation and some having less than one sixth of projects with such classification. There is a very small number of 'radical' innovation projects per corridor, which reflects the fact there are other Community programmes (notably Horizon 2020) in which such projects would be expected to have a better fit.

When comparing the number of innovation projects in each category of innovation activities according to the TEN-T regulation only one 'gap' is apparent: the low number of sustainable freight transport initiatives in the BAC corridor. Looking at the policy focus of projects no major gaps are also identified, i.e. in all corridors there are projects addressing all objectives analysed. However, it should be noted that many corridors could place more attention on the contribution of CNC to the development of European technological industry.

In terms of the contribution of innovation projects in the CNC for decarbonisation it is interesting to note that the focus is not targeting modal shift (once this topic is mainly addressed by other priorities) but in the deployment of alternative fuels. This suggests that TEN-T completion may be playing a key role in enabling low or zero carbon transport solutions in Europe.

CNC innovative projects show a very high level of transferability, meaning that the TEN-T can potentially position as a space for deploying transport innovations in a larger scale, helping project promoters better develop their innovations before transferring them to wider environments.

3.2. Climate change mitigation

The methodology to assess resilience to climate change in the TEN-T core network corridors is organised in six methodological steps, which are represented in the Figure below. As above, the detailed methodological steps were discussed in the deliverable D5.

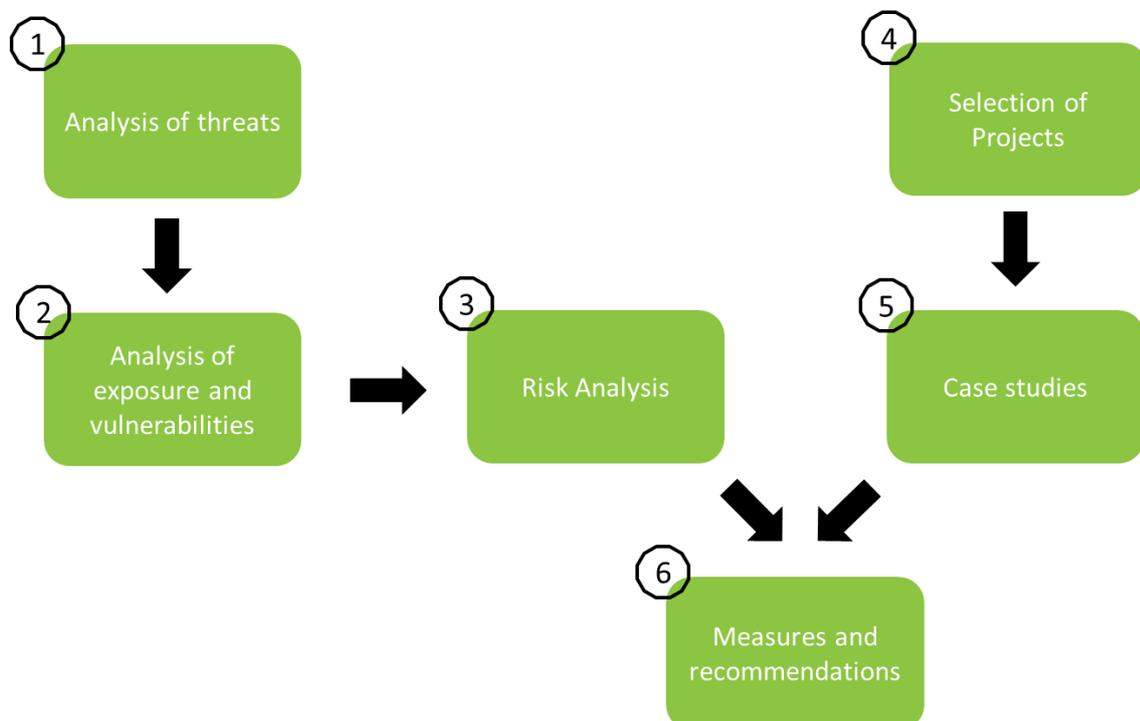


Figure 42: Methodological steps for assessing resilience to climate change

The major threats and impacts for the Atlantic Member States are summarised in the following two tables. This is complemented by more detailed tables per country.

Table 7: Major climate change threats

Rail	Road	Air	Maritime	Inland waterways
<ul style="list-style-type: none"> ▪ Increased summer temperature, thermal oscillations and heat waves ▪ Changes in precipitation patterns: increased number of high precipitation days and floods; reduced rain seasons and increased droughts ▪ Winds (e.g. average and extremes, number of days of high winds) ▪ Winter cold and extreme low temperatures (only France) 	<ul style="list-style-type: none"> ▪ Increased intensity of extreme precipitation ▪ Increased summer temperatures and heat waves ▪ Changes in river flow 	<ul style="list-style-type: none"> ▪ Increased and more frequent extreme winds ▪ Increased temperatures and heat waves ▪ Change in frequency of Winter Storms 	<ul style="list-style-type: none"> ▪ Increased and more frequent storms and extreme winds ▪ Sea level rise ▪ Increase of water temperature 	<ul style="list-style-type: none"> ▪ High precipitation and flood ▪ More frequent droughts ▪ Increased variation of water levels

Table 8: Major climate change impacts

Rail	Road	Air	Maritime	Inland waterways
<ul style="list-style-type: none"> ▪ Rail buckling ▪ Perturbation of power system and signaling ▪ Earthworks, structures and drainage works damaged ▪ Instability of embankments ▪ Interruption of traffic due 	<ul style="list-style-type: none"> ▪ pavement deterioration / bleeding of asphalt ▪ Interruption of traffic due to forest fires ▪ Road submersion ▪ Risks for bridges, including bridge scouring 	<ul style="list-style-type: none"> ▪ Traffic disruptions, including deviations and delays ▪ Insufficient runway length (decrease of thrust power) ▪ Degradation of bituminous surface 	<ul style="list-style-type: none"> ▪ Damage to infrastructure ▪ Worsening of water quality, phytoplankton blooms ▪ Risk of dam failure, overpass ▪ Traffic disruptions and closure of ports and 	<ul style="list-style-type: none"> ▪ Problems of passage under bridges ▪ Access to quays and difficult (or impossible) transshipments ▪ Traffic disruptions



Rail	Road	Air	Maritime	Inland waterways
to forest fires	<ul style="list-style-type: none">▪ Overstrain of drainage systems	(runways) <ul style="list-style-type: none">▪ Worsening of air quality▪ Jetstream change	terminals	

3.2.1. Portugal

Table 9 provides an overview of the most relevant potential impacts of climate change in each region in Portugal, and provides a first assessment of vulnerabilities that may derive from each impact and an assessment of exposure and risk for the main parts of CNC in Portugal. It was mostly based on the Portuguese National Climate Change Adaptation Plan.

Table 9: Climate impacts and threats to transport modes in Portugal, assessment of exposure and risk

MS	Mode	Climate Impact	Vulnerability	Exposure	Qualitative Risk Assessment
Portugal	Rail	Increased summer temperature	Rail buckling	Aveiro-Vilar Formoso	High
				Evora-Caia	
				Linha Beira Alta	
				Sines-Ermidas-Grândola	
			Overheating of rail infrastructure and equipment	Aveiro-Vilar Formoso	High
				Evora-Caia	
		Linha Beira Alta			
		Sines-Ermidas-Grândola			
		Comfort of travel will deteriorate	All passenger lines	Low	
		Changes in precipitation patterns: increased number of high precipitation days and floods; reduced rain seasons and increased droughts	Forest fires may lead to traffic disruptions and damage infrastructure	All lines	Medium
			Bridge scouring	All lines	High
			Forest fires may lead to traffic disruptions and damage infrastructure	All lines	Medium
Heavy rainfall induced landslides, track submersion, embankment damage	All lines		Medium		
Winds (e.g. average and extremes, number of days of high winds)	Traffic disruptions, e.g. in bridges		All lines	Medium	
	Deterioration of infrastructure, signals and equipment		All lines	Low	

MS	Mode	Climate Impact	Vulnerability	Exposure	Qualitative Risk Assessment
Portugal	Road	Changes in precipitation patterns: increased number of high precipitation days and floods; reduced rain seasons and increased droughts	Risk of landslides	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Medium
			Disturbs the transport smoothness	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Medium
			Blocked roads and traffic disruptions	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Low
			Damage in infrastructure	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Low
		Increased summer temperature	Higher accident rate	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Low
			Degradation of the surface	IP5 (E80). Vilar Formoso (Border) IC33. Santiago do Cacém - Grândola	Medium
		Changes in river flow	Bridge scouring	All road bridges over rivers	High
	Traffic disruptions		All road bridges over rivers	Medium	
	Aviation	Increased and more frequent extreme winds	Traffic disruptions, including deviations and delays	Lisbon & Porto airports	Medium
	Maritime	Increased storms and maritime floods	Traffic disruptions and closure of ports and terminals	Sines, Lisbon and Leixões	High
Damage in infrastructure			Sines, Lisbon and Leixões	Medium	

3.2.2. Spain

Table 10 provides an overview of the most relevant potential impacts of climate change in each region in Spain, as well as a first assessment of vulnerabilities that may derive from each impact. It was mostly based on the document Needs of Adaptation to Climate Change in the trunk network of transport infrastructure in Spain by the Centre of Studies and Experimentation of Public Works (CEDEX) of the Spanish Ministry of Transport. The Spanish National Climate Change Adaptation Plan of the Spain Office of Climate Change has also been considered.

Table 10: Climate impacts and threats to transport modes in Spain, assessment of exposure and risk

MS	Mode	Climate Impact	Vulnerability	Exposure	Qualitative Risk Assessment
Spain	Road	Increased intensity of extreme precipitation	Instability of embankments	Specially in northern regions	High
			<ul style="list-style-type: none"> Overstrain drainage system Road submersion Damage on structure 	All regions. Severe in Southeast of Spain when cold drop phenomenon occurs	High
		Increased aridity conditions	Erosion of slopes	All regions	Medium
		Increased summer temperatures and heat waves	<ul style="list-style-type: none"> Non-structural cracks and fissures in asphalt road surfaces Road signage, markings and joining elements durability Wildfires damage 	All regions	Medium
			Damage on plantations, bridges buckling, protection works, road geometry	All regions, remarkable for the following projects: Project of realignment of road traffic in the accesses to Madrid SE-40. Ring road of Sevilla	Medium
	Increased summer droughts	Permeable pavements damage	SE-40. Ring road of Sevilla	Medium	
	Rail	Increased intensity of extreme precipitation	<ul style="list-style-type: none"> Earthworks, structures and drainage works damaged Instability of embankments 	All regions. Severe in Southeast of Spain when <i>cold drop</i> phenomenon occurs	High
Remarkable for the following project: Madrid-Alcázar-Córdoba-Algeciras					
		Increased summer temperatures and thermal oscillations	<ul style="list-style-type: none"> Rail buckling, damaged sleepers and fasteners Air conditioning needs Wildfires damage 	All regions, especially in central and southern regions	High



		Increased storm and gusts of wind intensity	<ul style="list-style-type: none"> • Damage on acoustic screens • Damage on catenary 	All regions	Medium
Maritime	Sea level rise	Risk of dam failure, overpass		All regions	Medium
		Water table rise, Damage of underground pipes and services		All regions	Medium
	Extreme waves and storm events	Devastation of infrastructure		All regions. Severe in Southeast of Spain when <i>cold drop</i> phenomenon occurs Remarkable for Algeciras area	Medium
	Increase of water temperature	Worsening of water quality, phytoplankton blooms		Specially in the Southern coast (Algeciras)	Medium
Aviation	Increased temperatures and heat waves	<ul style="list-style-type: none"> • Insufficient runway length (decrease of thrust power) • Degradation of bituminous surface (runways) • Worsening of air quality • Risk of ignition in aircraft refuelling • Greater need for ground cooling • Wildfires damage 		All regions Remarkable for the projects related to Madrid Airport	Medium
	Increased intensity of extreme precipitation	Insufficient drainage capacity		All regions Severe in Southeast of Spain when <i>cold drop</i> phenomenon occurs	Medium
	Increased and more frequent extreme winds	Runway orientations, Runway use configurations		All regions	Medium
Noise exposure changes, Land use planning			All regions	Medium	

3.2.3. France

In France, the adaptation to climate change has been a major concern over the past years and more particularly over the past 10 years since the national mobilization during what has been called the two major "Grenelle de l'Environnement" conferences associating all the actors concerned.

In this perspective, a first national Climate Change Adaptation Plan has been elaborated for the period 2011-2015, has been evaluated in 2016 and followed by new recommendations in order to improve this process of planning in order to mitigate impacts on climate change concerning temperatures, and reduce effects on increase of temperature, and risks associated to weather instability, and increase of frequency of extreme situations for storms, increase of sea level, heat waves, floods...

A few important characteristics must then be stress in this evolution, which has been, to a large extend, affecting the planning process in France, and lead to a strong mobilization for the COP 21 conference in Paris, in order to better appraise the relation this can have with the planning of the corridor, as it develops presently for the development of TEN-T.

Table 11: Climate impacts and threats to transport modes in France, including an identification of associated vulnerabilities

Member State	Mode of Transport	Climate Impact	Observations	Vulnerabilities
France	Road	Increase of temperature and heat waves.	All regions and in particular South of France (PACA, Languedoc Roussillon, Midi-Pyrenees, Aquitaine) Permafrost degradation and thawing in Alps	Mainly for heat waves (high temperature during few days) -pavement deterioration / bleeding of asphalt -wildfires which interrupt traffic -comfort deterioration for passengers, and in particular in peak traffic of summer Road damage in the Alps
		Heavy precipitation and flood	All regions, with higher frequencies in Manche and Atlantic littoral as well as in Alpine/Pyrenean regions Rhône river Flash flood	-Road submersion -Risks for bridges -overstrain of drainage systems -risks of landslide - earthworks track - visibility distance Strain on drainage system
		Storms / Extreme winds	Mainly coastal regions	-Fall of trees on the road -vegetation block
		Extreme storm event and sea level rise / sea storm surges	Simulations have been made for sea level rise providing linear distance of infrastructure affected, and pointing out higher figures for Nord Pas de Calais, Pays de la Loire and Languedoc Roussillon	-infrastructure damage -erosion of coastal protections



Member State	Mode of Transport	Climate Impact	Observations	Vulnerabilities
		Winter cold waves	Average temperatures in winter is not a problem (although there is less use of salt on secondary networks for environmental protection, requiring winter wheels for cars), but extreme cold waves impact most regions (except Mediterranean)	-Icy dangerous roads, for cars and trucks -Eventually blockage motorways because of snow storm. Visibility Road friction Road obstruction Infrastructure damage
		General impacts: change of average temperature do not impact much road transport; But higher occurrence of extreme situation to create vulnerabilities of transport infrastructure	Extreme situations have often differentiated local impacts, and local occurrence Indicators for climate changes are defined, mapped, and monitored in France, for all regions. Scenarios of evolution of these indicators are estimated for 2050 and 2100. Local/regional climate and energy plans are set (PCET ,by 2018) following recommendations of PNACC (National Adaptation Plan for Climate Change, 2011-2015 and 2016 recommendations)	Analysis of impacts upon transport infrastructure of Climate Change has been conducted in PNACC (4 types of actions an 12 measures for transport infrastructure theme), pointing out 23 guidelines (all modes) definitively affected, and 58 which may need to be revised (requiring intervention of CEN, and AFNOR for norms at EU and French level)
	Rail	Summer heat and heat waves	Southern regions of France and in particular South East regions are affected, by increase of temperature in summer. All regions in France might be affected by heat waves	-comfort of passengers in trains (and in particular for suburban and local trains although rolling stock modernization diminishes this discomfort) -wildfires along the tracks, which block trains and create long delays for passengers and freight -Melting / Rail buckling -Electric system failure -Increased vegetation -desiccation of track earthworks -- > water infiltration / collapse
		Winter cold and extreme low	Mainly in Northern part of France	-ice on trains



Member State	Mode of Transport	Climate Impact	Observations	Vulnerabilities
		temperatures	as well as in the mountainous regions (Alps, Pyrenees, and Massif central)	-break of catenary -perturbation of power system and signalling -heavy snow fall and avalanche on the track, creating delays and traffic perturbations
		Extreme precipitation / flood and storm	All regions but for specific more vulnerable places located in deep valleys, on mountains, along coasts, or rivers (which call again for detailed geographic analysis, in a country like France, with such landscape diversity) PLM near Rhône river	-trees on tracks, vegetation blocks -earth landslides -flooding of tracks -damage on power line -destruction of catenary,
		Sea Level Rise and sea storm surges	between Perpignan and Montpellier near Marseille	- Flooding of tracks
		General impacts: The same general remarks as for road infrastructure apply		
	IWW	High precipitation and flood	High river flows, for Saône/Rhône, Seine, Mosel, Rhine (only upper Rhine in France): the rivers Loire and Garonne have fluctuating levels but have limited navigation, concentrated on estuaries)	-Problems of passage under bridges -problems of access to quays and difficult (or impossible) transhipments -infrastructure damage
		More frequent drought	So far do not affect much navigation except on more capillarity networks, or upper parts of rivers	
		General impact: High water is probably the most important threat, but coping with it has improved in combining water management in relation with infrastructure investments		



Member State	Mode of Transport	Climate Impact	Observations	Vulnerabilities
		<p>(Seine, Rhône, Mosel...). Beyond "Flood risk" management plans which have been implemented at French, and EU (2007 directive) levels, and in line with the COP 21 "Global Pact for Adaptation to Climate Changes), it must be also mentioned in the adaptation to Climate Changes:</p> <ul style="list-style-type: none"> -the "water development and management master plan" (2016-2021) -the involvement of "catchment areas authorities" for Rhône-Med (5 regions participating), Seine-Normandie ... 		
	Ports	Storms and strong winds	The Atlantic ports are more concerned (Brittany), as well as the Manche ports. Such threats are less frequent in Mediterranean ports.	<p>The impacts can be very important for infrastructure (damages), equipment (cranes), and ships on quay, but also from an economical point of view for freight (blockage, waiting time, and reliability of logistic chain) and passengers (mainly cross channel traffic, and services to islands).</p> <ul style="list-style-type: none"> - Safe navigation interruption - Ship sinking - Cargo loss
		Raise of sea level	This will impact more regions mentioned earlier (sea level tests) and their ports (Pays de la Loire, Languedoc Roussillon...), including in this case Mediterranean ports.	Infrastructure damage
		General remarks: again vulnerability comes mainly from extreme weather events with increasing frequency: a "national		



Member State	Mode of Transport	Climate Impact	Observations	Vulnerabilities
		integrated coast line management strategy" has been defined for coastal areas and CC threats. Coastal regions (as Mountain regions and River basins) are also treated in an "horizontal" way, in conjunction with Territorial approaches (PCET) for CC.		
	Aviation	Increased Precipitation and Floods	ew	Cloud ceiling Infrastructure damage turbulence
		Sea Level Rise and sea storm surges	Nice Marseille Coastal airport	Infrastructure damage
		Increased and more frequent extreme winds	ew	Turbulence
		Change in frequency of Winter Storms	ew	Jetstream change Ice Turbulence

3.2.4. Germany

Table 12 provides an overview of the most relevant potential impacts of climate change in Germany, and provides a first assessment of vulnerabilities that may derive from each impact. It was mostly based on the following main sources:

- German Strategy for Adaptation to Climate Change, adopted by the German federal cabinet on 17th December 2008.
- adelphi / PRC / EURAC (2015): Vulnerabilität Deutschlands gegenüber dem Klimawandel. Umweltbundesamt. Climate Change 24/2015, Dessau-Roßlau.
- Umweltbundesamt: Klimafolgen und Anpassung. <http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/>

Table 12: Climate impacts and threats to transport modes in Germany, including an identification of associated vulnerabilities

Member State	Mode of Transport	Climate Impact	Observations	Vulnerability	Qualitative Risk Assessment
DE	Road	more frequent/ more intensive rainfall	local occurrence	affects road traffic, e.g. through poor vision and wet roads; landslides and undercutting lead to destabilisation and destruction of road sections; increasing soil moisture can affect stability of bridges and tunnels	• Medium (H, M, M)
	Road	more frequent/ more intensive storms	local occurrence	damage on roads	• Medium (M, M, M)
	Road	increasing thunderstorms	local occurrence	failure of or damage on signals or other electronic traffic management systems	• Low (L, M, L)
	Road	prolonged heat in summer, drought	all regions	damage on material and structure of road surface; forest and embankment fires; affect on stability of bridges (thermal expansion)	• Medium (M, H, M)
	Road	rising temperatures in winter	all regions	less frequent and less serious frost damage to roads and bridges	• High (H, H, M)
	Road	flooding	especially in places with little difference in level between road and water surfaces		• Low (L, L, L)

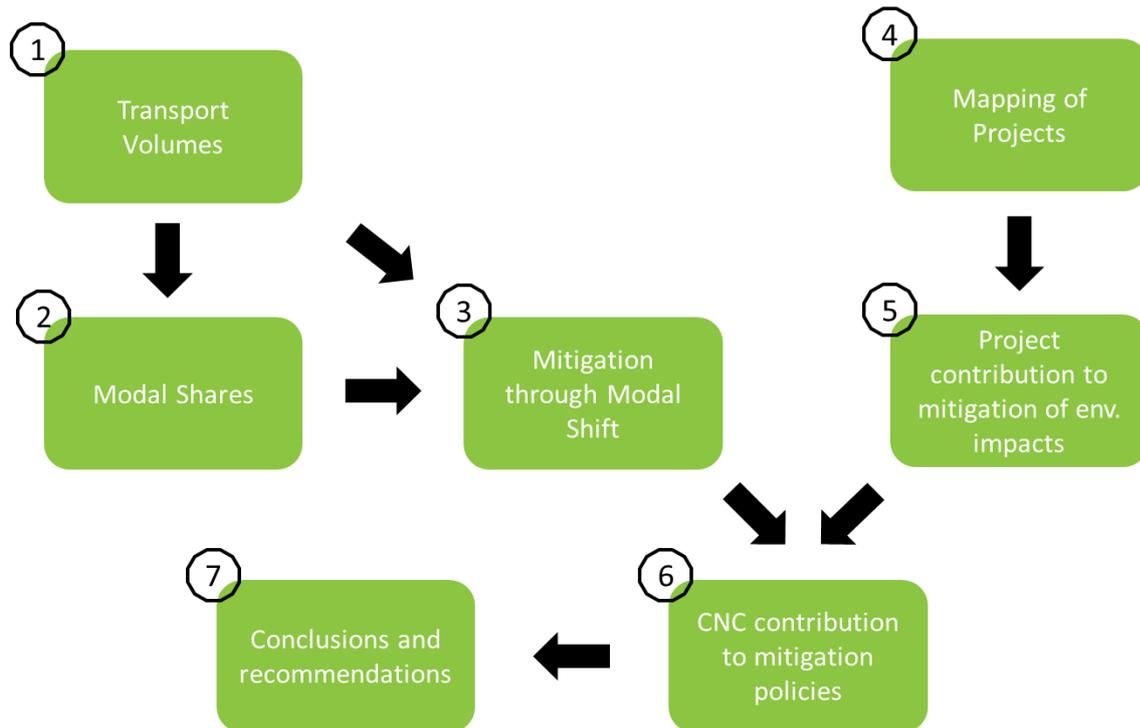


Member State	Mode of Transport	Climate Impact	Observations	Vulnerability	Qualitative Risk Assessment
	Rail	more frequent/ more intensive rainfall	local occurrence	landslides and undercutting lead to destabilisation and destruction of rail sections; increasing soil moisture can affect stability of bridges and tunnels	• Medium (H, M, M)
	Rail	more frequent/ more intensive storms	local occurrence	damage on railway tracks and power lines	• Medium (L, H, M)
	Rail	increasing thunderstorms	local occurrence	failure of or damage on signals or other electronic traffic management systems	• Medium (M, M, H)
	Rail	prolonged heat in summer, drought	all regions	damage on material and structure of rails; forest and embankment fires; affect on stability of bridges (thermal expansion)	• Low (L, L, M)
	Rail	flooding	especially in places with little difference in level between railway and water surfaces		• Medium (H, L, M)
	Maritime	rising sea level	German coastal areas	static stress and damages on port facilities; interruption of port operations	• High (H, H, M)
	Maritime	increasing storm surges	German coastal areas	damages on port facilities	• Medium (M, H, M)
	IWW	increased variation of water levels	all IWW, particularly free-flowing rivers	limited usability and decreasing reliability of IWW transport	• High (H, H, H)
	IWW	changes in water supply	all IWW, particularly free-flowing rivers	limited usability and decreasing reliability of IWW transport	• High (H, H, H)
	Aviation	prolonged heat in summer	all regions	damage on material and structure of runways	• Low (H, L, L)

4. Modal shift and Mitigation of environmental impacts

This chapter provides an overview of the analysis of decarbonisation carried out within the corridor studies (2015-2017), for six CNCs, namely ATL, NSB, NSM, OEM, RAL and RDA.

Each corridor was required to analyse the extent to which the proposed investments (as set out in the work-plan project list) contribute towards the mitigation of environmental impacts. A common set of guidelines has been developed to be followed by each corridor team. It is organised into seven methodological steps:



Source: Task 3b methodology TIS

Figure 43: Overview of methodology for analysing environmental impacts

4.1. Approach

This approach attempts to address the question of decarbonisation, as indicated in the diagram, from various perspectives. From one perspective, there is the question of how traffic volumes and associated GHG emissions will develop on the corridor, i.e. boxes (1) and (2) in the figure above. From the other perspective, there is the question of how corridor work-plans, and their investments actively contribute to reducing GHG emissions, specifically through the traffic impacts they have, i.e. boxes (4) and (5). Those impacts are not strictly limited to activity on the sections of the corridor, because they also involve shifts of traffic from non-corridor sections to corridor sections. To see the full impact of the work-plan it is therefore necessary to look at the broader picture beyond the specifically designated links of the corridor.

Two main methods have therefore been used:

1) A top-down methodology, based on the 2016 EU reference Forecast, to estimate volumes of traffic on the corridor across all modes of transport, taking into account a

full range of factors, including technological changes, economic and demographic growth.

2) A bottom-up methodology, estimated using a four-step transport model (NEAC10), estimating the traffic route and mode shifts arising specifically from the infrastructure projects in the work plans.

The aim is to be able to combine these results, using the second methodology to be able to show the direct impacts of the work-plan, and the first to show the full picture.

4.2.1. Scope

To date, much of the analysis connected with the corridor studies is based on the ability to define a corridor as a set of infrastructure links and nodes, and to be able to measure certain indicators (KPIs) for that infrastructure. In this way, corridors can be individually and consistently analysed.

However, when analysing the impact of projects on decarbonisation, it is necessary to take into account a series of dependencies across the corridors, namely:

- Overlapping corridor sections
- Overlapping corridor projects (certain projects are found in more than one corridor work plan)
- Complementarity (network effects) – upgrades in one corridor can work in tandem with upgrades on another, to produce an effect bigger than the sum of its parts.
- Substitutability (competition effects) – projects may be in effect competing for the same traffic.

4.2.2. Presentation of results

Consequently, the approach was to carry out the analysis as globally as possible, taking into account all corridors simultaneously in order to produce consistent results.

In the following sections, the results are analysed in turn for the two methods applied. First the analysis of traffic growth based on the 2016 EU Reference Forecast is shown, and secondly, the analysis of the work plan investments on modal shift. A summary of results from the BAC, MED, and SCM corridors which use separate models is added in the final section.

4.3 Forecast of traffic growth

4.3.1. Approach

- Based on a break-down of results originating from the 2016 EU Reference Forecast.
- Top down methodology, from EU28 level to national level, to an estimate per corridor.
- Taking into account socio-economic growth, trade growth, technological changes and all known EU policy, including TEN-T.
- Covering freight and passenger transport for most transport modes.
- Covering the period 2015-2030 (and 2050).
- Methodology to estimate “traffic on the corridor” in 2030.



4.3.2. Results

This method aims to provide a full picture of traffic volumes and transport-related emissions for the whole of the EU, incorporating all impacts arising from the full range of EU transport policies.

The six corridors (ATL, NSB, NSM, OEM, RAL and RDA) derive their 2030 traffic and GHG forecasts using a top-down methodology, starting from the 2016 EU Reference Scenario forecast of transport demand and transport-related emissions at national level. At EU28 level, the EU Reference Forecast shows:

Table 13: EU Reference Forecast 2015-2030

	units	2015	2030	Average annual growth, '15-'30
EU28	pax bn pkm	6,735	7,880	1.1%
	frgt bn tkm	2,704	3,457	1.7%
	mt CO2e from transport	1,023	947	-0.5%

These statistics cover all national transport including a portion of air and maritime, for the full national networks, of which the TEN-T core and comprehensive networks are a subset. The more complete context, showing the trends from 2000 to 2050, and all modes of transport is shown in Table 14.

Table 14: EU 2016 Reference Scenario (EU28)

	2000	2005	2010	2015	2020	2030	2050
Population (in million)	484	492	500	505	510	516	522
GDP (in 000 M€)	11231	12351	12895	13427	14550	16682	22526
Passenger transport activity (Gpkm)	5964	6295	6449	6735	7152	7880	9053
Public road transport	549	541	528	546	570	604	667
Private cars and motorcycles	4466	4721	4843	5001	5255	5676	6279
Rail	450	464	499	540	591	693	878
Aviation	458	528	539	608	693	860	1177
Inland navigation	42	42	40	40	43	46	52
Freight transport activity (Gtkm)	2295	2612	2556	2704	2981	3457	4051
Heavy goods and light commercial vehicles	1589	1853	1809	1915	2109	2446	2835
Rail	405	416	394	428	482	580	724
Inland navigation	300	343	354	361	389	432	492
Energy demand in transport (ktoe)	341525	364526	359402	358062	350945	341463	355025
CO₂ Emissions (energy related)							
Transport (MT of CO ₂ eq)	1001.7	1079.8	1036.6	1023.4	983.7	946.9	956.5

Source: <http://ec.europa.eu/energy/en/data-analysis/energy-modelling>

Between 2015 and 2030:

- Population grows from 505 million to 516 million (average of 0.1% year on year growth)
- GDP grows from 13,457 billion Euros to 16,682 billion Euros (average of 1.5% year on year growth)
- Passenger transport activity grows from 6,735 billion passenger kms to 7,880 billion (average of 1.1% year on year growth)



- Freight transport activity grows from 2,704 billion tonne kms to 3,457 billion (average of 1.7% year on year growth)
- Energy demand related to transport activity falls from 358,062 KTOE (kilo-tonnes of oil equivalent⁷) to 341,463 (average of 0.3% year on year decrease)
- Greenhouse gas emissions related to transport fall from 1,023.4 million tonnes of CO₂ equivalent to 946.9 million tonnes (average of 0.5% year on year decrease).

This EU Reference Forecast assumes a full range of transport policies, of which the TEN-T measures are also just a subset. Through modal shift, better energy efficiency and lower emission technology, transport performance can grow at around 1.1% (passengers) to 1.7% (freight) per annum, between 2015 and 2030, while overall CO₂ equivalent emissions from transport fall by 0.5% per annum. The net volume of CO₂ equivalent emissions in 2030 is 76m tonnes lower than in 2015. However, since this is against the background of rising traffic volumes, there is an implied saving of around 20% (~200mt) compared to the base year, by decoupling the rate of growth of CO₂ emissions from the rate of growth of transport.

To extract more detail from the Reference Forecast results and to look in more detail at the implications for the corridor studies it was necessary to use the national level results, and then try to estimate from those, the shares of transport and GHG emissions on the corridor sections.

The results estimated per corridor are shown in Table 15.

Table 15: Summary of Forecasts of Transport Volumes and Emissions for six CNCs

		2015	2030	Avg GR PA
NSM	Bn PKm	171.19	208.69	1.3%
	Bn TKm	149.85	194.48	1.8%
	Pax CO ₂ MT	30.20	28.54	-0.4%
	Frg CO ₂ MT	11.24	12.02	0.5%
	Total CO ₂ MT	41.44	40.56	-0.1%
ATL				
ATL	Bn PKm	158.40	203.28	1.7%
	Bn TKm	87.70	118.25	2.0%
	Pax CO ₂ MT	21.14	21.41	0.1%
	Frg CO ₂ MT	7.86	8.78	0.7%
	Total CO ₂ MT	29.00	30.19	0.3%
RAL				
RAL	Bn PKm	164.99	189.63	0.9%
	Bn TKm	128.74	155.93	1.3%
	Pax CO ₂ MT	13.95	11.60	-1.2%
	Frg CO ₂ MT	4.93	5.33	0.5%
	Total CO ₂ MT	18.88	16.93	-0.7%
NSB				
NSB	Bn PKm	129.09	152.68	1.1%
	Bn TKm	212.98	270.71	1.6%
	Pax CO ₂ MT	19.49	17.96	-0.5%
	Frg CO ₂ MT	10.82	11.79	0.6%
	Total CO ₂ MT	30.31	29.74	-0.1%
RHD				
RHD	Bn PKm	113.57	134.79	1.1%

⁷ 1 Tonne of oil equivalent = 107 kilocalories, or 41.86 GJ (Gigajoule)



	Bn TKm	149.10	188.57	1.6%
	Pax CO2 MT	13.04	11.93	-0.6%
	Frg CO2 MT	7.34	7.76	0.4%
	Total CO2 MT	20.39	19.69	-0.2%
		2015	2030	Avg GR PA
OEM	Bn PKm	131.44	158.91	1.3%
	Bn TKm	88.25	111.13	1.5%
	Pax CO2 MT	14.22	12.94	-0.6%
	Frg CO2 MT	6.55	6.91	0.4%
	Total CO2 MT	20.77	19.86	-0.3%
		2015	2030	Avg GR PA
6 CNC	Bn PKm	868.69	1047.98	1.3%
	Bn TKm	816.62	1039.06	1.6%
	Pax CO2 MT	112.04	104.37	-0.5%
	Frg CO2 MT	48.75	52.61	0.5%
	Total CO2 MT	160.79	156.98	-0.2%

The table shows results per corridor, including freight tonne-kms, passenger-kms, freight transport CO2 emissions, passenger transport CO2 emissions, and total CO2 emissions, for the years 2015 and 2030. The trends are all based on the EU reference forecast, and therefore show consistent patterns of growth, with transport volumes increasing by around 1.5% per annum on each corridor, freight growing faster than passenger transport, and CO2 falling by around 0.2% per annum.

These results at corridor level should all be interpreted as corridor forecasts, i.e. predictions of total traffic levels in 2030, incorporating all known policy impacts, including TEN-T. They include the same coverage of transport modes as the EU Reference Scenario, including allowances for certain (but not all) aviation and maritime flows.

With rising traffic volumes up to 2030, and levels of emissions staying close to 2015 levels, there is also an implied saving in CO2 emissions due to decoupling. The following figures have been estimated per corridor, taking into consideration the different growth rates, and the different shares of passenger and freight traffic.

Table 16: Total savings in GHG per corridor (annual basis, 2030 vs 2015)

	Absolute	Implied	Total
	CO2 Saved	CO2 Saved	CO2 Saved
	Mt CO2	Mt CO2	Mt CO2
NSB	0.57	6.49	7.06
OEM	0.91	4.67	5.58
RAL	1.95	3.12	5.08
ATL	-1.19	8.73	7.54
NSM	0.87	9.96	10.83
RDA	0.70	4.38	5.08

This shows that the corridors save between 5.08 and 10.83MT CO2e each. Allowing for the fact that that these corridors overlap, it is estimated that each corridor experiences an average saving of approximately 6MT of CO2 (equivalent) in 2030, compared to 2015 levels. The NSM, which includes London, Paris, and Amsterdam has the highest implied saving because of the relatively high proportion of passenger transport and share of passenger cars and aviation.



4.3.3. Summary

Using the EU Reference Forecast (2016) it has been possible to make estimates of the traffic growth and change in the levels of GHG emissions by 2030. Overall, it is expected that traffic grows by around 20% between 2015 and 2030 across all modes, but that there is a slight net decrease in CO₂ emissions. When the forecasts are mapped onto the corridors, we estimate a total saving of between 5.08 and 10.83 MT CO₂e per corridor in 2030, compared to the situation in 2015.

These figures include all modes of transport and all known policy impacts. In the following section, we attempt to isolate the impact on GHG due specifically to the corridor work-plan projects.

4.4. Forecast of modal shift

4.4.1. Approach

- Based on new results produced by corridor consultants.
- Bottom up methodology, based on estimating the impact of the list of corridor projects.
- Isolating the infrastructure impacts from all other possible effects.
- Covering freight transport for road, rail and inland waterway modes.
- Calculated in the model's base year (2015)
- Methodology to estimate "the impact of the corridor work plan" by 2030.

The aim of this exercise has been to estimate the impact of the TEN-T corridor work plans for six corridors upon modal share, as part of the wider analysis of the impact upon de-carbonisation. A network model (NEAC10) was used, applying the TRANSTOOLS mode split model.

NEAC10 is a chain-based multimodal network model covering the whole of Europe. It contains a trade module, a mode split module and an assignment module. For this exercise, only the mode split and traffic assignment routines were used, as the traffic forecast for the corridor studies is pre-calculated from the 2016 EU Reference Forecast.

As a pre-requisite for carrying out this analysis, the alignments of the six CNC corridors analysed were programmed into the NEAC model networks. The following diagrams show the corridor alignments per mode, also indicating the overlapping sections in dark blue.

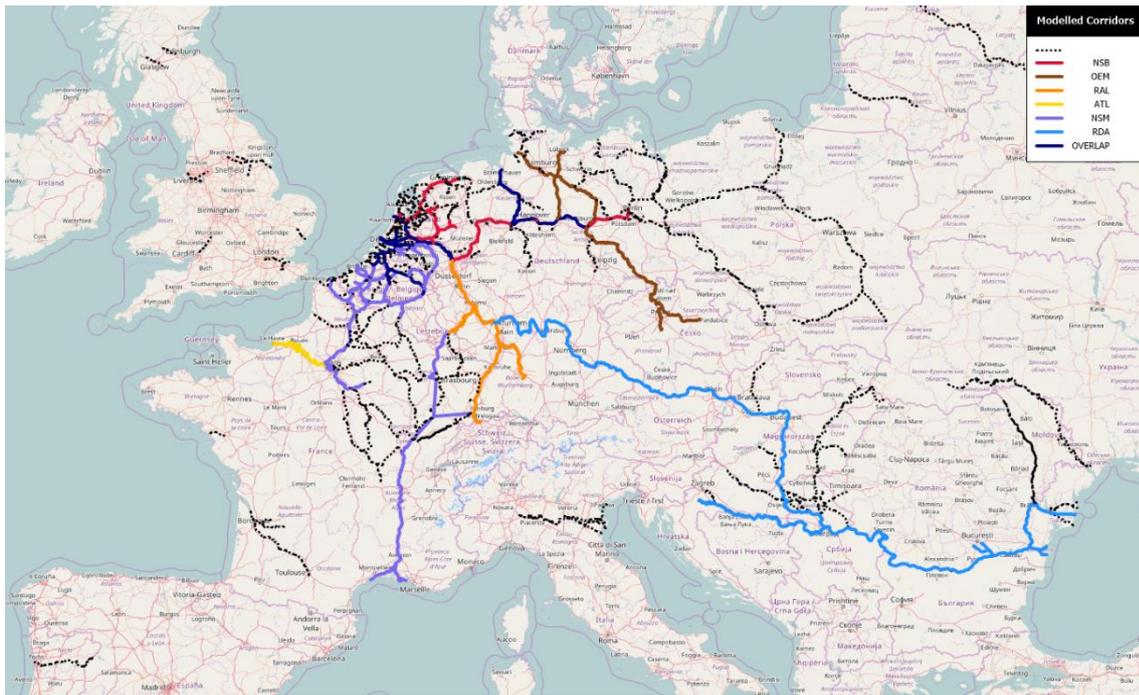


Figure 44: Inland waterway network - six corridors

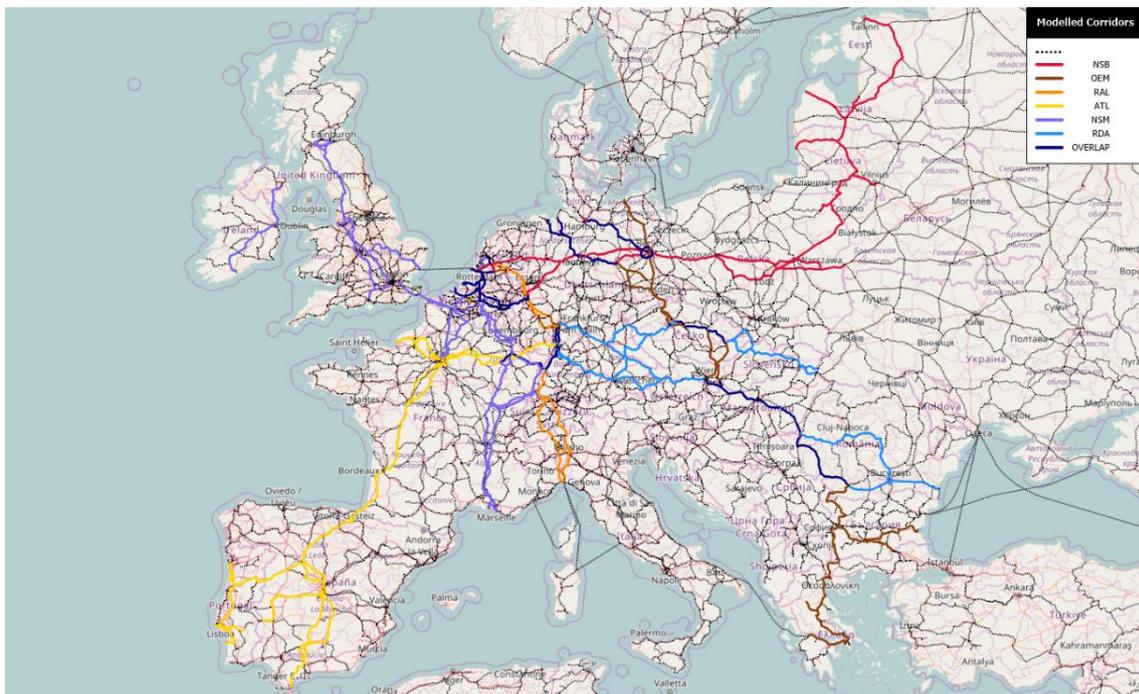


Figure 45: Rail network – six corridors



Figure 46: Road network - six corridors

Here it can be seen that the proportion of corridor links to non-corridor links varies substantially, as does the degree of corridor overlap per country.

4.4.2. Model Scenario Assumptions

A scenario was constructed in which the model's network has been adjusted to reflect the impact of the corridor work plans. The work has been done as a combined scenario for six corridors (NSB, OEM, RAL, ATL, NSM, and RDA). This is advantageous because of the degree of overlap, and therefore impacts on one corridor spill over onto the next. There is a need to have consistent forecasts across the corridors.

Therefore, all the assumptions have been derived from the six corridors' project lists. This posed a challenge due to the large number and the sheer variety of projects. A three-step approach was used, classifying the projects into three bundles:

- Missing link (activated link) projects
- Large projects,
- Small projects

The missing link projects were modelled by simply activating new links the model's network. Similar step changes were introduced in the case of fundamental upgrades such as the switch from broad gauge to standard gauge in e.g. Spain.

Main assumptions – missing links/activated links:

- Addition of Seine-Scheldt waterway in France, and linked investments in Belgium.
- Addition of motorway link, mainly in Romania, Bulgaria, and Czech Republic.
- Introduction of standard gauge in Portugal, Spain, and Baltic States.

(Note that the assumption of standard gauge applies to all international routes from those countries, and is not just limited to traffic on the specified corridors).

Large projects were introduced into the model as improvements in the level of service on the specific network links where the projects were located.

Small projects (which are the majority in number, but account for a relatively small proportion of the total investment (measured in €) were included by making improvements in the level of service on corridor links within specific NUTS2 regions. Thus, all the small projects in a given NUTS2 region were aggregated according to mode of transport, and the summed investment was used to create changes in level of service on the links.

In the following maps, the large projects and the missing link (activated link) projects are shown per mode of transport. The upgraded and activated links are highlighted in colour.

- Larger projects are projects over €150m
- Colours show the action taken per section e.g. activate link, or invest to improve level of service.
- These investment levels are converted proportionally into changes in level of service on the specified corridor links.

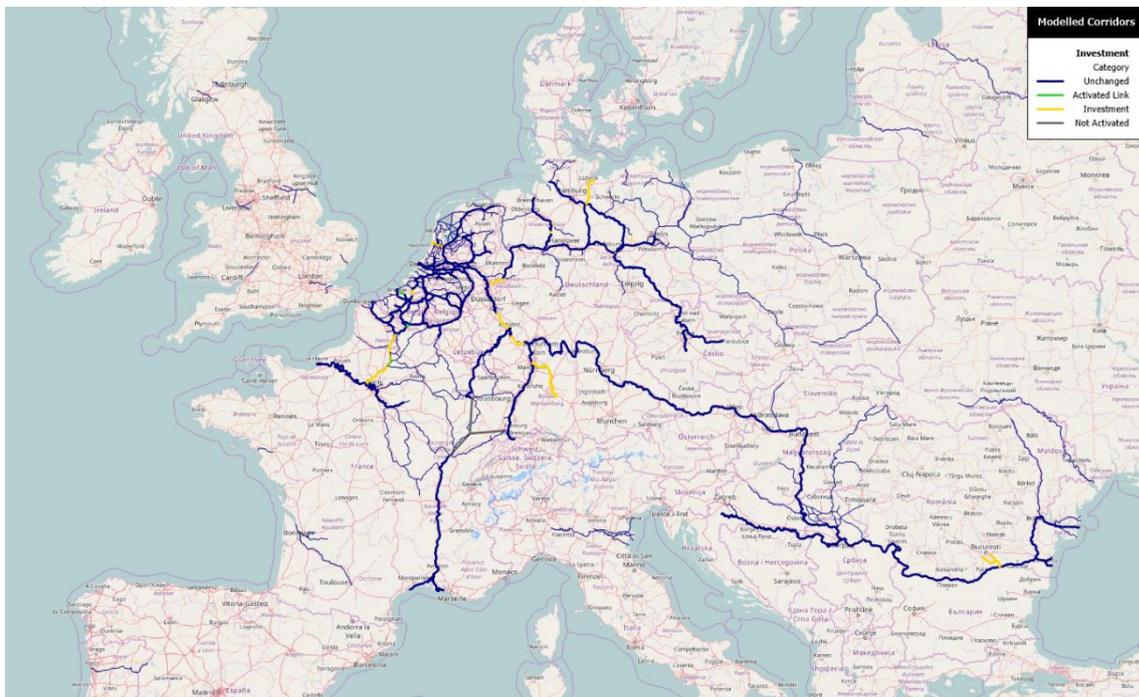


Figure 47: Waterway network- Large upgrades

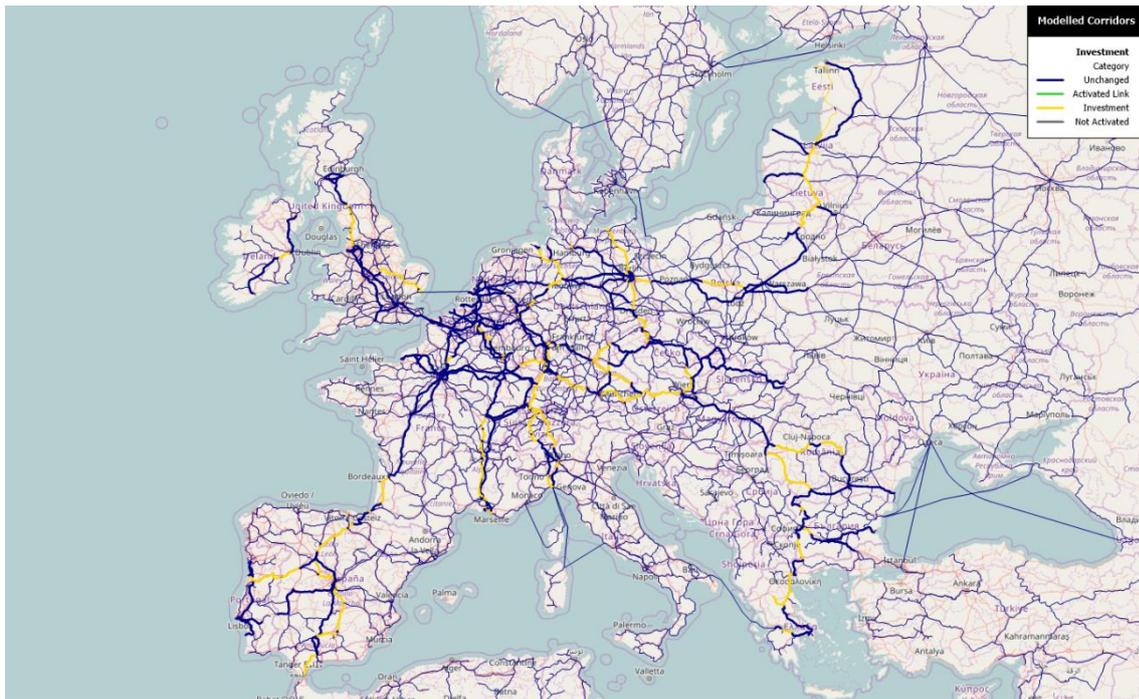


Figure 48: Rail network - Large upgrades

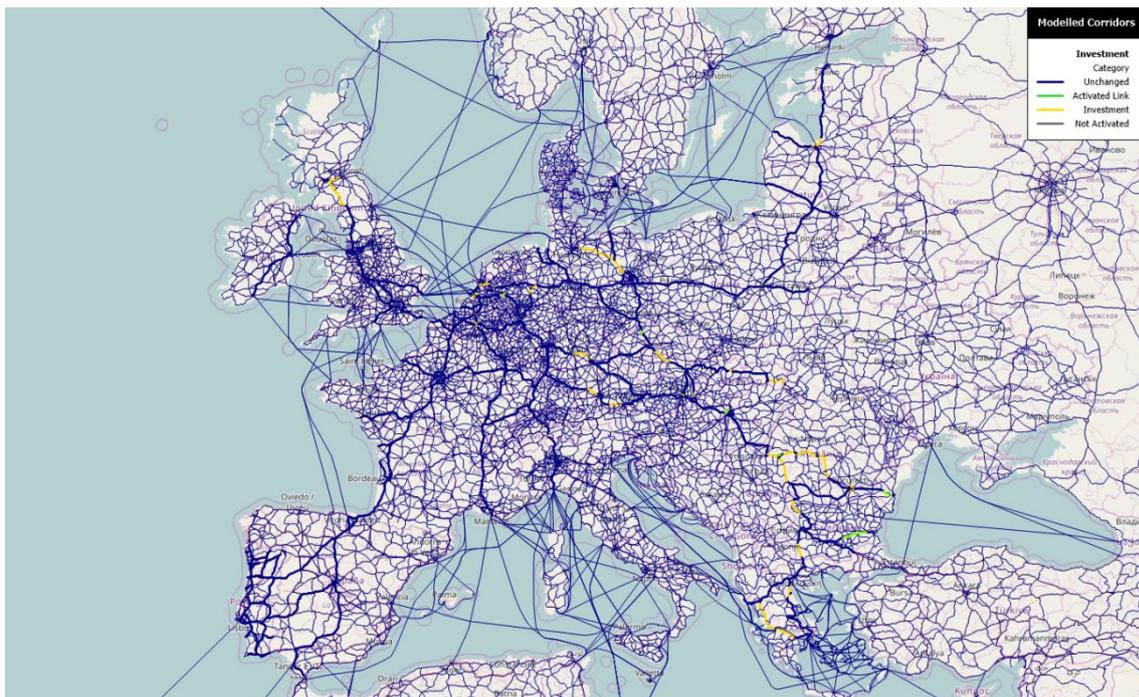


Figure 49: Road network - large upgrades

The investments categorised as large projects are summarised below:

Group 2: Investments: large projects (€million up to 2030)

	ROAD	RAIL	IWT	TOTAL
ATL	-	18,905.42	-	18,905.4
NSB	5,819.3	5,213.53	2,736.3	13,769.2
NSM	7,849.0	24,326.00	6,545.0	38,720.0
OEM	9,904.5	23,700.10	838.1	34,442.7
RAL	8,456.0	46,625.70	2,364.1	57,445.8
RDA	14,135.4	26,388.37	1,381.0	41,904.7
TOTAL	46,164.1	145,159.1	13,864.5	205,187.8

The smaller projects, which are input as changes per NUTS2 region are shown below per mode of transport:

- Smaller projects are projects under €150m
- Colours show how much investment in smaller projects per NUTS2.
- These investment levels are converted proportionally into changes in level of service on corridor links within these regions.

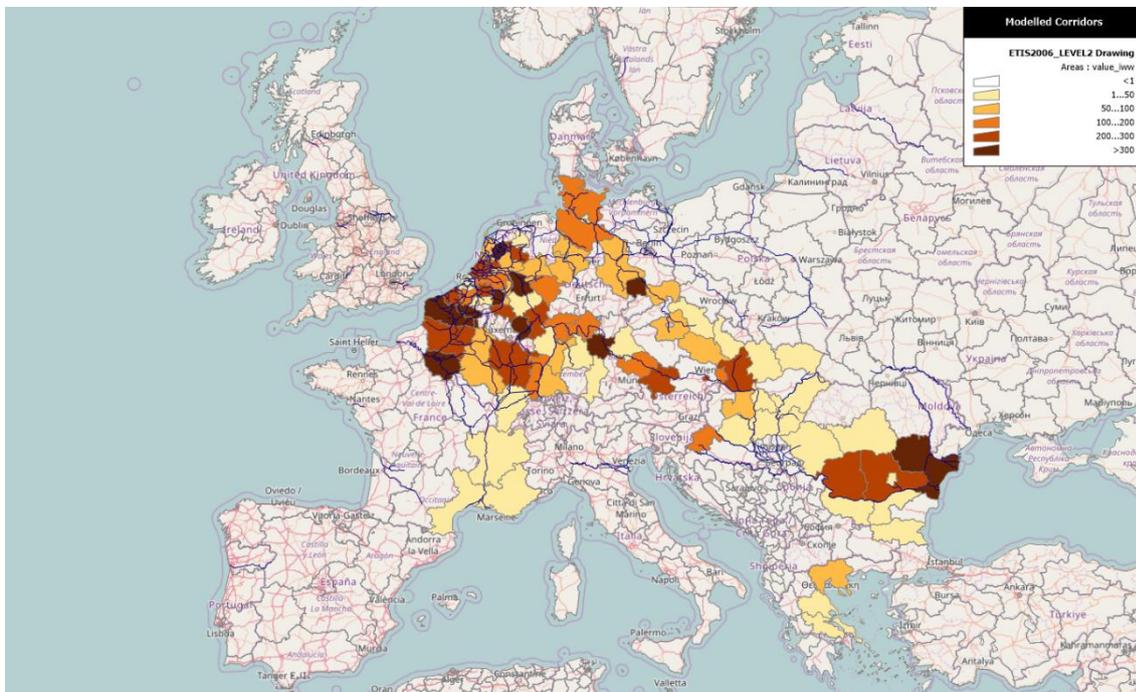


Figure 50: Smaller projects - per NUTS2 - waterways

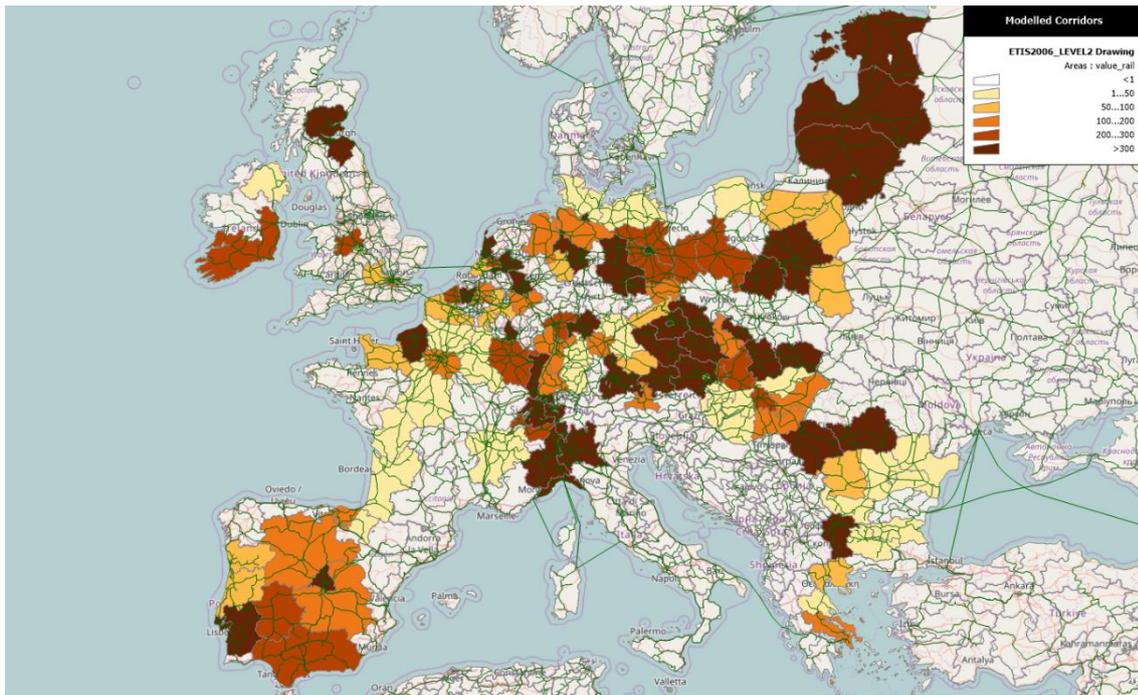


Figure 51: Smaller projects - per NUTS2 - rail

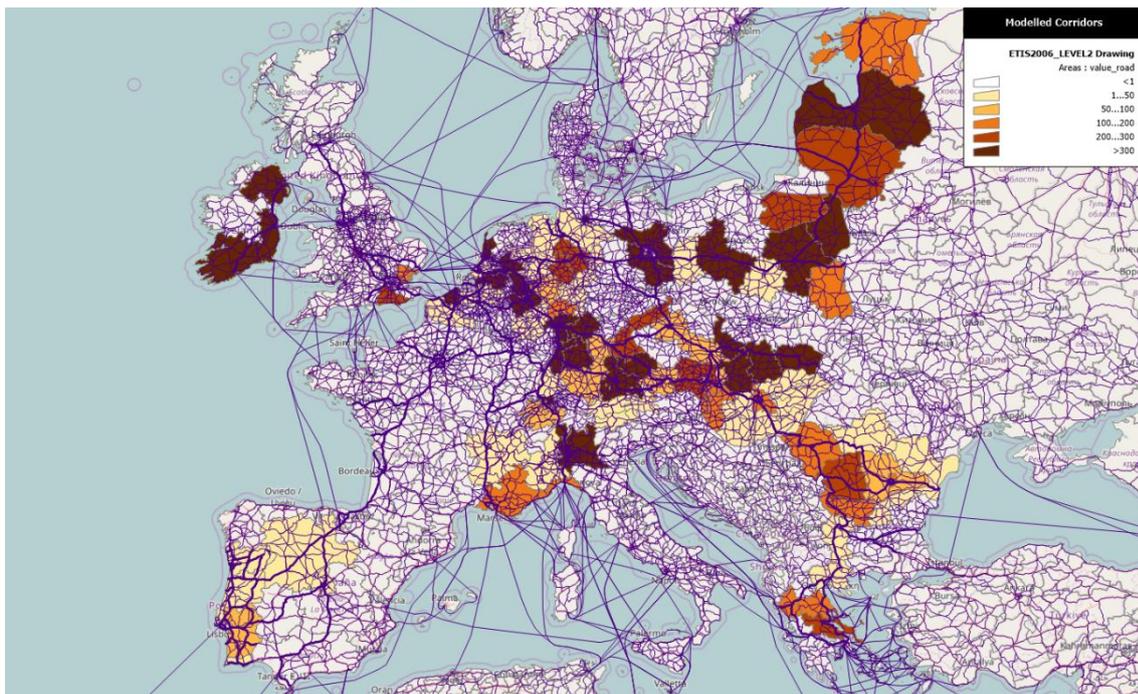


Figure 52: Smaller projects - per NUTS2- road

The investments classified as small projects are summarised in the table below:

Group 3: Investments: smaller projects (€million up to 2030)

	ROAD	RAIL	IWT	TOTAL
AT	506.72	1,351.71	476.65	2,335.09
BE	594.66	1,371.99	1,890.13	3,856.77
BG	145.80	398.42	32.60	576.82



	ROAD	RAIL	IWT	TOTAL
CH	1,948.00	16,060.05	-	18,008.05
CY	26.20	-	16.95	43.15
CZ	1,405.42	4,386.08	182.44	5,973.94
DE	8,871.90	6,777.73	3,327.44	18,977.07
EE	165.28	1,001.62	-	1,166.90
ES	22.79	1,374.81	-	1,397.60
FI	-	452.96	-	452.96
FR	252.08	1,920.04	1,497.75	3,669.87
GR	481.22	330.64	73.71	885.57
HR	-	-	185.34	185.34
HU	504.93	762.97	120.84	1,388.74
IE	574.00	266.29	-	840.29
IT	730.95	4,409.49	-	5,140.44
LT	205.28	757.05	-	962.33
LU	-	514.40	-	514.40
LV	985.00	982.43	-	1,967.43
NL	2,048.38	1,762.79	1,558.42	5,369.59
PL	3,445.31	3,629.86	-	7,075.17
PT	125.75	1,268.86	-	1,394.61
RO	696.38	970.35	1,393.48	3,060.20
SK	2,372.49	2,831.53	390.23	5,594.25
UK	1,432.00	1,113.12	-	2,545.12
TOTAL	27,540.56	54,695.18	11,145.97	93,381.71

4.4.3. Elasticities

Due to the large number of projects, there is no possibility to introduce each one specifically into the network model as a detailed set of technical changes. Therefore, an alternative was chosen, to convert the invested sums into assumed changes in network link speeds.

It is assumed that the higher the investment costs, the more benefit on the corridor sections.

The elasticities linking Euros invested to level of service increases are:

- Road: +2% increase in speed, for every billion Euros invested.
- Rail: +5% increase in speed, for every billion Euros invested.
- Waterway: +9% increase in speed, for every billion Euros invested.

This is evidently a major simplification. Not all projects affect link speed. However the model uses link speed in its cost functions so it has been used as a proxy for a general assumption linking investments in infrastructure to user benefits.

These elasticity values (time saving per billion invested) have been extrapolated from results published in the study "Cost of non-completion of the corridors" (M-FIVE et al, 2015). The study summarised the changes in travel time for the corridors in relation to investment costs. For example, the study shows a 19% improvement in travel time

arising from an investment of €2.4bn in the IWT sector (a single Rhine Danube example). The study shows quite a range of values, which is understandable given that investments are not necessarily targeting travel time as an impact, so an average of the data points per mode has been used in the network modelling.

4.4.4. Model results

Four model runs were carried out:

- I. Reference (REF) case (no work plan projects)
- II. Work plan scenario (WPS1) with only the rail and waterway upgrades, but no road upgrades, and no rail gauge changes.
- III. Work plan scenario (WPS2) with road, rail, and waterway upgrades, but no rail gauge changes.
- IV. Work plan scenario (WPS3) with all assumptions combined.

The settings are summarised below. 'X' means the assumption was applied, and 'O' means it was not.

Table 17: Overview of scenarios

		REF	WPS1	WPS2	WPS3
Group 1	W' way missing links	O	X	X	X
	Road missing links	O	O	X	X
	Rail gauge change	O	O	O	X
Group 2	Road upgrades	O	O	X	X
(Large projects)	Rail upgrades	O	X	X	X
	Waterway upgrades	O	X	X	X
Group 3	Road upgrades	O	O	X	X
(Small projects)	Rail upgrades	O	X	X	X
	Waterway upgrades	O	X	X	X

Thus, the main aim was to produce the full scenario (WPS3), but this was reached in stages in order to make it possible to see how much impact was associated with each change.

The first set of results shows total shares for road, rail, and inland waterway for all countries (EU28 and non-EU), EU28 countries, and the countries covered by the six CNCs.

Table 18: Model results - Overall mode shares

Total Mode Shares: all network countries				
	Road	Rail	Water	Total
REF	74.70%	19.93%	5.38%	100.00%
WPS1	74.16%	20.16%	5.68%	100.00%
WPS2	74.18%	20.14%	5.68%	100.00%
WPS3	71.37%	22.97%	5.66%	100.00%



Total mode shares: EU28 countries				
	Road	Rail	Water	Total
REF	73.87%	20.32%	5.80%	100.00%
WPS1	73.30%	20.56%	6.14%	100.00%
WPS2	73.32%	20.54%	6.14%	100.00%
WPS3	70.32%	23.57%	6.11%	100.00%

Total mode shares: Corridor countries (6 CNCs)				
	Road	Rail	Water	Total
REF	73.77%	20.06%	6.17%	100.00%
WPS1	73.14%	20.34%	6.53%	100.00%
WPS2	73.16%	20.31%	6.52%	100.00%
WPS3	69.89%	23.61%	6.49%	100.00%

In WPS1 there is a gain in share for rail and waterway, which is slightly reduced in WPS2 as the road upgrades are added. Then there is a larger shift to rail with the gauge change in WPS3. The effects are more intense, if only the countries where the projects take place are counted.

The second set of results (Table 19) shows the traffic levels per corridor, measured in million tonne kms. Note that the tables are not summed vertically because there are many overlapping sections.

Table 19: Projected volumes on corridor links (Million TKm per annum)

Corridor volumes (base year equivalent)					
		Road	Rail	Water	Total
REF	NSB	55,367	49,396	61,907	166,671
	OEM	61,411	32,700	5,213	99,324
	RAL	31,736	22,104	68,030	121,869
	ATL	59,278	11,502	2,536	73,317
	NSM	65,768	24,322	42,030	132,121
	RDA	52,344	44,647	22,110	119,102
WPS1		Road	Rail	Water	Total
	NSB	55,120	51,283	63,238	169,641
	OEM	61,328	33,899	5,378	100,605
	RAL	31,606	22,931	69,662	124,199
	ATL	58,586	11,798	2,967	73,351
	NSM	65,677	25,015	47,950	138,642
WPS2		Road	Rail	Water	Total
	NSB	55,522	51,238	63,214	169,975
	OEM	63,131	33,848	5,375	102,355
	RAL	32,533	22,863	69,651	125,047
	ATL	58,589	11,800	2,966	73,354
	NSM	65,743	25,219	47,935	138,898
WPS3		Road	Rail	Water	Total
	NSB	55,251	52,124	63,214	170,590
	OEM	63,287	34,118	5,375	102,780
	RAL	32,336	24,044	69,651	126,032
	ATL	46,904	25,756	2,966	75,626
	NSM	62,777	28,391	47,935	139,103
	RDA	56,234	47,202	22,480	125,916

The same results converted into indices, are shown overleaf (Table 20), in which the reference values are set to 100.

**Table 20: Projected volumes on corridor sections
(Index, REF scenario = 100)**

Corridor volumes					
		Road	Rail	Water	Total
REF	NSB	100	100	100	100
	OEM	100	100	100	100
	RAL	100	100	100	100
	ATL	100	100	100	100
	NSM	100	100	100	100
	RDA	100	100	100	100
		Road	Rail	Water	Total
WPS1	NSB	100	104	102	102
	OEM	100	104	103	101
	RAL	100	104	102	102
	ATL	99	103	117	100
	NSM	100	103	114	105
	RDA	99	104	102	101
		Road	Rail	Water	Total
WPS2	NSB	100	104	102	102
	OEM	103	104	103	103
	RAL	103	103	102	103
	ATL	99	103	117	100
	NSM	100	104	114	105
	RDA	107	103	102	105
		Road	Rail	Water	Total
WPS3	NSB	100	106	102	102
	OEM	103	104	103	103
	RAL	102	109	102	103
	ATL	79	224	117	103
	NSM	95	117	114	105
	RDA	107	106	102	106

These results show that in WPS1 (just rail and waterway upgrades) the road share on the corridor falls on two corridors, whereas rail and water shares increase on all corridors. The total volume carried on the corridor (traffic shifted from off-corridor to on-corridor) increases overall. The relatively high percentage shift to waterway on the Atlantic corridor reflects the low baseline volumes.

In WPS2, which adds the road projects, there is a gain for the road sections of three corridors (OEM, RAL, and RDA), and overall there is a further shift of traffic from off the corridors onto the corridors. The volumes shifted to rail and water decrease, but not by more than 1 index point per mode per corridor.

Finally in WPS3, which includes the step change in rail related to the gauge changes in the Iberian Peninsula and in the Baltic States, there is a more marked shift, mainly from road to rail, and especially on the ATL and NSM corridors which are more directly affected by the competitiveness of rail on routes towards Spain. Waterborne traffic (here, meaning inland waterway traffic) does not lose any traffic to rail, because there are no waterway routes affected by the competitiveness of the Iberian and Baltic rail routes.

Maps showing the traffic shifts (WPS3 vs REF) are shown below. The colours indicate the estimated shifts (measured in tonnes) on the network. For waterways, the largest investments are taking place on the NSM corridor, with the connection of the Seine

and Scheldt rivers. This creates a new waterway route between Paris and the Rhine/Maas network, with network effects stretching into the NSB and RAL corridors. (This model assigns 13.7 million tonnes (2015 traffic basis⁸) to the Seine-Scheldt route.)

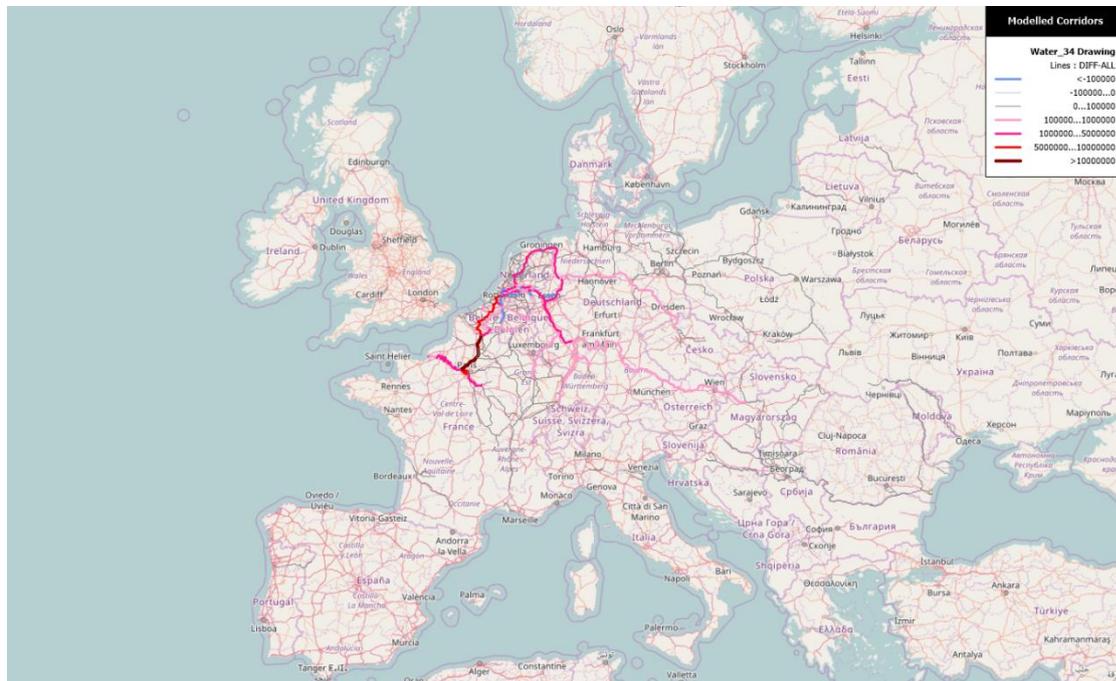


Figure 53: Estimated Traffic shifts - waterway network

Since the six workplans include over 400 rail projects spread across the network, the rail impacts are also very widespread. However, as explained, the key assumption is the that of standard gauge in Iberia. This assumption is applied to the Atlantic corridor route, and to other France-Spain routes, so part of the impact is carried onto the western half of MED corridor.

The large shifts visible on the two France-Spain crossings are partly the consequence of having relatively few crossing points, so traffic coming from all directions is focused onto the two coastal routes. The shift is also large because of the low volume of rail traffic in the base year, implying that there is a high potential for a shift. This contrasts for example with the trans-Alpine routes where rail has a high share in the base year. The shifts being predicted in these results on the trans-Pyrennes (around 10 million tonnes each for ATL and MED routes), are quite small relative to the current rail freight tonnages crossing the Alps (around 30m rail freight tonnes each for the Gotthard and Brenner routes). However, in the current context these trans-Pyrennes rail shifts should be seen as the upper end of the spectrum, as the modelling assumption of standard gauge throughout Iberia goes further than the upgrade projects being listed in the work-plan.

⁸ 2030 waterway volumes are expected to be approximately 20% higher.

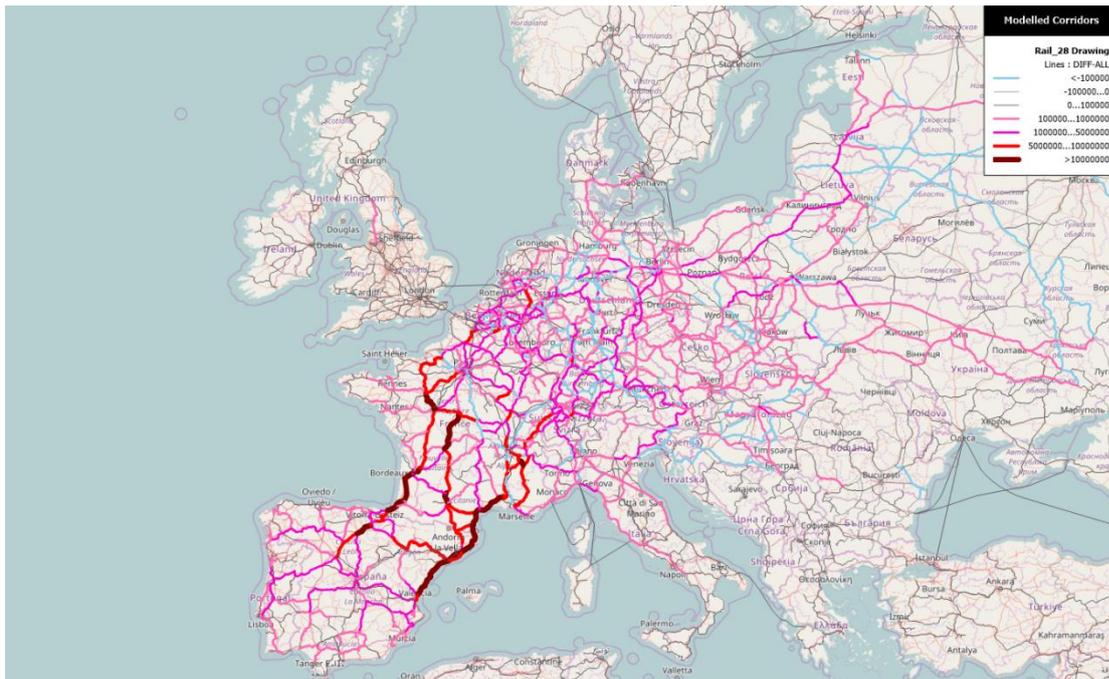


Figure 54: Estimated Traffic shifts - railway network

On the road there is a net decrease in traffic so the colours in the map (blue lines show traffic decreases) reflect this. Shifts away from road are naturally most evident in parts of the network where the model has shifted relatively high volumes to rail and waterway, i.e. in France.

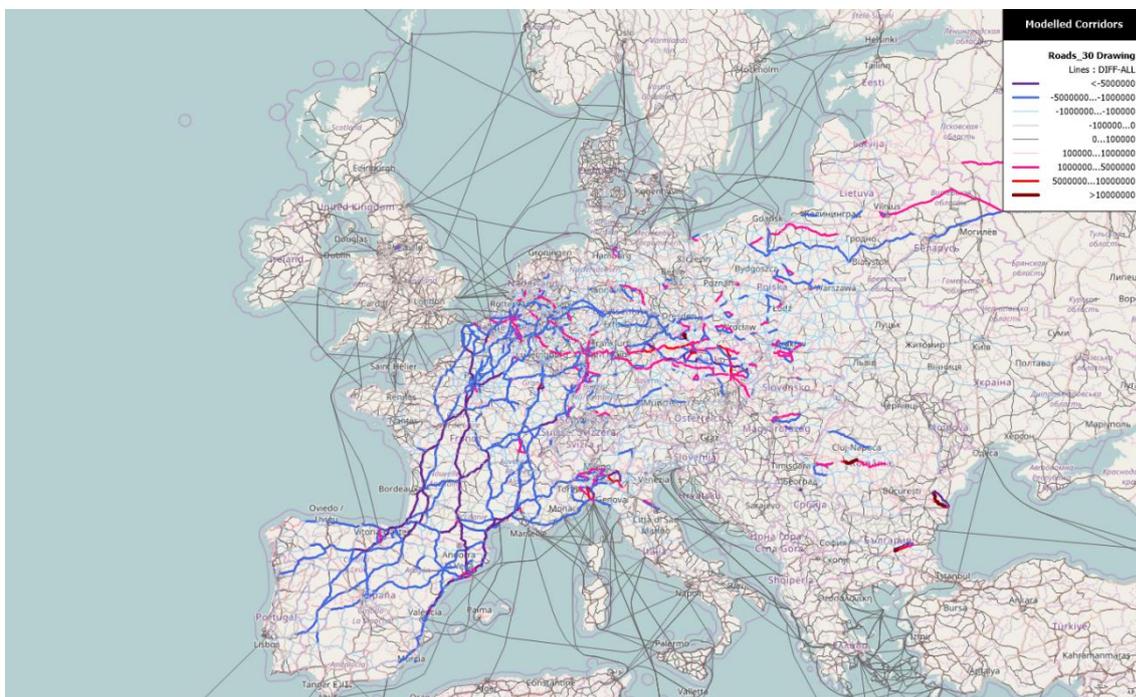


Figure 55: Estimated traffic shifts - road network

The work plans however do also include upgrades to the road network, especially in the Cohesion countries, so there are also shifts onto the road corridor links, especially in central and Eastern regions.

4.5. Model results and decarbonisation

The model results calculated for the base year show a number of impacts from the investments in the six corridors.

- A shift of traffic from off-corridor to on-corridor for all modes.
- A shift of traffic from road to rail and inland waterway.
- A series of network effects, where for example upgrades in Spain’s railways lead to increased rail traffic in Germany (i.e. one corridor affecting several others, because the cargo flows are not self-contained by specific corridors.)

In order to measure the impact of these projects on modal share and resulting changes in GHG emissions it is therefore necessary to analyse the results at the global level, rather than corridor by corridor.

This has been done by taking the model results (base year equivalent) and grossing them up to estimated 2030 levels.

The 2025:2030 growth factors at EU28 level were:

- Road: 27.7%
- Rail: 35.5%
- Water: 19.7%

The calculation is as follows:

Table 21: Decarbonisation from modal shift estimation, 2030

Model Data	Units	Road	Rail	Water	Total	
TRAFFIC						
2015 EU28	Bn. TKM	1,892,190	520,596	148,662	2,561,448	(A)
Growth 2015-30	Factor	1.277	1.355	1.197	(1.288)	(B)
2030 EU28	Bn. TKM	2,416,327	705,407	177,948	3,299,682	(C) =(A)*(B)
2030 WPS3	Bn. TKM	2,312,661	822,408	188,487	3,323,557	(D)
Difference	Bn. TKM	-103,666	+117,001	+10,539	+23,875	(D)-(C)
GHG						
2030 EU28	MT CO ₂ e	327.61	10.35	3.67	341.63	(E)
2030 WPS3	MT CO ₂ e	313.55	12.06	3.89	329.51	(F)
Difference	MT CO ₂ e	-14.05	+1.72	+0.22	-12.12	(F)-(E)

The table shows that if we compare the 2030 baseline at EU28 level against the model scenario (the full scenario with all corridor projects for six corridors), also at 2030 level, there is a saving of 12.12 MT of CO₂ equivalent which can be attributed to the modelled infrastructure projects.

Because of the overlaps, network effects and other dependencies between the corridors, it is hard to distribute these savings amongst the corridors. Therefore in conclusion we can approximate the savings per corridor at around 2MT each on an annual basis. This figure, of 2 MT showing the saving attributed to the ‘impact of the corridor’ investments can be compared against the estimate of savings ‘on the corridor’ of between 5.08 and 10.83 MT per corridor. The former relates directly to the corridor work-plans, and the resulting mode and route shifts, whereas the latter relates to greater energy efficiency and lower rates of GHG emission per km.

5. Mode specific issues: analysis of potential market uptake

The first step in this analysis is to look for environmental friendly transport modes with underutilised capacity. Looking at environmental transport modes, the rail and inland waterway transport modes are relevant on this corridor.

The short-sea maritime dimension of the Corridor is being tackled and further analysed in the framework of the MoS horizontal Corridor, especially with a study recently launched by DG Move (“Study on support measures for the implementation of the TEN-T core network related to sea ports, inland ports and inland waterway transport”). For the moment only the presentations done during the 8th Forum meeting are available and no further elements have been provided to the Atlantic team.

A study developed for the RFC on the “Impact of Atlantic ports’ development on international rail freight traffic” showed that rail traffic represents a hinterland market share of 12% (13 MT), with the highest share observed in Portugal (19%), Spain (10%), and the weakest in France (8%), and that, on the whole Atlantic Corridor, rail pre post haulages concern mainly dry bulk and container traffic (5 MT each of them) which covers the two thirds of its market. General cargo and liquid bulk are both secondary markets with traffic between 1 and 2 MT for each of them. The main container rail services are operated in Sines (2 MT), where the handled volumes permit economies of scale and intermodal services development, despite the high transshipment rate. Le Havre and Bilbao reach nearly 1 MT and, to a lower extent, Algeciras, Leixões and Lisboa dispatch 0.5 MT on rail intermodal services.

However, for reasons of flexibility and ability to adapt more quickly to the demand of freight clients, the main origin-destinations in volume on the short distance are captured by the road mode, due also to the barrier existing in cross-border railways. The deviation potential remains significant for mid or long-distance destinations, where the rail is already positioned or could benefit from multi-client intermodal services for containers and trailers (Algeciras, Le Havre). Together, long distance (over 400km) potential market amounts, as a whole, to 10.6 MT, of which 17% are from/to French Ports, 26% from/to Spanish Ports and 56% from/to Portuguese ports. On this market, rail currently captures 53% of French ports tonnages, 32% of Spanish ports, and only 23% of Portuguese ports.

For the Atlantic corridor, it must be kept in mind that major changes are indeed expected since:

- for the base year, alternative modes do not perform very well against road due to major interoperability problems;
- part of these problems are expected to be solved with major investment projects for alternative modes, including development of new techniques such as Rail Motorways and MOS services, while others can be overcome with operational arrangements between infrastructure managers and with innovative administrative tools;
- and that the relative importance of very long distance international transport along the corridor, compared to the existing situation in other corridors, calls, in addition, for innovative organizational solution opportunities, with the development of transport hubs and multimodal logistic platforms.

For instance, the new rolling motorway services in the Atlantic Corridor (Vitoria-Lille), are expected to capture, by 2020, 2 million tons per year (equivalent to 4 034 trains)

and 5,8 million tons by 2030, as forecasted in the Traffic Market Study (TMS), realized by the RFC in 2014/2015.

Ports' traffic projections, as well as MOS developments, are indeed part of the MoS "horizontal" study working in relation with corridor studies. For the appraisal of MTMS of the Atlantic corridor, in relation with maritime services, it is first important to start from a segmentation of the maritime market, pointing out segments which are more dependent upon land routes competition, and in particular segments which can attract road transport.

The maritime transport of container development is important for the evolution of traffic along the corridor on the maritime side. For instance, the study for the Atlantic RFC forecast for maritime and railway traffic, shows that a global moderate growth of 2%/year could be expected, assuming a stagnation of liquid bulk traffic and a rise of container, dry bulk traffic, and a marginal share of general cargo traffic forecasts. This trend is even more contrasted when looking at rail traffic development, as container rail services of the Atlantic ports should grow, as a whole, by 10%/year until 2020, dry bulk services by 5%/year, general cargo by 4%/year, and liquid bulk would remain stable. Improving ports accessibility in Portugal, Spain and France, within the corridor, will help the promotion of such traffic, using alternative modes such as rail and IWW in the northern part of the corridor⁹.

Market studies of MOS services have been launched with regard to the Atlantic corridor, and such services have been introduced in the market studies of the GPSO rail project pointing out a potential modal shift for road to MOS services, and complementarities between alternative services such as combined transport services and rail motorways services with MOS services; the results of the study depend upon hypotheses concerning the performances of MOS services, their overall cost, the type of service (mixed with passengers or not), and transit performances in ports.

The corridor's added-value will also be influenced by its potential to improve the logistics chains to/from the EU in the global framework. When assessing this potential, two additional key elements also need to be considered:

- The deployment in the near future of LNG as maritime fuel in the North Sea-Baltic and North America's East coast, following the establishments of ECAs according to the MARPOL convention (operational since 2015), being noted in particular the effects in terms of competition that might affect the port of Le Havre, the only Atlantic port included in a ECAs.
- The enhanced role of the Atlantic area following the opening of the new Panama lock system and, gradually, the growth of the polar route between the Far East and the North Sea.

While this set of factors call for enhanced capacity on ports, ensuring adequate inland connections for long-range transport, to the rail freight corridor, and to inland waterways, where available, is critical to be improved.

Taking into account interrelations between corridors in the MTMS for the Atlantic corridor is already a first step towards a comprehensive corridor planning, but it is also a requirement for a good appraisal of the market situation and the market projection of the corridor market. The importance of such interrelations is clearly relevant for corridors crossing the Pyrenees, although the Atlantic corridor is more isolated in the

⁹ As presented in the joint meeting in Paris for ATL and NSMED corridors, with expected results of Amsterdam/Marseille corridor study.

western part of Europe as compared to other corridors in the center of Europe. For Pyrenees-crossing, Madrid and southern Spanish regions can choose alternative routes towards northern Europe, depending upon the evolution of relative performances of the Atlantic and Mediterranean corridors.

5.1. Update of new elements

During 2016 and continuing in 2017 the Rail Freight Corridor had developed several relevant studies (Market study update, study on ports, study on rolling motorways, study on capacity constraints).

The study on “Assessment impact of the infrastructure constraints on railway undertakings”, includes an estimation of the modal shift related to each investment scenario, which is of particular interest to us.

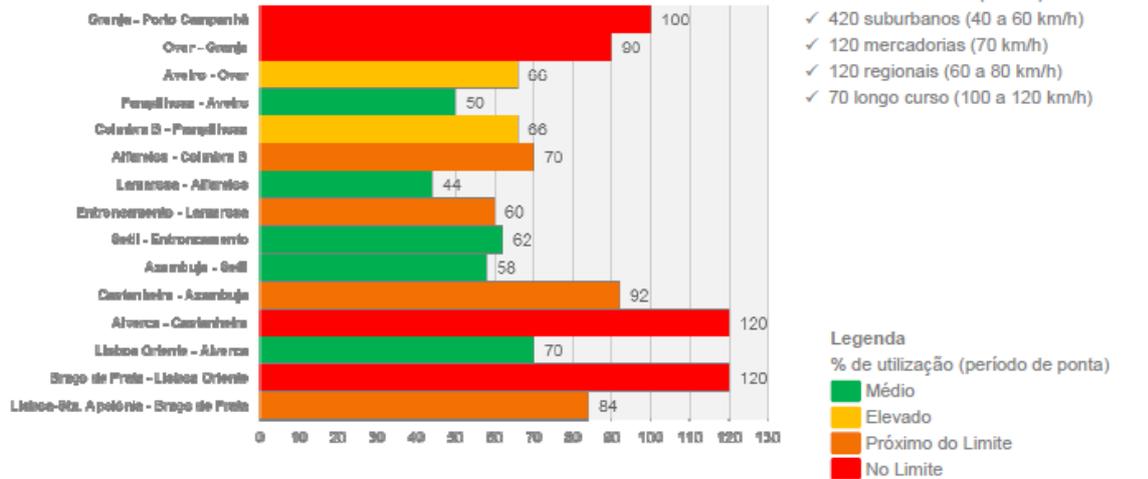
Table 22: Rail traffic projections associate to different scenarios of investments

Modal share of rail in %		SCN 1 : BASE	SCN 2 : Y Basque	SCN 3 : Lisboa - Madrid	SCN 4 : Elect	SCN 5 : 750m	SCN 6 : Gradient	SCN 7 : UIC	SCN 8 : ERTMS	SCN 9 : all Investments
International flows with at least 1 km on the corridor	France - Europe	14%	14%	14%	14%	14%	14%	14%	14%	14%
	Total transpyrenean flow (ATL paths)	7%	9%	8%	7%	9%	7%	13%	8%	18%
	Transpyrenean - Portugal	5%	5%	6%	5%	7%	5%	9%	6%	19%
	Transpyrenean - Spain	8%	10%	8%	8%	9%	8%	13%	8%	17%
	Iberian flows	3%	3%	3%	3%	4%	3%	3%	3%	5%
TOTAL		9%	9%	9%	9%	9%	9%	11%	9%	13%

Source: RFC

As already acknowledged in the previous studies, the rail corridor is still endowed of capacity, an aspect that will be reinforced with the completion of the Tours-Bordeaux and (by 2023) with the Y-Basque which will spare capacity on the conventional line for freight.

However, and as already point, other corridor branches are saturated (as it is the case for the North line connecting Lisbon to Porto, as shown in the figure below) which requires an overall planning not yet started.

**Níveis de Ocupação
(n.º de comboios por dia / via)**


Source: IP, Ferrovia 2020

Figure 56: Capacity usage in the North line

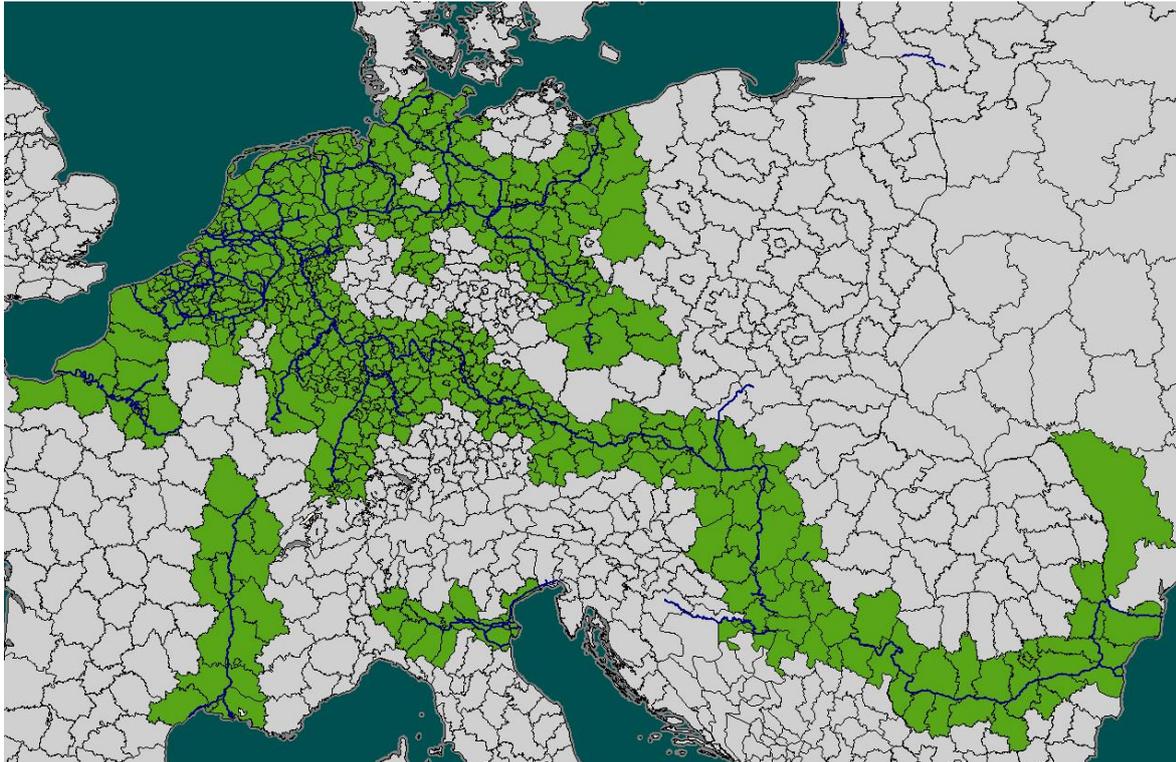
5.2. Macro analysis container shift potential study for inland waterways

The main objective of the 'analysis of modal shift potential' is to identify individual transport flows that, brought together, could bring enough volume to operate a liner service between two (or more) Inland Terminals. A top-down approach has been used to determine the multimodal market potential. Hereafter, the step-by-step methodology and the specifications behind the model are explained. A number of selection criteria have been used in order to further determine the continental multimodal potential:

- All regions that are connected to the CEMT class IV inland waterway network (TEN-T + all other waterways) have been selected. This includes both interconnected and isolated waterway regions. Moreover, non-connected regions that are within a range of a 100 kilometres from a CEMT IV waterway have been included too.
- Containerized goods have been selected. These goods are suitable to be transported in containers, however not all goods necessarily need to be transported in a container. There are mostly goods that are currently being transported by road, but it for example excludes specifically living animals and the already captive IWT markets of crude oil, coal, iron ore and dry bulk, sand and gravel. See Annex E for the full list of NST-2 good categories that can be containerized.
- Two distance criteria have been applied:
 - Regarding the selection of relevant regions for a potential model shift to IWT the regions have been selected which have access to the IWT network using pre-/end haulage over a distance of maximum 100 km.
 - The OD transport distance for road haulage should be at least 200 km. If the origin and destination are both located directly along waterways ("wet locations") already at transport distances from 20 km IWT can be competitive compared to road haulage. However, if locations are situated away from waterways (i.e. "dry locations") pre-/end haulage is needed resulting in an increase of break-even distance. For dry-locations the break-even distances

are between 180 to 200 km¹⁰. The potential based should however be a direct result of comparison of the intermodal vs. road transport costs, therefore no pre selection was made on distance classes for road haulage. Short distance transports by road (i.e. between Slovakia and Czech Republic) are thus also considered in this multimodal analysis.

On the basis of the assumptions and criteria mentioned above the scope for the continental container transport model has been determined. The scope is illustrated in the figure below by a selection of NUTS-3 regions (in green) with relatively close access to inland waterway network of Europe. For road transport, the ETISplus road matrix has been used (year 2010).



Source: Panteia

Figure 57: Overview scope market potential continental container market (NUTS-3 regions)

The selection results in a more refined road OD matrix presenting information the following variables:

- Origin (NUTS-3 level);
- Destination (NUTS-3 level);
- Tonnage transported of containerized goods between selected regions;

¹⁰ Based on extensive research on door-to-door costs for several types of transport chains for IWT for the situation in The Netherlands, a country with a high density waterway network. Source: NEA and Policy Research Corporation, 2006, Market Study IWT.

- Region types¹¹ : IWT-connected regions both on isolated as on interconnected waterways;

The resulting selection of transport between OD pairs was assigned to the existing network to help identify the study areas for continental multimodal potential. The service network for the transport of continental containers via IWT has been designed following from upon existing and, possibly, planned barge services¹².

Based on the availability of inland container terminals¹³, combined with existing and planned barge services a hub and spoke network is foreseen as the most promising to link O/D's and branches of the network. This approach uses the possibility to connect multiple branches and individual / separate barge services together through a hub and spoke network.

5.2.1. Potential intermodal transport vs. direct trucking

In order to determine the potential modal shift from direct trucking to intermodal transport via barge for continental containerized cargo for every O/D pair as selected in the scope a comparison must be made whether intermodal transport is less expensive than direct trucking. When this is demonstrated, there is a potential for modal shift.

Adding terminals to the network

The cost model is set up by assigning a selection of (inland) container terminals to the IWT networks (closed + EU Interconnected) where containers can be transhipped from inland shipping to road transport and vice versa. Also planned inland container terminals have taken into account. For the simplicity of the model, in certain NUTS-3 regions with a high density of (inland) container terminals (along the Rhine and in The Netherlands and Belgium) not all possible terminals have been taken into consideration. For neighbouring terminals within the same NUTS-3 region the differences in transport costs to and from all destinations in that region are considered to be relatively small.

Waterway and ship characteristics

For determining Inland waterway transport costs for all container barge services as schematized in the "metro"-maps above the characteristics of each waterway corridor / channel / river has been taken into consideration. Meaning:

- Either dimensions of the vessels based on the barge services or the maximum permissible vessel dimensions according to PC Navigo software.

Box 1: Information about PC Navigo

PC-Navigo is a full blown voyage planner and navigation system for the inland waterways; it literally shows you the way in these waters. Depending on which version is used (Europe, Benelux, Netherlands, Germany, France) voyages can be planned and during navigation the GPS provides position information and velocity. The software

¹¹ The ETISplus OD-matrix can also present the tonnage transported from/to maritime regions for road transportation. However, given that this study focusses on the potential shift of continental road transport this transport flow has not been taken into account.

¹² ETISplus terminal database (2010), completed with information from IDVV, VNF, NPI (Navigation, Ports et Intermodalité) and Schiffahrt, Hafen, Bahn und Technik

¹³ *ibid*

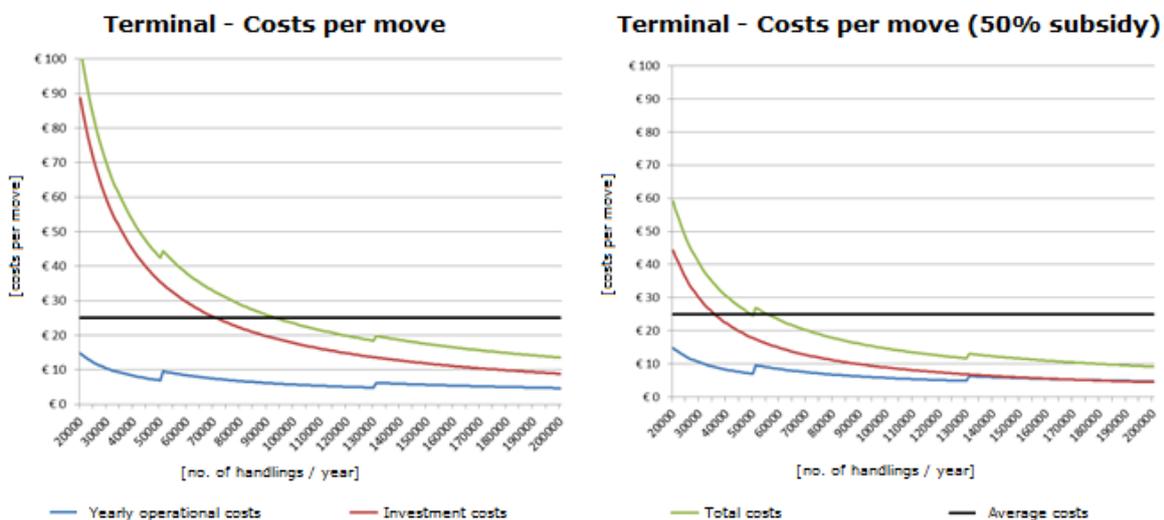
contains all operating hours, dimensions, communication data, VHF channels and other information about all bridges and locks in the waterways network. The program checks for stoppages or limitations that may block your passage. Many bridges and locks have pictures that can be shown to provide information about the local situation. The voyage planning process shows all details of navigation hours, the progress one can make, and the total time of the planned voyage. Bridge clearances, although the assumption is made that container vessels can pump ballast water in order to create clearance to pass "low" bridges.

Source: PC Navigo (2015): <http://www.pcnavigo.com/en/pc-navigo-2/really-long-uitleg/>

- The amount of locks on the route, according to PC Navigo software.
- The flag of the vessel, having influence on the costs structure of the vessel. Costs information is obtained from the yearly Panteia costs models (costs per hour)¹⁴. Trip times differ depending on fairway characteristics: sailing upstream implies different speeds than sailing downstream, and so do load factors, vessel sizes, etc.
- A ship is assumed to load 70% of its container capacity.
- 2/3rd of the containers on board are assumed to be laden, others are assumed to be empties that need to be repositioned. This way, also empty return loads are taken in to account.

Handlings costs and rental container

Based upon the network of barge services the number of transhipments made per O/D pair has been determined. Every transhipment (move) is multiplied by € 25,-. No distinction is made between terminals or the various countries. For additional transhipments, besides the origin or destination, an additional transhipment of € 25 per move has been added. E.g. for terminals with hub functions in the network. In general, two moves are needed at terminals with a hub function (ship – shore and shore – ship). Hacon and KombiConsult indicate € 20 - € 32,5 as a range for handling costs.¹⁵



Source: Hub en Spoke in de Containerbinnenvaart (2014), Panteia et al.

Figure 58: Handlings costs in IWT

¹⁴ Panteia (2014): Kostenontwikkeling binnenvaart

¹⁵ This includes subsidy by governments on terminal investment costs. See: KombiVerkehr –Entwicklungskonzept, Hacon et al. (2011).

The costs for the rent / use of containers are assumed to be € 15 per container¹⁶ . Hacon and KombiConsult indicate € 12 to € 20 for the rental of containers per trip¹⁷.

Pre- and end haulage

Costs for Pre-/End haulage to and from the container terminals in the network have been based on distances of the road network in ETISplus. The model uses the distance from industrial areas within NUTS-3 regions to/from the terminals. The costs for pre/end haulage are determined by cost function based on these distances. It should be noted that variable costs add up from € 0,47 per kilometre to € 0,65 per kilometre. The costs for trucks are based on the variable and fixed costs for trucks plus fixed costs for drivers originating from the country where the terminal is situated. Information about costs originates from Panteia costs models. A different time-distance relation is specified in the costs-function, making direct road transport cheaper than intermodal road transport for the same distance.

Intermodal costs – Lowest costs algorithm

The model calculates out of 5122 (O/D's) x 972 (terminals) = about 2,500,000,000 options the cheapest path out of all possible options to transport continental containers per O/D.

Direct trucking scenarios

For direct trucking per O/D pair the model chooses the lowest costs based upon several truck and driver combinations. If it concerns international traffic, the cheapest truck and the cheapest driver of the two countries involved is selected. For more details on costs, see Panteia costs models.

For road transport the (direct) transport costs have been calculated for three different scenarios, namely:

- i. No return load - **low road efficiency (50%)**
- ii. Return load in 80% of the cases, 20% no return load (EU average based on Eurostat statistics) – **medium road efficiency**
- iii. Return load in 100% of the cases – **high road efficiency (100%)**.

Comparison of intermodal transport costs vs. direct trucking scenarios yields a range of results.

Potential continental containerized cargo via IWT

Per O/D it is automatically calculated whether intermodal transport via barge is less or more expensive than direct trucking. When the alternative of intermodal transport via barge is less expensive for a specific O/D, the amount of cargo (in tonnes) following from the transport of continental cargo by road transport for that specific O/D (NUTS-3 level) as selected in ETISplus based on the scope, is shifted from road transport to intermodal transport by barge.

The sum of individual O/D relation leads to a total potential of continental containerized cargo to be shifted to intermodal transport, which can be illustrated in maps or specified through matrices (for the various scenarios). Based upon the cost

¹⁶ Panteia et al. (2014) – Hub en Spoke in de Container Binnenvaart, Annex Report

¹⁷ KombiVerkehr –Entwicklungskonzept, Hacon et al. (2011)

functions for intermodal transport by barge and direct trucking, including the pre-set criteria and assumptions above, the selection of freight flows from the ETISplus continental road transport matrix follows automatically.

5.2.2. Results macro analysis continental cargo study

The total potential of the three various scenarios is given in the table below. These are the current road volumes that can be containerised and shifted to inland waterways (including pre- and end haulage) in a cost efficient manner.

The analysis show that the Seine river basin shows hardly any potential for continental container cargo flows.

Table 23: Percentage of volume that can be shifted to IWT (green = high potential, red = low potential)

Regions	Max potential (TEU)	Low	Medium	High
Seine River Basin (FR)	167,156	77.7%	0.9%	0.0%

5.3. Impact of cooperation with RFC

5.3.1. Objectives

In 2010, the EU Regulation 913/2010 for a European rail network for the implementation of competitive rail freight transport entered into force. It was elaborated with the overall purpose to increase rail freight's attractiveness and efficiency with a focus on international traffic, in order to increase its competitiveness and modal share on the European transport market. To achieve this, the regulation has the general objective to improve the conditions for international rail freight by reinforcing collaboration at all levels along selected Rail Freight Corridors (RFC) with the aim to:

- strengthen the cooperation between infrastructure managers on key aspects such as allocation of train paths, deployment of interoperable systems and rail infrastructure development;
- find the right balance between freight and passenger traffic along the RFCs, giving adequate capacity for freight in line with market needs and ensuring that common punctuality targets for freight trains are met;
- promote intermodality between rail and other transport modes by integrating terminals into the corridor management process.

Altogether, 9 Rail Freight Corridors have been defined and form the rail freight backbone of the European Core Network Corridors. RFC will be adapted over time (until 2020) to fit with "their" respective Core Network Corridors. They will continue to evolve in the context of the Regulation 913/2010, but shall also profit from the TENT-T regulation instrument and thereby be boosted considerably¹⁸. Article 48 of the TEN-T Regulation states that "adequate coordination shall be ensured between the core network corridors and the rail freight corridors provided for in Regulation (EU) No 913/2010, in order to avoid any duplication of activity, in particular when establishing the work plan or setting up working groups."

¹⁸ Core Network Corridors – Progress Report of the European Coordinators, June 2014



As a basis for any cooperation and sharing of work it is therefore necessary to outline the main differences between the two corridor frameworks as highlighted in the table below.

Table 24: Comparison of CNC and RFC - scope and structure

Topic	Core Network Corridors	Rail Freight Corridors
Legal basis	Regulation (EU) 1315/2013 Regulation (EU) 1316/2013	Regulation (EU) 913/2010
Main objectives	Infrastructure development	Harmonisation of business and technical conditions (implementation plan)
Transport modes & types	Multimodal (rail, road, aviation, inland waterways and ports); Passenger and freight	Rail transport Freight only
Assessment of infrastructure characteristics	Core parameters defined in the Regulation 1315/2013: Electrification Axle load: 22,5 t Line speed: 100 km/h freight Train length:740m ERTMS Track gauge:1435mm	All parameters
Alignment	Core network sections as defined in the Regulation	Include diversionary routes and principal lines which are classified as comprehensive links inside the core network
Nodes	Only core network nodes as defined in the Regulation 1315/2013 are described for compliance assessment (ports /terminals)	Include various connecting links and nodes classified as core, comprehensive inside the core network
Governance structure and stakeholder involvement	EU Coordinator (plus advisor) Secretariat (consortium) Corridor Forum	Executive Board Management Board Advisory groups

Source: Atlantic CNC study report, 2014

The Atlantic Rail Freight Corridor (former RFC 4) was established on the 10 November 2013. In accordance with annex II of the Regulation (EU) No 1316/2013, the corridor was renamed to Rail Freight Corridor "Atlantic" and an extension to Mannheim and Strasbourg was envisaged to be implemented until 10 November 2016. From January 2016, Germany joined Portugal, Spain and France as partner of the EEIG Atlantic Corridor with the extension of the RFC to Mannheim via the French/German border in Forbach/Saarbrücken.

The Rail Freight Corridor "Atlantic" connects with the Mediterranean Corridor in Madrid and Zaragoza, with the North Sea-Mediterranean Corridor through Paris, Metz and Strasbourg. With the extension of the Atlantic Corridor to Mannheim in Germany

enabled a direct articulation with two other corridors: The Rhine-Alpine and the future Rhine-Danube, thus increasing outreach of the Atlantic Corridor.

The Rail Freight Corridor (RFC) is a key actor in enhancing the efficiency of rail freight services along the Atlantic corridor and the inland backbone the corridor delivering transport efficiency and sustainability.

In 2014, during the first phase of the corridor studies, already a close cooperation was initiated between the RFC Atlantic with their management team and the CNC. This cooperation has been continued in the second phase of the CNC study and this proven cooperation will be further continued.



Figure 59: Rail freight Corridor Atlantic

Source: www.corridor4.eu

5.3.2. Cooperation model and forms of interaction

A permanent and fruitful collaboration has been set up from the beginning of the Forum's activity, in 2014 with the Managing Director of RFC Mr. Jacques Coutou. Mr Coutou participated in all the Forum meetings and in several working group meetings, presented its contribution and shared with the CNC Coordinator and the supporting consulting team the results of the studies carried out at the RFC level (such as the annual reports, the synthesis of the market study and the customer satisfaction surveys). Studies by the RFC were shared in the Forum meeting. This was the case for the studies on Impact of Infrastructure investments upon rail operation costs, Atlantic ports, Rolling Motorways, and capacity along the corridor.



The new on-going studies were also presented and are expected to provide further insights for the progress of the corridor:

- Study on 750m trains for freight in the Iberian Peninsula
- ERTMS implementation for the cross-border section Woippy-Mannheim (250km stretch)
- Gauge classification harmonisation on the Corridor

Such continuous communication and interaction allowed for a deeper understanding on the status of the interoperability along the corridor and its main challenges. Finally, the positive performances of the RFC Atlantic in terms of promotion of an integrated commercial offer (PaPs) have been regularly shared with the Forum, helping its Members to become aware of the operational results that can be achieved by an integrated management of the corridor. For instance, for 2018, 28 daily paths were allocated; some sections are at full capacity, others not.

It is noted that Atlantic RFC, together with other two connected RFC are testing the use of flexible slots instead of fixed schedules. If successful, this will eventually be rolled out and replace PaPs.

Despite the loss of market share of rail in 1st semester 2017 due to decrease of oil prices, leading to the temporary abandonment of the rolling motorways, the capacity wishes for 2019 are significantly higher than for 2017/2018 so traffic and probably modal shift will also increase.

Furthermore, as input for the Atlantic corridor work plan, it would be important to consider success factors for rail freight corridors such as the adoption of the following measures:

- Coordination of works in cross border sections, through the implementation of a coordinated approach where all rail infrastructural and equipment work that might restraint the capacity available is coordinated at the level of the corridor and subject to an up to date publication. Particularly for cross border sections the overall goal is to have same maintenance periods on both sides, ensuring more capacity for international traffics.
- Coordination tools promoted by the RNE, such as Path coordination, Charging Information System and Train Information System, highlighting activities in terms of the centralized management of capacity allocation, traffic management and customer relationship
- Enhancing and speeding up train handling (and customs) procedures in border stations
- Harmonisation of operational rules
- Harmonised quality and performance monitoring across corridors.

However, on top of the coordination of works, it is worth noting that due to the large number of ongoing and planned works, the Atlantic corridor will be suffering for the next years relevant constraints to operation. For instance, there will be 8 weeks of closure in Spring 2020 between Bayonne and Hendaye for which alternatives are being looked at: diverting traffic on the Mediterranean Corridor and/or doing rail to road transshipment in Bayonne Mouguerre. Most likely such type of closure will be more frequent for the next years and therefore a close relation with the adjacent RFC will be intensified.

6. Mapping of projects

6.1. Methodology

Mapping of investments has been based on the analysis of common defined KPIs, projects' data gathered under Task 2 and analysis carried out under Task 3 concerning the update of the work plan.

The proposed methodology is based on the evaluation of all projects and related investments on a case-by-case basis, weighing up the different benefits of a project with the requirement for financial return on investment, examining its socio-economic and financial viability via well-established and widely applied tools, such as the Multi-criteria Analysis (MCA). This methodology enables both quantitative and qualitative criteria to be considered rendering a final project score. It should be, however, emphasised that MCA does not provide a definitive solution, rather a rational and structured basis for guiding decision-making. The application of the MCA ensures that the project economic characteristics are not the only rating criterion, while other critical aspects, such as regional cohesion, environmental impacts, policy, etc. can also be applied. MCA provides a logical approach, whereby any criteria (both quantitative and qualitative) and their relative importance can be taken into account.

The exercise will evaluate two main aspects:

- **Project maturity:** analysed by assessing the level of progress (“not started” / “in progress” / “concluded”) on specific project steps, such as (1) Planning stage / pre-feasibility studies / Strategic Environmental Assessment (SEA) (2) Preliminary project analysis/ Feasibility studies (3) Environmental Impact Assessment (EIA) / Detailed Design / Detailed Implementation Plan / Administrative Permits and Licences.
- **Project relevance:** basically, related to the purpose of the intervention and its capacity to meet **TEN-t and EU** priorities, as set by Regulation (UE) N. 1315/2013 and 1316/2013 (reflected by the technical parameter and bottlenecks tackled by the intervention).

The above-mentioned criteria have been evaluated through the analysis of data currently available in each CNC Project list. Furthermore, it shall be underlined that projects already completed as well as projects comprising only Studies have been excluded from this assessment.

6.1.1. Assessment of Project relevance

Project relevance have been assessed through the identification of project clusters, reflecting the need to classify Corridor Projects into homogenous categories with respect to the requirements of the Regulation (EU) N. 1315/2013 and to map them accordingly. Each Cluster is conceived as a set of projects capable to address different levels of technical requirements and likely to produce a certain level of impacts on the CNC infrastructure per each transport mode.

More specifically, the above-mentioned clustering exercise is based on the transport mode. For each project, related to a specific transport mode, 4 clusters have been identified which mainly reflect the project relevance according to TEN-t priorities stated by the TEN-T Regulation.

Table 25: Identification of project clusters

Innovation / Transport Mode	Cluster 1	Cluster 2	Cluster 3	Cluster 4
New technologies & Telematic applications	<ul style="list-style-type: none"> ▪ Low Carbon & Decarbonisation/Clean fuels (Art. 33. a & b 1315/2013, Annex I.I. 1316/2013) 	<ul style="list-style-type: none"> ▪ Telematics applications others than ERTMS, RIS, SESAR, ITS, VTMS (ex. E-maritime services, data sharing etc. cooperation systems) Art. 33d Reg.1315/2013 	<ul style="list-style-type: none"> ▪ Safety & Security, noise mitigation ▪ (Art. 33 letter c Reg. 1315/2013) 	Residual projects
Rail & ERTMS Projects	<ul style="list-style-type: none"> ▪ Pre-identified projects (reg. 1316/2013 annex I, part.2) ▪ Ertms deployment (reg. 1315/2013 art.13, 39.2, 1316/2013 annex i part i) ▪ Achievement of compulsory technical parameters (ex. all compulsory parameters stated by art. 39.2) 	<ul style="list-style-type: none"> ▪ Projects eliminating current or expected capacity bottlenecks (according to TMS carried out in 2013) 	<ul style="list-style-type: none"> ▪ Projects contributing to the achievement of technical parameters others than compulsory ones (ex. gabarit etc.) 	Residual projects
IWW & Inland Ports	<ul style="list-style-type: none"> ▪ Pre-identified projects (Reg. 1316/2013 Annex I, part.2) ▪ ECMT Class >= IV (Reg. 1315/2013 art. 16) ▪ Last mile rail connection to inland ports (Reg. 1315/2013 art. 16) 	<ul style="list-style-type: none"> ▪ RIS deployment & projects contributing to good navigation status (Reg. 1315/2013 art. 39.2) 	<ul style="list-style-type: none"> ▪ Capacity expansion & safety interventions (Reg. 1315/2013 art. 13) 	Residual projects
Road projects	<ul style="list-style-type: none"> ▪ Pre-identified projects (Reg. 1316/2013 Annex I, part.2) ▪ Upgrading to express road/motorway (Reg. 1315/2013 art. 19) ▪ Creation of rest areas/parking 	<ul style="list-style-type: none"> ▪ ITS (Reg. 1315/2013 art. 19) 	<ul style="list-style-type: none"> ▪ Upgrading/new construction within or bypassing an urban node (Reg. 1315/2013 art. 19.e) 	Residual projects



Innovation / Transport Mode	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	spaces (Reg. 1315/2013 art. 19, 39.2)			
Airport projects	<ul style="list-style-type: none"> ▪ Pre-identified projects (Reg. 1316/2013 Annex I, part.2) ▪ Horizontal priority for air SESAR. (1316 Annex I, part I/ 1315 Art. 31) ▪ Last mile connection to core rail network (1315/2013 art. 41.3 and Annex II part II, only main airports) 	<ul style="list-style-type: none"> ▪ Last mile rail and road connections to other core airports (Reg. 1315/2013 art. 26) 	<ul style="list-style-type: none"> ▪ Airport capacity expansion (Reg. 1315/2013 art. 26) 	Residual projects
Seaport Projects	<ul style="list-style-type: none"> ▪ Pre-identified projects (Reg. 1316/2013 Annex I, part.2) ▪ MOS (1316 Annex I, part I/ 1315 Art. 31) ▪ Last mile connection to core rail + iww network (1315/2013 art. 41.2) 	<ul style="list-style-type: none"> ▪ VTMIS (Reg. 1315/2013 art. 23) ▪ Seaports capacity expansion within the port area (Reg. 1315/2013 art. 23) 	<ul style="list-style-type: none"> ▪ Last mile connection to road (1315/2013 art. 41.2) 	
Multimodal projects	<ul style="list-style-type: none"> ▪ Pre-identified projects (Reg. 1316/2013 Annex I, part.2) ▪ Projects contributing to RRT rail or IWW accessibility (Reg. 1315 art. 29) 	<ul style="list-style-type: none"> ▪ Projects contributing to RRT Road accessibility (Reg. 1315 art. 29) 	<ul style="list-style-type: none"> ▪ Projects contributing to RRT capacity 	Transport Mode <i>Multimodal projects</i>

In order to maintain their visibility, “new technologies and innovation projects¹⁹”, resulting from the *innovation project mapping* performed under task 3b of the assignment, have been assessed in a separate clustering exercise, therefore, evaluated independently from the relevant transport mode.

Obviously, the main aim of clustering exercise is to allocate each project to one of the four defined clusters, based on the agreed criteria; whereas the highest relevance belongs to cluster 1 and decreases linearly up to cluster 4, which presents the projects

¹⁹ According to art. 33 a-d of Regulation (UE) N. 1315/2013

with the lowest relevance. Furthermore, project clustering has a progressive approach, projects belonging to Cluster 1 cannot be considered for Cluster 2 and so on; cluster 4, represent a residual cluster, containing all those projects. The table below shows the clusters identified for both, transport mode related projects as well as innovation ones.

Calculation of project relevance

At the completion of the clusterisation exercise, all projects will be allocated to one of the above presented clusters; subsequently by applying the following points, the project relevance indicator will be calculated.

	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL CLUSTER (Other projects)
Project relevance Indicator	1,0	0,75	0,50	0,25


max *Project relevance* *min*

As showed above, project relevance indicator will may vary from 0.25 up to 1, depending on the scope of planned intervention.

6.1.2. Assessment of Project maturity

Project maturity represents the second criteria group to be evaluated for the project mapping. As a general hypothesis all the projects resulting as “recommended” for CEF funding may be considered mature “*ipso facto*”, given the maturity requirements of the calls.

Then, all the remaining projects, “Proposed or Not Recommended for CEF funding” will be assessed in terms of project maturity through the evaluation of the following criteria:

- *Technical Readiness*: showing high maturity if all necessary technical steps for project implementation (i.e. Detailed Design/Detailed Implementation Plan/Administrative Permits and Licences) have been concluded. Medium maturity is given by the completion of the preliminary technical analysis (i.e. Preliminary project analysis/ Feasibility studies). Remaining projects are considered not mature.
- *Institutional readiness*: all projects included in the Project list shall be considered as mature in terms of institutional readiness. This due to the fact that such projects have been proposed/revised/suggested by the relevant institutions involved in Corridor implementation.
- *Financial/Economic maturity*: high maturity rate if they have a CBA completed and full financing is guaranteed, medium maturity rate if only one of this two conditions is met, not mature in all the remaining cases.

- *Social/Environmental maturity*: set according to the presence/absence of the Environmental Impact Assessment (EIA): high maturity is given on case of complete/approved EIA, medium maturity in case of EIA under preparation, low maturity in case of no EIA.

Calculation of project maturity

To evaluate each of the project maturity criteria (technical, institutional, financial, environmental) it is necessary to rate and award points for each project according to the following levels: Low maturity level= 0; Medium maturity level= 0.5, High maturity level=1. The general assumption is that each maturity criteria has the same relative importance and accordingly following simple calculation can be applied:

$$\text{Project Maturity Indicator} = \frac{Tm + Im + Fm + Em}{4} \leq 1$$

As for the project relevance assessment, the table presented here below shows the overall structure of the project maturity assessment.

Table 26: Project maturity assessment criteria

Project maturity criteria	Dimensions for project maturity assessment	Status	Maturity Level	Points awarded according to the maturity level
Technical readiness	Environmental Impact Assessment (EIA) / Detailed Design / Detailed Implementation Plan / Administrative Permits and Licence	Concluded	High	1
	Preliminary project analysis/ Feasibility studies	Concluded	Medium	0.5
	Planning stage / pre-feasibility studies	Concluded	Low	0
Institutional readiness	-	-	High	1

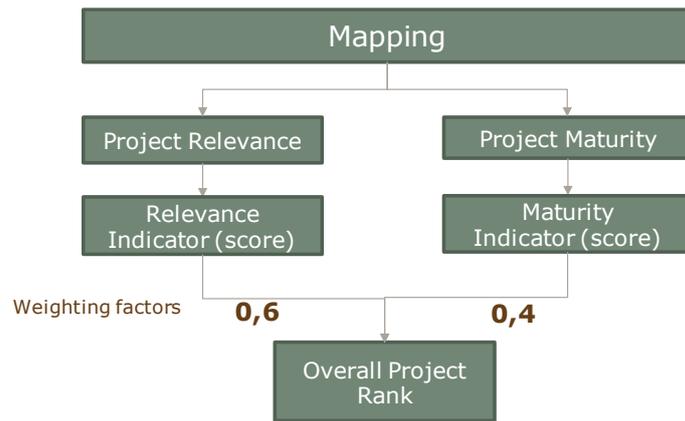


Project maturity criteria	Dimensions for project maturity assessment	Status	Maturity Level	Points awarded according to the maturity level
Financial/ Economic maturity	CBA & Financing sources	CBA performed & Full financing Assured	High	1
		CBA performed OR Full financing Assured	Medium	0.5
		CBA not performed AND Full financing not Assured	Low	0
Social/Environmental maturity	Environmental Impact Assessment (EIA)	Completed OR Approved	High	1
		Under preparation	Low	0

6.1.3. Calculation of the overall Project rank

Once each project has been assessed against the criteria and awarded with the number of points for relevance and maturity, by applying different weighting factors to the project relevance and maturity score (0.6 and 0.4 respectively), a unique overall project rank will be calculated. More specifically, the weighting factors have been introduced in order to reflect higher importance of the project relevance, given that the aim of the exercise is to assess contribution on corridor development as defined by the Regulation.

The picture below shows the structure of the project prioritization calculation.



6.2. Results

6.2.1. Project relevance

It should be noted that total number of projects in this exercise does not match with the total number of projects per mode as reported above when presenting the overall project list. This is related to the fact that study only projects as well as horizontal projects are not considered for the mapping analysis in accordance to the common methodology approved.

Moreover, projects to support decarbonisation have been clustered in the “new technologies & innovation” and not in modal clusters.

The charts below show the results of the clustering methodology, indicating the number of projects falling in each cluster.

Clustering based on the characteristics of the corridors:

New Technologies & Innovation, independently from each Transport mode - ## of projects per cluster

CLUSTERING ELEMENTS	EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A Low Carbon & Decarbonisation/Clean fuels (Art. 39. a & b 1315/2013, Annex I.L. 1316/2013)	Measures aiming to support and promote decarbonisation of transport through new technologies, by stimulating energy efficiency, introducing innovative propulsion systems/fuels, including electricity supply systems and ship generated waste and providing corresponding infrastructure	28			
B Telematic applications others than ERTMS, RIS, SESAR, ITS, VTMS (Art. 33. d Reg. 1315/2013)	This cluster element mainly comprises telematics applications others than ERTMS, VTMS, RIS, ITS, SESAR, as listed in the INECO methodology for mapping innovation projects. (ex. e-Maritime Services, single window services, port community systems, custom information systems, telematics applications for rail or road others than ERTMS or ITS. Furthermore, all those projects considered, following the INECO Methodology as “data sharing, cooperation systems and real time predictive analysis for multimodal transport”.		7		
C Safety & Security, noise mitigation (Art. 33 letter c Reg. 1315/2013)	Measures aiming to improve the safety and sustainability of the movement of persons and of the transport of goods, as well as, any intervention aiming at mitigating rail noise impacts (excluding parking areas for road, which are considered in the corresponding transport mode)			2	
D OTHERS	Remaining interventions, linked to innovation category.				1

Clustering based on the characteristics of the corridors: Rail and ERTMS Projects - ## of projects per cluster

CLUSTERING ELEMENTS	EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A PRE-IDENTIFIED PROJECTS	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex I.I of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)- Requested by DG MOVE	69			
B ERTMS DEPLOYMENT (Reg. 1315/2013 art. 13, 39.2, 1316/2013 Annex I part I)	All railway planned projects aim at deploying ERTMS telematics applications on Core railway lines shall be considered as Cluster 1 interventions				
C ACHIEVEMENT OF COMPULSORY RAIL TECHNICAL PARAMETERS (Reg. 1315/2013 art. 39.2)	The project scope aims at achieving one or more of the following technical parameters: Electrification, Track gauge 1435 mm , Axle load 22.5, Train length 740 m., speed				
D ELIMINATION OF CURRENT OR EXPECTED CAPACITY BOTTLENECK (Reg. 1315/2013 art. 10)	The intervention aims at solving a capacity issue highlighted in the Transport Market Study included in the first CNC study (2013); through the realization of a new railway line or through the upgrading of the existing one (with the exception of last mile projects).		25		
E ACHIEVEMENT OF TECHNICAL PARAMETERS OTHER THAN COMPULSORY ONES (Reg. 1315/2013 art. 39.2)	The project scope aims at achieving one or more of the following technical parameters: gabarit etc.			1	
F OTHERS	Remaining projects, including the removal of single track section and the elimination of strong inclines (if such interventions don't fall within previous categories (ex. A, C).				7

Clustering based on the characteristics of the corridors: IWW and Inland Ports - ## of projects per cluster

CLUSTERING ELEMENTS	EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A PRE-IDENTIFIED PROJECTS	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex I.I of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)- Requested by DG MOVE	34			
B ECMT Class>= IV (Reg. 1315/2013 art. 16)	All interventions on IWW sections/ Inland Ports aiming at meeting the requirement on ECMT class as set by art.16 of Regulation				
C LAST MILE RAIL CONNECTION TO INLAND PORTS (Reg. 1315/2013 art. 16)	All interventions aiming at improving rail/road last mile connections to inland ports (new realizations or upgrading of an existing infrastructure)				
D RIS DEPLOYMENT & PROJECTS CONTRIBUTING TO GOOD NAVIGATION STATUS (Reg. 1315/2013 art. 39.2)			1		
E INLAND PORT CAPACITY EXPANSION AND IWW SAFETY INTERVENTIONS (Reg. 1315/2013 art. 13)	Condition fulfilled by any kind of increased capacity for inland ports or IWW sections.			1	
F OTHERS					1

Clustering based on the characteristics of the corridors: Seaports Projects - ## of projects per cluster

CLUSTERING ELEMENTS		EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A	PRE-IDENTIFIED PROJECTS (Reg. 1316/2013 Annex I, part.2)	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex I.I of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)- Requested by DG MOVE	3			
B	MOS (1316 Annex I, part I/ 1315 Art. 31)					
C	LAST MILE CONNECTION TO CORE RAIL + IWW NETWORK (1315/2013 art. 41.2)	Any intervention related to the upgrading (or new construction) of last mile rail connections (within and outside the port area). Any intervention aiming at linking Core Ports to IWW Network.				
D	VTMIS (Reg. 1315/2013 art. 23)			20		
E	SEAPORTS CAPACITY EXPANSION WITHIN THE PORT AREA (Reg. 1315/2013 art. 23)	Condition fulfilled by any kind of increased capacity: additional ship to shore, increasing warehouse spaces, new docks, bigger locks etc.				
F	LAST MILE CONNECTION TO ROAD (1315/2013 art. 41.2)	Any intervention related to the upgrading (or new construction) of last mile road connections (within and outside the port area) shall be considered			1	
G	OTHERS	Usually all minor interventions (maintenance works shall be excluded from the CNC Project lists) validated by DG MOVE				4

Clustering based on the characteristics of the corridors: Road Projects - ## of projects per cluster

CLUSTERING ELEMENTS		EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A	PRE-IDENTIFIED PROJECTS	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex I.I of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)- Requested by DG MOVE	3			
B	UPGRADING TO EXPRESS ROAD/MOTORWAY (Reg. 1315/2013 art. 19, 39.2)	Projects related to the upgrading to EXPRESS ROAD/MOTORWAY of a core section which has not been considered as pre-identified. (last mile road links to ports/airports/rrt will be addressed by ports/airports/rrt project categories)				
C	CREATION OF REST AREAS/PARKING SPACES (Reg. 1315/2013 art. 19, 39.2)	All those interventions related to the realization of new resting areas, regardless of the requirement of "every 100km". (<i>Validated by DG MOVE</i>)				
D	ITS (Reg. 1315/2013 art. 19)			9		
E	UPGRADING/NEW CONSTRUCTION WITHIN OR BYPASSING AN URBAN NODE	Any Upgrading of an EXPRESS ROAD road or any New construction aiming at solving congestion problems within an urban node (According to art. 19.e)			2	
F	OTHERS	Usually all minor interventions (maintenance works shall be excluded from the CNC Project lists) validated by DG MOVE				

Clustering based on the characteristics of the corridors:
Airport Projects - ## of projects per cluster

CLUSTERING ELEMENTS		EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A	PRE-IDENTIFIED PROJECTS (Reg. 1316/2013 Annex I, part.2)	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex II of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)-Requested by DG MOVE	1			
B	HORIZONTAL PRIORITY FOR AIR (SESAR) (1316 Annex I, part I/ 1315 Art. 31)					
C	LAST MILE CONNECTION TO CORE RAIL NETWORK (1315/2013 art. 41.3 and Annex II part II, only main airports)	The planned intervention relates to the upgrading/new construction of a last mile direct link with heavy TEN-t Core Rail Network (HS or Conventional) for all those main airports marked with an “#” in the Annex II part II of Reg. 1315/2013.				
D	LAST MILE RAIL AND ROAD CONNECTIONS TO OTHER CORE AIRPORTS (Reg. 1315/2013 art. 26)	Any upgrading of last mile links (road or rail) to all Core airports, with the exception of main Airports (required to be linked just to heavy or HS rail network), as stated by articles 26 letter c and 30 letter c of the Regulation. This may include local rapid transit, metro infrastructure.				
E	AIRPORT CAPACITY EXPANSION (Reg. 1315/2013 art. 26)	Only those interventions which may increase the landside capacity (n. of passenger/hour) and airside (n. of airplane movements/hour) airport capacity. Projects addressing the increase of the capacity of baggage security checks shall not be considered (Validated by DG MOVE)			2	
F	OTHERS	Remaining projects, including rail links (rapid transit connections) to main airports, due the fact that this interventions don't meet the requirements set by art. 41.3.				

Clustering based on the characteristics of the corridors:
Multimodal Projects - ## of projects per cluster

CLUSTERING ELEMENTS		EXPLANATION	CLUSTER 1	CLUSTER 2	CLUSTER 3	RESIDUAL
A	PRE-IDENTIFIED PROJECTS (Reg. 1316/2013 Annex I, part.2)	The planned intervention could be assumed to be associated to the pre-identified projects listed in Reg. 1316/2013 annex I, part II. (<i>Horizontal priorities listed in Annex II of Reg. 1316/2013 shall not be considered as pre-identified projects</i>)	25			
B	PROJECTS CONTRIBUTING TO RRT RAIL OR IWW ACCESSIBILITY (Reg. 1315 art. 29)	Projects aiming at enhancing rail last mile connections (EU interoperability standards for freight: 740 m train accessibility, electrification etc.) or allowing terminal connections to the IWW system				
B	PROJECTS CONTRIBUTING TO RRT Road ACCESSIBILITY (Reg. 1315 art. 29)			√		
D	PROJECTS CONTRIBUTING TO RRT CAPACITY				√	
E	OTHERS	Usually all minor interventions (maintenance works shall be excluded from the CNC Project lists) validated by DG MOVE				1

6.2.2. Project Maturity

Technical Readiness	New Technologies & Innovation	Rail and ERTMS Projects	IWW and Inland Ports	Airports	Road	Seaports	Multimodal
High Maturity	14	28	4	2	5	12	4
Medium Maturity		7	3	1	1	2	4
Low Maturity	24	67	30		7	14	18

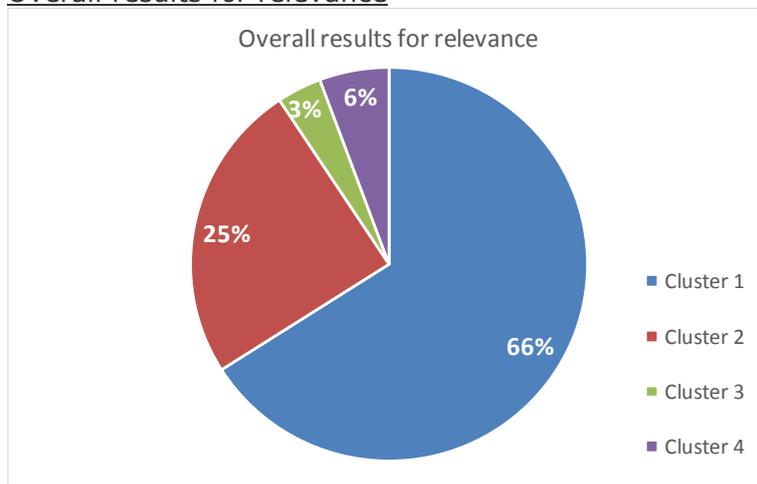
Financial / Economic Readiness	New Technologies & Innovation	Rail and ERTMS Projects	IWW and Inland Ports	Airports	Road	Seaports	Multimodal
High Maturity	18	14	27	3	5	12	9
Medium Maturity	8	30	4		2	11	2
Low Maturity	14	58	6		6	5	15

Social / Environmental Readiness	New Technologies & Innovation	Rail and ERTMS Projects	IWW and Inland Ports	Airports	Road	Seaports	Multimodal
High Maturity	16	23	6	3	5	13	4
Low Maturity	22	79	31		8	15	22

6.2.3. Overall mapping results

Mapping exercise is the result of two different indicators, namely relevance and maturity, therefore a deeper look into the singular ranking of these two indicators is hereby provided.

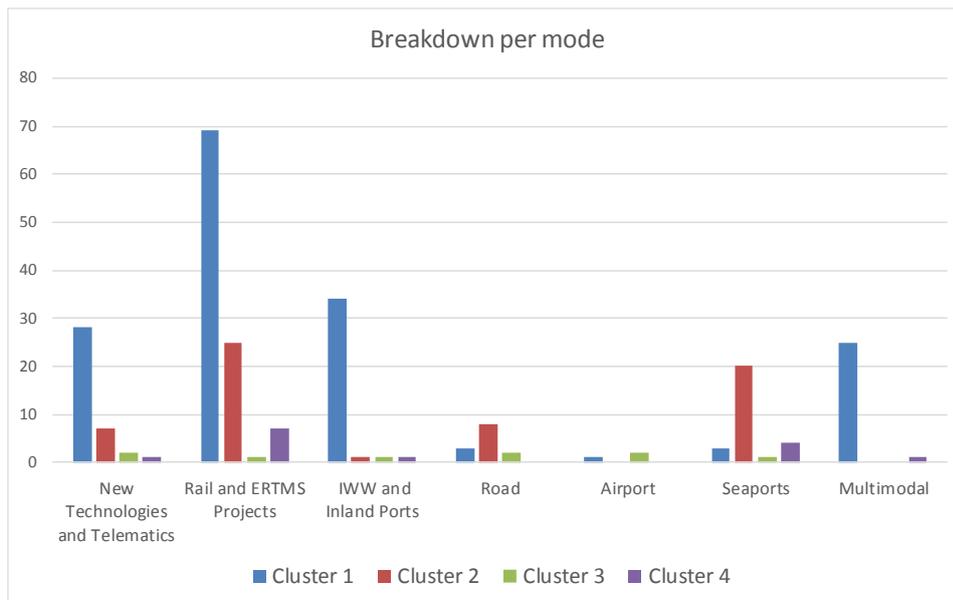
Overall results for relevance



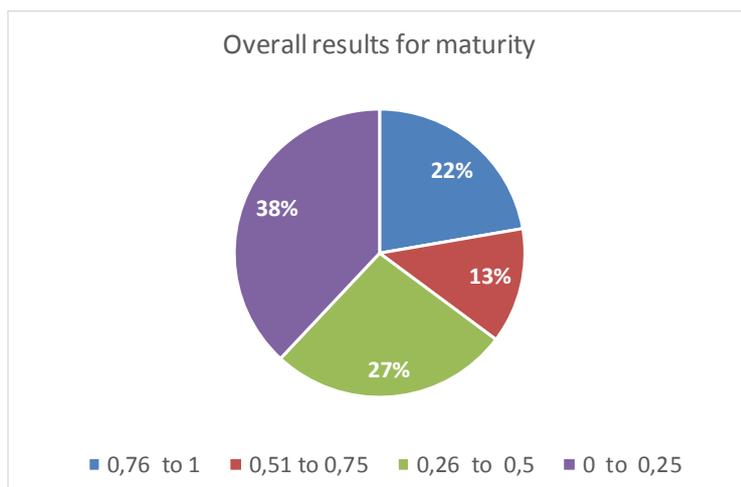
Breakdown per relevance and mode

Here below more detail on the breakdown per transport mode is provided where it is evident that Rail and ERTMS projects, which are the priority at European level show a major number in the cluster 1. They are followed by Innovation, IWW and Multimodal. given their importance in terms on positive impact on the environmental sustainability. Seaports, mainly resulting from the fact that no project is part of the priority projects, are positioned in its majority in cluster 2.

Moreover, one should remember that a large number of the proposed projects in seaports are targeting the deployment of alternative fuels, therefore they are ranked as cluster 1 in "new technologies" and not in seaports.

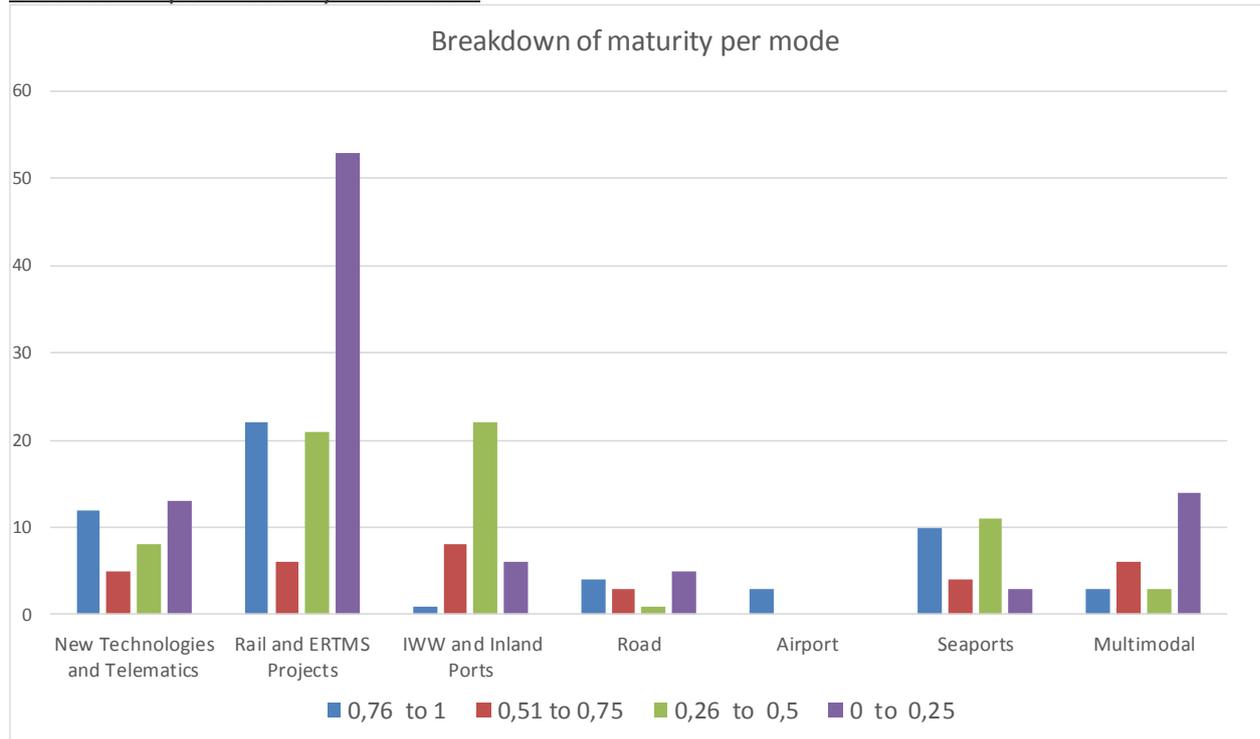


Overall results for maturity



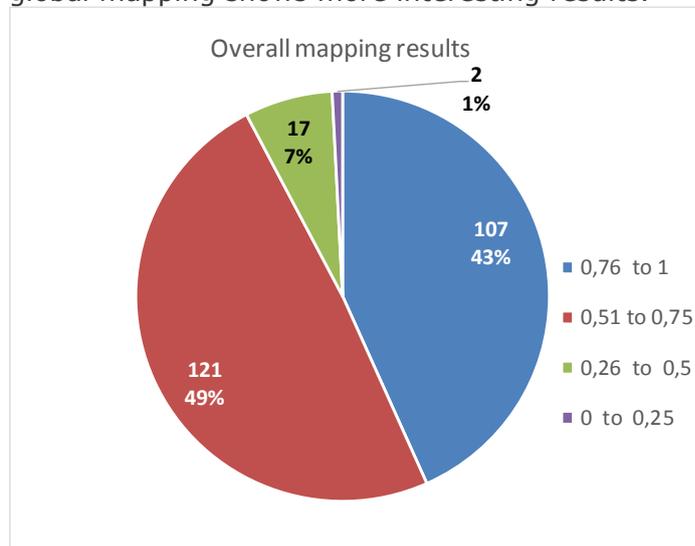
Maturity level for Atlantic projects tends to be low – globally 65% of the projects (just works projects) have low maturity (below 0,5 points). For the remaining 35%, only 22% (55 projects out of 247) classify from medium to high. Despite so, it should be noticed that high maturity levels are found in the rail and innovation, followed by seaports, which is directly associated to the main corridor priorities, that is to completing the rail network, clean fuels and maritime dimension.

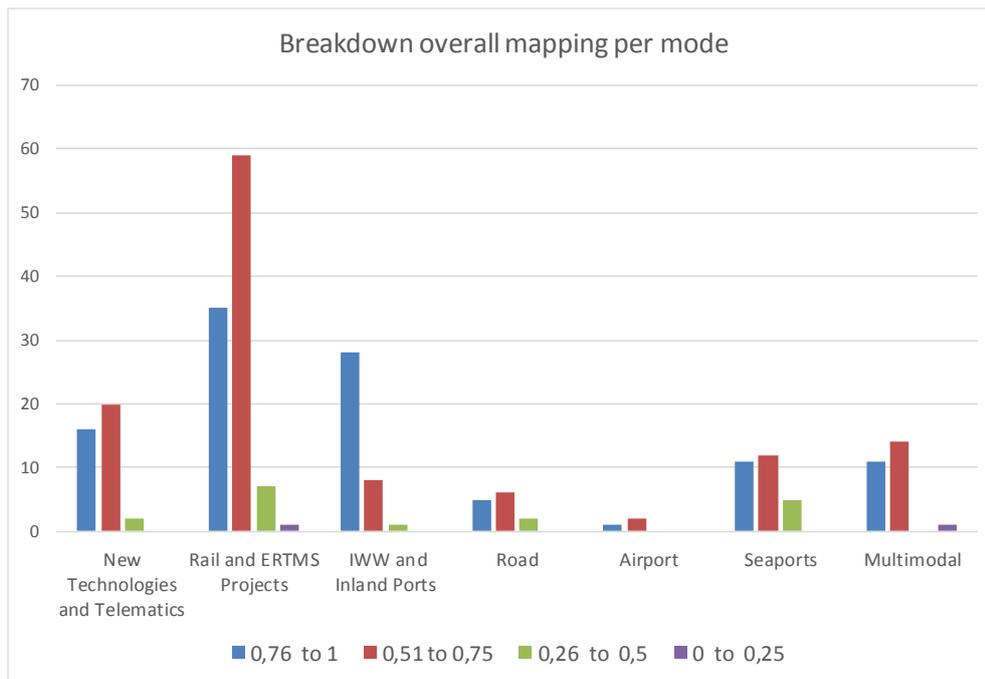
Breakdown per maturity and mode



Overall mapping

Despite the relative low levels for maturity (largely influenced by the lack of economic and environmental results), as the relevance has a high weight than maturity, the global mapping shows more interesting results.





As such the overall picture results in a much better shape: 43% of projects reaching a score above 0,76 and other 49% a score between 0,51 and 0,75.

However, it is worth noting that 20 projects score 1 (14 for rail, 3 for multimodal, 2 for road related with the completion / upgrade to motorway of the few kilometres on the north border PT-ES and 1 for a seaport). Additionally, 7 projects score with 0,95, all related with rail and rail + ERTMS projects.

Other 22 projects score 0,9 (4 for rail, 6 for seaports and 6 for IWW and inland ports, 5 multimodal and 1 for airport). With a score of 0,85, there are 6 projects (2 innovation, 2 for road and 1 for rail and 1 road).

The tables with the results of mapping for innovation and per transport mode provide detailed results. Those are included in annex 4

7. Summary of Task 6 results

7.1. Identification of projects financing tools

7.1.1. Definition of the methodology

The analysis aims to identify the funding sources of projects listed within the ATL WP pipelines. The rationale of the exercise is to leverage the information provided in the project list and determine the presence of funding gaps and the potential for other-than-public-grants forms of support.

Before the analysis were performed, the data was reviewed and corrected. Once data was cleaned and unique categories of funding sources names for all the projects were defined, the analysis were performed.

As a sum up, it was necessary to cluster funding sources used to cover investment costs, linking every recurring funding source name to a specific pre-determined tag, following a common guidance prepared by PwC.

- Macro-level tag: in which the different “funding sources” were related to macro categories (i.e. MS/ public; EU; Private/own resources),
- Detailed tag: where, specifically for the EU support, a further break down was made to categorise the EU funding sources (i.e. CEF, ESIFs and Other/unspecified),
- Data analysis: once data were cleaned and the categories of funding sources names for all the projects were unique, the analysis was performed, following a specific procedure,
- Identification of the overall investment requirement for the CNC WP, summing up all the investments costs of each project on the Corridor,
- Identification of the share of investments for the analyses' elaboration, taking into account only the projects that presented complete information (total cost equals to the sum of the amounts listed in the funding sources),
- Analysis of the funding sources identified to cover the investment cost, considering the “potential” and “approved” share of funding and identifying the EU funding already approved;
- Application of the ratios to the overall investment cost, carried out to assess if the EU share of the investment costs of the whole Corridor WP can be financially sustained by the identified sources, keeping fixed the rate of the EU grants approved.

7.1.2. Results for the ATL Corridor

ATL Corridor is composed of 272 projects, accounting for €43,79 billion. Of these, 61% presents complete financial information and hence are eligible for the analysis. The corresponding amount (approx. €26.82 billion) is divided into the following financial sources:

- MS/ Public grants: €16.44 billion, or 61% of the total,
- EU Grants (CEF, ESIF): about €5.67 billion, or 21,2% of the total,
- Private/own resources: nearly €2.82 billion, or 10,5% of the total,
- EIB/Bank loan & others: about €1.89 billion, or 7% of the total.

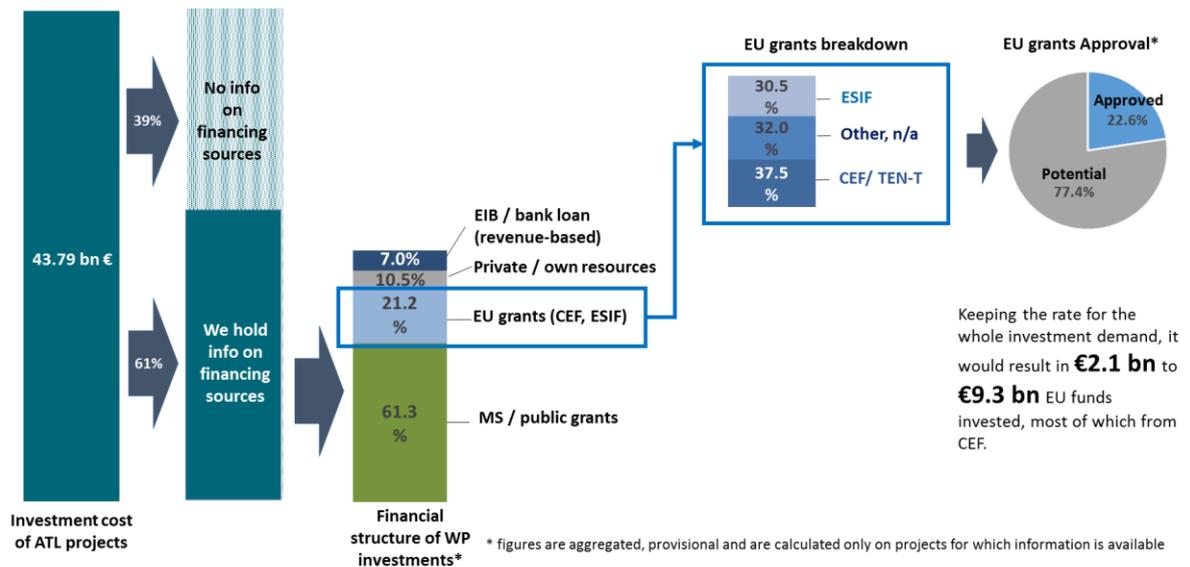
The EU grants share of the total is then further divided into subcategories related to their origin:

- CEF/ TEN-T: €2.13 billion, or 37,5% of the total,
- ESIF: €1.73 billion, or 30,5% of the total,

- Other: €1.81 billion, or 32% of the total.

This analysis is further broken down considering the “potential” and “approved” share of funding, when available (e.g. when not specified, funding has been considered as potential).

Atlantic Corridor Work Plan Funding sources and financing



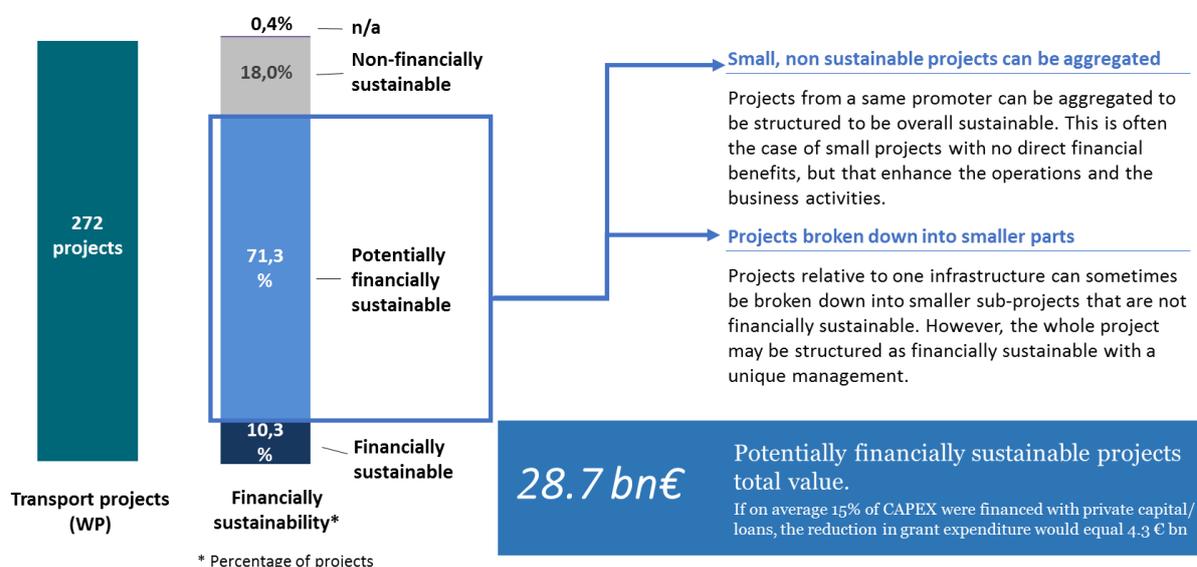
Approved funding accounts for 22,6%% of the total, while the remaining 77,4% of the total is still potential.

The results of the analysis show that keeping the rate fixed to 42% for the whole investment demand, it would result in €2,1 billion to €9,3 billion of EU funds deployed. The inclusion of private investors and the use of financing (properly favoured through financial instruments, when necessary) can strongly contribute to provide the resources the market needs.

7.1.3. Financial sustainability assessment

Following the analysis of financially sustainable projects in the Atlantic Corridor list, 18% (49 projects) are not financially sustainable, 71,3% are potentially financially sustainable (194 projects) and 10,3% (or 28 projects) are financially sustainable. Total value of financially sustainable projects is € 28,7 billion, it is therefore apparent that if 15% of CAPEX were financed with private capital/loans, the reduction in grant expenditure would be equal to € 4,3 billion.

Looking for EIB/EFSD support potential - A preliminary assessment of Atlantic WP pipeline



Atlantic Corridor Work Plan - Pipeline of projects to be completed by 2020

State	ID	Projects to be completed by 2020 with highest total costs (>100 M€)	Mode	Finalisation	Total Costs (M€)	Potential for private finance utilization
DE	7074	Upgrading of the existing railway line to establish a high-speed rail connection between Paris / Eastern France and South West Germany	Rail ERTMS	2019	634.00	
ES	3848	Upgrade of on-board ERTMS of trains on Spanish network	Rail ERTMS	2020	164.00	x
DE	7297	Upgraded rail line 23 Saarbrücken-Ludwigshafen, upgrade of Neustadt-Bohl-Iggelheim and Landstuhl- Kaiserslautern rail sections	Rail ERTMS	2020	128.87	
ES	7012	HS line Valladolid-Burgos	Rail	2020	500.00	x
ES	3845	Atocha - Chamartín rail connection in Madrid node	Rail	2020	372.73	x
PT	7242	Completion of missing rail link Évora - Caia and technical stations	Rail	2019	317.75	
PT	7237	Rehabilitation and upgrade of North rail line. Section Lisboa-Porto	Rail	2020	315.80	
ES	3846	Upgrade of HS line Madrid - Sevilla	Rail	2020	273.60	
DE	6031	Upgrade and expansion of rail node Mannheim (2. stage)	Rail	2017	160.00	
PT	7241	Rehabilitation and upgrade of rail corridor section Aveiro - Vilar Formoso	Rail	2020	606.00	
FR	7273	Improvement of vessel access to the Port of Rouen	Maritime	2019	183.90	
PT	7196	Logistic Platform of Leixões	Maritime	2020	180.00	x
PT	7223	Terminal XXI Capacity Expansion Project of Port of Sines	Maritime	2017	117.60	x
PT	7257	Lisbon airport upgrade	Airport	2020	602.00	x

7.2. Growth and Jobs (inputs for JRC)

Estimation of the socio-economic impact – composed of (a) total direct, indirect and induced jobs, and (b) induced growth (total value in M EUR) to be obtained by and input /output matrix which will be performed by the JRC.

The consultants were required to fill in a matrix for projects with costs above 75 million euro and starting date until 2020. Information per project include whenever available the costs breakdown per category, per region (NUTS 2) where the action is taking place and per year.

For the 46 projects in the ATL project list respecting the above conditions (start until 2020 and cost higher than 75 million) the consultants could provide the cost breakdown per category / year / region for 10 projects. Other projects have been desegregated per year/ region but not per category.

7.3. Multiplier-based growth and jobs analysis

We carried out an analysis of the growth and jobs impact of our corridor applying a multiplier methodology based on the findings of the study Cost of non-completion of the TEN-T²⁰. For the analysis we classified the projects contained in our project list as of May 2017 into three mutually exclusive categories:

- Cross-border projects.
- Innovation projects.
- Other and thus average projects.

The three categories also present a hierarchy. If a project is marked in the project list as cross-border it belonged to that category. If not, it is checked if it belonged to an innovation category. If not, it will be treated as average project. Mixed rail and ERTMS projects are counted with 10% as an innovation project and the reminder as average project. Only those projects were considered that were not completed before 2016. For each of the three categories we aggregated the investments related to the projects of the category and thus obtained the investments planned for the period 2016 until 2030.

These were the investment figures to which the multipliers presented have been applied to estimate the total growth and job impacts of the corridor over the period 2016 to 2030.

	Type of investment			
Categories	Average	Cross-border	Innovation	Unit of measurement
GDP-Multiplier	4,35	16,8	17,7	bn€-GDP / bn€-INV
JOB-Multiplier	16.300	37.000	38.700	FTE-JobY / bn€-INV

²⁰ Schade W., Krail M., Hartwig J., Walther C., Sutter D., Killer M., Maibach M., Gomez-Sanchez J., Hitscherich K. (2015): "Cost of non-completion of the TEN-T". Study on behalf of the European Commission DG MOVE, Karlsruhe, Germany.

The projects for which cost estimates are available and that are planned to be implemented over the period 2016 until 2030 amount to an investment of 43,6 billion €2015. The implementation of these projects will lead to an increase of GDP over the period 2016 until 2030 of 419 billion €2015 in total. Further benefits will occur also after the year 2030.

The investments will also stimulate additional employment. The direct, indirect and induced job effects of these projects will amount to 1 092 437 additional job-years created over the period 2016 to 2030. It can be expected that also after 2030 further job-years will be created by the projects.

7.4. Monitoring of jobs directly linked to construction

This part follows a bottom up approach as there is no multiplier available and ready for use – and focus on checking with project promoters' available data.

Consultants were required to gather this information for all major (cross-border) projects on the CNC and desirably to collect data on projects indicatively whose total cost exceeds 75 M EUR.

Consultants aware the Commission on the large difficulties in collecting the mentioned data, which results from several reasons:

Nevertheless, for the Atlantic it was possible to collect direct data for the following projects:

- Y-Basque (estimated) - Job creation during construction 7,000 jobs²¹
- Tours-Bordeaux (monitored) – Job creation of 8500 jobs²²

Additionally, the following elements were obtained:

- in Portugal, the main program "Ferrovia 2020" for which the higher share of investment is related to projects along the CNC, estimates the creation of more than 10 000 direct jobs in construction for the next five-year period.
- in Spain ADIF estimates the creation of 1 job per each 97 000 euros invested. Considering the total investment in rail projects as included in the project list 2017, this would mean nearly 122 708 jobs for the corridor in Spain.
- French transport ministry analysed national statistics and compared employment in construction sector with investment in transport network (rail, inland waterways and road). Recommendation resulting from the study indicate a ratio of 5 jobs-year per million euros of investment (euros-year 2010).

It was also possible to obtain some estimations for port investments, such as:

- New container terminal Leixões (7198) – 4840 jobs
- Improvement of Accessibilities to the Pole of the Port of Leixões in Viana do Castelo (7209) - 700 jobs (443 direct, 282 indirect)
- Increase the efficiency of current Alcantara container terminal (7202) – 1560 jobs
- Terminal XXI Capacity Expansion Project (phase 3) (7223) – 1000 jobs

²¹ Presented during the WG meeting on cross-border

²² As highlighted by Nouvelle Aquitaine in the presentation done during the urban nodes working group meeting



7.5. Storytelling project fiches

Consultants were asked to prepare two types of storytelling fiches:

- One for the corridor
- One for a major cross-border project

Corridor fiche includes main information on the corridor categorised under following topics:

- Jobs and Growth
- Connectivity
- Funding needs
- Efficiency
- Success stories
- Climate impact

The cross-border project comprehends the corridor sections from Y Basque High Speed Rail - Astigarraga-Irún/Hendaye UIC integration – Grand Projet ferroviaire du Sud-Ouest (GPSO), which for clarity have been shortly referred as High Speed Rail Vitoria / Bilbao – Bordeaux. The cross-border fiche includes main information under following topics:

- Connectivity
- Decarbonisation
- Funding needs
- Local / social/ human factors
- Jobs and growth

These fiches are included in the annex 2.

8. Elaboration on Innovative Pilot Initiatives

Consultants were also required to elaborate on potential flagship projects complementing the 3rd generation of corridor work plans & to boost the integration of infrastructure and transport policy development.

A first round of proposals was presented to the Commission in a meeting in March, counting also with the presence of other relevant policy units in DG Move. After the meeting, the Commission has undertaken a first assessment of project proposals on the basis of relevant policy objectives and legal acquis. It has also complemented the proposals with some top-down ideas to boost the implementation of policy objectives of particular importance.

The assessment of the Commission in relation to Atlantic proposals was the following

The Commission supports the main areas proposed by TIS, namely alternative fuels infrastructure and ITS – to build a 'Green and Intelligent Corridor'. In the field of alternative fuels, TIS' proposal focuses on both the maritime dimension and the land corridor. The Commission sees indeed a strong potential to make the land corridor one of the forerunners for the implementation of Directive 2014/94/EU. The state of the relevant national policy frameworks submitted by the Member States along the corridor backs this assessment, and ongoing action referred to by TIS underpins this. The Commission invites TIS to further expand its analysis and provide more detailed information (thereby building on on-going LNG plans for Spain and Portugal and also drawing on the information gathered in the Commission's study 'Clean Power for Transport Infrastructure Deployment'). The Commission is ready to discuss the generation of such a project further and to accompany it as appropriate.

Building on ongoing ITS projects, the Commission also sees a good opportunity to make the Atlantic corridor a flagship / pilot corridor for the provision of interoperable C-ITS. It invites TIS to explore this idea and provide further relevant information. In particular, the Commission invites TIS to look into the deployment of all C-ITS "Day 1" and "Day 1,5" services. This could be combined in a beneficial and forward-looking way with already existing ITS and C-ITS / C-road projects on the corridor.

The corridor presents a range of elements (existing and potential) to advance efficient freight logistics, including aspects such as ITS aspects (the logistic single window for ports), terminal development in Vitoria or rail interoperability; it could significantly help increasing the share of "cleaner" freight transport.

Finally, the corridor also offers interesting aspects in relation to TEN-T urban nodes: notably the development of the Irun – Hendaye cross-border "twin-node" presents, besides the need for main TEN-T links, the particular challenge of connecting long-distance with urban public transport across a national border.

These ideas were presented in the 10th Forum meeting in June and further worked and finetuned with stakeholders and with the Commission.

Those updated initiatives were then further discussed and presented in the 11th Forum meeting in October 2017 as follows:

- Alternative fuels from Helsinki to Lisboa and South of Spain: to offer seamless electric recharging, LNG/CNG refuelling and H2 refilling on a road-based route from Lisboa to Helsinki, in cooperation with the North Sea Baltic Corridor from Helsinki to

Brussels and with the North Sea Mediterranean Corridor from Brussels to Paris as well as with Scandinavian Mediterranean Corridor.

- LNG at ports on the Atlantic coast: to ensure that as many as possible core and comprehensive ports on the Atlantic coast have bunkering and possibly ship-to-ship infrastructure to refuel LNG-motored ships.
- Seamless Spain-France cross-border connection at Irun-Hendaye: to relieve the heavy road congestion at this connection by putting in place more sustainable local solutions for both passengers and freight, involving for example rail and coaches/buses.
- Logistics single window from the Atlantic ports to the inland corridor: to support efficient freight logistics, interlinking and supporting existing digital initiatives in the different modes of transport along the corridor and improve/ contribute to speed up the corridor digitalisation.

A brief summary is below included. It should be noted that from discussions with stakeholders, some needs have been identified as described below. However, the information may not be up-to-date nor complete at this point in time and is provided only for the sake of giving an idea of what such a flagship project could look like.

8.1 Alternative fuels from Helsinki to Lisbon and South of Spain

This pilot initiative was developed based on an analysis of the existing EU and national regulatory framework and of data regarding existing and near-future existing infrastructure. The analysis also looked at potential benefits and needs for financial support of each fuel type. Information gathering about stakeholders was an essential last step to progress towards a concrete project.

Initial needs for financial support have been identified as follows:

- Electric charging (public fast charging station near the highway) has a high level of deployment. The pilot initiative focus is on adding missing stretches to the route Lisboa – Helsinki to ensure uninterrupted travel. This involves, for instance, adding electric charging points in Poland and Lithuania and in the cross-border sections of Portugal – Spain.
- CNG refuelling also a high level of deployment, similar to electric charging. The focus of the pilot initiative is on the gaps around the peripheral areas i.e. the areas furthest away from the corridors' urban nodes.
- LNG refuelling could be further developed in the regions where this fuel is available, for example in France.
- Hydrogen refilling is in its earliest stage of development. The regions of the Benelux and Northern Germany are the most mature, so the gaps are in the other regions along the route.

A very wide range group of stakeholders have been identified, including CEF project beneficiaries, car manufacturers, alternative fuel providers, local authorities, port authorities and others. These stakeholders now have the opportunity to work together to develop a project proposal for an upcoming CEF call, including a blending call since some revenues generation is involved in alternative fuels recharging/refuelling/refilling.

8.2 LNG at ports on the Atlantic coast

Background

In the 2014 CEF call, the Commission granted EUR 16.650.000 to the project "Core LNGas hive" which aims at developing a safe, efficient and integrated logistic chain for

the supply of LNG as a fuel for the maritime sector in the Iberian Peninsula. This project integrates 42 partners from Spain and Portugal, of which 13 ports. It is testing several technical solutions to identify the most suited ones in different circumstances. This project needs a follow-up phase of concrete implementation and roll out of these solutions. This follow-up could be the basis for or part of the pilot initiative.

For France, developing LNG at ports fits with Law n°2015-992 of August 2015 about the energy transition and with the national framework of February 2017 for the deployment of the recharging and refuelling infrastructure for alternative fuels, in application of Directive 2014/94/EU.

Spain is committed to developing LNG based on existing infrastructure, including regasification plants, and in using LNG in the transport chain. The consolidated text of the Law of State Ports and Merchant Marine (RDL 2/2011) incorporates sustainability as one of the principles that should govern the model of planning and management of ports.

In Portugal, the Council of Ministers issued in June 2017 a decree to implement a national framework for the development of alternative fuels including LNG at ports, in application of Directive 2014/94/EU. Moreover, the strategy for the competitiveness of ports 2016-2026 incorporates clean fuels and notably LNG availability has a necessary condition for that competitiveness, being followed by a Rotary for the Maritime LNG.

Initiative

Very important to note is that the pilot initiative would supply LNG to vessels that depart from or arrive into the Atlantic corridor. However, these vessels would not necessarily be supplied at core ports of the Corridor nor necessarily at comprehensive ports of the TEN-T. But even then the supply would feed sustainable transport flows in the Atlantic Corridor and further into the rest of the core TEN-T and as such form an integral part of its functioning.

Concrete needs have been identified and quantified in terms of cost for several French, Spanish and Portuguese ports and for the related feeding vessels, virtual pipelines and training centres. These needs have been quantified for a total cost of around € 300 million. However the list of ports and their needs is subject to evolution and some ports are not included because they have already developed or have already secured financing for their LNG-related installations.

Stakeholders now have the opportunity to work together to develop a project proposal for an upcoming CEF call, including a blending call since revenues generation is involved in LNG supply. The EIB has already expressed interest.

8.3 Seamless Spain-France cross-border connection at Irun-Hendaye

Background

The cross-border connection Irun-Hendaye is suffering from road congestion. In that context, works have started to improve the rail freight cross-border connection and on passenger high speed lines on the Spanish side within the Basque Region.

In 2014, a CEF grant was awarded for works and studies for the Bergara-San Sebastian-Bayonne rail section (2014-EU-TM-0600-M). That action involves parts of three railway lines: the existing cross-border line, part of the High Speed Line (HSL) San Sebastian-Bilbao/Victoria (namely "Y Vasca") in Spain and part of the HSL Grand



Project of South West (GPSO) in France. The "Y Vasca" is being completed during the course of this action, while the GPSO in France will be developed in the longer run. Works include: works on the Mondragon-Astigarraga section of the HSL "Y Vasca", the upgrade of the Astigarraga-Irun section on the existing line, works on the international cross-border stations Hendaye-Irun and upgrading works of Atotxa-San Sebastian station. Studies concern: the upgrade of the existing Dax - Victoria line and the update of the preliminary studies of the new international link. The action cost €1.15 bn with a CEF contribution of €459 million. In addition, the region is also concerned by the project of a rolling motorway from Vitoria to Dourges near Lille.

Initiative

The cross-border connection has the specific situation of having a city on each side: Irun, part of the San-Sebastian area in Spain and Hendaye, part of the Bayonne area in France. There are important commuting flows in both directions.

There is an opportunity to complement the cross-border freight connection and long-distance passenger rail connection with more local actions to ensure efficient transport also for the local freight and for the inhabitants. There are 100.000 inhabitants directly at the border (Irun-Hendaye) and 600.000 in the larger San-Sebastian-Bayonne area. A study called Transfermuga was conducted in 2013 to define efficient local cross-border connections. Some funds were received from Interreg for studies and small infrastructure but there remain infrastructure investment needs which could be covered by CEF.

Needs have been quantified for a total amount of close to € 20 million. They include amongst others: the adaptation of platforms for the extension of the regional SNCF trains to the station of Irun; works for connections by buses and coaches; the doubling of the tracks at the cross-border Euskotren station of Hendaye; the upgrade of the Hendaye-Kostorbe station; the implementation of an interoperable and cross-border ticketing system. This list is however not exhaustive and other elements, especially related to freight, should complete the 'programme'.

Stakeholders now have the opportunity to work together and further develop a project proposal for an upcoming CEF call, with the necessary revisions on values and projects.

8.4 Logistics single window from the Atlantic ports to inland corridor - Portugal (and Spain / France)

Starting from the national logistic single windows being deployed, this pilot initiative aims to deploy a technological information system for cross border chains. This is achieved by developing an upper layer of communication that reads from each national platform and through this contribute for the continuity and increased visibility of the logistic chain along the corridor. By doing this upper layer, the identity and specificity of each national window is preserved but the continuity of the chain is enhanced with large benefits for the end users.

A first estimate of the costs could be around 1,5 million euro for the 3 countries together.

9. Summary of accomplished actions

As previously highlighted, important progresses at corridor level, notably for cross border sections, has been noticed since the end of the 2014 studies and Coordinator Work Plan in 2015.

As major achievements at the corridor level it is highlighted:

- The TGV East (to Strasbourg) entered in operation in September 2016;
- The Tours-Bordeaux HSL ended – largest PPP on railway in the world (7.8 B EUR) thanks to by EU Guarantee (LGTT) and EIB Loan – and the line entered in operation in July 2017 allowing to travel between Paris and Bordeaux in only 2 hours. This is now sparing capacity on the conventional line for freight;
- The launch of the Port Accessibility Fund in Spain, supported by EFSI;
- The launch of investments in most ports (PT, ES, FR).

9.1. Progresses and decisions on ongoing works

Relevant on-going projects are expected to be operational on time or with some delays:

- The Y Basque by 2023 (likely to be delayed);
- The GPSO (Grand Projet Sud-Ouest): 2024 to Toulouse (not part of the corridor), 2027 to Dax and 2032 Dax-Spain if the project is confirmed by the French authorities;
- The construction of the missing rail link “Évora-Caia”, with completion foreseen by 2021 (likely to be delayed);
- Electrification works (at 25Kv) on the Spanish border between Fuentes de Oñoro and Medina del Campo by 2019;
- Partial conclusion of works on the Spanish border between Badajoz and Plasencia (UIC gauge), mixed line for passengers and freight.

9.2. Governance

Advancements are also visible in terms of governance with the continuous cooperation between Portugal and Spain on interoperability and between France and Spain for rolling motorways. For the later, a joint proposal for studies on the Vitoria-Lille rolling motorway was presented and accepted in the CEF 2016 calls and a call for interested industry parties to submit proposals for technical specifications for the rolling stock was opened over March-June 2017. Five proposals were received which are under examination. A new call for interested services suppliers will be launched shortly (or has been launched at the time of finalisation of this Work Plan).

Stakeholders and political participants in Forum activities clearly reinforced their commitment to Corridor activities and acknowledge that:

- Cooperation on concrete working themes as in the thematic groups is key to succeed in the Corridor;
- Development is facilitated by clear, simple and mandatory parameters for TEN-T;
- EU support, notably through CEF, is important;
- Decarbonisation of transport is a political mission;

- Motorways of the Sea and Port connectivity are of the uttermost importance for the Atlantic Corridor for all the MS;
- Blending of funds will prove crucial to timely develop the ambitious infrastructure needs.

9.3. Territorial Cooperation

There is a growing acceptance that strong territorial cooperation across borders increases the interest and facilitating cross-border projects. Relevant stakeholders are taking part in different working group meetings, presenting successful projects and studies. The Euskadi-Nouvelle Aquitaine-Navarre Euroregion, the Macro-Region RESOE (Galicia, Asturias, Castilla y León, Norte and Centro), the coordinated services between Portuguese ports and logistic platform in Extremadura or the Quattropole and Grande Region are excellent examples of the territorial cooperation in place in the Atlantic Corridor.

Euskadi-Nouvelle Aquitaine-Navarre Euroregion

The Euroregion highlighted a successful project (co-financed by Interreg) on coordinated planning and deployment of macro-regional (cross-border) local transport services named Transfermuga. Nearly 70% cross-border flows are very short distance, 25% medium distances and 5% long distance. 85% by car with very low occupancies with shopping identified as main travel motif.

The project highlights a very interesting multidimensional analysis: governance, planning, information flows, and policies such as Park and Ride, Tariffs & clearing, cycling. To facilitate exchanges, coordination is visible at various levels: improvement on parking policies, cycling lane, new cross-border coach services, implementation of joint passes for public transport including cross-border services and exchange zones, cross-border information and synchronized rail services in Irun-Hendaye. It is expected that soon the French trains will run towards Irun. Additionally, an app (and a portal) for multimodal, cross-border planning being developed, complementing the one already operational for railways.

Moreover, the Euroregion is also involved in paving the way for the continuity of gauge between railway networks developing new services.

Macro-Region RESOE (Galicia, Asturias, Castilla y León, Norte and Centro)

Master-plan of Promotion of Intermodal Freight Transport for the Macro-Region of European Southwestern Regions (RESOE), a technical document with a portfolio of key projects and facilities in the macro-region, identifying 75 actions in these regions.

Coordinated services between PT south ports and logistic platforms in Extremadura

Structured cooperation between ports of Lisboa-Setúbal and Sines with the cross-border logistic platform in Badajoz (Spain) with regular train services towards the ports for exporting fresh products from the region.

Quattropole and Grande Region

Coordination of cross border mobility and integrated territorial planning and transport infrastructure between four main poles – Luxembourg, Metz, Sarbrücken and Trier

10. Conclusions

10.1. WP progress and activities

Table 27 provides an overview on the progress of the work regarding the technical work packages within the contractual period, in accordance with the tasks listed in the Terms of Reference (ToR) and related work packages and sub-tasks presented by the Contractor in the Inception Report/technical proposal.

Table 27: Overview on Progress of work

Task (as per ToR)	Work Package	Sub-Task	Status
1	Taking stock of existing results and KPI identification	Identification of potential improvements of the 2014 Study	<i>Completed</i>
		Assessment of information collected	<i>Completed</i>
		Methodology for fine-tuning the analysis	<i>Completed</i>
		Definition of KPIs	<i>Completed</i>
2	Updating of project list	2.1- Further development of project list	<i>Completed</i>
		Development of updated project list	<i>Completed</i>
3	Preparations for update of work plan	Proposed measures for implementation of the Corridor	<i>Completed</i>
		Wider elements of the work plan	<i>Completed</i>
4	Expert review / Input to updated corridor work plan	Conclusions identified for updating the 3 rd Work Plan	<i>Completed</i>
		Analysis of potential market uptake for specific modes	<i>Completed</i>
		Impact of cooperation with RFC to the Corridor	<i>Completed</i>
		Key Objective criteria to categorise/map investments	<i>Completed</i>
		Proposal for categorisation/mapping of projects	<i>Completed</i>
5	Corridor Forum	Corridor Forum (6/6)	<i>Completed</i>
		Working group meetings (6/7) ²³	<i>Completed</i>
6	Other support to DG MOVE	Corridor Fiches	<i>Completed</i>
		TEN-T Project Fiche	<i>Completed</i>

²³ The 7th working group meeting (2nd for ports) is planned for February 2018, together with the Mediterranean corridor.



Task (as per ToR)	Work Package	Sub-Task	Status
		Flagship projects template	<i>Completed</i>
		Jobs and Growth analysis	<i>Completed</i>
		Flagship projects	<i>Completed</i>
		Monitoring of direct jobs	<i>Completed</i>
		NUTS2 allocation and costs split	<i>Completed</i>

10.2. Main findings

The current state of the Corridor compliance in 2017 underlines the need to increase Corridor performances, mainly for some rail parameters and alternative fuels deployment.

Rail and ERTMS: the following key critical issues could be highlighted:

- Lack of compliance in terms of electrification in cross border sections and in the access to Algeciras and Le Havre, the two main corridor ports in volume.
- Track gauge non-compliance on several Spanish sections included in the Corridor alignment and in the entire Portuguese sections. Some sections won't reach compliance until 2030.
- Train length limitations on several sections along the Corridor alignment and particularly in the access to corridor ports.
- ERTMS signalling system to be deployed on the majority of Corridor railway lines.

The missing link Évora-Caia is of the utmost importance being the direct connection to Lisboa, Sines (and Setubal) towards Madrid. This section is the only missing cross-border stretch; besides, representing the second connection between Spain and Portugal for long-distance transport, it is needed to upgrade the current route Aveiro-Salamanca through the Beira Alta line without isolating Portugal; the agreed plan is for a mix (freight-passenger), fast line to start in Iberian gauge with polyvalent sleepers, electrification at 25 kV and ERTMS is to be pursued with EU support. The Évora-Caia civil works project has been selected in the framework of the CEF Call 2014, and a project to complete the Spanish section in Extremadura has been submitted to be eligible for the European Regional Development Fund.

Maritime: With regard to the impact on KPI, all Atlantic ports already met the basic requirement of TEN-t Regulation (EU) N. 1315/2013, art. 41.2, stating that all core ports need to be connected with rail. Nevertheless, several bottlenecks need to be solved, notably to allow 740-meter train length, to allow an improvement of these technical parameters, enhancing modal shift for freight transport.

It is worth noting the need for the reclassification of the actual rail connection to the port of Sines, through the comprehensive network, after the withdrawal of the foreseen new connection in result of environmental rejection. Solving this issue is critical to maintain and increase the flows to this core port.



Deployment of alternative fuels in the Atlantic core ports is progressing and foreseen deployments will ensure compliance in this respect.

Road: as regards the express road/ motorway parameter, less than 0,2% of the corridor extension, i.e. the north border PT-ES on both sides, is not compliant yet. A CEF project from 2016 call is addressing this issue and compliance will be achieved by 2020. In what concerns alternative fuels deployment although in the current stage only about 12% of the core road corridor already answer to the requirements, the ongoing and planned projects will ensure a full compliance. Interoperability for road tolling is progressing and it can be expected a quick start of commercial services (progress from the technological side is already reached).

Last mile projects: Rail connection to ports is available but should be upgraded to meet the full interoperability. Airport rail connection totalling fulfilling the Regulation criteria is only available in Paris CDG. Important study developments are on-going in Madrid.

Urban nodes: Effective integration of urban nodes in the corridors is a key and urgent issue. The importance of a global and integrated strategy from the Regions, aligned with the Member States and EU policies, to effectively address bottlenecks within urban nodes is accentuated. Looking towards a quick deployment of C-ITS day 1 (and as far as possible day 1,5 services) is a step forward and several of the corridor urban nodes are frontrunners in this respect.

Cross-border projects: The completion of the corridor missing link and the electrification of cross-border sections are ongoing but a continuous follow-up of the working group on Iberian interoperability is necessary. The completion of the last stretches of the road corridor rank high in the mapping exercise and are relevant to ensure the full accomplishment of the Regulation criteria. Progressing in terms of road interoperability, taking advantages of the solutions already deployed between PT and ES (in non-corridor sections) and ES-FR.

Innovation: Innovation is of paramount importance for the achievement of the different strategic goals set for the transport sector in Europe, across all modes. The number of innovation projects for the corridor is relatively small and of those only 34% of have a direct contribution to transport decarbonisation. It is however important to note that such figures represent only those projects that are considered to have a direct impact on transport decarbonisation but there are many other that also contribute to a lesser extent or in a less evident way. Moreover, gauge is not classified as innovation, however the necessary articulation of two gauges for several more years bring in itself an innovative character that can't be avoided.

Compliance with the Regulation and coverage of Issue Papers seems to be assured. However, general perspective is that most projects and most budget is NOT allocated to innovative projects. Most innovative projects refer to catch-up innovation, which would be expected. There seems to be margin to increase the number of projects targeting transport decarbonisation through innovation deployment

Common priorities for the whole sector can be identified:

- A greener transport through the adoption and implementation of alternative fuels that contribute to the decarbonisation of transport.



- Development and adoption of technology-based solutions such as ITS, C-ITS and other telematics applications as a means to achieving a better information exchange that contributes to a more efficient management of transport networks
- Encourage multimodal transport and efficient and sustainable freight logistics.

Climate change: Relevant impacts across all countries and modes. Transport now part of climate adaptation strategies. Most problems associated with extreme weather events, which damage infrastructure and cause traffic disruptions

Some recommendations can be made:

- The systematic realization of a territorial assessment of transport systems in order to understand the effects of climate change on the corridor and its associated infrastructures.
- Adaptation of technical reference systems for the design, operation and maintenance of infrastructures to climate change. It is necessary to ensure that infrastructures built according to old standards can be adapted to climate change, just as new infrastructure projects are in line with the projected hazards.
- Improved knowledge of the behaviour of materials and structures (railway rails, roadways, etc.) to new stresses (high temperatures, submersions, wave effects, etc). Climate change will also modify the behaviour of the users and the journeys will no longer be carried out according to the same considerations as today. The training of people affected by climate change, whether they are infrastructure managers or users, is also essential.
- Define the responsibility of the actors. Climate change and the extreme events that it can cause, with an increase in the occurrence, duration of the events and location concerned, raises the questions of responsibility in strategy and operation.

Decarbonisation: The exercise undertaken, based on the Reference Scenario and workplan scenario shows that planned investments along the Atlantic corridor will allow for a better performance of the corridor, being still worth noting that (due to model limitations) the maritime modes, representing the better choice for the long distance are not captured in the current exercise. Nevertheless, and mainly based on the land modes, investments will contribute to nearly 33% emission savings, with modal shift to rail accounting for roughly half of the Emission savings. Other half efficiency and alternative fuel

The positive impacts of the Corridor could also be maximized through a set of measures at European, national or local level, for example:

- Implementing the TEN-T core network as a whole with good interconnections between corridors, as we have seen how they are interdependent;
- Encouraging innovation for improving energy efficiency and decarbonisation of all transport modes;
- Lowering the level of CO₂ emissions for the production of electricity by encouraging the development of renewable energy sources: this would make the modal shift to rail more efficient for GHG emission reductions;
- Promoting modal shift for local and regional transport.

Cooperation with RFC: In providing input to the update of the Atlantic corridor work plan, it would be important to consider also the success factors for rail freight corridors such as the adoption of the following soft measures:



- Enhancing and speeding up train handling (and customs) procedures in border stations,
- Harmonisation of operational rules,
- Harmonised quality and performance monitoring across corridors.

It is worth noting that for the next years, the corridor will be affected by operational constraints and closure of sections for relevant periods in result of the large number of works on rail infrastructure. Alternatives are being thought, notably by diverting some traffic through the Mediterranean corridor and although this is fundamental for upgrading of the rail infrastructure, over the coming years the demand might not increase as expected.

IWW market potential: The assessment conducted highlights a low potential for container shift growth along the Seine river basin. The Douro inland waterway was not considered in the exercise, although it could play an important role in the future by connecting relevant industrial zones to seaport.

10.3. What has still to be done

The TEN-T Regulation defines the transport infrastructure requirements for the Core Network, stating that these requirements need to be met by 2030 at the latest.

Application of these TEN-T requirements is a priority for the Corridor whenever feasible. In this regard, the most important interventions include: the deployment of UIC track gauge on the Iberian Peninsula; the electrification of cross border sections and of the railway lines connecting to the ports of Algeciras and Le Havre; the connections for 740m long trains to all Corridor's ports and the completion of rail missing links. Moreover, as already acknowledged, addressing the rail connection to the port of Sines through the comprehensive network is critical.

Beyond signalling and electrification, a special attention has to be paid to the gauge issue in the Iberian Peninsula, where delivering interoperability means agreeing on the deployment of UIC gauge along the Corridor lines, therefore going beyond the current planning and project listed. It will be important to continue and progress the on-going work of the joint task force Spain-Portugal on interoperability which is delivering an accurate estimate of costs and benefits of different options to ensure the compatibility with UIC gauge in the Iberian Peninsula, to come with a shared long-term planning.

Of particular attention is the rail connection to the port of Sines, where due to the withdrawal of the only Core Network Section linking Grândola with the Core Port of Sines, following the outcome of the environmental studies, the only possible rail access to the Port of Sines (3rd port in volume and 1st for rail intermodal connections) takes place through the existing TEN-T rail line Sines-Ermidas do Sado-Grândola (in Portugal), although it belongs to the comprehensive network. Addressing this connection to the port of Sines through the comprehensive network is a critical issue that should be mentioned and should be addressed exceptionally before the forthcoming revision of the network.

However, there are many cases where there is a need to go further and beyond the TEN-T requirements. This is in particular the case for land access to the Corridor's ports which calls also for qualitative and capacity improvements. For rail, we also need to address the issues related to the differences in voltage, the steep gradients and the non-harmonised loading gauges which make that not all routes permit the same vertical clearance, limiting the interoperability of trains. For roads, we need to address the issue of tolling



interoperability, currently technologically ready but commercial services are still to be deployed.

Moreover, as developed earlier, there is a clear potential on the Corridor for the provision of better multimodal services and for improving multimodal connections. However, an overall planning, implementation, and management model for Rail-Road terminals, notably in Iberian Peninsula, is still missing. Last, there is also a strong opportunity to deploy logistic single windows along the Corridor, extending the current port single windows towards the hinterland and integrating with e-maritime services and information technologies. Finding innovative solutions to enhance multimodality on the Corridor is key to meet the continuous growth of maritime flows to the inland routes.

In the short-to-medium range (by 2021), Vitoria will be the key interconnecting point Iberian-UIC gauge, while capacity is being developed on the French side (which already consists of a double track electrified line compatible for 740-m long trains) it is therefore crucial to develop a plan to fully exploit its potential, also with reference to branch of the RFC feeding the Atlantic Corridor (e.g.: Zaragoza-Pamplona-Vitoria). The Jundiz platform is in a very good position to develop a strong case for intermodal services for hinterland and port traffic and transshipment between local/national and international rail transport using different gauges:

- for interconnection between maritime services in the hinterland of major Atlantic ports and continental rail intermodal services;
- for transshipment between Iberian and UIC gauge rail networks;
- for the launching of new rail motorways services for long distance transport between Spain, Portugal and northern Europe, including the Paris area, Belgium and The Netherlands.

The maritime connectivity along the Atlantic Coastline has to be seen as a corridor component to be enhanced: in fact, Motorways of the Sea, the de facto maritime component of the Corridor, beyond being a corridor feeder, are already developed among the corridor's ports up to the EU northern coast, but are still not fully exploited, as shown by market research, estimating about 29 million tons of freight flows to be potentially transferred to Motorways of the Sea by 2020.

These investments have to be considered in a wide range, from infrastructure (port accessibility both land-side, on which a major breakthrough is expected to take place thanks to the ad hoc fund for Ports accessibility set by Spain with EFSI contribution – interoperable rail and inland waterways - and Sea-side) to terminal efficiency, and to systems and procedures to evolve e-maritime towards e-freight, increasing the efficiency of the logistic chains using maritime transport. Its environmental component, including the deployment of innovative fuels, ought to be taken into the picture. A careful follow-up and best practices sharing in the WG will be ensured in the next years, in order to come to a full deployment of the maritime and logistic single window ASAP. The foreseen flagship initiative for the logistic single window might be a step in that direction.

In a wider perspective, the Atlantic coastline and all its Core and Comprehensive ports and logistic platforms ought to be seen as feeding the corridor / served by the corridor. The foreseen flagship for LNG along the Atlantic corridor was designed considering that wider view, that is the deployment of the pilot initiative would allow to supply LNG to vessels that depart from or arrive into the Atlantic corridor. However, these vessels would not necessarily be supplied at core ports of the Corridor nor necessarily at comprehensive ports of the TEN-T. The role of the Atlantic islands of Madeira, Azores and Canarias represent indeed the continuity of the Atlantic corridor overseas. Efforts to deploy LNG bunkering facilities and capacity to supply vessels in the islands is of utmost relevance to enhance the maritime dimension of the Atlantic.

Annex 1: Implementation of Atlantic KPI (updated results)

Generic supply indicators

Mode	KPI	Definition	2015	Target 2030
Rail network	Electrification	Electrified rail network km as a proportion (%) of relevant CNC rail network km.	87%	100%
	Track gauge 1435mm	Standard (1435mm) track gauge as a proportion (%) of relevant CNC rail network km.	58%	74%
	ERTMS implementation	Length of Permanent Operation (excluding operational test lines) of both ERTMS and GSM-R on rail network, as a proportion (%) of relevant CNC rail network km.	12%	89%
	Line speed ≥ 100 km/h in accordance with art. 39 para. 2. Item a) (ii) of the Regulation 1315/2013	Length of Freight and combined line with allowing for a maximum operating speed greater than or equal to 100 km/h, as a proportion (%) of relevant CNC rail network km without load restriction.	96%	100%
	Axle load (≥ 22.5 t)	Length of Freight and combined line with a permitted axle load greater than or equal to 22.5 tonnes, as a proportion (%) of relevant CNC rail network km.	100%	100%
	Train length (740m)	Length of Freight and combined line with a permitted train length greater than or equal to 740m, as a proportion of relevant CNC rail network km.	57%	100%
Inland waterway network	CEMT requirements for class IV IWW	Length of Inland waterways classified as at least CEMT class IV, as a proportion (%) of CNC waterway network km.	100%	100%
	Permissible Draught (min 2.5m)	Inland waterway network km permitting a vessel of 2.5m draught, as a proportion (%) of CNC waterway section km.	100%	100%
	Permissible Height under bridges (min. 5.25m)	Inland waterway network km with vertical clearance of at least 5.25m under bridges, as a proportion (%) of CNC waterway section km.	100%	100%
	RIS implementation (% of km on which the minimum requirements set out by the RIS directive are met)	Inland waterway network km on which the minimum technical requirements of the RIS directive are met, as a proportion (%) of CNC waterway section km.	75%	100%
Road network	Express road/ motorway	Road network km classified as motorway or express road, as a proportion (%) of CNC road section km.	99,8%	100%
	Availability of alternative clean fuels (stations)	Number of fuel stations offering plug-in electricity, hydrogen, liquid biofuels, LNG/CNG, bio-methane or LPG along CNC road sections or within 10km from its junctions.	Electric - 18,4% LNG - 12 %	100%
Airports	Connection to rail	Number of core airports in CNC with a rail connection as a proportion (%) of the number of relevant core airports in the CNC.	25%	75%
	Availability of at least one terminal open to all operators in a non-discriminatory way and application of transparent charges.	Number of airports with at least one open access terminal, as a proportion (%) of the total number of core airports in the CNC.	100%	100%
	Availability of alternative clean fuels	Number of airports offering liquid biofuels or synthetic fuels for aeroplanes, as a proportion (%) of the total number of core airports in the CNC.	-	-
Seaports	Connection to rail	Number of seaports in CNC with a rail connection as a proportion (%) of the number of relevant core seaports in the CNC.	100%	100%
	Connection to IWW CEMT IV	Number of seaports in CNC with a (hinterland) inland waterway connection of at least CEMT IV class, as a proportion (%) of the number of relevant core seaports in the CNC.	100%	100%
	Availability of alternative clean fuels	Number of seaports offering (at least one of) LPG, LNG, liquid biofuels, or synthetic fuels as a proportion (%) of the total number of seaports in the CNC.	13%	100%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of	Number of seaports with at least one open access terminal, as a proportion (%) of the total number of core seaports in the CNC.	100%	100%



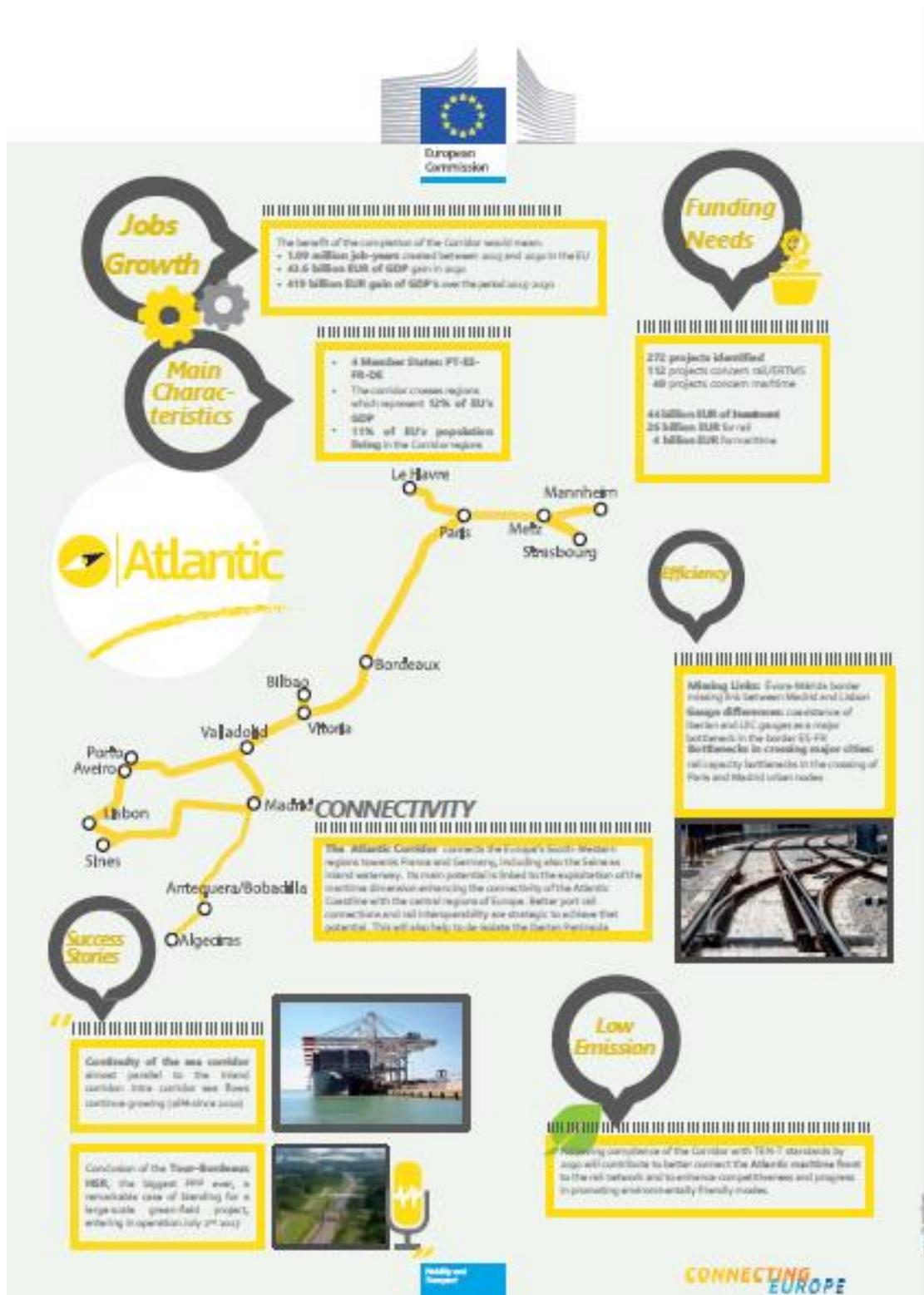
Mode	KPI	Definition	2015	Target 2030
	transparent charges			
	Facilities for ship generated waste	Number of seaports offering facilities for accepting PRF mandatory (MARPOL Annexes I, IV, and V) categories of ship-generated waste, as a proportion (%) of the total number of core seaports in the CNC.	100%	100%
Inland ports	Class IV waterway connection	Number of inland ports in CNC with an inland waterway connection of at least CEMT IV class, as a proportion (%) of the total number of core inland ports in the CNC.	100%	100%
	Connection to rail	Number of inland ports in CNC with a rail connection as a proportion (%) of the total number of core inland ports in the CNC.	100%	100%
	Availability of alternative clean fuels	Number of inland ports offering (at least one of) LPG, LNG, liquid biofuels, synthetic fuels or hydrogen as a proportion (%) of the total number of inland ports in the CNC.	14%	100%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	Number of inland ports with at least one open access terminal, as a proportion (%) of the total number of core inland ports in the CNC.	100%	100%
Rail Road Terminals (RRT)	Capability for Intermodal (unitised) transshipment	Number of road rail terminals with the capability of handling intermodal units, as a proportion (%) of the total number of core RRTs in the CNC.	80%	100%
	740m train terminal accessibility	Number of road rail terminals with the capability of handling 740m trains (without decoupling), as a proportion (%) of the total number of core RRTs in the CNC.	40%	100%
	Electrified train terminal accessibility	Number of road rail terminals with the capability of handling electrified trains, as a proportion (%) of the total number of core RRTs in the CNC.	70%	100%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	Number of RRTs with at least one open access terminal, as a proportion (%) of the total number of core RRTs in the CNC.	80%	100%

Corridor Specific KPI

Mode	KPI	Unit	2014	2020	2030
Rail network	Core Nodes connected in UIC gauge				
	Freight	Nr	8	9	
	Passengers		11	12	
	Border crossing points connected in UIC gauge	Nr	1	2	4
	Cross border extension connected in UIC gauge				
	Freight	index (2014=100)	100		
Passengers	(Km)	100			
Maritime	Regular SSS / MoS	Nr	8		
	Intra corridor sea flows	index (2014=100) (Tonnes)	100		

Annex 2. Storytelling Atlantic corridor fiches

Annex 2.1. Atlantic Corridor Fiche



Annex 2.2. Major cross-border project fiche





TEN-T PROJECTS High Speed Rail Vitoria / Bilbao - Bordeaux



Local - social - human factors

The High Speed rail in France as well as in Spain has generated development, improving the country's transport structure and the quality of people's lives. The experience and technological know-how achieved have significantly increased the competitiveness and internationalization of companies in the Spanish and French railway sector. The creation of the High-Speed network will have positive repercussions for the whole country, beyond the direct advantages for the people and the companies that use their services.

An efficient rail system will mean the elimination of numerous vehicles from the roads, the reduction of connection times between cities, the consolidation of the public transport system and the structuring of the whole territory around sustainable mobility.



Jobs and growth

The improved rail sections will boost economic growth of Basque Country, Aquitaine and the rest of Spain and France. Direct employment is estimated at more than 10800 jobs. Moreover, in case of Y Basque, the creation of this new HS rail will provide an annual increase of 1.3% of GDP in the region.

Apart from enhancing passenger mobility, these projects will also facilitate the functionality of freight transport, bringing rail closer to nodes with possibility of modal exchange.

Iñigo DE LA SERNA *Spanish Minister of Transport*

From our department we are going to give a decisive impulse to the Y Basque railway project



Sections of the Y Basque (March 2017)
Black - Project phase
Red - Works ongoing
Green - Works Declared



Sections of Y Basque Project at Basque Coast, 2016



Annex 3: Pilot initiative

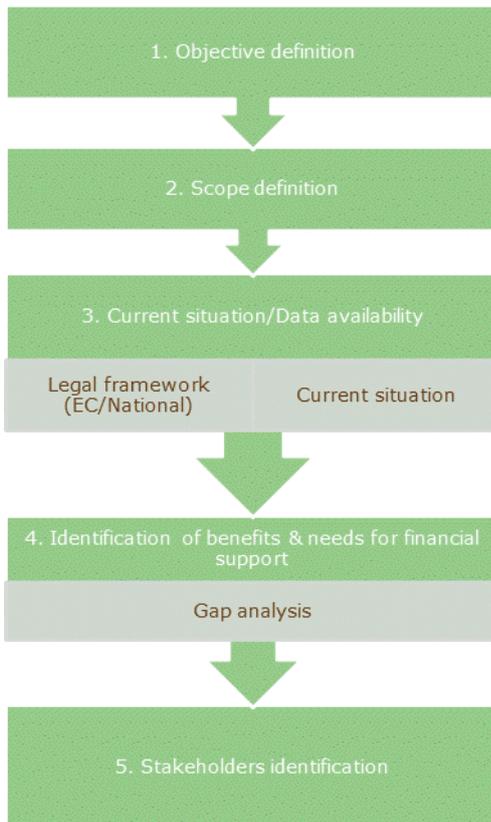
Alternative fuels for four corridors combined into one: Helsinki to Lisbon



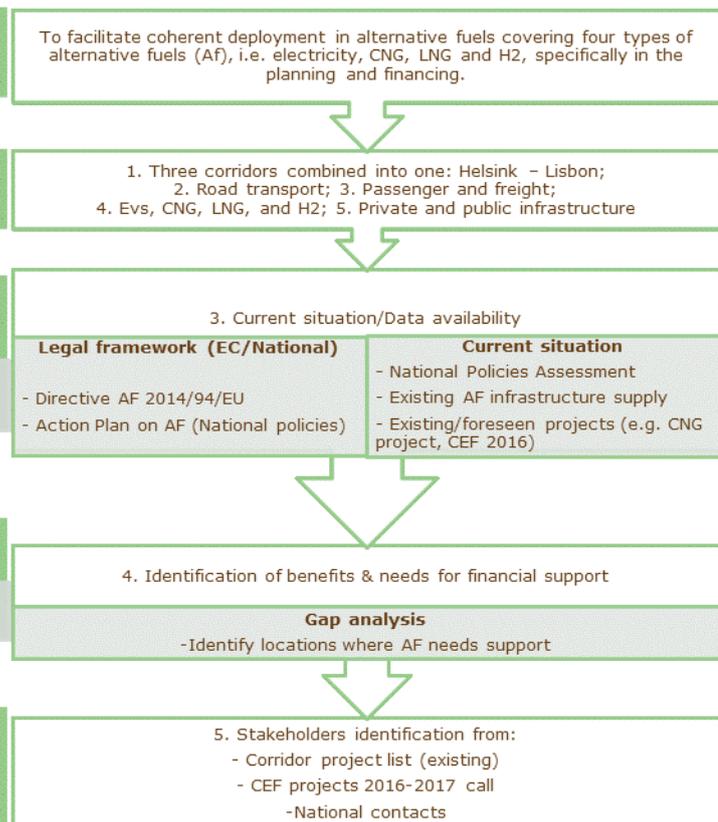
To offer seamless electric recharging, LNG/CNG refuelling and H2 refilling on a road-based route from Lisbon to Helsinki, in cooperation with the North Sea Baltic Corridor from Helsinki to Brussels and with the North Sea Mediterranean Corridor from Brussels to Paris.

- Road transport
- Passengers and freight
- Private and public infrastructure
- Coherent deployment and financing of AF infrastructure

Flagship project workflow



Alternative Fuels Flagship project



Background

The aim is to facilitate coherent deployment in alternative fuels covering four types of AFs, i.e. Electricity, CNG, LNG and H2. It will bring together different elements; coherent deployment/planning and financing.

Scope

- Three corridors combined into one : Helsinki – Lisbon
- Road transport
- Passengers and freight
- EVs, CNG, LNG and H2
- Private and public infrastructure.

EU legal framework analysis

As of 2013, oil still represented 94% of the energy consumed by the transportation sector in Europe, which imports almost all of it. In order to actively promote the use of alternative fuels, in compliance with Europe 2020 strategy and the 2011 White Paper entitled "Roadmap to a Single European Transport Area – Towards a Competitive and Resource Efficient Transport System", and to strengthen the EU energetic independence, the Commission published a series of working documents in 2013 known as the "Clean Power for Transportation Package" which led to the adoption of the directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels. The directive is to date the main legislative document of the EU to address the three main barriers to the deployment of clean fuels in the Union: a high retail cost of vehicles, a low level of consumer acceptance and the lack of infrastructure for recharging and refueling.

The directive 2014/94/EU follows two main objectives in this regard. It requires member states to develop national policies, in separate strategic documents or in an integrated manner, for the development of alternative fuels and their infrastructure, based on the technical specifications of the alternative fuels list defined in the directive itself. It then prepares the way for a clear communication strategy consumer information on alternative fuels. The directive encourages member states to create investment-friendly frameworks and indicated that national policies contributing to the deployment of clean fuels and their infrastructure should be eligible for Union and national support measures. The Annex I of the directive gives an indication on legal, support measures and targets to be implemented by each member state, while the Annex II lists the technical specifications to be followed for the deployment of each alternative fuels and their infrastructure.

The directive has set the following deadlines for the implementation of the following fuels:

Alternative fuels	Coverage	Timings
Electricity in urban/suburban and other densely populated areas	Appropriate number of publicly accessible points	By end 2020
CNG in urban/suburban and other densely populated areas	Appropriate number of points	By end 2020
CNG along the TEN-T core network	Appropriate number of points	By end 2025
Electricity at shore-side	Ports of the TEN-T core network and other ports	By end 2025
Hydrogen in the Member States who choose to develop it	Appropriate number of points	By end 2025
LNG at maritime ports	Ports of the TEN-T core network	By end 2025
LNG at inland ports	Ports of the TEN-T core network	By end 2030
LNG for heavy-duty vehicles	Appropriate number of points along the TEN-T core network	By end 2025

In addition the good practice guide on AF in indicates the distances between the points as follows:

Alternative fuels	Maximum distance between infrastructure (km) AF	Optimal distance between infrastructure (km) AF
Electricity	130	60
CNG	400	195
LNG	600	290
H2	300	145*

*The good practice guide states 295km as optimal distance. This value would be inconsistent with the presented formula in the guide. Also it seems unlikely. Therefore the value 145 km has been estimated by the consultants to be a more likely figure.

Each Member State should transpose the content of the directive in their national legal system by 18 November 2018. In addition, each Member State shall submit to the Commission a report on the implementation of its national policy framework by 18 November 2019, and every three years thereafter. By 18 November 2017, the Commission shall submit to the European Parliament and to the Council a report on the assessment of the national policy frameworks and their coherence at Union level, including an evaluation of the level of attainment of the national targets and objectives referred to in Article 3(1). 3. The Commission shall also submit a report on the application of this Directive to the European Parliament and to the Council every three years with effect from 18 November 2020.

Need for fuels analysis – gap analysis

In order to ascertain how much the alternative fuel directive can be realised, a short gap analysis is performed. This analysis allows to see the geographical coverage where AF infrastructure needs support and which areas already have mature AF or mature self-sufficient plans to realise the infrastructure. It looks at the long-distance travel opportunities for AF and possibilities to have connecting homogenous fuel station one a long distance trip. It leaves capacity issues of fuel infrastructure out of the analysis. This analysis looks at AF infra near (>radius of 10km) the motorway for public fast charging electric station or other public AF infra types. The analysis has its focus on the obvious geographical coverage where AF seems needed. The other geographical coverage may, or may not need additional AF infrastructure, depending on the technological development (large action radius, so more space between fuel stations possible) and the demand uptake (more capacity needed of AF infra).

To perform the analysis the following input has been obtained and used.

- The CNC Corridor project study material.
- The Steer Davies Gleave study on AF on the CNC corridors 2017.
- TENtec maps of AF infrastructure
- Public (consumer oriented) information sources
- CEF projects of the 2016-2017 call
- National policy framework of the Member States and also the JRC assessment of the plans.

The current known situation has been analysed with the corridor studies material, the public information sources, the SDG AF study and the TENtec maps. Then for the near future AF infrastructure it was determined if the CEF projects and the National plans add specific projects on the geographical coverage with a lack of AF infrastructure. The

national plans provide indeed plans, some are elaborated with existing projects. Other MS have plans which are an ambition, not necessarily with a binding target. In addition some national plans count on CEF/TEN-T funding for a number of projects. Therefore the plans do not always fully indicate if a gap is covered or not and if funding is strictly needed.

Per fuel types the situation has been summarized in a map. This consists of 3 layers:

- Layer 1 shows gaps in the current situation.
- Layer 2 indicates if a CEF/TEN-T project covers an existing gap, if the exact location is known it is presented.
- Layer 3 shows the National Policy Framework coverage, according to analysis of the JRC. This is a rough indication if there are many initiatives supported by the Member State. If not, private companies seem more obvious.

Electric Vehicles (EVs)

For Electric Vehicles (EV) it seems relevant to promote projects on the following geographical coverage: Lithuania, Poland, France and Spain, cross border Portugal-Spain. In Poland and France there are currently projects funded and also the national policy framework seems supportive. Due to the short distance of EV, a relatively large number of charging stations is needed.

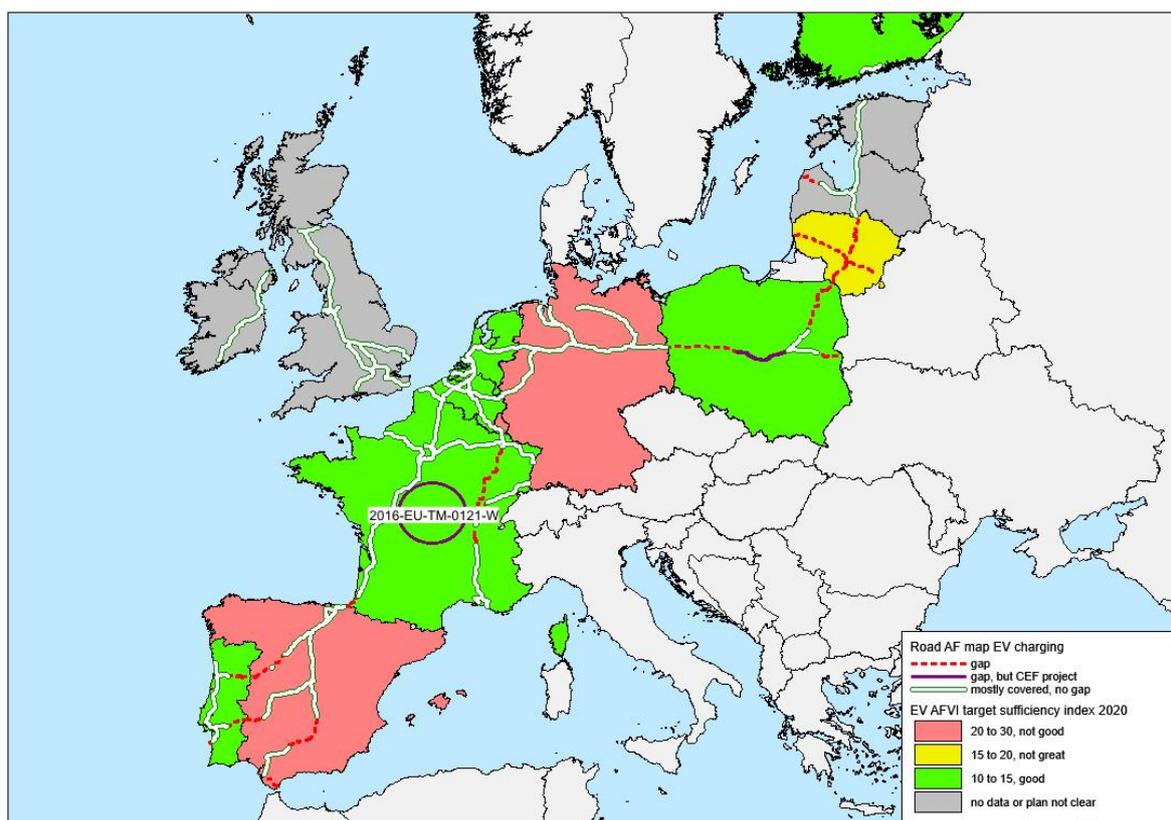


Figure 60: Gap analysis on EV charging

Compressed natural gas (CNG)

For CNG vehicles fuel infrastructure it seems relevant to promote projects on the following geographical coverage: UK & Ireland, the border regions of Spain with Portugal. Further there are isolated stretches on the corridor in France and Lithuania. Due to the medium range of CNG, a relatively small number of charging stations is needed as there are not too many gaps found during this exercise compared to other AF types.

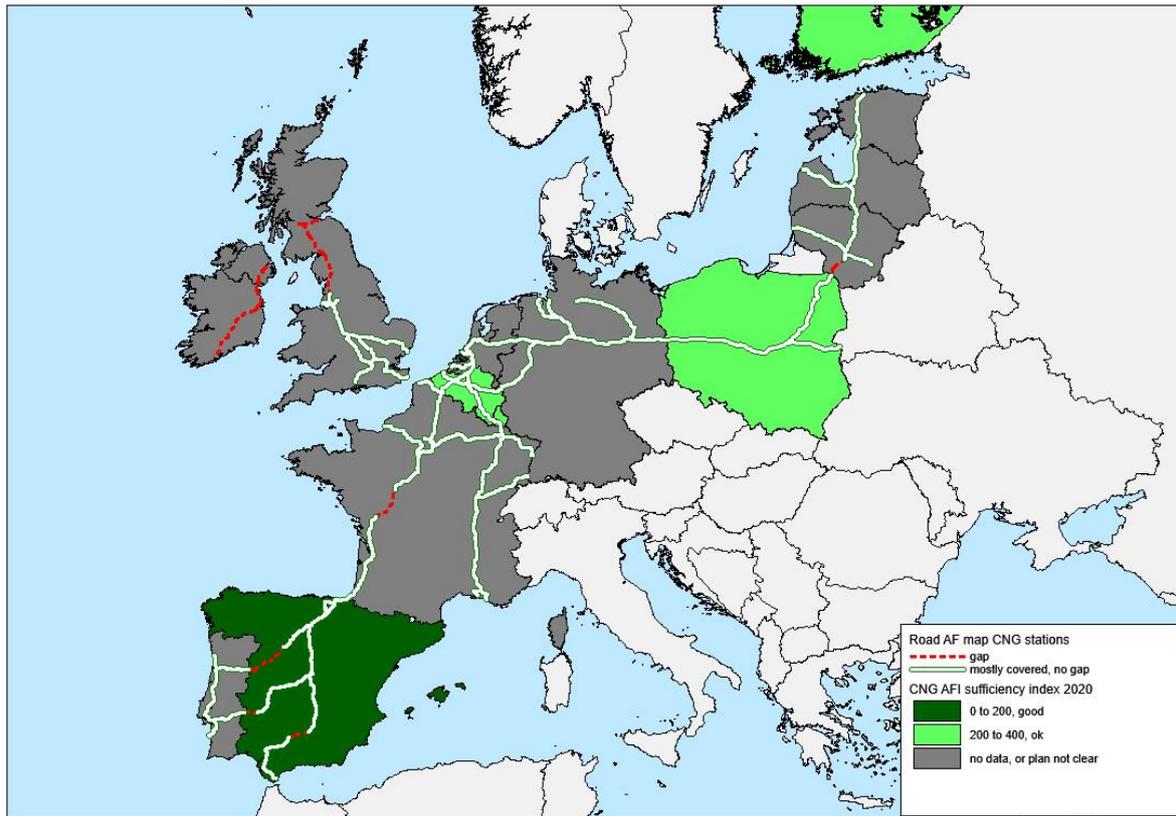


Figure 61: Gap analysis on CNG stations

Liquefied natural gas (LNG)

For LNG vehicles fuel infrastructure is seems relevant to promote projects on the following geographical coverage: Ireland, France, Poland, and Lithuania. There is no information available in the national policy frameworks if LNG infrastructure is available by 2020.

For LNG there are some near future projects on LNG bunkering in Baltic Seaports. It is assumed that once a bunker facility is there, it is relatively easy to create a public road LNG fuel facility. A seaside bunker facility greatly helps supply the hinterland. In addition in other regions with a strong IWW network it is relevant to use IWW to supply LNG between ports and inland LNG road stations.

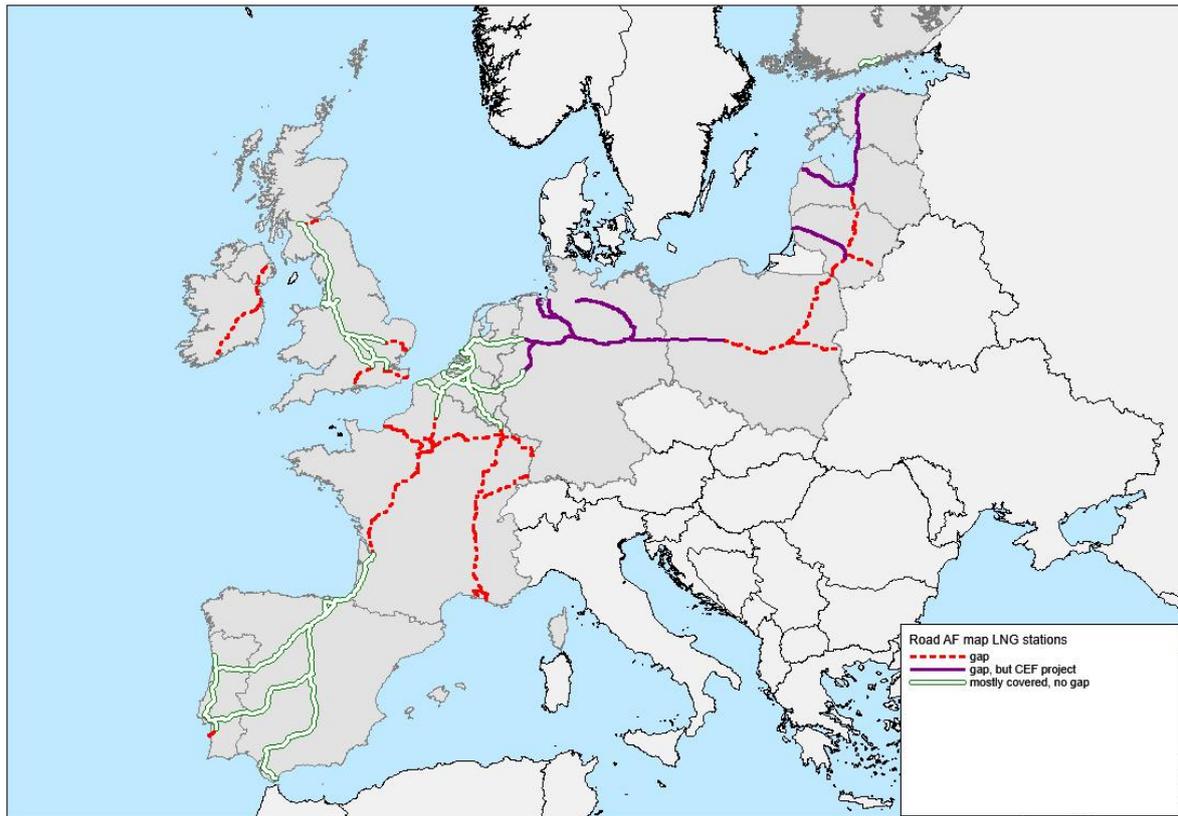


Figure 62: Gap analysis on LNG stations

Hydrogen (H2)

For Hydrogen vehicles it seems relevant to promote projects on the following geographical coverage: The Baltic states, Poland, UK & Ireland, France, Spain, Portugal. That means that for the Benelux, Finland and Germany the situation seems to be the most mature when it comes to H2.

Due to the long range of H2, a relatively large number of charging stations is needed. In fact there are 7 known stations in operation and these cover already quite a large part of the corridor road networks.

It is not a specific primary target of the National Policy frameworks to have H2 infrastructure readily available by 2020, yet the plans of Spain, Belgium, The Netherlands and Germany seems supportive of H2 in general.

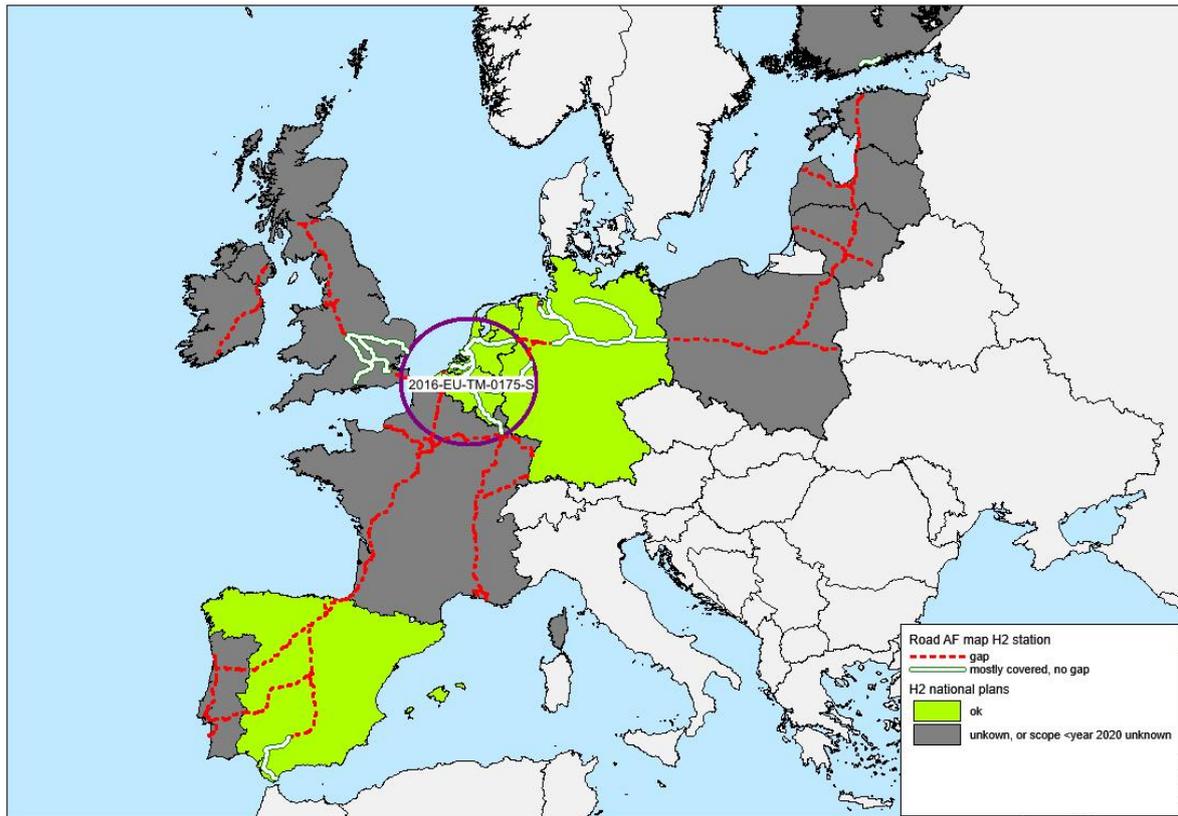


Figure 63: Gap analysis on H2 stations

Call for Expressions of Interest

This call addresses EU stakeholders involved in the alternative fuels for road sector to express their interest to participate in a discussion on an innovative flagship project on alternative fuels for the TEN-T Corridors North Sea-Mediterranean, Atlantic, North Sea-Baltic and Scandinavian-Mediterranean.

This discussion will be held in a workshop, taking place on the 14th December.

This flagship project, to be the centre of the discussion at this workshop, is an initiative of the European Coordinators for the TEN-T corridors and forms part of the recent Action Plan on Alternative Fuels and the new Clean Mobility Package.

See: https://ec.europa.eu/transport/modes/road/news/2017-11-08-driving-clean-mobility_en

Action under this project should enable continuity of service throughout the EU, linking the North to the South and illustrated through establishing a full network of recharging and refuelling facilities between Helsinki and Lisbon.

The objective of this flagship project is to facilitate coherent and cross-border deployment of alternative fuels, covering electricity, CNG, LNG and Hydrogen. Action should address all elements of planning, technical realisation and financing.

We are launching a call for interest to identify and engage all relevant stakeholders (alternative fuels suppliers, infrastructure managers, local and regional public authorities, Member States, logistic service providers, vehicle manufacturers, IT developers, associations, etc.) to discuss further cooperation and potential projects that could contribute to the coherent deployment of alternative fuels in these corridors by:

- Stimulating the generation of this flagship project;



- Facilitating and accelerating implementation of alternative fuels infrastructure in accordance with EU Directive;
- Boosting continuity of alternative fuels deployment along corridors by filling gaps, generating synergies between existing initiatives and new needs and giving direction and focus to combined and concentrated action along corridors;
- Stimulating cooperation at all relevant public and private sector levels, also taking account of vehicle markets;
- Identifying problems and obstacles that need to be resolved at a flagship project level (e.g interoperable payment systems, geographical coverage for fast charging, etc).

Contributors to the alternative fuels flagship project are expected to set an example for similar action along other corridors of the TEN-T, for concentrating efforts at European and national, public and private levels; for making best use of resources and maximising the impetus on a sustainable and low-carbon transport system.

