ATLANTIC CORRIDOR

Co-financed by the European Union
Connecting Europe Facility

TRANSPORT MARKET STUDY OF THE ATLANTIC CORRIDOR

31th of March 2021

SYNTHESIS

GEIE Atlantic Corridor MA19-002

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1. OVERVIEW

The Atlantic Corridor is part of the Trans-European Transport Network (TEN-T) core network. It connects, through the Atlantic coast, the Iberian Peninsula (from Lisbon to Madrid to the transpyrenean border) to the rest of Europe, on one hand towards the axis of the Seine to Le Havre, on other part to the East of France and Germany.

Among them, the Rail Freight Corridor Atlantic (previously named RFC4) includes the railway connection: Lisboa / Leixões, Sines-Elvas/Algeciras-Madrid-Medina del Campo/Bilbao/San Sebastián – Irún -Bordeaux-Paris/Le Havre/Metz –Strasbourg/Mannheim. It was extended to Strasbourg and Mannheim a first time in 2016, and a second time to Nantes St Nazaire & La Rochelle ports, Zaragoza and Valongo terminal at the beginning of 2018.

The purpose of this transport market study is overall to provide the RFC Atlantic with a knowledge of the current and future market (volume but also the understanding of modal choice), and to identify the main issues to improve the rail competitiveness.

First, the Economic and Territorial frameworks were developed. Thus, countries and regions along the corridor have been the subject of an analysis on economic variables and their overall situation regarding freight transport.

The past evolution of rail freight has been analysed and compared with the previous Transport Market Study of 2014. While national GDP and international trade increase, we have seen a decrease in rail traffic: we notice that rail traffic on the Atlantic Corridor declined by more than 50% between 2007 and 2018. This is in part due to the 2009 economic recession, but the trend appears to continue afterwards independently of economic conjuncture. The main explanations are the importance of the works between Paris and Hendaye, which limited the quality paths, and the numerous strikes in France.

On the basis of these analyses and taking into account the latest long-term projections for trade partners' GDPs, available from internationally recognized sources, forecasts are made in the short and medium terms (respectively 2025, 2030). The definition of macroeconomic scenarios includes the 2020 pandemic and its impact on the economy and traffic.

From the supply side, the transport infrastructure projects provided for different horizons were reviewed and analysed to consider their impact on traffic projections. Particular attention is now given to the extension's perimeter in what concerns capacity, transhipment facilities, tracks (loading profiles, axle loads, train lengths and weights, etc.), and infrastructure development plans.

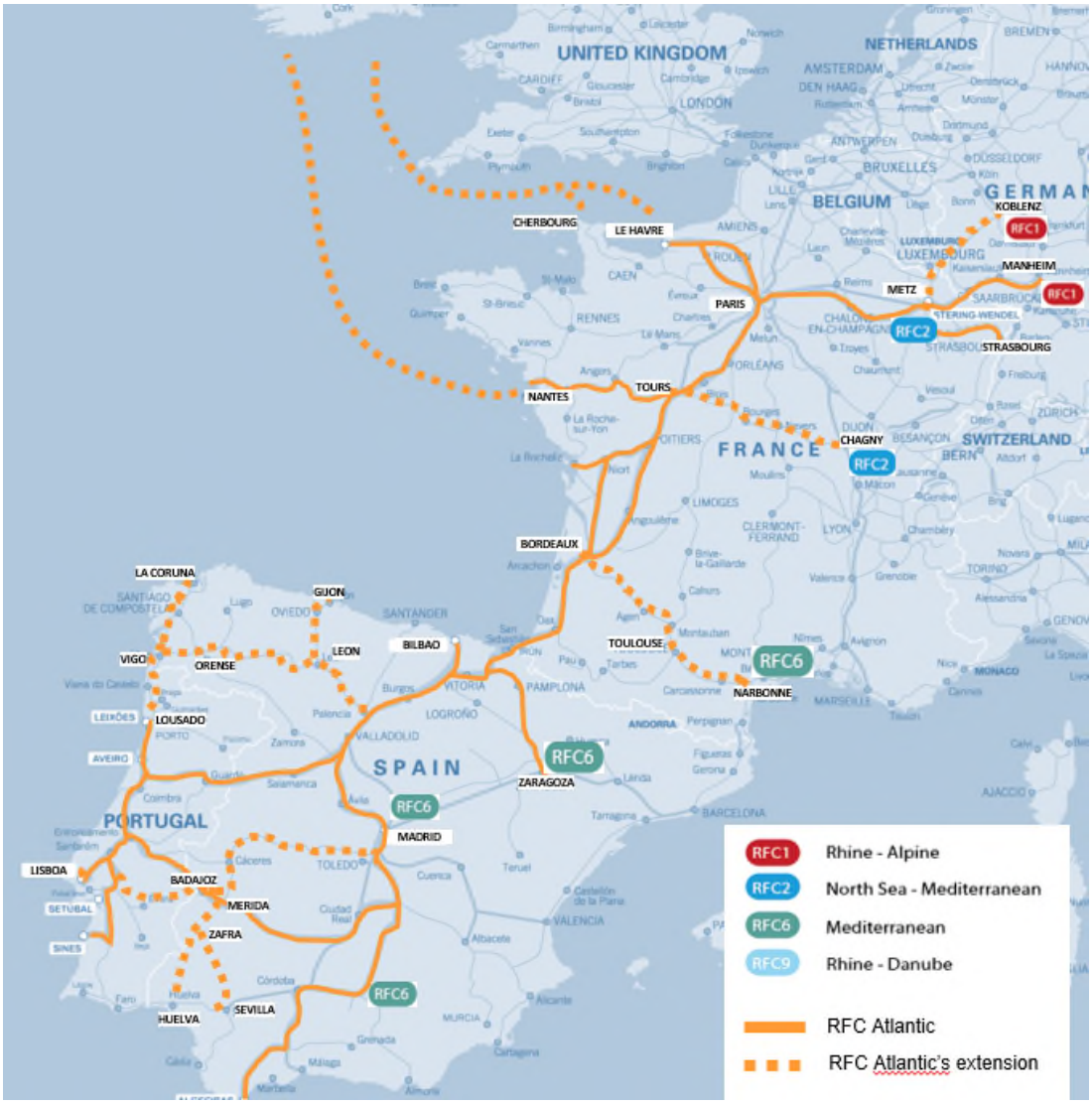
This study deals with the evaluation of possible extensions to terminals and seaports (La Coruna, Gijon, Vigo, Lisboa, Huelva and Seville, as well as with new connections to corridors Rhine-Alpine and North Sea-Mediterranean) or to Ireland (Brexit) and main economic areas, showing the benefits that can be expected from further extensions of the Atlantic Corridor eastwards.

A new set of comprehensive discussions was undertaken with a large variety of stakeholders in the four countries covered by the RFC Atlantic, i.e. port operators, railway operators, terminal operators, shipping companies, corridor managers, infrastructure managers and logistic operators.

Finally, demand forecasts on freight flows on the Corridor are provided - taking into account all the elements mentioned above (economic forecasts, context, demand, supply and determinants of modal choice).

The studied extensions are shown on the map below.

Figure 1: Corridor and possible extensions



Source: Consultant

2. SUMMARY

Despite the economic crisis of 2008 (then 2012 in Spain and Portugal), the economies of the 4 countries of the Atlantic Corridor have regained their dynamics: GDP growth over the period 2010-2018 varies between 1 to 2% for Portugal and Spain, 7% for France and finally 17% for Germany. International trade increased between 10% (Portugal) and 22% (Germany) in volume, over the same period.

However, rail traffic did not follow this dynamic. If it increases on certain ODs, we notice however that rail traffic on the Atlantic Corridor declined by more than 50% between 2007 and 2018. This is in part due to the 2009 economic recession, but the trend appears to continue afterwards independently of economic conjuncture. Rail has lost in competitiveness on the RFC Atlantic, and therefore in modal share. The two main explanations are the following:

- Works in France along the Atlantic Corridor disturbing freight trains 'paths
- Social factors in France and especially French Aquitaine region such as recurrent strikes in the years 2016, 2018 and 2019.

In addition to these elements, the fact that certain projects to improve rail infrastructure have been postponed over time (Basque Y for example) explains why the previous transport market study, carried out in 2014, finally established forecasts that were higher than this. which was actually observed in 2018 and 2019.

Regarding the traffic forecasts for 2030 that have been made in this current transport market study, taking into account the economic impact of COVID required the definition of two scenarios, in order to better understand the uncertainty about the characteristics of the economic recovery. In any case, demand growth is not expected to be an important driver of traffic growth along the Atlantic Corridor in the coming decade due to the impact of the pandemic-linked recession.

The potential for modal shift towards rail on the Atlantic Corridor remains high but depends on major infrastructure projects (Y Basque, Caia-Badajoz, Atlantic rolling motorway for instance) and is limited by issues facing the rail sector in France where recurrent works on the infrastructure and national strikes considerably reduce train paths' reliability and rail competitiveness.

The combined impact of those issues facing rail is particularly visible at the Irun-Hendaye border crossing where rail traffic has decreased significantly over the last decade, even though the previous transport market study expected a strong rail traffic growth. There is today no reason to believe that those problems will improve in the near future. It is even possible that increasing local passenger traffic around cities such as Bordeaux, Paris and Metz could further impact capacity allocated to freight trains along the Atlantic Corridor, but this question is beyond the scope of this transport market study.

Therefore, it is doubtful that the European aim of increasing rail freight traffic by 50% by 2030, as stated in the 2020 Sustainable and Smart Mobility Strategy published by the European Commission, can be achieved on the Atlantic Corridor as long as those issues persist. According to the results of this TMS, rail freight on the Atlantic Corridor can be expected to increase by around +50% on some Transpyrenean OD relations which are the most likely to benefit from the major infrastructure programme in Spain and at the French-Spanish border. But the overall number of international trains on the RFC Atlantic is only expected to increase by +20% between 2018 and 2030.

3. DIAGNOSTIC

3.1. SOCIO-ECONOMIC CONTEXT

First at all, it is important to mention that the data period analysed here is 2010-2018, and it does not include the current crisis due to the COVID-19 pandemic.

The main socioeconomic variables provide positive information about the recent evolution of the four countries within the Atlantic Corridor. The main variables are presented in the table below.

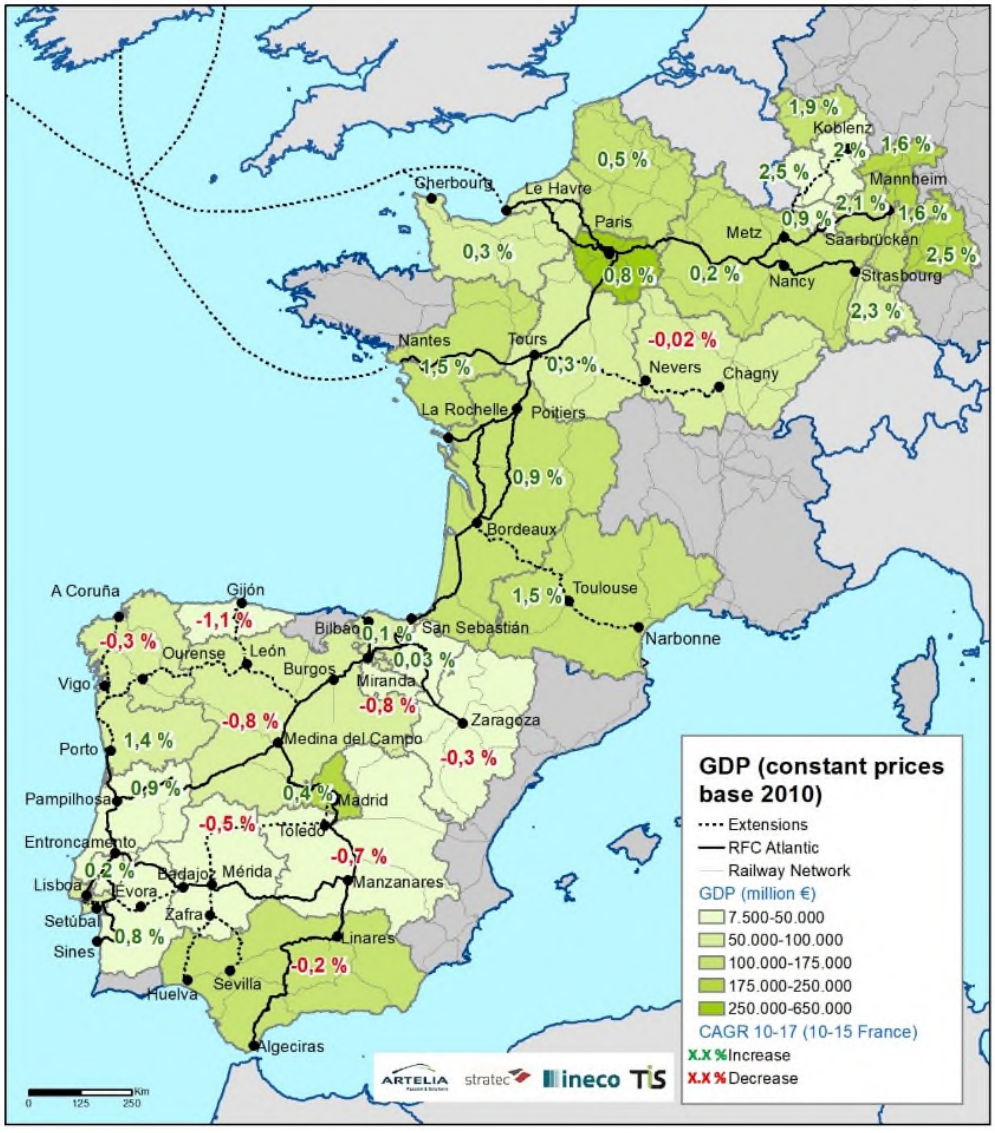
Table 1: Socio-economic and transport indicators (2018)

	Germany	*France*	*Spain*	*Portugal*
Population (10^6habitants)	82,8	66,9	46,7	10,3
GDP (10^9€)	3 344	2 361	1 202	204
GDP per capita (€/hab)	40 898	35 177	25 872	19 631
Rail transport (10^9 t.km)	117,9	32,0	10,7	2,8
Rail modal share	18%	9%	3%	10%
Evol rail tkm (2013-18)	4,7%	-0,6%	14,1%	20,7%

Source: Eurostat

The figure below shows the GDP ate the regional level.

Figure 2.Total GDP in 2010 constant prices and global growth by NUTs 2, 2010-2018 (source EUROSTAT)



Population data shows that Germany and France have a positive trend; Spain keeps stable results and Portugal significatively decreases. GDP data present that the global wealth of the countries is in a positive

trend and the purchasing power of the inhabitants. Positive results in these factors imply an increase in the productive activities and consumption. Even though Spain has a higher level of unemployment than the rest of the Corridor countries, in the recent years they are improving their results and decreasing unemployment levels very fast. The trend of the other countries also shows a general decrease in unemployment rates.

3.2. TRANSPORT INFRASTRUCTURE AND SERVICES

The analysis of rail infrastructures shows a discontinuity between the North of Pyrenees (Germany and France) on the one hand and the Iberian Peninsula on the other hand (Spain and Portugal), firstly in terms of track gauge, a hard constraint for the rail traffic. Indeed, such gauge difference leads to a heavy use of specific infrastructures, rolling stock and personnel in order to conduct the transhipment of cargo or axle change operations. This translates into an increase in costs for the rail operators and has an impact on rail efficiency and consequently its competitiveness. It also shows a discontinuity in terms of maximum train length, number of tracks with the same distribution. The slope can also be an issue as it plays a main role, as depending on the rolling stock and the traction (braking, traction power, strength of the couplings…); it limits the gross tonnage hauled.

The analysis of the international freight paths shows a significant demand between the four countries. In order to meet the demand, the rail infrastructures tend to be more interoperable between the countries. Indeed, some projects are planned such as:

- Parts of the Iberian freight network that will be implemented by offering the two gauges indifferently in order to facilitate the rail traffic between UIC and Iberian network,
- Commissioning of new lines (new line Evora – Caia in 2023, Basque Y in 2029),
- The electrification of some parts of the RFC Atlantic, mainly in Spain in medium term,
- The increase of the maximum train length in the centre of Portugal in short term and in Spain in medium term,
- The increase of the number of tracks and the improvement of the tunnel gauge, especially on the New High Speed Line Plasencia-Cáceres-Badajoz.

The figures below show the electrification improvement between the current situation and 2030.

Figure 3: Electrification, current situation

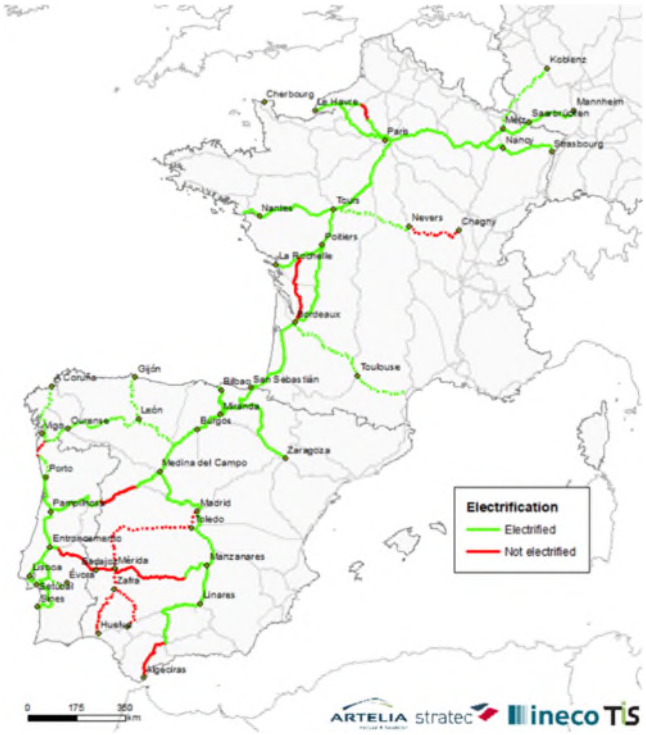
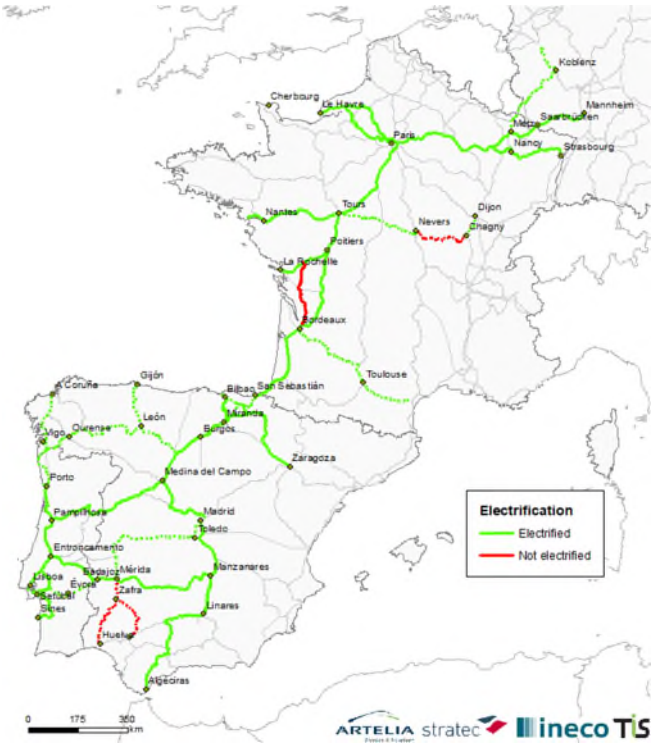


Figure 4: Electrification, 2030



To meet the rail undertakings' demand, the number of Pre-arranged Paths (PaP) provided by the RFC Atlantic has increased, especially between France and Germany due to the extension of the Corridor to Germany in 2016. It has slightly increased between Spain and Portugal but slightly decreased between Spain and France. However, we can note that a large part of the trains using a PaP is still delayed (over 30% in 2018).

Concerning the intermodal network, 46 terminals referenced in the TEN-T are located on the RFC (36) and its extensions (10), showing a potential for the extensions. They offer relations between terminals of the RFC, but also with the main economic, logistic and industrial sites in Western Europe (Rotterdam, Antwerp, Marseille, Barcelona, etc.). Moreover, several rolling motorway projects exist on the RFC Atlantic, in France and Spain.

The Atlantic Corridor connects 23 seaports of the Atlantic coast (7 in France, 11 in Spain and 5 in Portugal), of which 9 on the extensions. There are also 14 inland ports (5 in Germany, 7 in France, 1 in Spain and 1 in Portugal). A short overview shows that every type of goods can be handled in the corridors port infrastructure, showing their diversity.

3.3. CURRENT TRANSPORT DEMAND

All trade cumulates 410 million tonnes in 2018 (and 300.7 million tonnes when we only focus on the "core" perimeter (Benelux, Germany, France, Spain and Portugal), of which 67% by road (respectively 81%), the majority mode. The maritime mode, with 124 million tonnes, represents 30% of the whole (but only 16% of the core perimeter), but with strong variations depending on the ODs of course. The maritime mode thus represents approximately 45% of the exchanges of Portugal and Spain with its European partners.

Table 2: Freight traffic in the RFC perimeter, 2018

TOTAL Freight traffic, thousand tonnes – 2018								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal	-	17 530	590	830	3 090	1 980	2 050	26 070
Spain	21 110	-	25 530	8 840	10 410	7 950	26 900	100 740
France	2 020	28 760	-	56 020	8 880	2 760	10 450	108 890
Germany	550	8 300	73 080	-	-	-	-	81 930
Benelux	3 580	12 790	10 910	-	-	-	-	27 280
North Europe	3 130	7 970	2 730	-	-	-	-	13 830
East Europe	4 140	37 360	10 050	-	-	-	-	51 550
TOTAL	34 530	112 710	122 890	65 690	22 380	12 690	39 400	410 290

Finally, the rail mode transports only 15.3 million tonnes or 4% of the modal share. However, these shares vary from 0% to 7% depending on the country, in the core perimeter. The flows between Portugal and its partners are mainly maritime or road, the rail mode being used only with Spain (market share of 6%).

Table 3: Rail modal share in the RFC perimeter, 2018, 2 directions

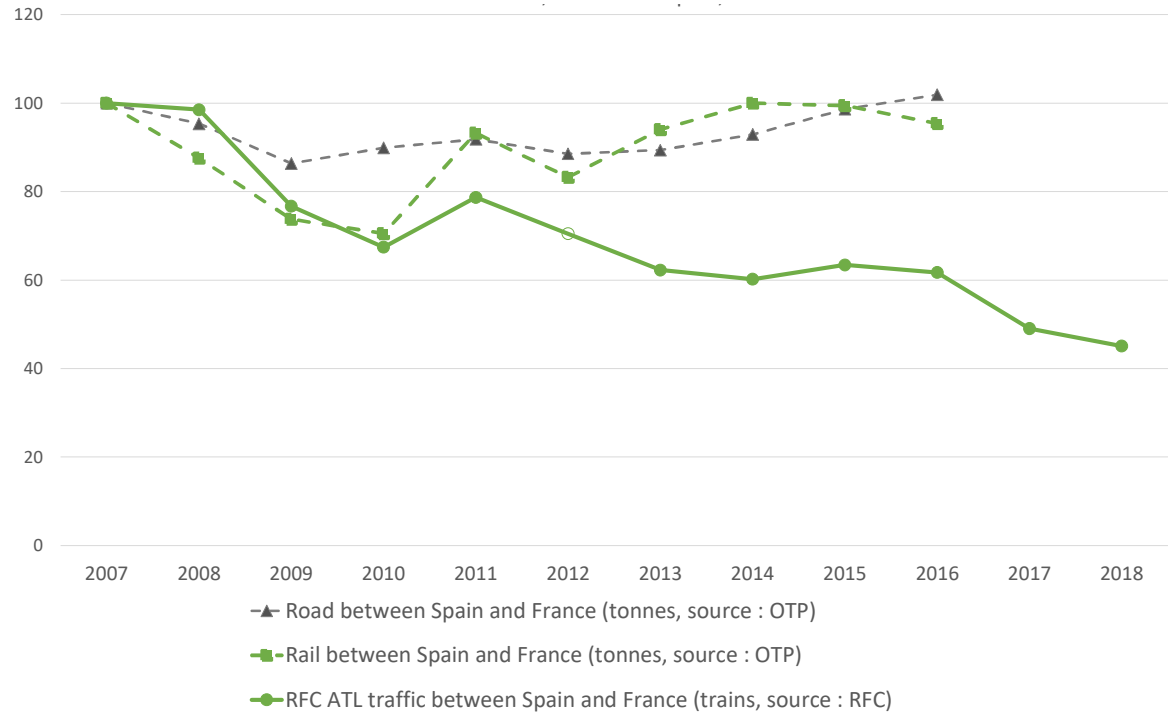
Rail Freight traffic, modal share - 2018				
both ways	Portugal	Spain	France	TOTAL
Portugal				
Spain	6%			6%
France	0%	1%		1%
Germany	2%	7%	4%	5%
Benelux	0%	3%	1%	2%
North Europe	0%	1%	3%	1%
East Europe	0%	0%	19%	4%
TOTAL	4%	2%	6%	4%

4. SCENARIOS AND DEMAND PROJECTIONS

4.1. PAST EVOLUTION

The previous Transport Market Study carried out in 2014 forecasted a strong increase in rail traffic on the corridor. Instead, the opposite happened even before the impact of the COVID-linked recession with a continuous decline in rail traffic. This is particularly true for cross-Pyrenean traffic at Irun-Hendaye. The following chart presents the evolution of road and rail traffic between Spain and France (dotted lines), with a focus on the Atlantic Corridor. We notice that rail traffic on the Atlantic Corridor declined by more than 50% between 2007 and 2018. This is in part due to the 2009 economic recession, but the trend appears to continue afterwards independently of economic conjuncture.

Figure 5 : Road and rail traffic between Spain and France (2007-2018)



The following table presents cross-Pyrenean traffic forecasted on the Atlantic corridor by the previous TMS, and compares it to 2018 real. From a base year of 2010, land traffic (rail + road) was forecasted to increase by 18% (1.7%/year), but with a strong modal shift since the rail modal share (conventional + CT + rolling motorway) was expected to grow from 3.7% in 2010, to 10.2% in 2020.

Real rail traffic is hence estimated to be -74% lower than forecasted (see table below).

Figure 6 : Rail traffic at Hendaye-Irun (1000 tonnes)

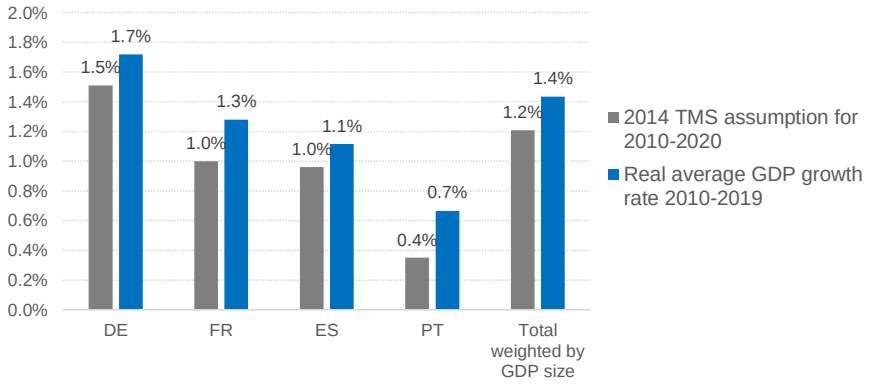
Rail traffic at Hendaye-Irun in Kt	2010	2018 forecasted	2018 real*	2020 forecasted
Conventional + TC	1 963	3 696	1 495	4 330
Rail motorway	0	1 954	0	2 021
Total rail traffic	**1 963**	**5 650**	**1 495**	**6 351**

* Estimated with train numbers at the border crossing

If we leave the question of modal shift aside and first focus on the evolution of total demand, we see that total demand according to OTP (Observatoire des Trafics à travers les Pyrénées) data has increased at a rate of 2.1% per year between 2010 and 2016. This is above the AAGR of 1.7% forecasted by the previous TMS.

Indeed, economic forecasts of the time appear to have underestimated economic growth up until 2019. We chose here to exclude 2020 which was marked by a strong recession due to the covid pandemic and which could not have been forecasted. The following chart compare forecasted economic growth from the previous TMS with real economic growth between 2010 and 2019. Hence, between 2010 and 2019, the economy grew faster than expected at the time of the previous TMS for all four countries of the Atlantic corridor.

Figure 7 : GDP growth (2010-2019): reality vs 2014 assumption



The difference between the evolution of forecasted and real rail traffic on the Atlantic corridor is therefore entirely due to modal shift and trade-off between Atlantic and Mediterranean borders. The two maps below are extracts from the previous TMS presenting transport projects taken into account in France and Spain.

With hindsight, the 2014 TMS was optimistic in terms of rail projects, both for infrastructure and services:

- Y Basque is now postponed to 2029
- Improvement of the rail complex Hendaye-Irun is now planned for 2023
- AF Atlantic (rolling motorway) was postponed, redesigned and is dependent on Y Basque to reach Spain
- Bordeaux - Hendaye HSL (GPSO) is now considered for 2050
- VFCEA : Nevers-Chagny still not electrified
- etc.

Hence, rail ability to gain modal shares was largely overestimated for the 2020 timeframe, in large part due to projects postponement. But even if rail modal share had been constant between 2010 and 2018, we should still have seen a growth in traffic equivalent to total demand and not a decrease in rail traffic.

Rail has lost in competitiveness on the RFC Atlantic, and therefore in modal share. The two explanations are the following:

- Works in France along the Atlantic Corridor disturbing freight trains' paths
- Social factors in France and especially French Aquitaine region such as recurrent strikes in the years 2016, 2018 and 2019.

As a consequence rail flows have either shifted to other modes of transport such as road or long-distance rail flows have shifted towards the RFC Mediterranean, with a decrease in the share of the Atlantic corridor in trans-Pyrenean rail flows, from over 40% in 2010 to less than 30% in 2016, out of a total of 3.5 million tonnes[1]. If we assume that the market shares (40% - 60%) observed in 2010 for these rail flows had been maintained in 2016, then rail traffic across the border at Irun-Hendaye should have been 1.4 million tonnes, all other things being equal.

[1] OTP data's last available year. Only rail traffic going through the borders between Spain and France (not included lorries. Lorries loads that cross the border to be transhipped onto a train in France (Mouguerre, Hendaye) are not included.

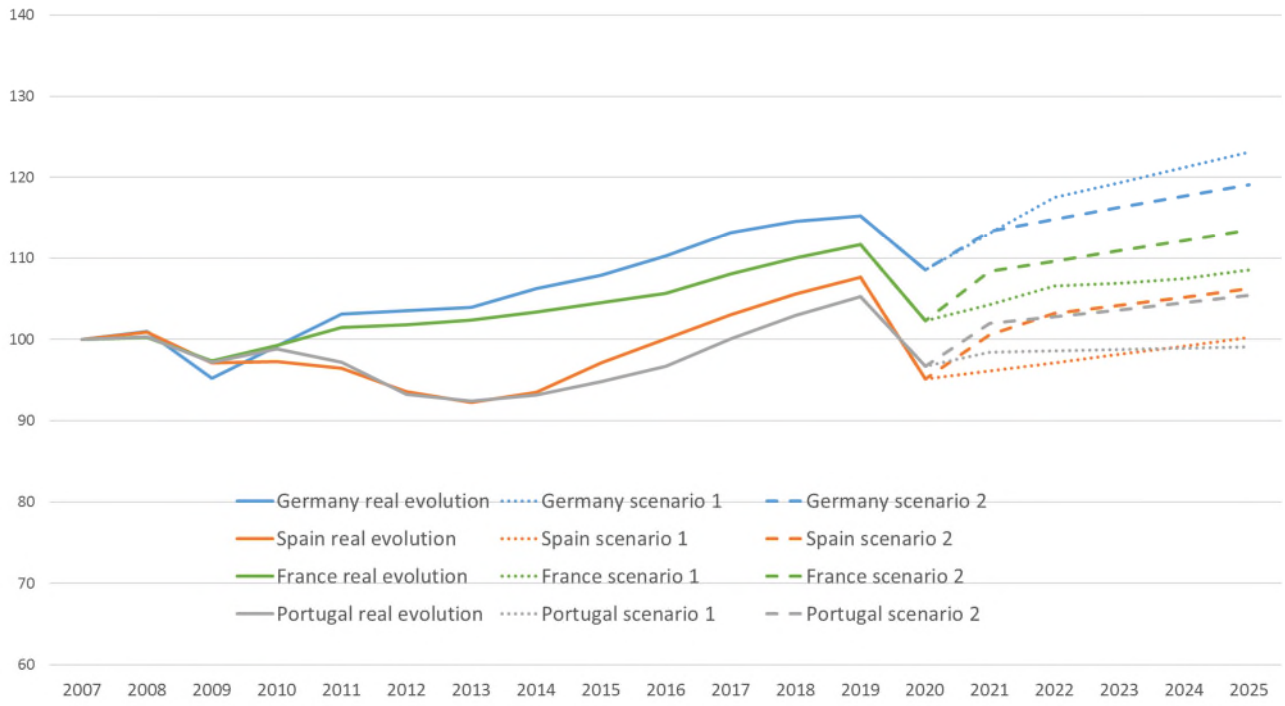
4.2. MACRO-ECONOMIC SCENARIOS (2030)

During the study, it was necessary to take into account the economic impact of the 2020 COVID-19 pandemic, and its consequences on rail traffic. The choice of assumptions for economic growth was a delicate matter. It was therefore decided to retain 2 sets of economic forecasts over the recovery period, then the 2018 Ageing report' scenario from the European Commission was used up to 2030:

- Scenario 1 was estimated based on economic patterns observed during the previous economic recession following the 2008 sub-prime financial crisis up to 2025,
- Scenario 2 is based on the last available economic forecasts up to 2023, GDP growth is then assumed to come back to its long-term economic trend after 2023.

The figure below shows the evolution of the two GDP's scenarios for each country.

Figure 8: Evolution of 2 GDP's scenarios (constant price), base 100



4.3. DEMAND PROJECTIONS

Demand forecast is estimated on the basis of economic growth. The relationship between all modes traffic and the main known economic variables (for which medium-term projections were available) was tested over the past period. Traffic growth was analysed in terms of tonne-kilometres for rail (national + international + through traffic) and road (nation + international, without through traffic). It was not possible to focus on international traffic alone since Eurostat data was not always consistent with national data.

Figure 9 : Example of perimeters taken into account for French tonnes-kilometres

An analysis of the past evolution of traffic growth observed according to Eurostat in the four countries of the Atlantic Corridor for the time period 2007-2018 was finally retained (allowing both to take into account the past but mitigating the consequences of the 2008 economic crisis). This analysis shows a correlation between economic growth (GDP) and demand for freight transport over the period 2007-2018, which is equal to 0.84: when economic growth increases by + 1%, then freight traffic increases. by + 0.84%.

5. TRAFFIC PROJECTIONS

5.1. TRAFFIC MODEL'S MAIN CHARACTERISTICS

The traffic model incorporates the characteristics of the road, rail and sea networks, the demand for freight transport for all modes, and cost functions which allow the calculation of travel time and transport costs. It then estimates how shippers change their choice of mode according to the costs and time specific to each mode and how they optimise the freight route. The modal assignment model has been developed at European level (detailed with NUTS3), with 13 categories of goods.

The modal choice considers several criteria such as terminal equipment, transport cost and travel time for each mode, as well as the respective competitiveness of each mode. This competitiveness essentially depends on each shipper's location, logistical organisation (storage area, private rail line, etc.) and shipments size. It is also translated, in the utility function of each mode, by a modal constant measuring all exogenous factors of the modal choice.

Costs and travel time used in the model are values calculated between origins and destinations, which are modelled by centroids located on shippers' zones.

Concerning more specifically the rail mode, the model makes distinction:

- Between full trains, combined transport and automobile transport trains,
- Between 4 train's lengths,
- Between electricity and diesel's engines.

Moreover, the transhipment modalities between the UIC and Iberian gauges are taken into account at an additional cost and time.

It was also necessary to take into account the problems of train path reliability, which strongly impacts rail demand in relation to France, so as to be consistent with the feedback from the RUs during the interviews

which underline the difficulty of maintain quality services on the Atlantic Corridor due to works, particularly in Aquitaine, and more generally strikes in France.

5.2. TRAFFIC FORECAST TO 2030

5.2.1. Global demand projections

The results presented below are detailed by ODs between countries concerned by the corridor. For example, flows between Germany and Spain presented below can also pass through the Mediterranean corridor. Likewise, not all flows between France and Germany go north-south through northern Lorraine.

Traffic forecasts vary between 425.2 and 436.8 million tonnes by 2030, depending on the scenario, i.e. an increase varying between + 3.6% and 6.5%. This small increase is the direct consequence of the 2020 pandemic. In any case, demand growth is not expected to be an important driver of traffic growth along the Atlantic Corridor in the coming decade due to the current pandemic-linked recession.

Table 4: Freight traffic in the RFC perimeter[2], 2030, 2 macro-economic scenarios, thousand tonnes

TOTAL Freight traffic, thousand tonnes – 2030 scenario 1								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal	-	17 350	600	920	3 370	2 190	2 270	26 700
Spain	20 980	-	26 100	9 840	11 410	8 510	29 000	105 840
France	2 010	28 470	-	62 310	10 280	2 970	11 050	117 090
Germany	540	8 230	74 550	-	-	-	-	83 320
Benelux	3 560	12 660	11 160	-	-	-	-	27 380
North Europ	3 110	7 890	2 780	-	-	-	-	13 780
East Europe	4 120	37 000	9 960	-	-	-	-	51 080
TOTAL	34 320	111 600	125 150	73 070	25 060	13 670	42 320	425 190

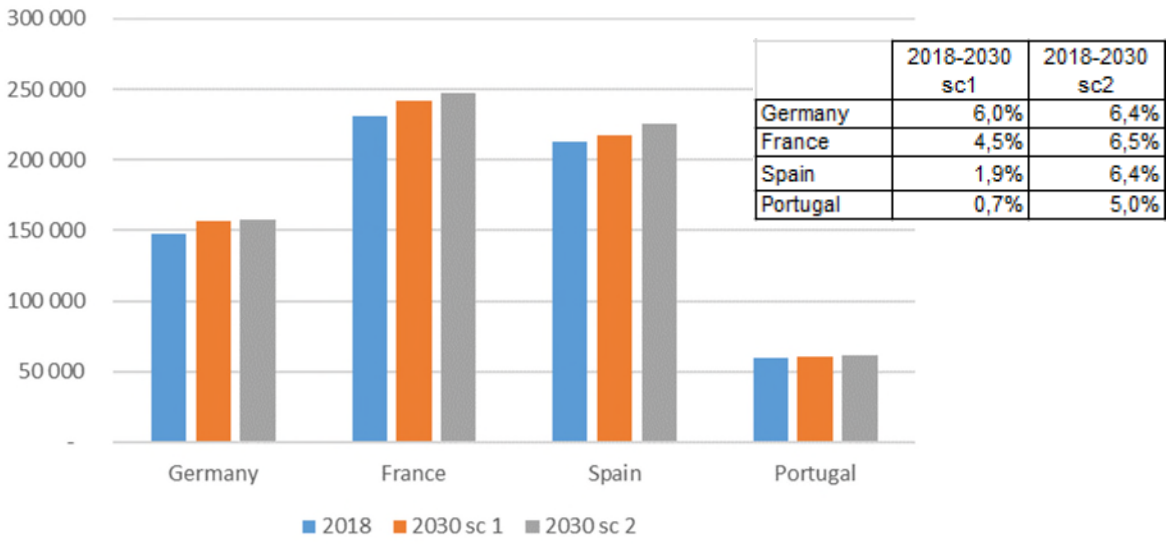
TOTAL Freight traffic, thousand tonnes – 2030 scenario 2								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal	-	18 600	620	880	3 370	2 190	2 270	27 930
Spain	21 790	-	27 100	9 470	11 410	8 510	29 000	107 280
France	2 100	30 560	-	59 910	10 280	2 970	11 050	116 870
Germany	560	8 830	77 420	-	-	-	-	86 810
Benelux	3 710	13 600	11 580	-	-	-	-	28 890
North Europ	3 240	8 480	2 900	-	-	-	-	14 620
East Europe	4 290	39 720	10 350	-	-	-	-	54 360
TOTAL	35 690	119 790	129 970	70 260	25 060	13 670	42 320	436 760

Growth is mainly driven by the dynamics of the countries to the north of the Corridor (Germany, Benelux mainly), which explains why the flows between these zones and the rest of the Corridor (France, Spain and Portugal) are stronger than between France, Spain and Portugal. In the case of scenario 1, we note that the economic recovery after COVID therefore does not always compensate for the fall in 2020, the level of traffic

[2] Only flows passing through the Atlantic Corridor

in 2030 is sometimes lower than its level in 2018 (flows from the north to Portugal and Spain). But overall, traffic in 2030 is higher than the 2018 level across the entire scope of the corridor.

Figure 10 : Evolution of freight traffic in the RFC perimeter, 2018-2030, macro-economic scenarios 1 and 2 (thousand tonnes)



	2018-2030 sc1	2018-2030 sc2
Germany	6,0%	6,4%
France	4,5%	6,5%
Spain	1,9%	6,4%
Portugal	0,7%	5,0%

Table 5: Evolution of freight traffic in the RFC perimeter, 2018-2030, macro-economic scenario 1

TOTAL Freight traffic, % evolution 2018-2030 scenario 1								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal		-1%	2%	11%	9%	11%	11%	2%
Spain	-1%		2%	11%	9%	7%	8%	5%
France	0%	-1%		11%	16%	8%	6%	8%
Germany	0%	-1%	2%					2%
Benelux	0%	-1%	2%					0%
North Europe	0%	-1%	2%					0%
East Europe	0%	-1%	-1%					0%
TOTAL	-1%	-1%	2%	11%	12%	9%	7%	4%

Table 6: Evolution of freight traffic in the RFC perimeter, 2018-2030, macro-economic scenario 2

TOTAL Freight traffic, % evolution 2018-2030 scenario 2								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal		6%	6%	7%	9%	11%	11%	7%
Spain	3%		6%	7%	9%	7%	8%	6%
France	4%	6%		7%	16%	8%	6%	7%
Germany	4%	6%	6%					6%
Benelux	4%	6%	6%					6%
North Europe	4%	6%	6%					5%
East Europe	4%	6%	3%					6%
TOTAL	3%	6%	6%	7%	12%	9%	7%	6%

5.2.2. Focus on rail forecasts

5.2.2.1 Scenario 1 (economic pattern similar to 2007's recession)

Results from the first scenario are presented for the four main OD groups on the Atlantic Corridor. For example, this means that the rail flows between Germany and Spain presented here only pass through the Atlantic corridor, and those passing through the Mediterranean corridor are not taken into account.

- The first chart below present rail traffic growth within the perimeter of the RFC between 2018 and 2030, whereas the second chart explains the component of traffic growth. Growth rates notably higher than those presented above for national matrices, since modal shift tends to concentrate on OD relations within the RFC perimeter.**Between France and Germany, rail traffic along the corridor is forecasted to increase by 8% between 2018 and 2030**, these rail traffic gains are mainly driven by economic growth in France and Germany as there are not major infrastructure development between the two countries.
- **On cross-Pyrenean OD relations, rail traffic along the corridor is forecasted to increase significantly** (+42% for Spain-France and +62% for Spain-Germany) due to the modal shift expected to happen thanks to the Y Basque and other rail infrastructure projects, such as 750m trains, in Spain. Despite this strong growth, cross-Pyrenean rail traffic does not come in 2030 back to 2010 levels.
- Further South, **between Spain and Portugal, rail traffic is expected to increase by 3%** thanks to modal shift (+4% between 2018 and 2030) due to network upgrades such as the new Evora- Caia link, whereas total demand remains stable according to the economic assumptions of scenario 1 for Spain and Portugal (-1%).

Figure 11 : Rail traffic forecasts on the RFC Atlantic according to scenario 1 by origin-destinations, index 100

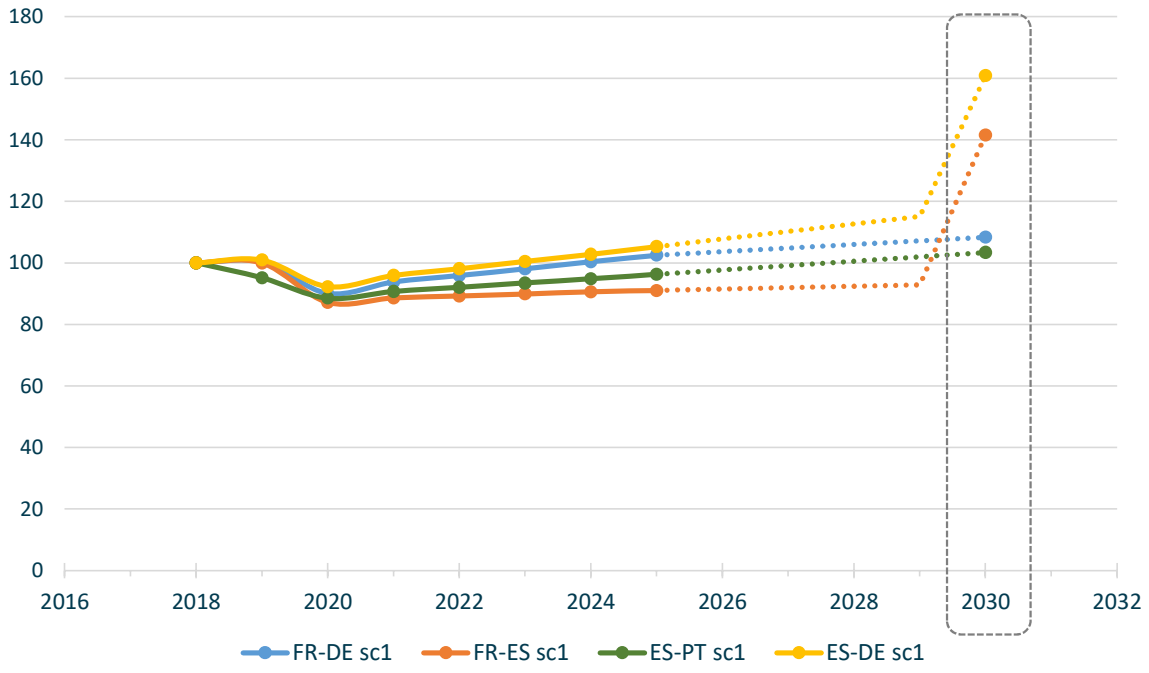
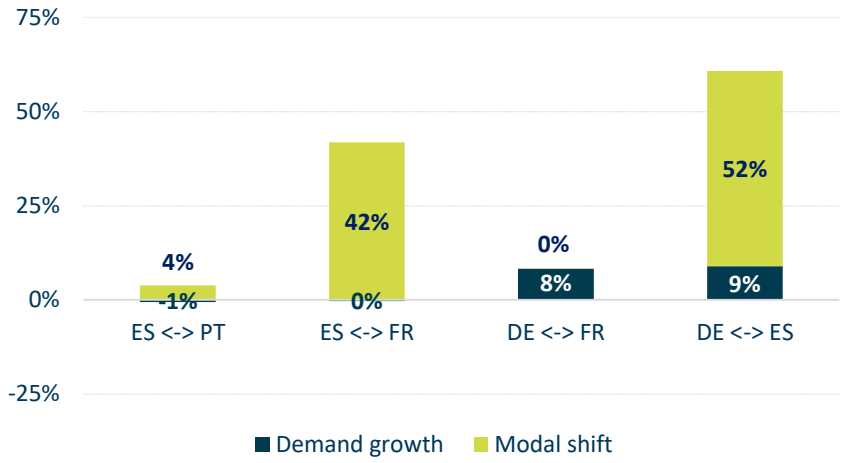


Figure 12 : Sources of rail traffic growth between 2018 and 2030 on the RFC Atlantic according to scenario 1 (%)



The Road is still the main mode. If we focus on land transport, the road modal share slightly decreases from 94.7% to 94.5%. If the rail sector remains at a reduced level, its average share nonetheless increases, from 5.3% to 5.5% to represent 16.6 million in 2030, i.e. increase in volume of +8,3% (+1.3 million tonnes). The increase of the rail mode observed between Spain and Portugal is +97'000 tonnes. Despite the improvement of the infrastructure in the Iberian Peninsula, the economic dynamic is not sufficient (as consequences of the COVID on economy crisis).

Table 7: Evolution of rail traffic in the RFC perimeter, 2018-2030, macro-economic scenario 1, thousand tonnes

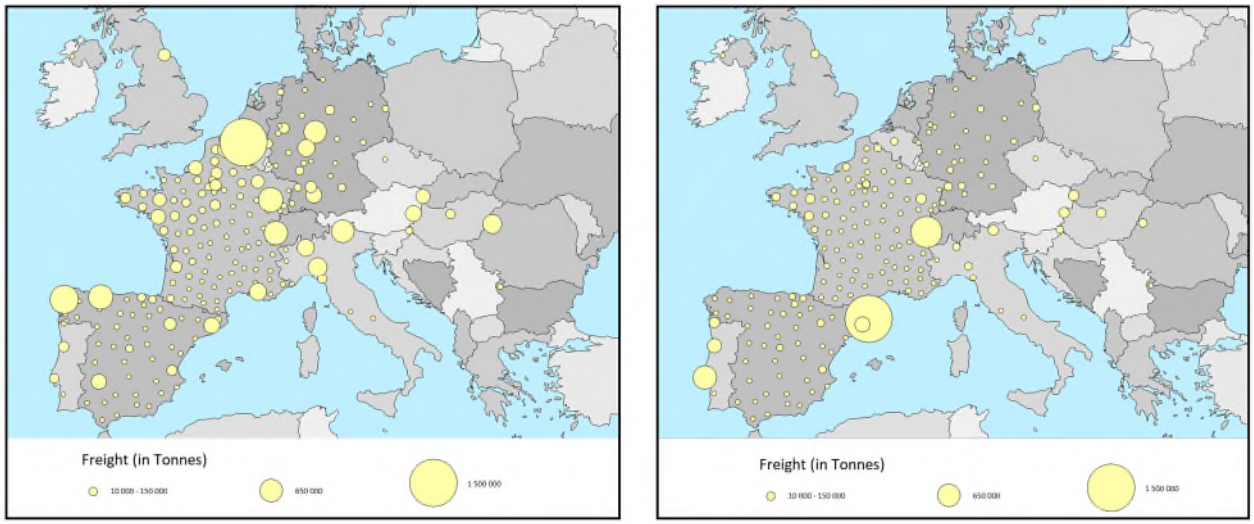
RAIL Freight traffic, thousand tonnes' evolution 2018-2030, scenario 1								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal	-	21	-	4	-	-	-	25
Spain	76	-	35	37	32	12	15	207
France	-	90	-	410	17	7	292	816
Germany	1	10	46	-	-	-	-	57
Benelux	-	44	4	-	-	-	-	48
North Europe	-	8	4	-	-	-	1	13
East Europe	-	15	72	-	-	0	-	87
TOTAL	77	188	160	451	49	19	308	1 253

Table 8: Evolution (%) of rail traffic in the RFC perimeter, 2018-2030, macro-economic scenario 1

RAIL Freight traffic, % evolution 2018 – 2030 scenario 1								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal		14%		27%				15%
Spain	3%		29%	32%	39%	27%	18%	8%
France		18%		12%	17%	8%	14%	13%
Germany	18%	1%	2%					2%
Benelux		7%	2%					6%
North Europe		20%	5%					10%
East Europe		11%	4%					4%
TOTAL	3%	7%	4%	12%	27%	14%	14%	8%

The potential for modal shift towards rail on the Atlantic Corridor remains high but depends on major infrastructure projects (Y Basque, Caia-Badajoz, Atlantic rolling motorway for instance) and is limited by issues facing the rail sector in France where recurrent work on the infrastructure and national strikes considerably reduce train paths' reliability and rail competitiveness.

Figure 13 Origins and destinations of rail traffic in 2030 (scenario 1)



5.2.2.2 Scenario 2 (national economic forecasts)

The second scenario is identical in terms of network and cost assumption, the difference with scenario 1 lies in economic growth which is more balanced among the four countries, as assumed by official economic forecasts. Growth rates presented below are notably higher than those presented for national matrices, since modal shift tends to concentrate on OD relations within the RFC perimeter.

- **Between France and Germany, rail traffic along the corridor is forecasted to increase by 7% between 2018 and 2030**, these rail traffic gains are mainly driven by economic growth in France and Germany as there are no major infrastructure development between the two countries.
- **On cross-Pyrenean OD relations, rail traffic along the corridor is forecasted to increase significantly** (+48% for Spain-France and +59% for Spain-Germany) due to economic growth driving a small demand increase and the modal shift expected to happen thanks to the Y Basque (opening in 2029) and other rail infrastructure projects, such as 750m trains, in Spain. Despite this strong growth, cross-Pyrenean rail traffic only comes back in 2030 to 2006 levels.
- Further South, **between Spain and Portugal, rail traffic is expected to increase by 8%** with a combination of modal shift (+4% between 2018 and 2030) and demand growth (+4%) due to network upgrades such as the new Evora- Caia link.

Figure 14 : Rail traffic forecasts on the RFC Atlantic according to scenario 2 by origin-destinations, index 100

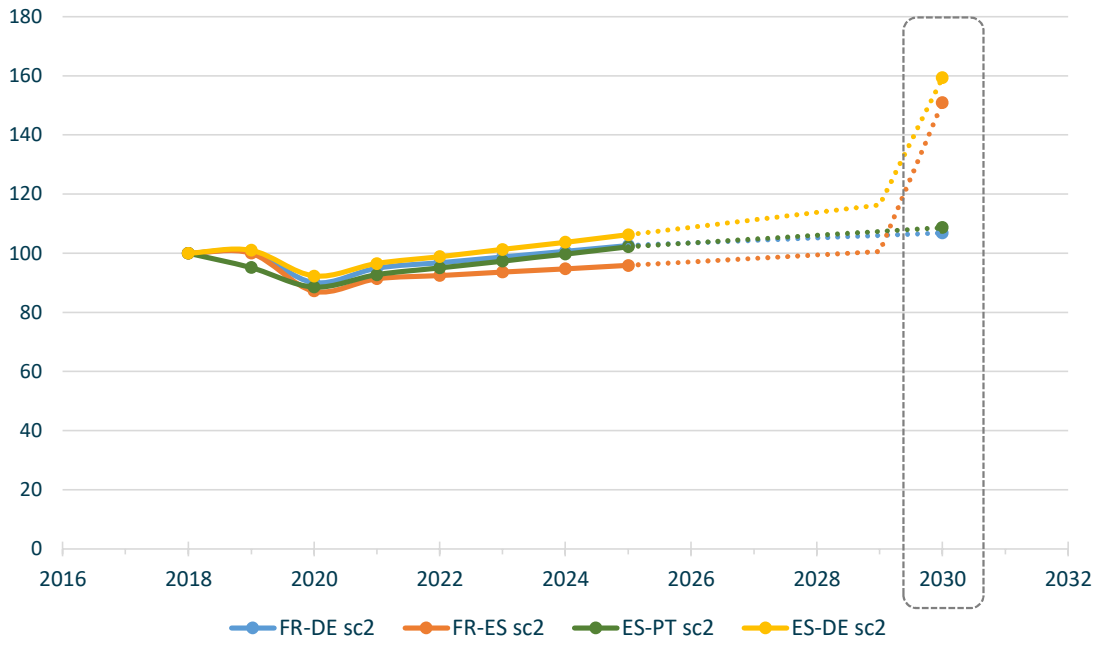
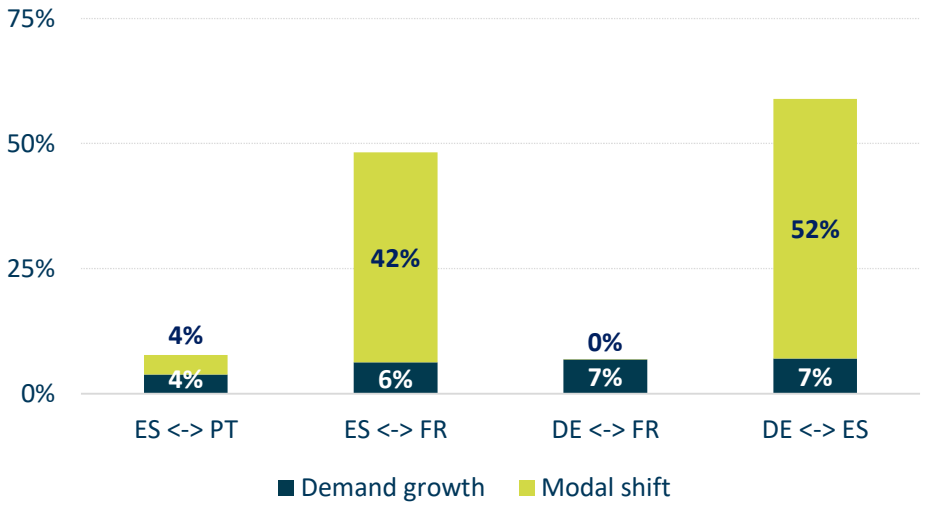


Figure 15 : Sources of rail traffic growth between 2018 and 2030 on the RFC Atlantic according to scenario 2, %



The Road is still the main mode. If we focus on land transport, the road modal share slightly decreases from 94.7% to 94.5%. If the rail sector remains at a reduced level, its average share nonetheless increases, from 5.3% to 5.5% to represent 16.9 million in 2030, i.e. increase in volume of +10.2% (+1.6 million tonnes). The increase of the rail mode observed between Spain and Portugal is +1.0 million tonnes which confirms that the improvement of the infrastructure in the Iberian Peninsula has made it possible to strengthen the competitiveness of the rail mode.

Table 9: Evolution of rail traffic in the RFC perimeter, 2018-2030, macro-economic scenario 2, thousand tonnes

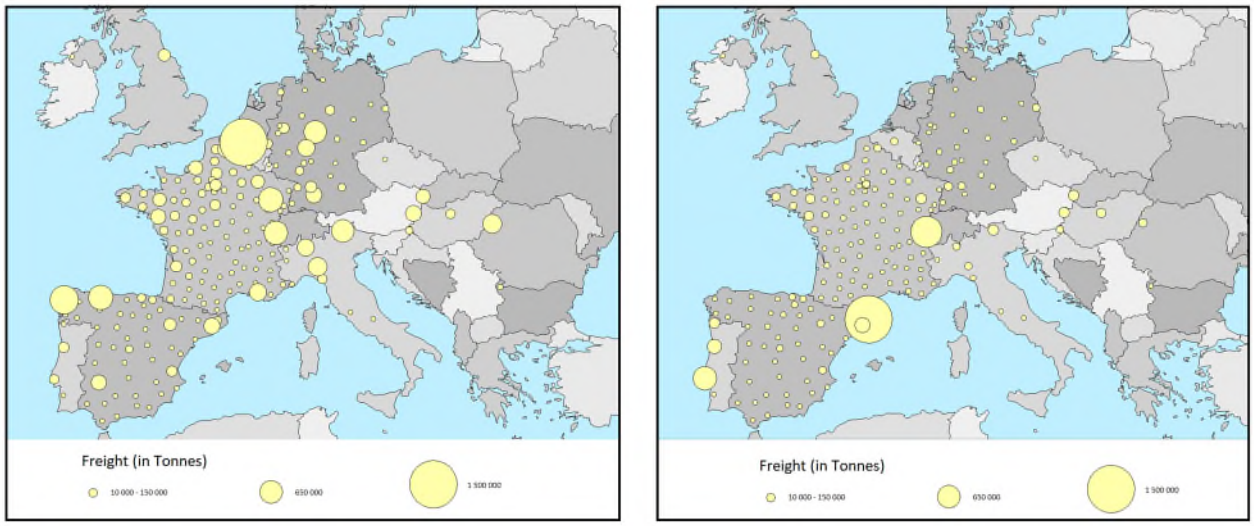
RAIL Freight traffic, thousand tonnes' evolution 2018-2030, scenario 2								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal	-	33	-	3	-	-	-	36
Spain	171	-	41	31	32	12	15	303
France	-	134	-	257	17	7	292	707
Germany	1	93	126	-	-	-	-	220
Benelux	-	93	10	-	-	-	-	103
North Europe	-	12	7	-	-	-	1	20
East Europe	-	26	149	-	-	0	-	175
TOTAL	172	392	332	291	49	19	308	1 564

Table 10: Evolution (%) of rail traffic in the RFC perimeter, 2018-2030, macro-economic scenario 2

RAIL Freight traffic, % evolution 2018 - 2030 scenario 2								
O / D	Portugal	Spain	France	Germany	Benelux	North Europe	East Europe	TOTAL
Portugal		23%		19%				22%
Spain	8%		34%	27%	39%	27%	18%	11%
France		27%		7%	17%	8%	14%	11%
Germany	16%	8%	6%					7%
Benelux		15%	6%					13%
North Europe		30%	9%					16%
East Europe		19%	8%					9%
TOTAL	8%	15%	8%	8%	27%	14%	14%	10%

As for scenario 1, the potential for modal shift towards rail on the Atlantic Corridor remains high but depends on major infrastructure projects (Y Basque, Caia-Badajoz, Atlantic rolling motorway for instance) and is limited by issues facing the rail sector in France where recurrent work on the infrastructure and national strikes considerably reduce train paths' reliability and rail competitiveness.

Figure 16 : Origins and destinations of rail traffic in 2030 (scenario 2)



5.2.2.3 Train traffic forecasted

The figures below show the number of annual trains on the corrido, for both scenarios.

Figure 17 : Yearly train flows along the RFC Atlantic in 2030 (scenario 1)

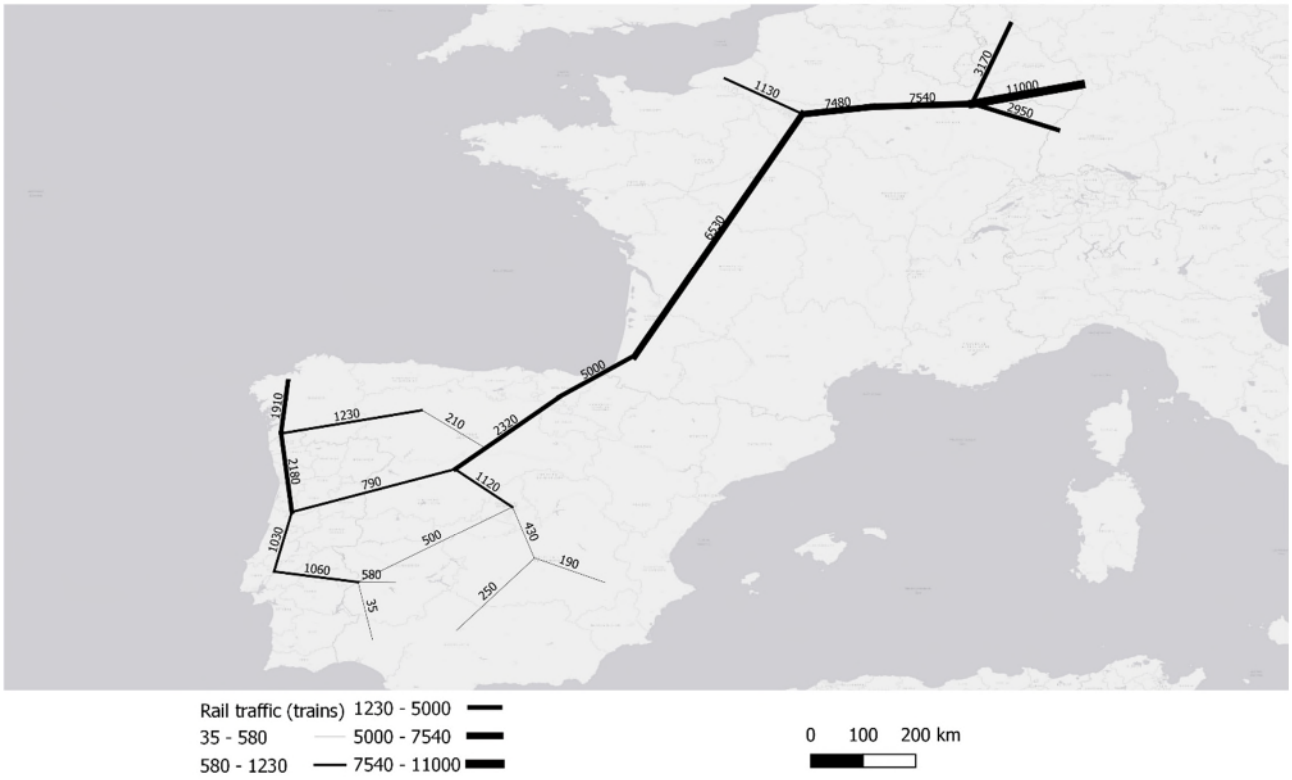
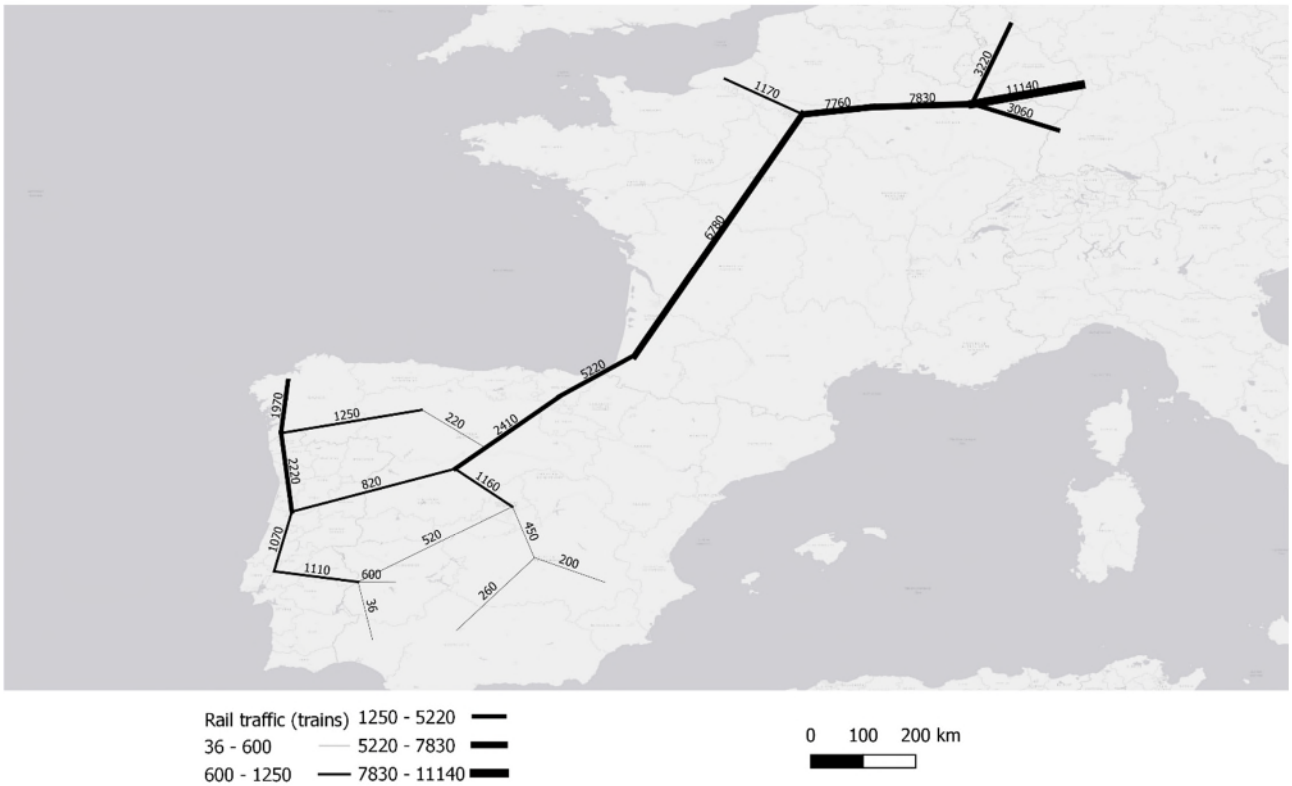


Figure 18 : Yearly train flows along the RFC Atlantic in 2030 (scenario 2)



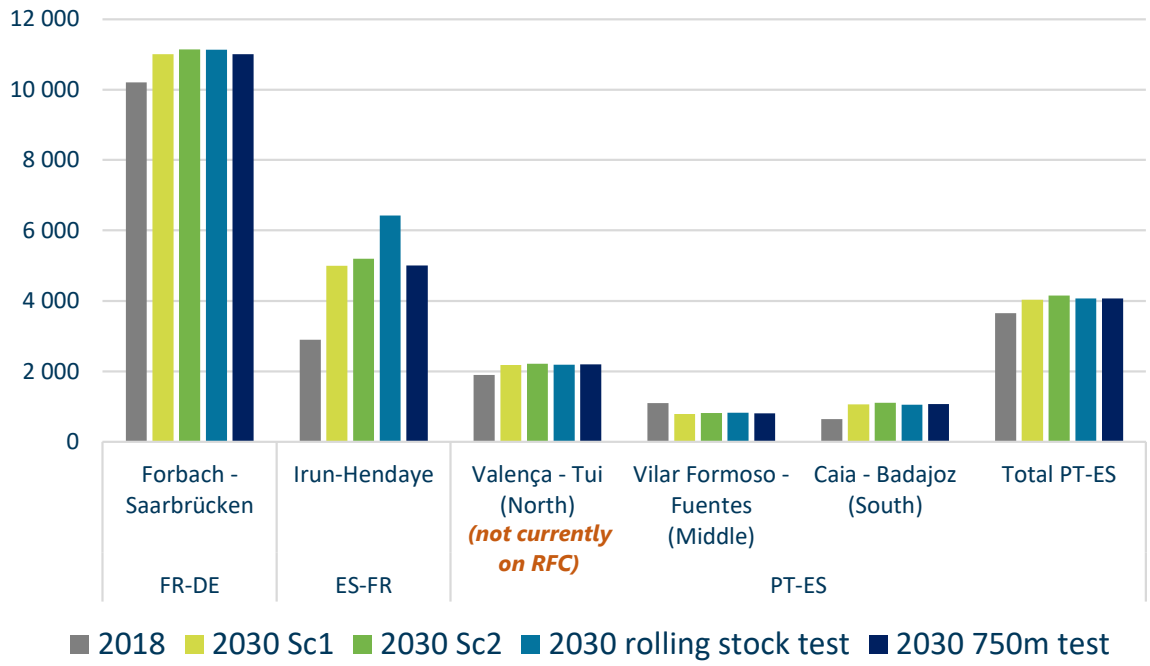
Forbach – Saarbrucken is expected to remain the main border crossing of the RFC Atlantic with around 11'000 trains per year in 2030.

Due to the impact of modal shift on cross-Pyrenean traffic, **Irun-Hendaye is expected to see the strongest growth in rail traffic**:

- +73% trains (5'000 trains per year in 2030) according to scenario 1 and the test with 750m train on the entire Spanish network,
- +79% trains (5'200 trains per year in 2030) according to scenario 2,
- +121% trains according to the new rolling stock test (6'400 trains per year).

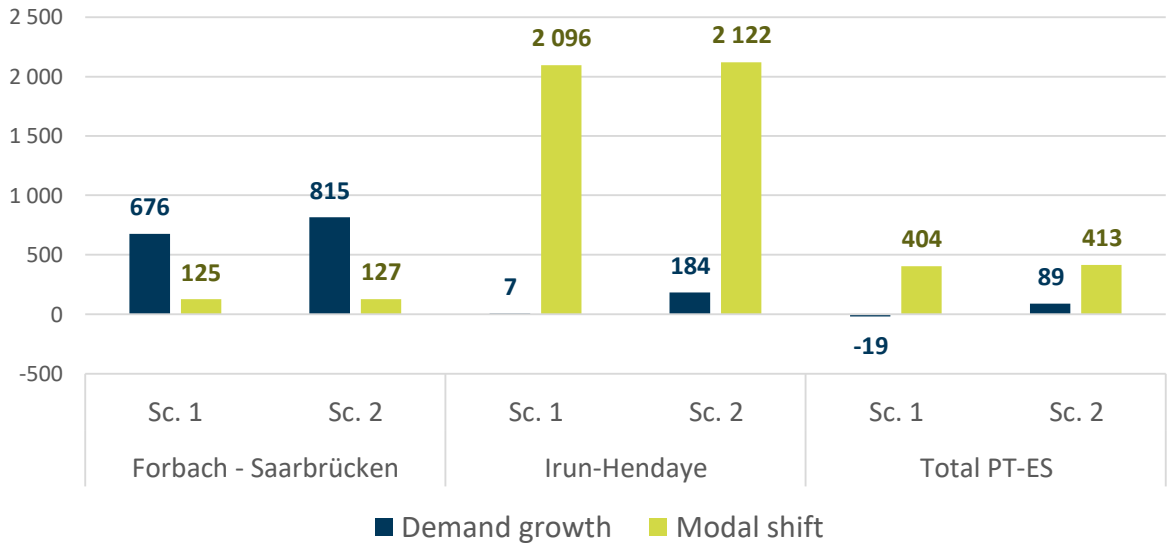
Finally, **between Spain and Portugal, the impact of rail traffic increases lead to over 4'000 trains crossing the border in 2030 at the three border crossings**. Due to network upgrades in the South of Portugal and in the North of Spain, we also expect a shift of traffic from Vilar Formoso – Fuentes (-25% to -28%) towards the other two border crossings in the South at Caia – Badajoz (+64% to +71%) and in the North at Valença – Tui, which is not currently a part of the RFC Atlantic (+15% to +17%).

Figure 19 : Yearly number of trains at border crossings according to the scenarios and tests



The following chart presents the number of additional trains expected at border crossings according due to demand growth and modal shift. Demand growth is the main driver for rail traffic crossing the French-German border, whereas modal shift is expected to play a larger role at the French-Spanish and Portuguese-Spanish borders.

Figure 20 : Additional annual trains at border crossings in 2030 compared with 2018 due to demand growth and modal shift



The number of trains forecasted at border crossings are presented on the table below.

Table 11 : Trains at border crossings according to scenarios and tests

Border crossing	2018	2030 Sc1	2030 Sc2	2030 rolling stock test	2030 750m test
Forbach	10 200	11 000	11 140	11 130	11 000
Irun-Hendaye	2 900	5 000	5 210	6 420	5 010
Valença - Tui (North)	1 900	2 180	2 220	2 180	2 200
Vilar Formoso - Fuentes (Middle)	1 100	790	820	830	810
Caia - Badajoz (South)	650	1 060	1 110	1 050	1 070
Total PT-ES	3 650	4 040	4 150	4 070	4 070

Those trains are split along the following main OD relations.

Table 12 : Train flows on the RFC Atlantic perimeter by main OD in 2030

OD relation on the RFC Atlantic perimeter	2030 sc1	2030 sc2
ES <-> PT	4 040	4 220
ES <-> FR	1 970	2 400
DE <-> FR	10 160	10 030
DE <-> ES	510	590
BENELUX <-> ES	370	440
ES <-> North Europe	30	40
East Europe <-> ES	240	290
East Europe <-> FR	3570	3630
Total	17 320	18 010

5.3. CONCLUSIONS ON THE TRAFFIC FORECASTS

Uncertainty is currently high when it comes to forecasting economic activity, two scenarios were therefore considered with two different methods. The first scenario assume that national economies would follow a pattern similar to the recovery from the previous 2009 recession, whereas scenario 2 is based on official national economic forecasts. Hence, the second scenario is more pessimistic for traffic in relation to the Iberian Peninsula which was characterised by economic stagnation in the 2010's. The first scenario therefore leads us to lower increases in rail traffic on the Iberian Peninsula. Multimodal freight flows in relation with Portugal increase by 0.7% in scenario 1 and 5.0% in scenario 2 between 2018 and 2030. For Spain, multimodal traffic increase is 1.9% in scenario 1 and 6.4% in scenario 2. The two scenarios are closer when it comes to traffic in relation to France (+4.5% in scenario 1, +6.5% in scenario 2) and Germany (+6.0% in scenario 1 and +6.4% in scenario 2). In any case, demand growth is not expected to be an important driver of traffic growth along the Atlantic Corridor in the coming decade due to the impact of the pandemic-linked recession.

The potential for modal shift towards rail on the Atlantic Corridor remains high but depends on major infrastructure projects (Y Basque, Caia-Badajoz, Atlantic rolling motorway for instance) and could be limited in future by issues facing the rail sector in France where recurrent work are still planned between Tours and Hendaye on the infrastructure.

The combined impact of those issues facing rail is particularly visible at the Irun-Hendaye border crossing where rail traffic has decreased significantly over the last decade, even though the previous transport market study expected a strong rail traffic growth. There is today no reason to believe that those problems will improve in the near future. It is even possible that increasing local passenger traffic around cities such as Bordeaux, Paris and Metz could further impact capacity allocated to freight trains along the Atlantic Corridor, but this question is beyond the scope of this transport market study.

Therefore, it is doubtful that the European aim of increasing rail freight traffic by 50% by 2030, as stated in the 2020 Sustainable and Smart Mobility Strategy published by the European Commission, can be achieved on the Atlantic Corridor as long as those issues persist. According to the results of this TMS, rail freight on the Atlantic Corridor can be expected to increase by around +50% on some Transpyrenean OD relations which are the most likely to benefit from the major infrastructure programme in Spain and at the French-Spanish border. But the overall number of international trains on the RFC Atlantic is only expected to increase by +20% between 2018 and 2030.

6. INTERVIEWS

In total, 32 interviews were conducted, aimed at forming a better understanding of the challenges along the Atlantic Corridor and to identify potential new markets, as well as assess the relevance of the different corridor extensions considered. Contacts were therefore made with corridor managers, port authorities, terminal operators, railway undertakings and cargo owners (shippers), both current rail users and potential users. Information specific to train path quality is summarized below.

The currently existing infrastructures are correct for the existing traffic but for various reasons (fragility of the system and insecurity of the infrastructure due to works, strikes and roadblocks) its full potential is not being obtained.

In the case of the Irun border, the little coordination between Hendaye - Irun since the disappearance of the joint management organization for international trains of RENFE and SNCF (GOTI, Operational Management of International Transport), makes coordination and agility in this last mile very complicated, producing

dysfunctions that impact transit times and imply a deterioration of the service compared to other alternatives such as the highway.

The strikes carried out, in France, in a repetitive manner in recent years and more and more lasting, have resulted in a transfer of transport flows to other alternative means. These flows have not returned to rail (or partially).

The works carried out to condition the infrastructure, especially in French territory, have repeatedly caused service interruptions for long periods of time. Moreover, the Clients mention the lack of coordination between the works' planning in the railway network in relation to the needs of the freight market. It needs greater anticipation in the notification of works / cuts to the Railway Undertakings: planning dates, compensatory measures, alternative solutions, etc. The large number of work slots has had the effect of reducing the capacity available and average speed of trains on the Atlantic Corridor.

Requesting Pre-arranged rail Paths from the RFC requires of advance planning for the RU. The PaP request timeline is nor adequate to the RUs business as they have clients with often late and irregular requests.

Moreover, the Clients indicate the difference between the paths finally offered and what has been programmed ("deformed" paths). Finally, they also mention the strong heterogeneity in the quality of train paths (on the same OD and for a regular schedule) during the year.

This deterioration in the quality of paths has resulted in a reduction in the paths for the transport of goods that has a negative impact on the development of traffic. It largely explains the decrease in rail traffic on the Atlantic Corridor's French sections (greater decrease than the decrease observed on average in France) and the transfer of traffic through the Mediterranean passage (market share estimated at 70%), or a transfer to other means of transport alternative to the rail.

The rail paths are limited in the "Linha do Norte", in Portugal. Some clients indicate they suffered for years from a lack of supply of rail transport capacity. They have the potential to move more goods by rail than they currently do, so they are forced to use alternative modes. The example of lack of capacity Spain North-West and Portugal is given. Other clients ask for an improvement of signalling and cantonment on the line Huelva Port - Badajoz – Portugal border, with the aim of improving the operation and capacity of the line.

7. FOCUS ON EXTENSIONS

7.1. METZ-TRIER-KOBLENZ EXTENSION

The Metz-Trier-Koblenz extension runs from Metz in the Grand-Est region in France, via the border point Apach and through Trier and Koblenz in Rhineland-Pfalz, where it connects with the Rhine-Alpine Corridor in the North.

Figure 21: Extension in Southwest of Germany – France border

This extension is foremost a diversionary rail route offering an alternative to existing lines of the RFC Atlantic and RFC Rhine-Alpine. The potential for new markets for the RFC Atlantic along the line itself is limited.

The proposed extension offers an opportunity for the development and expansion of rail freight transport between Northern and Southern Europe. This potential extension is indeed strategically located between Mediterranean and North European countries. It would improve intermodal connections between France and Germany, the two largest economies in the EU since Brexit. The benefits of this new proposal would be:

- Alternative connection to RFC Rhine-Alpine for long distance flows: This connection could be a shorter alternative route than the current line through Mannheim for traffic coming from the North, that is from Köln and the Ruhr area. It is important to highlight the mileage savings using this line rather than the current corridor lines, which is of about 150 kilometres. The total capacity available on the lines between Koblenz and the Metz area (Lorraine) would also increase with this extension, especially since the line from Thionville to Koblenz has a significant share of available capacity.

- Improving the flow of goods between southern to northern countries, in favour of regions in various economic shapes and with different types of economic activities, but with several important manufacturing areas.

- Rail infrastructures that are already technically in line with the RFC Atlantic.

- Transport offer for the significant potential demand between France and the North-West of Germany (or even beyond).

- Connection to different seaports (in particular the port of Rotterdam). It will expand the trade to new locations, increasing the diversity of products. In addition, ports would be connected, which improves the flow of goods between the corridor and other countries.

- Connection to industrial areas and their transport logistics nodes and inland ports. Overall, a medium potential for new rail traffic generated by economic activities along the line due to the extension of the corridor, but taking into consideration its strategic situation, this connection could foster the exchange of goods, opening new markets and generating new rail traffic.

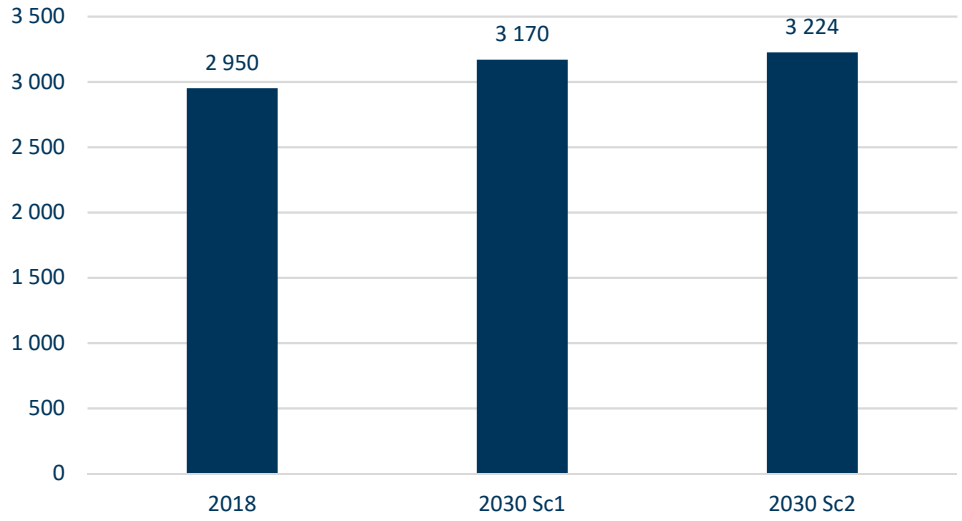
However, it is important to note that current rail traffic along this potential extension does not yet match the Atlantic Corridor alignment. An analysis of train paths on this extension pointed out that:

- 86% of trains run between the German Ruhr area and the French Metz in Lorraine, with most trains stopping within 30-50 km of the French-German border and only 2 trains per week continue on the RFC Atlantic (Ile-de-France, Champagne-Ardenne).
- Long distance trains on this line don't run through France via RFC Atlantic but via North-Sea Mediterranean Corridor towards Lyon and further South (19 trains per week).

Furthermore, it must be noted that the long-distance train services to Spain already use the Pre-Arranged-Path (PaP) product in France of RFC North-Sea Mediterranean. And looking on the RFC Atlantic capacity offer with the Pre-Arranged-Paths (PaPs) it has to be noted that the demand rate of the RU for the offered PaP on the German section of RFC Atlantic has been very poor for years (but could be increase in the future, according to RU's strategy).

The following graph shows the train traffic forecasted by the model at Perl - Apach border for years 2018 and 2030.

Figure 22 : Annual train traffic forecasted at Perl-Apach



Although long distance traffic may yet increase if the line was added to the RFC Atlantic, the main reason for this lack of long-distance demand running on this extension towards the Atlantic Corridor is probably linked to other difficulties which have been identified elsewhere in France. Recurrent works in Nouvelle Aquitaine Region appears to seriously reduce the reliability of trains paths offered. Hence, although we consider that this extension could notably improve connections between France and Germany along the Atlantic Corridor, it appears that other issues elsewhere on the Atlantic Corridor probably limit the interest of this extension for long distance traffic.

In conclusion, although this extension appears to be relevant to the corridor in terms of rail functionality, train traffic demand does not yet justify its addition to the Atlantic Corridor. This could change however when several key issues of the Atlantic Corridors are solved at the French-Spanish border in the coming decade. The two main issues are currently the persistence of Iberian track gauge, which will eventually be solved with the Y Basque, and recurrent work along the corridor in France which are expected to be over by 2030.

7.2. TOURS-CHAGNY EXTENSION

This extension runs through Tours in the Centre-Val-de-Loire region and Chagny in the Bourgogne-Franche-Comté region connecting the RFC Atlantic with the RFC North Sea-Mediterranean (as alternative itinerary for the Atlantic rail freight traffic flows crossing Paris region).

Figure 23: Extension in Centre of France

The aim of this potential extension between Tours and Chagny could offer 3 features:

1. connect the two main freight corridors in France (RFC Atlantic and RFC NSM),
2. be an alternative route to the passage through Ile-de-France,
3. connect the west of France (Pays de la Loire and Brittany regions) and the east of France (Lyon region, Alsace).

But the first two functionalities are linked, since there are already numerous flows between the two corridors (for example Spain - Hendaye with Germany), which pass through Ile-de-France. However, the undeniable interest of offering the possibility of bypassing the Ile de France, a region regularly encountering problems of saturation of the rail network at certain times of the day. This would provide an alternative, reliable route with a low level of traffic. However, this route is not in line with the RFC Atlantic in terms of electrification and tunnel gauge.

The third functionality (connect the west of France and the east of France) concerns several types of flows. First of all, this will improve the rail service to the port of Nantes-Saint-Nazaire, even if its current hinterland probably does not extend beyond Nevers. Ultimately, this hinterland could extend to the Rhone corridor (Dijon / Lyon) although these areas are already served by the port of Marseille to the south, the port of Antwerp to the north (or even the port of Le Havre to the north-west, but less importantly). But for moment the current characteristics of the infrastructure explain that there is no traffic passing through this extension. The analysis of paths confirms that it's not an axis that is taken from end to end. Traffic passing through the entire extension is extremely low, with only one train per week between Vittel (Vosges) and Angers (Maine-et-Loire). It's a mineral water train, to a logistics warehouse. In the medium term, if the infrastructure was improved, this will facilitate exchanges between east and west, which currently pass through Ile-de-France because the route is more efficient than through Nevers-Chagny although it is longer.

On the other hand, the economies of the territories between Tours and Chagny are not very dynamic, and do not represent a great potential of traffic. The Tours-Chagny extension therefore has no interest in serving local generators.

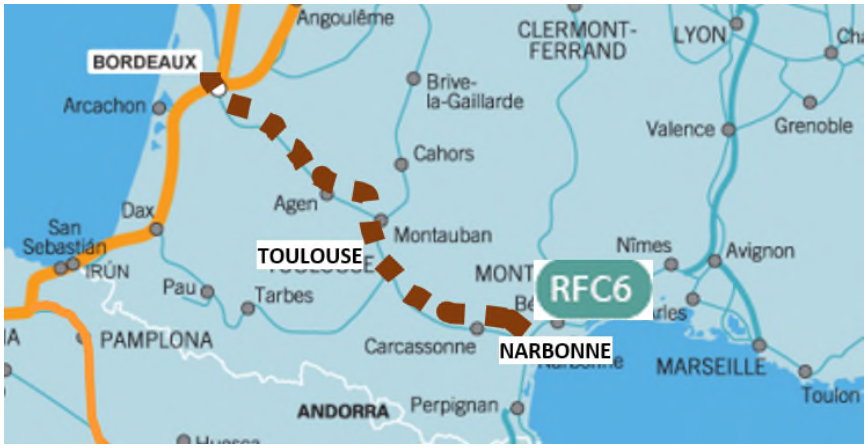
Because this extension is internal to France and is not competitive for international routes, there is currently no international demand and we could not produce traffic forecasts. It is possible that some international traffic switch to this route in the future when the line is upgraded and fully electrified and if capacity becomes too scarce on other lines through Ile-de-France.

This extension therefore offers a diversionary rail route functionality.

7.3. BORDEAUX-TOULOUSE-NARBONNE EXTENSION

This extension runs through Occitanie and Nouvelle-Aquitaine regions connecting the Port of Bordeaux and the RFC Atlantic to the RFC Med, and the economic centre of Toulouse. It is also considered as alternative route in case of traffic disruption on between Bordeaux and Hendaye (on RFC ATL) or between Narbonne and Perpignan/Cerbère (on RFC MED).

Figure 24: Extension in South of France



The extension proposed in the south of France will serve as an opportunity for communication and trade at international level, and especially among the countries that make up the European Union. The extension running from Bordeaux to Narbonne will connect with the different modes of transport and logistic nodes, opening new possibilities for trade and economy.

The advantages of this extension are shown below:

- Connexion to the port of Bordeaux and city's logistics terminal. This will lead to a greater international trade and an increase in the goods flow from maritime transport. Furthermore, as it is the leader city in wine production, its connexion with the logistics terminals will help favouring this sector and its expansion to new markets. The port of Bordeaux is very interested in extending the corridor to Narbonne, which would allow it to improve its rail service to the east (Toulouse and Languedoc-Roussillon), which probably represents its greatest development potential.

- The logistics nodes in Toulouse have a capital importance because of the aeronautical and economic activities that take place in Airbus headquarters. In addition, the Toulouse conurbation is a dynamic economic territory, with a growing population, and is therefore a major generator of flows. Serving the Toulouse metropolitan area, a large generator of traffic in the southwest, is also interesting, both

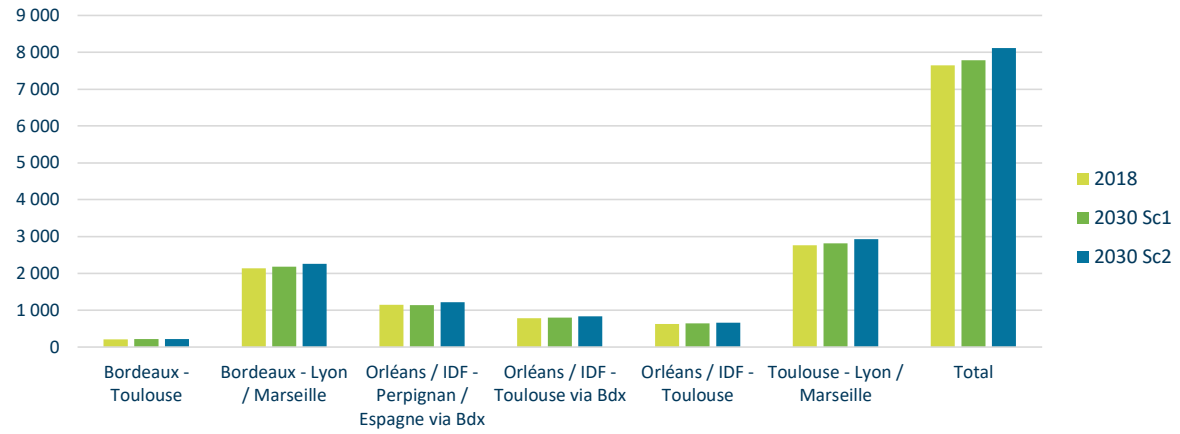
for national flows (combined transport services between Toulouse and the north of France) and international (between Catalonia and Toulouse).

- Rail infrastructures that are already in line with the RFC Atlantic.
- Transport offer for the significant demand between north-east of Narbonne and Bordeaux-Hourcade from where they go south (Hendaye-Irun) and north (Poitiers / Ile-de-France) and between the south of Narbonne (Perpignan, Cerbère) and the north of Bordeaux (Ile-de-France in Valenton and Nord-Pas-de-Calais in Dourges).
- Connexion with the Mediterranean corridor in Narbonne. This connexion can be a good opportunity to connect traffics coming between Mediterranean region (Marseille and Barcelona areas) or located on the North Sea – Mediterranean corridor (Lyon industrial area), and Atlantic Corridor regions.
- This extension is located in a strategic place due to the proximity to the border between Spain and France achieving a greater fluidity and movement of goods.
- This extension is also of interest to the port of Marseille / Fos sur Mer for its westward flows. Indeed the Toulouse metropolitan area is also mainly in the hinterland of Marseille (containers and petroleum products) although it can also be supplied by the port of Bordeaux in addition.
- Finally, it is also considered as alternative route in case of traffic disruption on between Bordeaux and Hendaye (on RFC ATL) or between Narbonne and Perpignan/Cerbère (on RFC MED).

The Bordeaux-Narbonne extension has several advantages, and clearly offers an interest in connecting the RFC Atlantic to the Mediterranean RFC.

Traffic on this extension mainly national and is therefore in large part not considered in the traffic model. We can however provide traffic forecasts by applying traffic growth assumptions from the model to existing flows (see chart below). Hence, overall traffic on this extension should increase between 2018 and 2030 by 1.8% according to scenario 1 (economic path from previous recession) and by 6.2% according to scenario 2 (official national economic forecasts).

Figure 25 : Annual train traffic forecasted on Bordeaux-Toulouse-Narbonne extension



7.4. NORTH OF IBERIAN PENINSULA EXTENSION

This extension pretends to connect Asturias and Gijón Port with the rest of the Atlantic Corridor. The proposed route runs through Venta de Baños – León –Gijón.

Figure 26: Extension in Asturias-Northwest of Iberian Peninsula

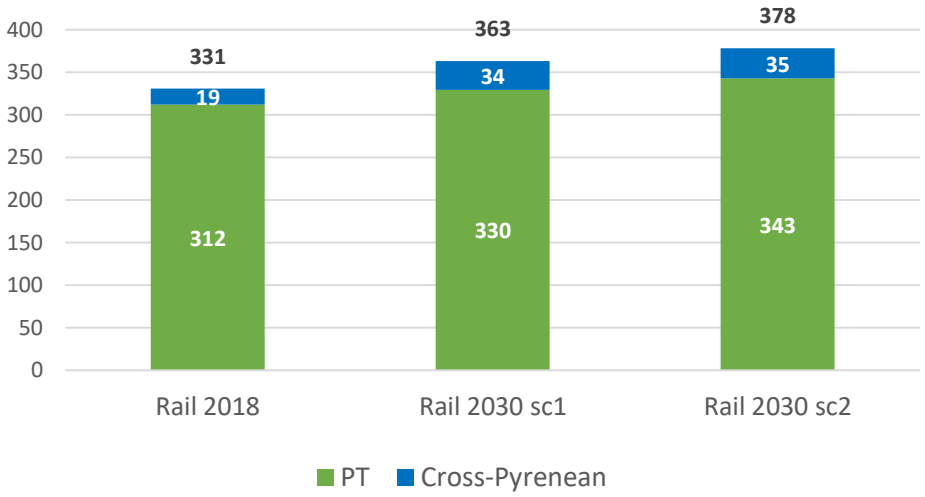
This extension's functionality is the opportunity to offer an international connection to markets.

Including this region in the Atlantic Corridor may provide the following benefits:

- Connection with the Steel industry located in Asturias.
- The opening of new markets that could improve the regional economy.
- Connection with the Port of Gijón, although it is mainly a bulk port and the first one in freight railway transport in Spain, its freight rail traffic is mainly national.

The aim of this extension is to connect the corridor to traffic generators such as the port of Gijon. The following chart presents international train traffic forecasted towards Portugal and the rest of Europe. Rail traffic is expected to increase by only around 10% between 2018 and 2030 since traffic is mainly in relation to Portugal and this extension should benefit less from improving rail connections towards France.

Figure 27 : International train traffic in relation to León and Asturias (annual number of trains)



An important fact to mention is that rail infrastructures are already or will be in line with the RFC Atlantic.

7.5. NORTHWEST OF IBERIAN PENINSULA EXTENSION

In the northwest area of the Iberian Peninsula (Norte region in Portugal and Galicia in Spain), three extensions are proposed:

- Venta de Baños - León – Ourense
- A Coruña – Vigo to Leixões (via Tui – Portugal Border)
- Connexion to the new terminal of Lousado

Figure 28: Extensions in Northwest of Iberian Peninsula

These extensions offer 2 functions:

- International connection to markets for A Coruña – Vigo to Leixões (via Tui – Portugal Border),
- National connection to international market (León – Ourense – Vigo).

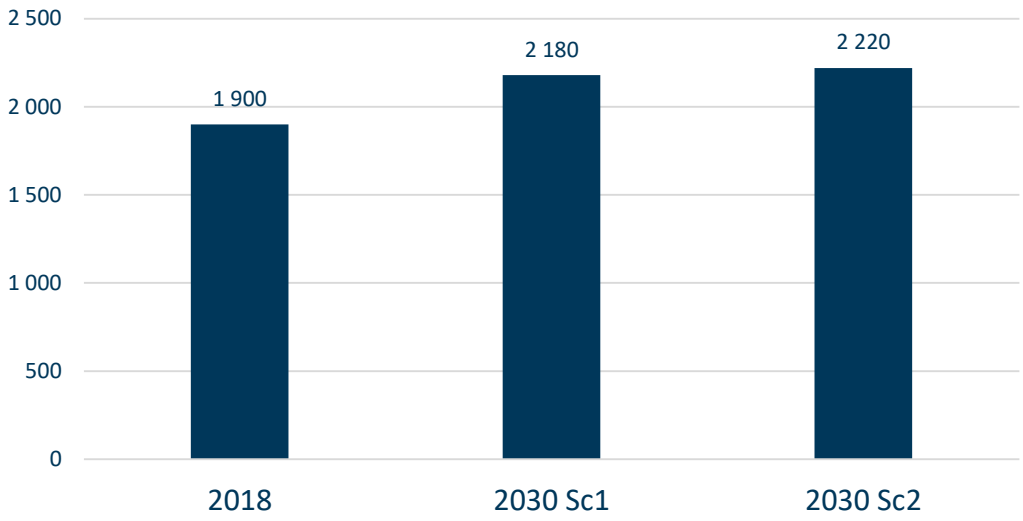
These extensions will connect the most important ports of the north of Spain and Portugal with the current RFC Atlantic, favouring the international connexion to markets and the efficiency of the international trade. “Venta de Baños - León – Ourense” extension will connect the industrial areas and the main ports of the northwest with the current Atlantic RFC. “A Coruña – Vigo to Tui – Portugal Border” extension will also provide an Atlantic Corridor connexion thought the border between Norte region in Portugal and Galicia in Spain for the most significative demand between the two countries.

The “connexion to the new terminal of Lousado” will connect Norte region of Portugal with the centre and South of Portugal and the Northwest of Spain, consolidating the rail transport network of the Iberian Peninsula. According to MEDWAY, a traffic of around 10 trains per day is expected between the terminal of Lousado and the Terminal XXI (Sines).

Since the aim of this extension is to connect North-Western Spain to international markets, we look at internal train traffic forecasted on this potential extension.

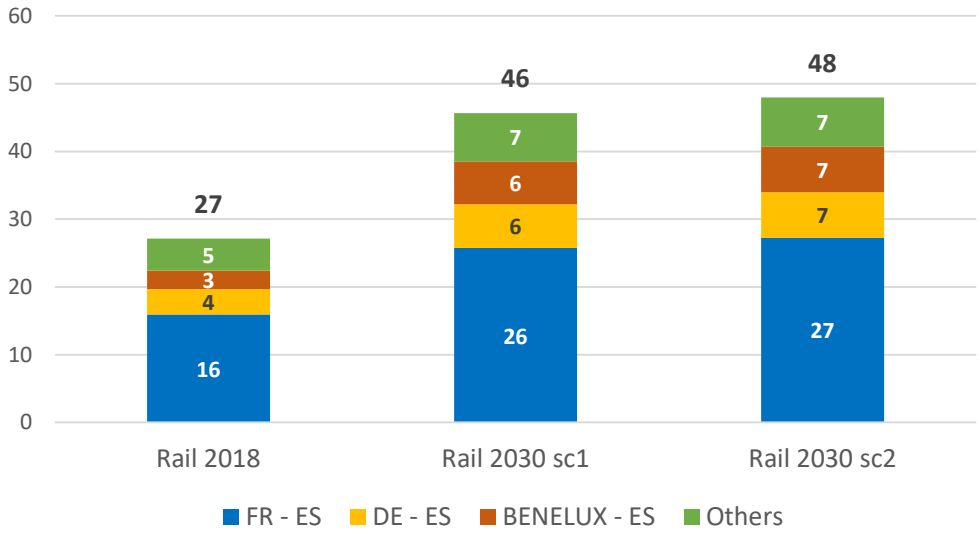
Towards Portugal, the following chart presents the number of trains expected at the Valença – Tui border crossing. From 1 900 trains per year, traffic is expected to increase to around 2 200 trains per year by 2030.

Figure 29 : Train traffic forecasted at Valença - Tui



Towards the rest of Europe, cross-Pyrenean traffic is expected to increase by around +70%.

Figure 30 : Cross-Pyrenean traffic in relation to North-Western Spain (annual number of trains)



Improving the proposed extension in the Iberian Peninsula main benefits can be summarised as:

- Improving the connections between the areas of northwest of Spain and Portugal with rest of the Atlantic Corridor.
- Promoting the trade between the corridor and countries outside through the ports of A Coruña, Vigo, Leixões and Sines.
- Providing Portugal with more connexions to the European markets.
- Developing the regional economy and increasing the trade to/from the Northwest of the Iberian Peninsula.
- Connecting important industries such as wood, metal, textile and automotive with the RFC.
- Including Tui-Valença do Minho border point in the Atlantic Corridor (which has important rail and road international traffic between Spain and Portugal) would promote modal shift through improving the Infrastructure Manager services, such as improved the capacity and the coordination of works.

7.6. MADRID – SOUTHWEST OF IBERIAN PENINSULA EXTENSION

The connexion "Madrid-Cáceres-Badajoz" and the new link Evora-Caia, connects Madrid with the southwest of the Iberian Peninsula, highlighting the improvement of connexions between Madrid and Lisbon. This perimeter also includes the connection to the extension of Lisboa port in Barreiro. Moreover, this is the connection to Madrid foreseen in the TEN-T and CNC.

Figure 31: Extension in Madrid- Southwest of Iberian Peninsula

This extension's functionality is the international connection to markets.

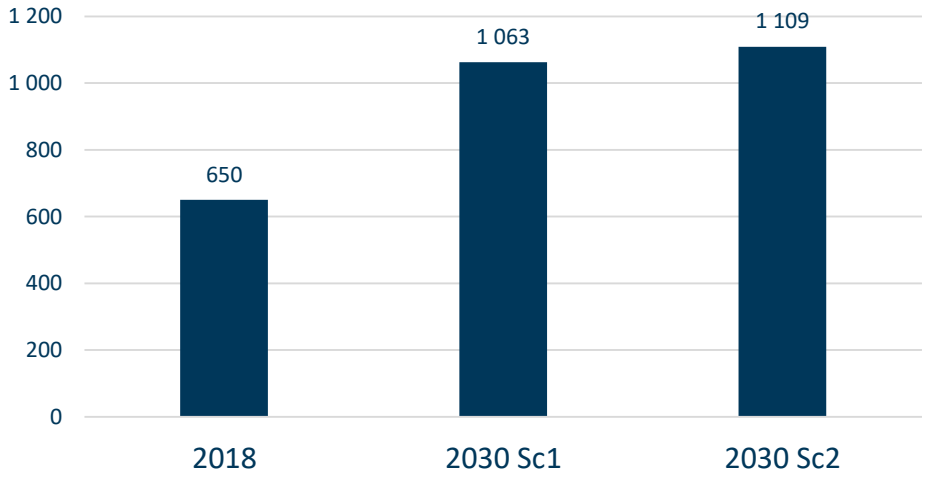
Madrid is the economic and financial centre of Spain. With this extension of the RFC Atlantic it is intended to improve the connexion Madrid-Lisbon. These two markets represent the engine of their national economies and developing better connexions among them may benefit not just the 2 countries, but the global Corridor economy. The proposed extensions main benefits can be summarised as:

- Improving the connexions between the areas of Lisbon and Madrid, which are important economic centres for their countries and where the demand is significant.
- Improving the connection from Lisboa port to its Spanish hinterland (especially Madrid area),
- Approaching Portugal to other European markets.
- A faster and more competitive rail connexion between two national capitals can attract new markets and increase the flow of goods in the corridor.
- Consolidate the economic position of these South European countries.

This extension will add two new lines between Portugal and Spain, with more efficient characteristics (length of trains and electrified routes) which leads to a significant increase in traffic at this border crossing due to modal shift, but also shifting of existing rail traffic from Vilar Formoso – Fuentes in the north to Caia – Badajoz.

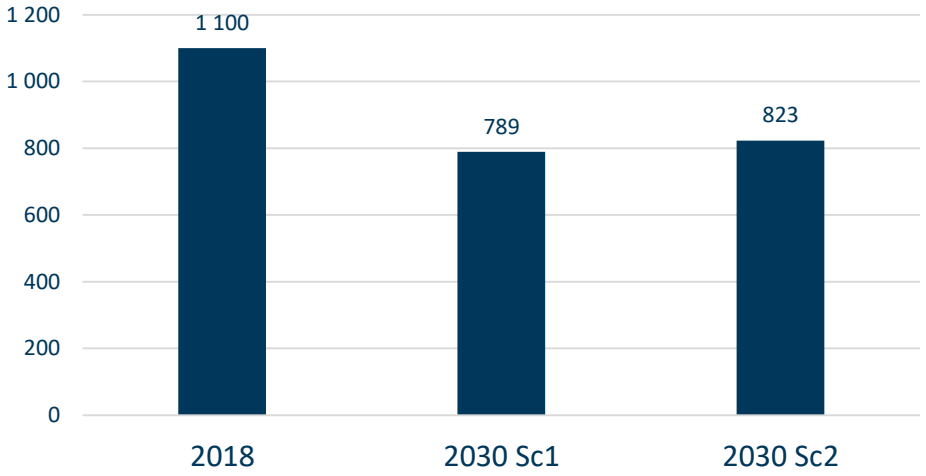
The impact of improving connections and rail routes between Spain and Portugal is + 4% between 2018 and 2030on rail traffic, all other things being equal.

Figure 32 : Annual train traffic forecasted at Caia - Badajoz



For comparison, the following chart presents trains flows forecasted further North at Vilar Formoso – Fuentes which is expected to decline due to traffic shifts towards Caia – Badajoz, but also, to a lower extent, towards Valença – Tui.

Figure 33 : Annual train traffic forecasted at Vilar Formoso - Fuentes



For now, the rail infrastructures are not really in line with the RFC Atlantic, but it will be in medium term (2030).

7.7. SOUTHWEST OF IBERIAN PENINSULA EXTENSION

In the southwest area of the Iberian Peninsula, three extensions are proposed:

- Port of Huelva/Sevilla – Badajoz – Portugal Border
- New link Evora – Caia
- Connexion to the extension of Lisbon Port in Barreiro

Figure 34: Extensions in Southwest of Iberian Peninsula

This extension's functionality is the international connection to markets.

The proposed extensions will improve the corridor functionality and provide a range of advantages. The extension "Port of Huelva/Sevilla – Badajoz – Portugal Border" will connect the corridor with two important ports, consumption and production centres such as Huelva and Sevilla, improving the international connexion to the markets through a more efficient flow of goods. The strategic location of Extremadura, at the border with Portugal and in the centre of the triangle Madrid, Sevilla and Lisbon, will benefit both the aforementioned areas and also the region, which fullest potential has not been exploited so far, and the corridor activity will help to boost the undeveloped regional economy.

The "new link Evora-Caia" provides a new connexion between Portugal and Spain and a more direct route for freight coming from Lisbon region (Ports of Lisbon and Setubal), Centro and Alentejo (Port of Sines) to Madrid and to the south of Spain, increasing the international hinterland of Portugal. According to MEDWAY, an increase on the rail freight traffic at the Port of Sines is expected due to this extension.

The "connexion to the extension of Lisbon port in Barreiro" was expected to will reinforce the current trade of goods between Lisbon and its commercial partners, increasing the attractive of the region as an international hub. However, following the environmental assessment procedures, the decision for the new container terminal of Barreiro has been suspended.

The proposed extensions in the southwest of the Iberian Peninsula main benefits can be summarised as:

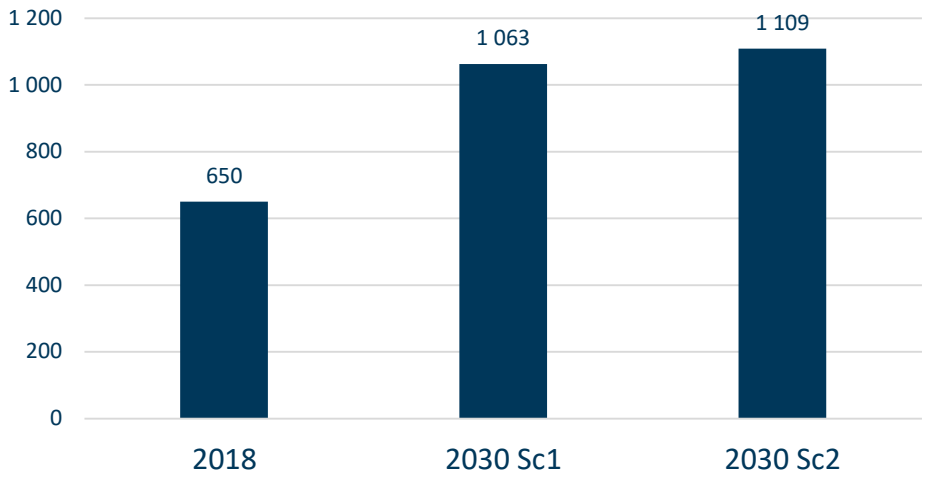
- Connection the ports of Huelva and Sevilla with the current RFC Atlantic.
- Improving the connexions between the South-West areas of the Iberian Peninsula with the ports of Lisbon (and industrial activities), Sines, Huelva and Sevilla, which could increase the trade of the Atlantic.
- Connecting to the international railway network important industries such as chemistry and agri-food ones.

However, the rail infrastructure is not really in line with the RFC Atlantic.

This extension will add two new lines between Portugal and Spain, with more efficient characteristics (length of trains and electrified routes) which leads to a significant increase in traffic at this border crossing due to modal shift, but also shifting of existing rail traffic from Vilar Formoso – Fuentes in the north to Caia – Badajoz.

The impact of improving connections and rail routes between Spain and Portugal is + 4% between 2018 and 2030on rail traffic, all other things being equal.

Figure 35 : Annual train traffic forecasted at Caia - Badajoz



7.8. EXTENSION TO IRELAND PORTS

The extensions to Ireland ports are new maritime connection from the most important Irish ports (Shannon Foynes/Dublin/Cork) to Le Havre, Cherbourg and Nantes-Saint-Nazaire.

Figure 36: Extension to Ireland ports

The analysis of the extensions to Ireland ports aimed to understand the impact of new maritime connection from Shannon Foynes / Dublin / Cork to Le Havre, Cherbourg and Nantes-Saint-Nazaire on rail freight

business. For now, Brexit is still too recent to identify structural changes. In addition, the impact of the pandemic on flows also has a temporary effect, which is difficult to distinguish from the Brexit effect.

For the moment, only the port of Cherbourg seems to benefit from a certain Brexit effect (strengthening of direct maritime lines with Ireland), with an impact on its rail service. As a result, the rail motorway project between Cherbourg and Mouguerre, led by Brittany Ferries, should be launched soon.

For the ports of Nantes and Le Havre, there is currently no identified impact, but this could change over time.

This extension offers an interest in connecting the RFC Atlantic to the Ireland, in the Brexit context.

7.9. EXTENSIONS PRIORITIZATION

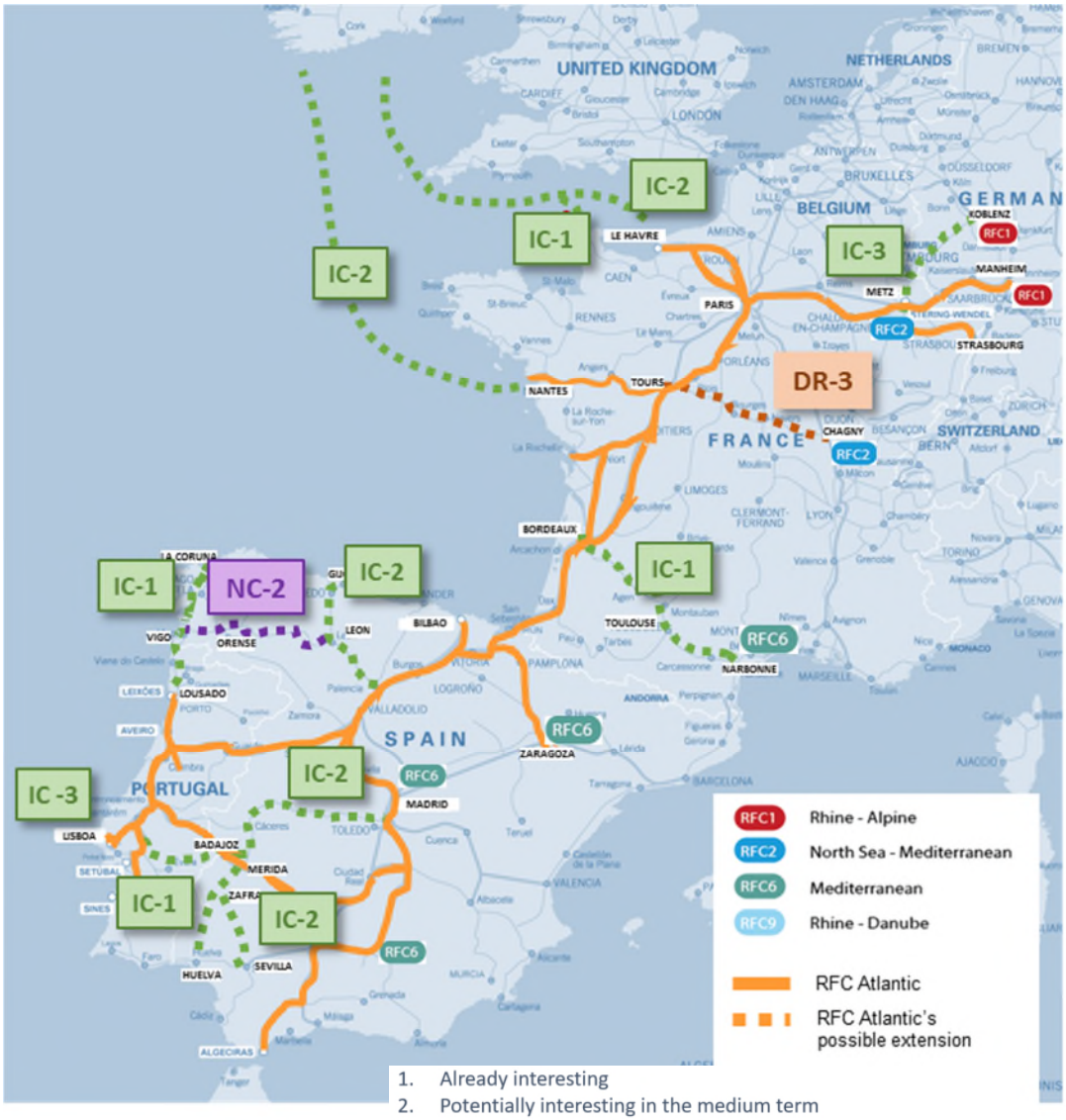
There are 3 functions to the possible extensions: international connection to markets, national connection to international market and diversionary rail routes.

We propose below a hierarchy of extensions, according to 3 degrees of relevance:

1. Already interesting
2. Potentially interesting in the medium term
3. Potentially interesting in the long term

The extensions are described below, and their degree of interest is indicated, which varies with the horizon of relevance.

Figure 37: Extensions prioritization



1. Already interesting
2. Potentially interesting in the medium term
3. Potentially interesting in the long term

Table 13: Prioritization of extensions

Extensions	category	Issues	Degree of relevance
Metz - Koblenz	international connexion	The main benefits would be the improvement of the goods' flow between southern to northern countries and the creation of an alternative connection to RFC Rhine-Alpine for long distance flows. Moreover Rail infrastructures are already technically in line with the RFC Atlantic. But current rail traffic along this potential extension does not yet match the Atlantic corridor alignment, as shown by the analysis of train paths. Consequently, the train traffic demand does not yet justify its addition to the Atlantic corridor for moment	3
Tours-Chagny	diversionary route	Main benefit of this extension is to potentially facilitate exchanges between East and West, which currently has to pass through Ile-de-France where capacity is scarce due to heavy passenger traffic. However, the route choice through Ile-de-France because the itinerary provides better quality infrastructure (fully electrified and GB1 loading gauge). For moment, capacity issues in Ile-de-France do not yet justify extension's addition to the Atlantic corridor. This could change in the future with increasing capacity issues in Ile-de-France and when the route will be fully electrified.	3
Bordeaux-Toulouse-Narbonne	international connexion	The Bordeaux-Narbonne extension has several advantages, and clearly offers an interest in connecting the RFC Atlantic to the Mediterranean RFC. Moreover, the territory is very dynamic (port of Bordeaux, area of Toulouse). Finally, the rail infrastructures are already in line with the RFC Atlantic.	1
León/Orense & Vigo – A Coruña (Spain) to Ermesinde (Portugal) via Tui-Valença	National connexion: León – Orense International conexión: Orense - Vigo – A Coruña to Tui-PT border – Ermesinde	There are several functionalities. One of most important is the improvement of the connections between the areas of northwest of Spain and Portugal with rest of the Atlantic Corridor (and European markets in case of Portugal). This extension will also facilitates the trade between the ports of A Coruña, Vigo, Leixões and Sines, and local important industries, with their Clients and markets. Moreover, including Tui-Valença do Minho border point in the Atlantic Corridor (which has important rail and road international traffic between Spain and Portugal) would enable to promote modal shift through improving the	1 for Orense - Vigo – La Coruña to Ermesinde (Portugal) via Tui-Valença 2 for León – Orense

Extensions	category	Issues	Degree of relevance
		Infrastructure Manager services, such as improved the capacity and the coordination of works.	
Asturias - Northwest of Iberian Peninsula extension (Gijón – León – Venta de Baños)	international connexion	Including this region in the Atlantic Corridor may provide 3 main benefits. Firstly, it will connect the Steel industry located in Asturias to its international market (Central Europe and Portugal). Moreover, the opening of new markets could improve the regional economy and finally, it will connect the Port of Gijón to the RFC Atlantic (which is a bulk port and the first one in freight railway transport in Spain, but for moment the current freight rail traffic is mainly national). Rail infrastructures are already or will be in line with the RFC Atlantic.	2
Madrid – Southwest of Iberian Peninsula extension	international connexion	Madrid is the economic and financial centre of Spain. With this extension of the RFC Atlantic RFC it is intended to improve the connexions Madrid-Lisbon. These two markets represent the engine of their national economies and developing better connexions among them may benefit not just the 2 countries, but the global Corridor economy. Moreover, this extension will improve the connection from Lisboa port to its Spanish hinterland (especially Madrid area), and more globally will approachs Portugal to other European markets. This extension will provide a more direct route between Portugal and Spain (Evora-Caia's new link), with more efficient characteristics (length of trains and electrified routes) which leads to a significant increase in traffic at this border crossing due to modal shift, but also shifting of existing rail traffic from Vilar Formoso – Fuentes de Oñoro in the north to Caia – Badajoz. For now, the rail infrastructures are not really in line with the RFC Atlantic, but it will be in medium term (2030).	1 for New Link Évora – Caia 2 for Madrid – Cáceres - Badajoz
Port of Huelva/Sevilla – Badajoz – Portugal Border	international connexion	The extension will connect the corridor with two important ports, production and consumption centres such as Huelva and Sevilla, improving the international connexion to the markets through a more efficient flow of goods. The improvement will be reinforced with the opening of the Evora-Caia link between Portugal and Spain, with more efficient characteristics (length of trains and electrified routes) and which leads to a significant increase in traffic at this border	2

Extensions	category	Issues	Degree of relevance
		crossing due to modal shift However, the rail infrastructure in Spain is not really in line with the RFC Atlantic.	
Connexion to the extension of Lisbon Port in Barreiro	international connexion	This connexion was expected to reinforce the current trade of goods between Lisbon and its commercial partners, increasing the attractive of the region as an international hub. This improvement would be reinforced with the opening of the Evora-Caia link between Portugal and Spain, with more efficient characteristics (length of trains and electrified routes) and which leads to a significant increase in traffic at this border crossing due to modal shift. But the decision for the new container terminal of Barreiro has been recently suspended following the environmental assessment procedures, this extension has lost its relevance.	3
Extension to Ireland ports	international connexion	The two ports of Le Havre and Nantes-Saint-Nazaire, already on the RFC Atlantic, do not yet have any ferry service (or very little for Le Havre) to Ireland. Consequently, there is for the moment no identified issue of rail service in connection with the maritime service of Ireland. The port of Cherbourg, on the other hand, presents a certain interest. On the one hand, because the port has clearly positioned itself on the service to Ireland. On the other hand the port has an advanced rail motorway project to the south (Mouguerre and probably Spain in the future), with trucks coming from Great Britain or Ireland. The rail route joins the current RFC Atlantic, in Tours. To date, only the integration of the port of Cherbourg is of interest for the RFC Atlantic according to Ireland connexion's issue.	1 for Cherbourg 2 for Nantes and Le Havre

*: 1 = already interesting / 2 = potentially interesting in the medium term / 3 = potentially interesting in the long term)