

**SIL**  
Barcelona **25** Anniversary  
7<sup>th</sup>-9<sup>th</sup> June 2023



Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

## ***FERRMED CONFERENCE***

***FERRMED Study of Traffic and Modal Shift  
Optimisation in the EU***

***BARCELONA INTERNATIONAL LOGISTICS FAIR (SIL)***

Fira de Barcelona, Montjuïc Exhibition Hall

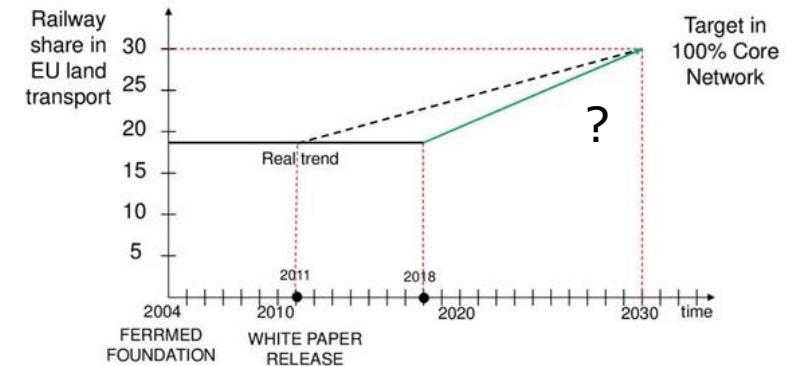
Barcelona, June 8<sup>th</sup> 2023

# PERFORMANCE AND ENVIRONMENTAL IMPACT OF THE EUROPEAN LAND FREIGHT TRANSPORT SYSTEM

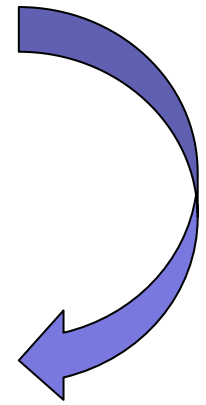
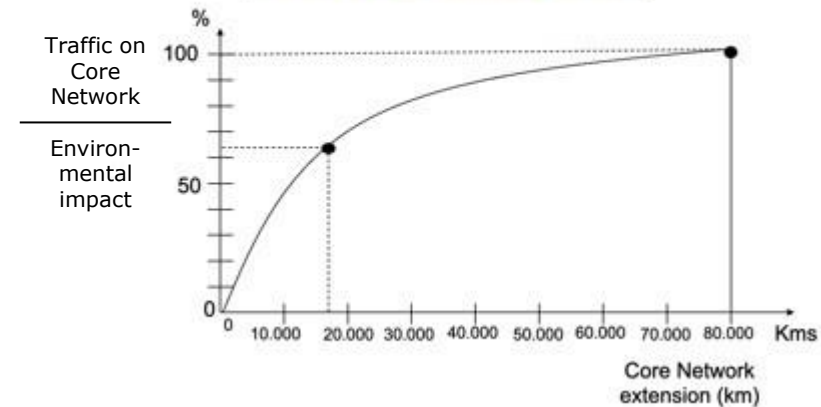
## BACKGROUND

- ❖ In 2015 transport volume in the EU-28 was **19 billion tonnes of goods (or 2,385 billion tonne-kilometres)**. In terms of tonne-kilometres, **75% was transported by road, 18% by rail and 7% by barge**.
- ❖ The major part (around 55%) of total road freight transport performance was over distances of more than 300km of which, roughly one third where over more than 1,000km.
- ❖ The impact of road transport on the environment is massive: some **275 million tonnes of CO<sub>2</sub>** per annum representing **30% of total GHG emissions of the transport sector as a whole**.

RAILWAY SHARE REAL VERSUS PLANNED



FERRMED APPROACH TO ACHIEVE AT LEAST 65% OF "WHITE PAPER" TARGETS IN 2030



## BASIC STRUCTURE AND CONTENTS OF THE STUDY

- Identification of EU Extended Core Network sections with most cargo movements (all transport modes) → “Backbone Network” (65% of the Extended Core Network transport) (~70.000 km of corridors analysed, equivalent to ~200.000 km of different modes: rail, road and IWW)
- Main strategic logistics hubs determination
- Analysis of the key intermodal terminals and main interconnection links, back-up links and feeder links in the “Backbone Network”. Bottlenecks analysis.
- Definition of the “FERRMED Fast, Flexible, Integrated Rail-Road System of Transport (+FIRRST)”
- Best routes inside the “EU Backbone Network” for interconnection with the Eurasian Transport System
- Socio-economic and environmental impact assessment
- Action Plan



## TASK FORCE

- ❖ 24 experts: professors, engineers, economists, geographers and senior analysts from all over the EU
- ❖ 10 students: from Economics, Engineering and Geography Faculties
- ❖ 2 Universities involved: Antwerpen University and Barcelona University
- ❖ 1 Consultant company: MCrit
- ❖ More than 40.000 work hours engaged: from June 2019 till May 2023






## MAIN CONCLUSIONS (I)

### RAILWAY INFRASTRUCTURE IMPROVEMENT

- ❖ First priority investments in the part of the Extended Core Network that supports 65% of land freight transport performance (18,040 km, 25.8%).
- ❖ Second priority to be devoted to sections of peripheral Member States that concentrate 65% of the land freight traffic of the country (8,500 km, 12.1%)
- ❖ Third priority in the rest of the Network (43,700 km, 62.2%)  
Investments assigned according to transport volume of different sections and interconnection easiness with First priority sections.



# MAIN CONCLUSIONS (II)

-  Central Backbone
-  Extended backbone in states below EU threshold
-  Feeder and backup links of the Backbone Network
-  Sections that are within 2% of the EU threshold and almost make it into the central Backbone
-  Sections that are within 2% of the national threshold and almost make it into the extended Backbone



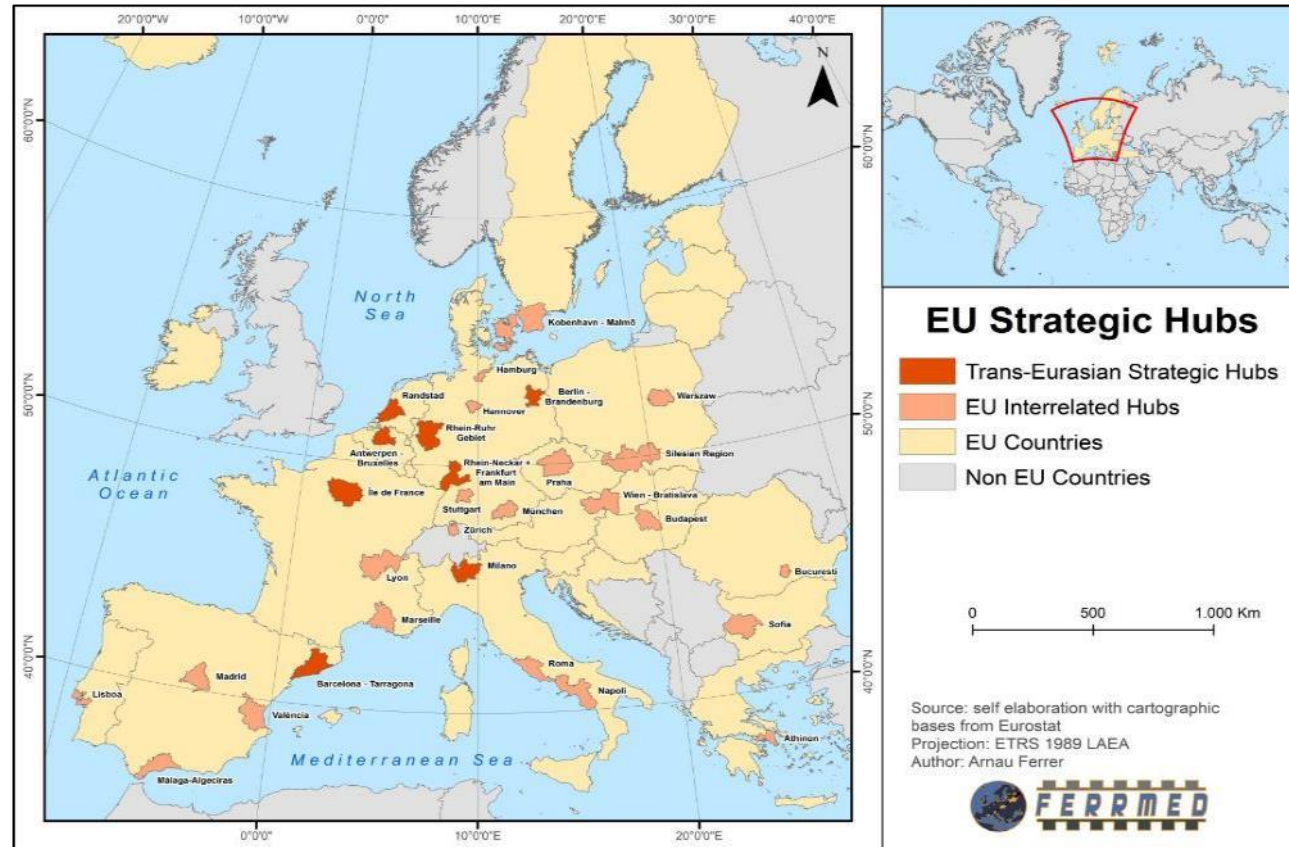
## EU BACKBONE DETERMINATION



# MAIN CONCLUSIONS (III)

## DETERMINATION OF THE MAIN STRATEGIC HUBS

### Geographical distribution of the EU Strategic hubs



## MAIN CONCLUSIONS (IV)

### INTERMODAL TERMINALS CONSIDERATIONS (1)

#### Basic characteristics

There are two main parameters for the classification:

- “Dead-end” or “Pass-through” lay out
- Length of loading/unloading (L/U) tracks

Most of the existing terminals (~90%) are dead-end and have L/U tracks of less than 750 m length.

#### New intermodal terminals concept

The intermodal terminals proposed are “pass-through”.

They have three main components:

- Central loading/unloading zone
- Two buffers for acceleration/deceleration and pause of freight trains (if L/U tracks are occupied).

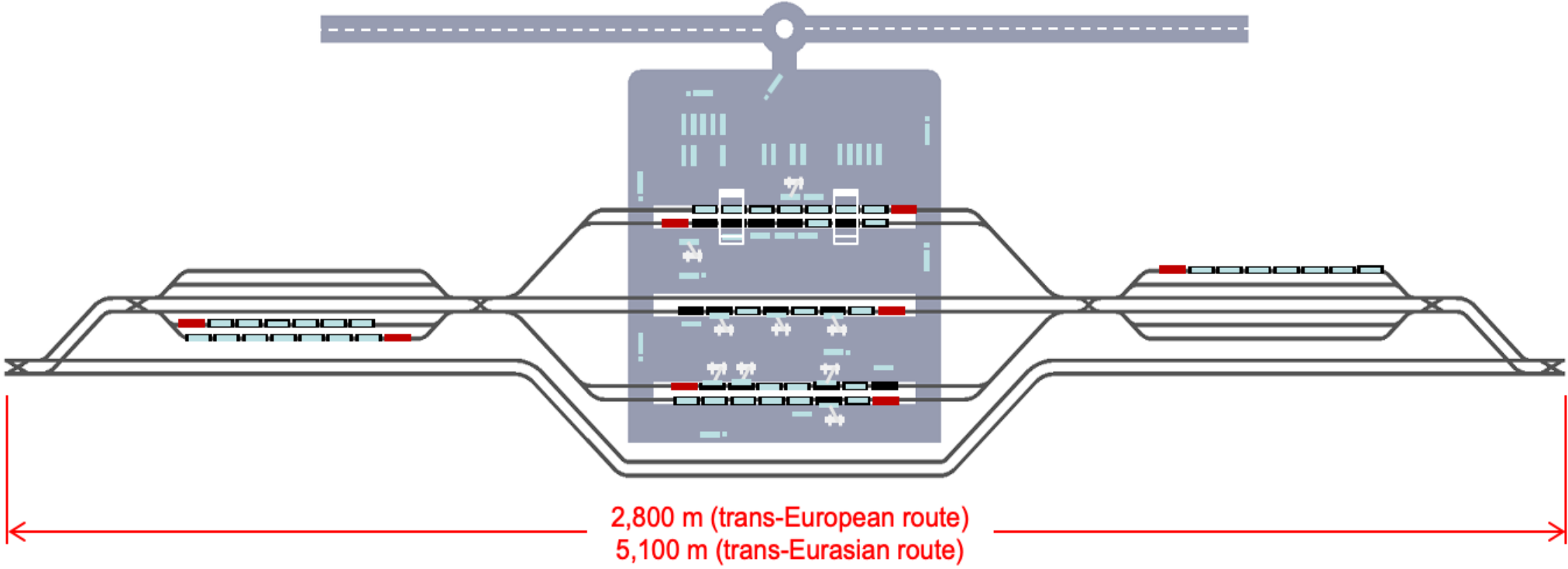




# MAIN CONCLUSIONS (V)

## INTERMODAL TERMINALS CONSIDERATIONS (2)

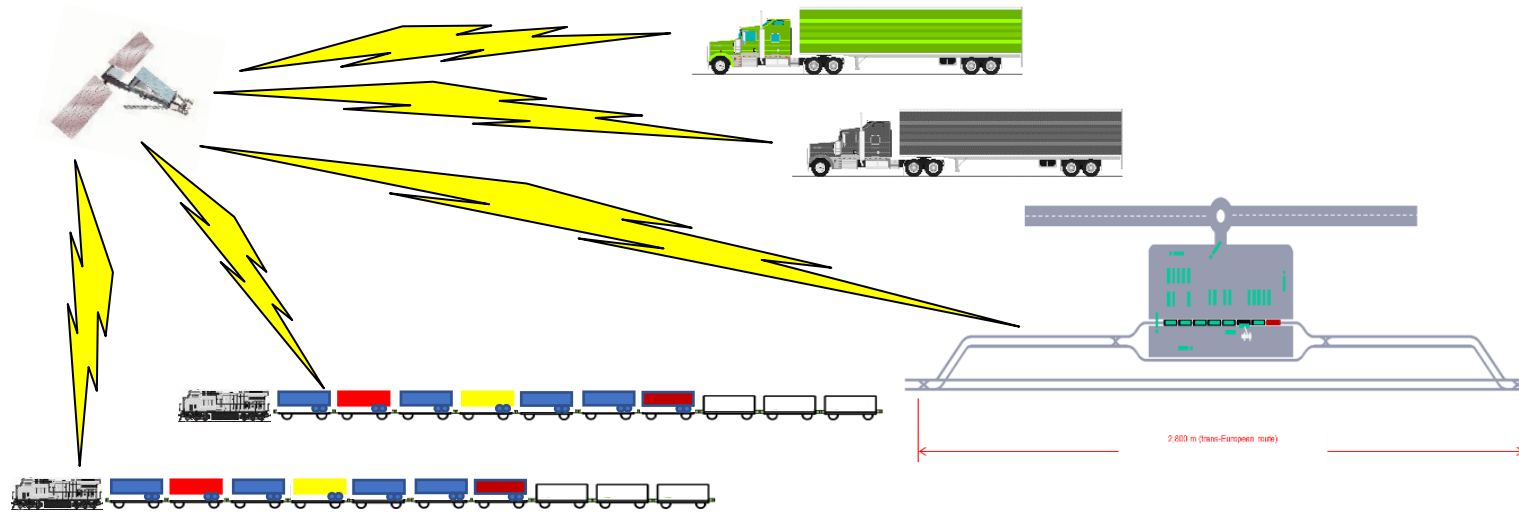
### +FIRRT STRATEGIC TERMINAL (A)



# MAIN CONCLUSIONS (VI)

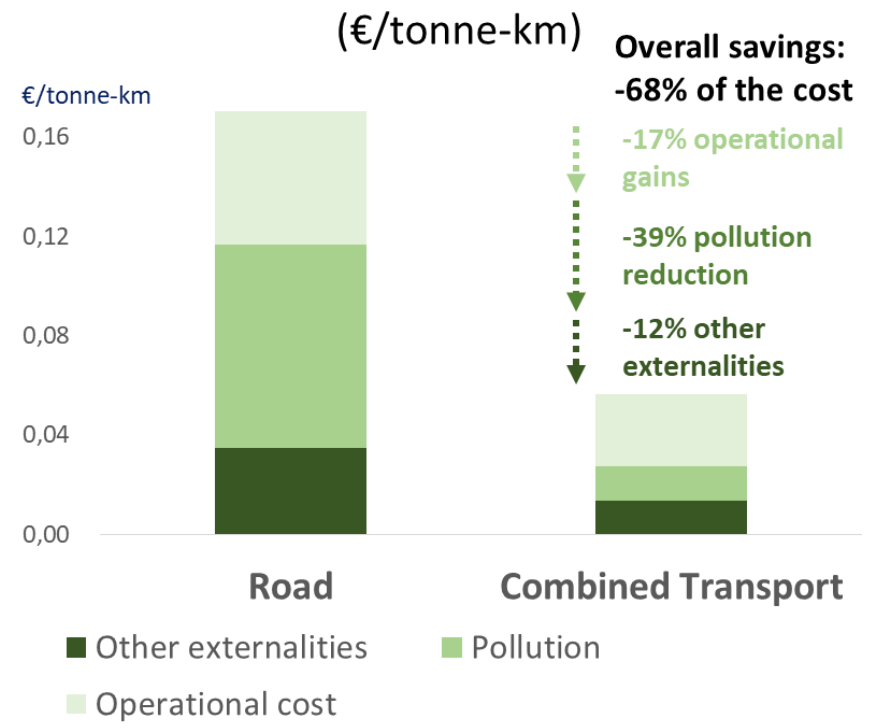
## FERRMED, FAST, FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRST)

Hybrid/Dual locomotive plus multipurpose wagons able to carry semi-trailers, swap bodies and containers, duly interconnected with trucks and +FIRRST Terminals in real time. ILUs transfer to fixed train composition. It is a novel way of organising multimodal rail-road transport in the form of “Mobility as a Service (MaaS)”.



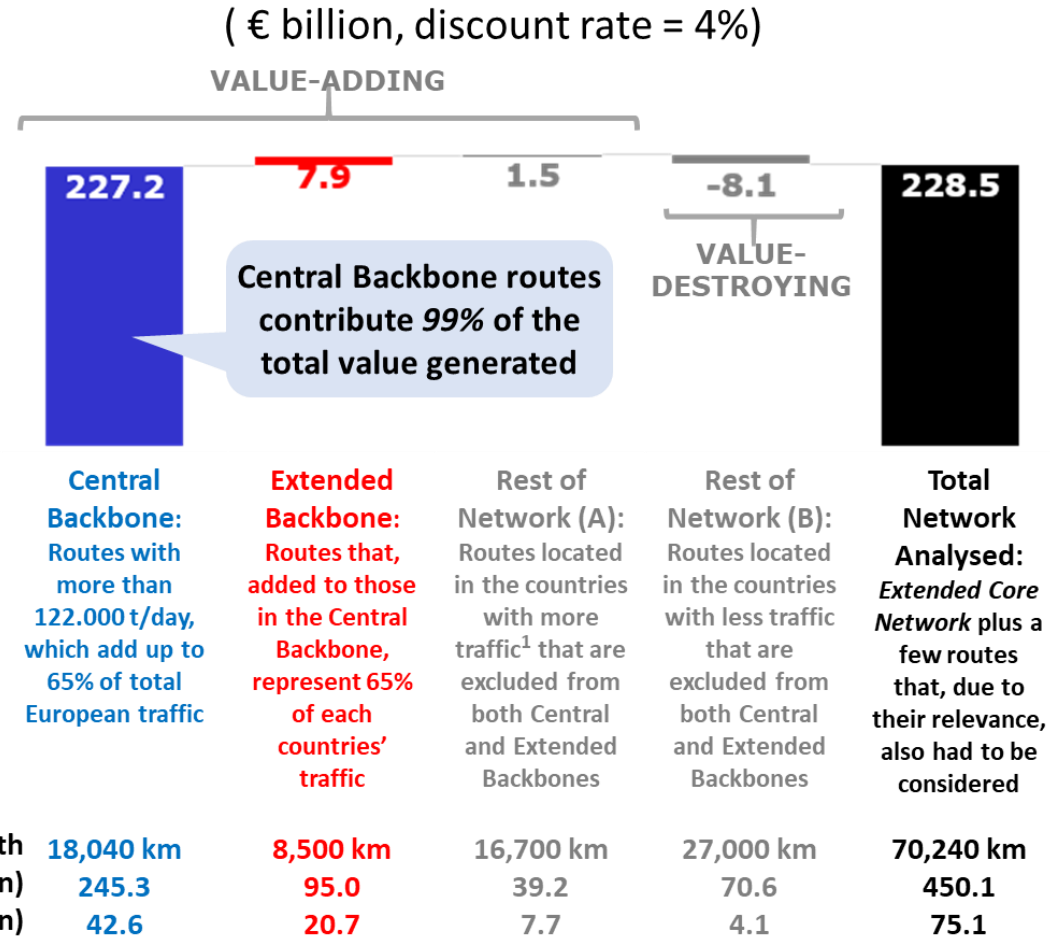
# MAIN CONCLUSIONS (VII) (PRELIMINARY RESULTS)

## 1. Marginal economic cost of transport (€/tonne-km)



- ❖ **Operational cost reduction.** Road vs +FIRRST combined transport (including taxes): 58%
- ❖ **Externality reduction.** Road vs +FIRRST combined transport: 76%

## 2. Net present value contribution (€ billion, discount rate = 4%)



	Central Backbone	Extended Backbone	Rest of Network (A)	Rest of Network (B)	Total Network Analysed
Length	18,040 km	8,500 km	16,700 km	27,000 km	70,240 km
TEN-T investment (1€ billion)	245.3	95.0	39.2	70.6	450.1
FERRMED investment (1€ billion)	42.6	20.7	7.7	4.1	75.1

1. These countries are Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, Netherlands, Slovakia and Switzerland.  
 Source: FERRMED, preliminary data as of May 2023 (some details might differ from those published in the final report to be issued later in 2023).  
 Rest of the network sections include also the segments that are almost within the threshold of Central and Extended Backbone (light blue and red blue in the Backbone Network map)



## RECOMMENDATIONS

### ❖ To the EC (DG MOVE)

To establish a “EU land freight transport priority investment plan” with first priority where the most freight transport exist.

### ❖ To the European Council and EU Parliament

To consent to the proposed “EU land freight transport priority investment plan”

### ❖ To the Member States

To establish the corresponding national investment plan according with “EU land freight transport priority investment plan”

### ❖ To the transport sector (logistics operators, transport operators, freight forwarders, ...)

To engage in concretising and implementing +FIRRST.

### ❖ To the EU key associations

To agree in common guidelines with associations (such as BUSINESS EUROPE, CER, CLECAT, ERFA, ESC, FERRMED, IRU, SME UNITED, UIRR...) to support the “EU land freight priority investment plan”, including +FIRRST testing in preselected corridors.





**FERROMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# TABLES AND MAPS OF THE EU LAND TRAFFIC

# TABLES AND MAPS OF THE EU LAND TRAFFIC

## Data collection

- **Data gathering** from several sources for **year 2015** (even 2018), mainly **UNECE, EUROSTAT, CEDR, OPEN RAILWAY MAP, OPEN STREET MAP** for road and rail
- **Complementary** data obtained from **national sources** wherever necessary (Italian toll motorways association, Croatian national transport model...)
- **Inland waterway** traffic calculated using an **assignment** model based on **origin-destination matrices** obtained from **national sources**
- **Revision of data** by national experts + completion of gaps



# TABLES AND MAPS OF THE EU LAND TRAFFIC

SECTION					ACTUAL TRAFFIC 2015						
					Rail traffic				Road traffic		
ID	FROM	TO	Km	Nº of tracks	Passenger Trains / Day	Freight Trains / Day	Rail Tonnes	Total trains / Day	Trucks	Road Tonnes	Total Tonnes
219	Aranjuez	Madrid	48	2	141	26	10.400	167	17.389	243.446	253.846
220	Alcázar de San Juan	Aranjuez	84	2	33	26	10.400	59	5.648	79.072	89.472
221	Manzanares	Alcázar de San Juan	49	2	26	11	4.400	37	6.672	93.408	97.808
222	Linares/Baeza	Manzanares	109	2	10	15	6.000	25	6.672	93.408	99.408
223	Córdoba	Linares/Baeza	127	1	12	10	4.000	22	4.844	67.816	71.816
226	Bobadilla / La Roda	Córdoba	118	2	1	3	1.200	4	1.854	25.956	27.156
228	Algeciras	Bobadilla	187	1	11	2	800	13	7.567	105.938	106.738
246	Sevilla	Cordoba	127	1	0	8	3.200	8	4.214	58.996	62.196
246	Sevilla HSL	Cordoba HSL	127	2	0	8	3.200	8	4.214	58.996	62.196
247	Dos Hermanas	Sevilla	8	2	114	0	0	114	6.330	88.620	88.620
248	Bobadilla	Dos Hermanas	118	1	18	0	0	18	2.786	39.004	39.004
256	Figueres	Portbou	30	2	32	12	4.800	44	11.222	157.108	161.908
257	Sant Celoni	Figueres	91	2	52	12	4.800	64	12.538	175.532	180.332
258	Granollers	Sant Celoni	22	2	113	12	4.800	125	13.690	191.660	196.460
259	Mollet	Granollers	10	2	151	13	5.200	164	12.743	178.402	183.602
261	Figueres HSL	<b>Le Pérthus (French border)</b>	20	2	0	3	1.200	3	0	0	1.200
262	Mollet HSL	Figueres HSL	110	2	0	3	1.200	3	0	0	1.200
263	Castellbisbal	Mollet	27	4	62	18	7.200	80	14.990	209.860	217.060
263	Castellbisbal	Mollet	27	4	62	18	7.200	80	14.990	209.860	217.060
264	Barcelona (Port/ZF)	Castellbisbal	27	4	3	37	14.800	40	26.548	371.672	386.472
265	Martorell	Castellbisbal	8	2	162	46	18.400	208	26.548	371.672	390.072
266	Sant Vicenç	Martorell	49	2	72	36	14.400	108	23.793	333.102	347.502
267	Picamoixons	Sant Vicenç	36	1	9	6	2.400	15	0	0	2.400
268	Tarragona	Sant Vicenç	25	2	92	30	12.000	122	23.793	333.102	345.102
269	Vandellós	Tarragona	38	2	53	9	3.600	62	9.334	130.676	134.276
270	Castelló	Vandellós	140	2	39	9	3.600	48	9.203	128.842	132.442
271	Sagunt	Castelló	43	2	91	10	4.000	101	14.517	203.238	207.238
272	València	Sagunt	27	2	103	13	5.200	116	21.272	297.808	303.008
273	Silla	València	12	2	190	19	7.600	209	18.255	255.570	263.170
274	Xàtiva	Silla	44	2	118	15	6.000	133	18.255	255.570	261.570
275	Font de la Figuera/La Encina	Xàtiva	41	2	34	15	6.000	49	15.816	221.424	227.424
276	Alacant (S.Vicent Raspeig)	Font de la Figuera/La Encina	79	1	27	0	0	27	8.845	123.830	123.830
277	El Reguerón	Alacant	68	1	47	0	0	47	10.345	144.830	144.830
278	Cartagena	El Reguerón	53	1	47	1	400	48	3.458	48.412	48.812
279	Murcia	El Reguerón	10	2	67	1	400	68	11.364	159.096	159.496
280	Alcantarilla	Murcia	16	1	9	2	800	11	11.364	159.096	159.896
281	Lorca	Alcantarilla	56	1	31	0	0	31	7.102	99.428	99.428
282	Águilas	Lorca	54	1	7	0	0	7	466	6.524	6.524



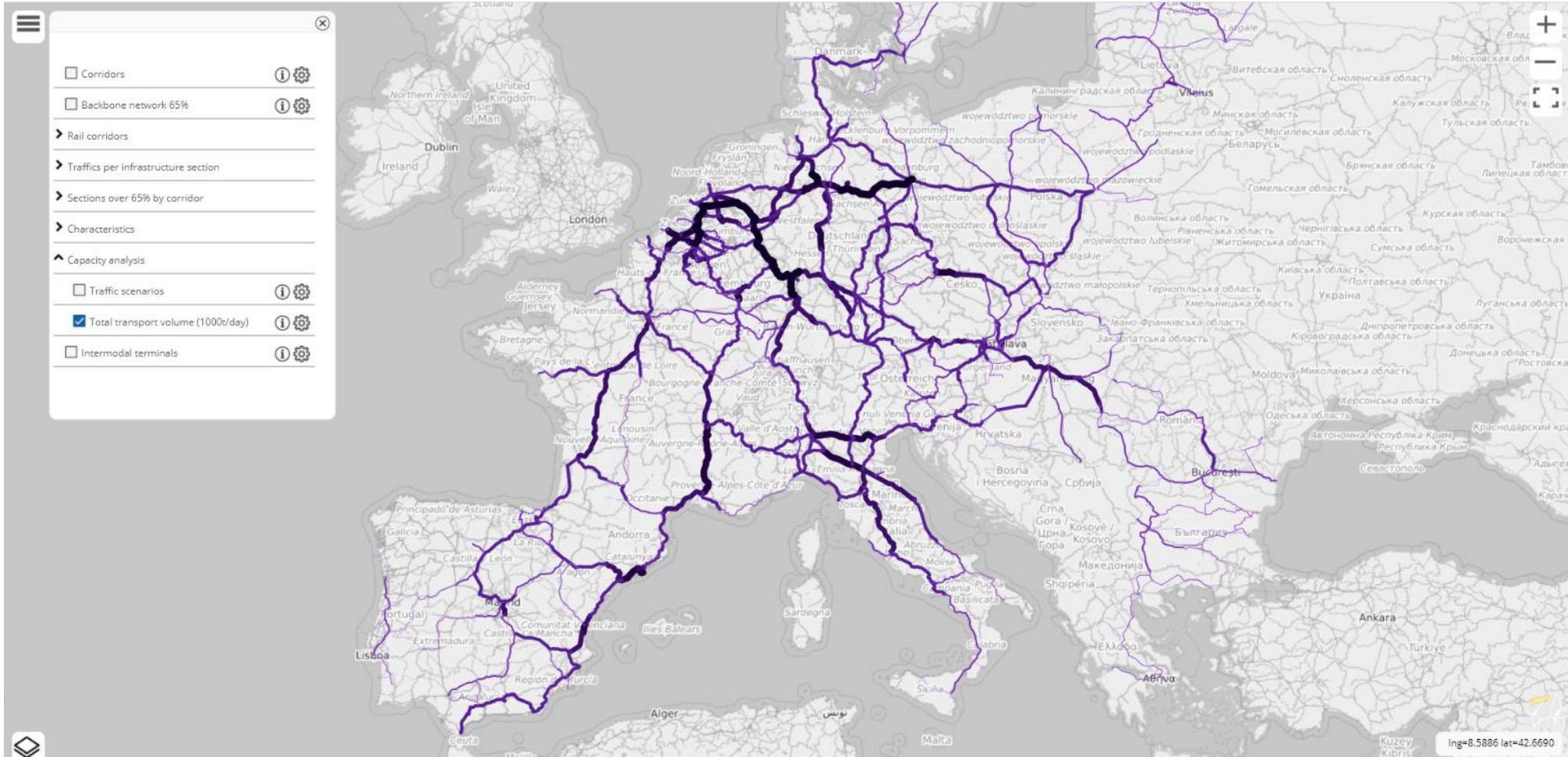
# TABLES AND MAPS OF THE EU LAND TRAFFIC

SECTION					ACTUAL TRAFFIC 2015						
					Rail traffic				Road traffic		
ID	FROM	TO	Km	Nº of tracks	Passenger Trains / Day	Freight Trains / Day	Rail Tonnes	Total trains / Day	Trucks	Road Tonnes	Total Tonnes
283	Almería	Lorca	147	1	0	0	0	0	6.816	95.424	95.424
284	Moreda	Almería	124	1	12	0	0	12	6.816	95.424	95.424
285	Bobadilla	Moreda	157	1	6	0	0	6	8.301	116.214	116.214
286	Alora	Bobadilla	32	1	14	0	0	14	3.970	55.580	55.580
287	Málaga	Alora	34	1	38	0	0	38	0	0	0
288	Reus	Nus de Vilaseca/Tarragona	18	2	48	32	12.800	80	15.312	214.368	227.168
289	Flix	Reus	48	1	13	19	7.600	32	398	5.572	13.172
290	Samper	Flix	121	1	8	17	6.800	25	203	2.842	9.642
291	Zaragoza	Samper	63	1	8	14	5.600	22	0	0	5.600
292	Picamoixons	Reus	21	1	10	11	4.400	21	16.623	232.722	237.122
293	Lleida	Picamoixons	69	1	11	17	6.800	28	15.206	212.884	219.684
294	Cerdanyola	Montcada	5	2	210	3	1.200	213	0	0	1.200
295	Terrassa	Cerdanyola	18	2	148	1	400	149	0	0	400
296	Manresa	Terrassa	32	2	63	1	400	64	9.705	135.870	136.270
297	Lleida	Manresa	126	1	23	18	7.200	41	15.312	214.368	221.568
298	Monzón	Lleida	52	1	7	17	6.800	24	0	0	6.800
299	Zaragoza	Monzón	136	1	7	16	6.400	23	0	0	6.400
300	Lleida - HSL	Tarragona HSL	100	2	0	0	0	0	0	0	0
301	Zaragoza - HSL	Lleida HSL	150	2	7	17	6.800	24	8.540	119.560	126.360
302	Casetas	Zaragoza	9	2	71	29	11.600	100	7.289	102.046	113.646
303	Arcos de Jalon	Casetas	145	2	9	15	6.000	24	5.264	73.696	79.696
1615	Guadalajara	Arcos de Jalon	150	2	9	15	6.000	24	7.000	98.000	104.000
304	Madrid	Guadalajara	57	2	124	15	6.000	139	12.520	175.280	181.280
305	Castejón	Casetas	78	2	37	22	8.800	59	7.289	102.046	110.846
306	Miranda de Ebro	Castejón	145	1	16	13	5.200	29	4.177	58.478	63.678
308	Chinchilla	La Encina	78	2	0	15	6.000	15	9.577	134.078	140.078
309	Albacete	Chinchilla	20	2	0	17	6.800	17	10.151	142.114	148.914
310	Cieza	Murcia/Alcantarilla	58	1	9	2	800	11	6.160	86.240	87.040
311	Chinchilla	Cieza	99	1	9	3	1.200	12	2.618	36.652	37.852
312	Alcázar de San Juan	Albacete	157	2	25	17	6.800	42	6.696	93.744	100.544
314	Caudiel	Sagunt	55	1	7	0	0	7	3.499	48.986	48.986
315	Zaragoza	Caudiel	259	1	7	0	0	7	3.198	44.772	44.772
1362	Altsasu	Pamplona-Castejón	141	1	25	9	3.600	34	4.703	65.842	69.442
1387	Madrid-HSL	Zaragoza HSL	320	2	70	0	0	70	0	0	0





# TABLES AND MAPS OF THE EU LAND TRAFFIC



Example of total traffic map





Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# EU BACKBONE NETWORK DETERMINATION

# EU BACKBONE NETWORK DETERMINATION




**EU Core Network (aggregated): 70,240 km**  
**EU Central Backbone Network: 18,040 km (25.8%)**  
**EU Extended Backbone Network: 8,500 km (12.1%)**  
**Backbone Network 65% threshold: 122,000 tonnes/day**

### Country thresholds in 1000 tonnes/day

<i>Austria</i>	116	<i>Germany</i>	172	<i>Finland</i>	31	<i>Lithuania</i>	63	<i>Portugal</i>	28
<i>Belgium</i>	180	<i>Denmark</i>	119	<i>France</i>	128	<i>Luxembourg</i>	204	<i>Romania</i>	73
<i>Bulgaria</i>	35	<i>Estonia</i>	62	<i>Croatia</i>	21	<i>Latvia</i>	43	<i>Sweden</i>	50
<i>Switzerland</i>	155	<i>Greece</i>	39	<i>Hungary</i>	174	<i>Netherlands</i>	213	<i>Slovenia</i>	92
<i>Czech Republic</i>	122	<i>Spain</i>	100	<i>Italy</i>	161	<i>Poland</i>	83	<i>Slovakia</i>	72

This information is always available on the interactive map by clicking on the bottom left icon:



**Country thresholds in 1000 tonnes/day**

<i>Austria</i>	116	<i>Germany</i>	172	<i>Finland</i>	31	<i>Lithuania</i>	63	<i>Portugal</i>	28
<i>Belgium</i>	180	<i>Denmark</i>	119	<i>France</i>	128	<i>Luxembourg</i>	204	<i>Romania</i>	73
<i>Bulgaria</i>	35	<i>Estonia</i>	62	<i>Croatia</i>	21	<i>Latvia</i>	43	<i>Sweden</i>	50
<i>Switzerland</i>	155	<i>Greece</i>	39	<i>Hungary</i>	174	<i>Netherlands</i>	213	<i>Slovenia</i>	92
<i>Czech Republic</i>	122	<i>Spain</i>	100	<i>Italy</i>	161	<i>Poland</i>	83	<i>Slovakia</i>	72








# EU BACKBONE NETWORK DETERMINATION






# SPANISH BACKBONE NETWORK DETERMINATION

COMPROVAR  
PER L'EFRAIN

-  Central Backbone
-  Extended backbone in states below EU threshold
-  Feeder and backup links of the Backbone Network
-  Sections that are within 2% of the EU threshold and almost make it into the central Backbone
-  Sections that are within 2% of the national threshold and almost make it into the extended Backbone



-  First priority (2,855 km)
-  Second priority (1,451 km)
-  Third priority (4,673 km)





Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# DEFINITION AND DETERMINATION OF STRATEGIC SOCIO-ECONOMIC HUBS

## THE IMPORTANCE OF EU STRATEGIC HUBS

- Transports “serve” social and economic development
- Territorial hubs are geo-economic agglomerations that drive freight mobility
- “Strategic” hubs are the hierarchically most relevant hubs in promoting European growth and competitiveness

## IDENTIFICATION OF THE 30 EU HUBS

To identify and determine the EU hubs, 4 factors were used as a selection criteria: Population, Input-Output flow, GVA and the Synthetic Index.

- **Inflow-Outflow:** number of total freight tonnes (to destinations at a distance over 300km from the centroids of the hub's NUTS3 components) handled per day resulting from the matrix.
- **Gross Value Added (GVA manufacture):** it is the value of manufactured goods produced in an area or an economic sector.
- **Population:** First filter to select the main EU urban agglomerations susceptible to become a Hub. For the Strategic Hubs, the population of their corresponding urban agglomeration had to exceed the 1% of the EU population (4,4M people). For the EU Interrelated Hubs, their population had to be between the 1% and the 0,5% of the EU population (2,2M people).
- **Synthetic Index:** value resulting from the weighting of the Population, GVA and Input-Output flow values.





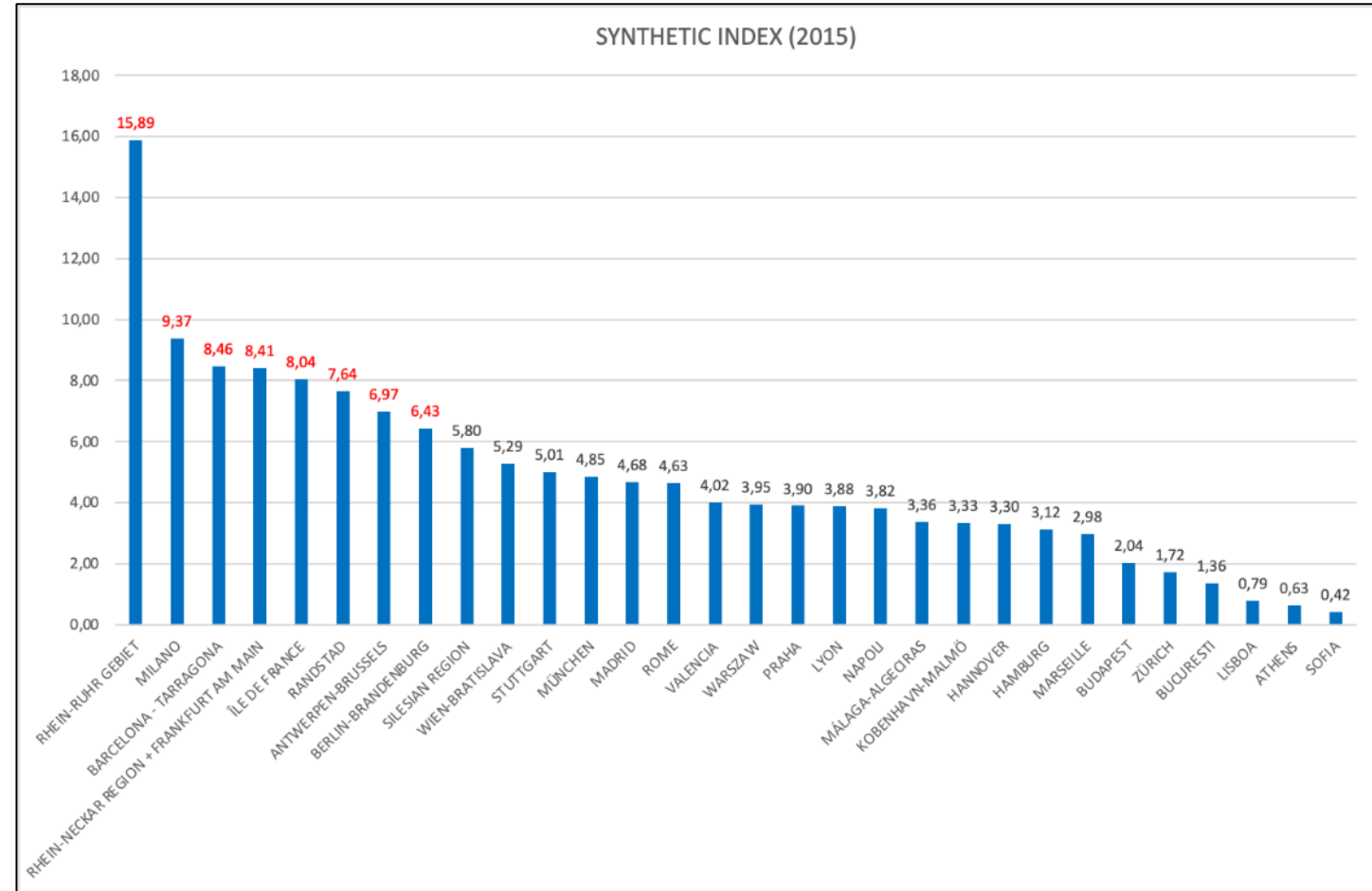
# THE HIERARCHICAL DISTRIBUTION OF THE EU STRATEGIC HUBS

## Synthetic Index

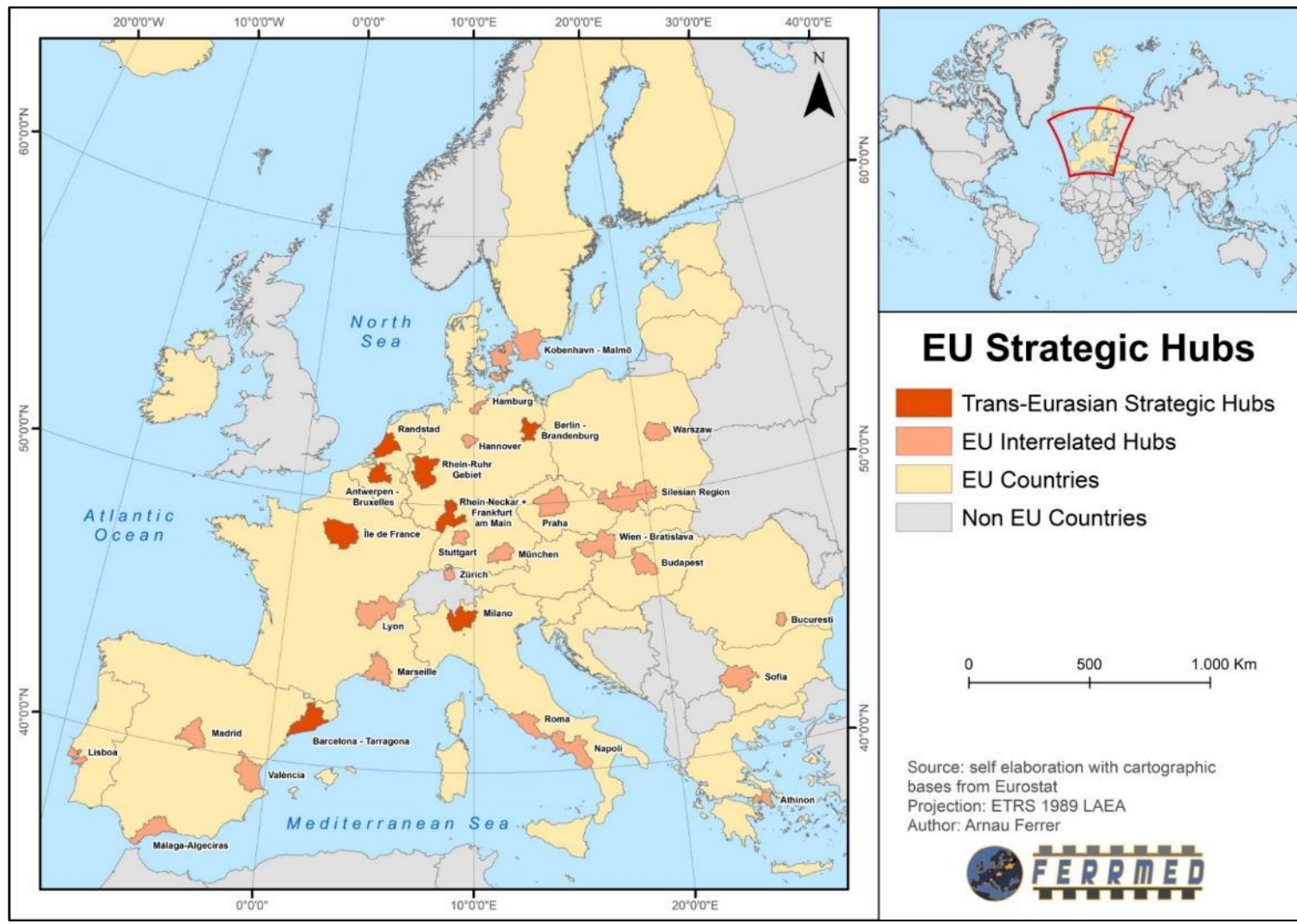
### Values weighting

HUB NAME	Synthetic index
RHEIN-RUHR GEBIET	15,89
MILANO	9,37
BARCELONA - TARRAGONA	8,46
RHEIN-NECKAR REGION + FRANKFURT AM MAIN	8,41
ÎLE DE FRANCE	8,04
RANDSTAD	7,64
ANTWERPEN-BRUSSELS	6,97
BERLIN-BRANDENBURG	6,43
SILESIA REGION	5,80
WIEN-BRATISLAVA	5,29
STUTTGART	5,01
MÜNCHEN	4,85
MADRID	4,68
ROME	4,63
VALENCIA	4,02
WARSAW	3,95
PRAHA	3,90
LYON	3,88
NAPOLI	3,82
MÁLAGA-ALGECIRAS	3,36
KOBENHAVN-MALMÖ	3,33
HANNOVER	3,30
HAMBURG	3,12
MARSEILLE	2,98
BUDAPEST	2,04
ZÜRICH	1,72
BUCURESTI	1,36
LISBOA	0,79
ATHENS	0,63
SOFIA	0,42

HUB POP	GVA Ind.	INPUT-OUTPUT
1	5	10



# GEOGRAPHICAL DISTRIBUTION OF THE EU STRATEGIC HUBS





Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# DEFINITION AND ANALYSIS OF INTERMODAL TERMINALS

# DATA COLLECTION OF INTERMODAL TERMINALS AND MARSHALLING YARDS

- ❖ The FERRMED Database of the EU Backbone Network consists of the main characteristics of the terminals as well as some screenshots.
- ❖ Checking sessions of the gathered information have been made.

## Basic key characteristics requested:

### Intermodal Terminals

1. Contact information
2. Modes served
3. Opening hours for load/unload
4. Total terminal area (m<sup>2</sup>)
5. Configuration: Dead-End / Pass-Through
6. Number and usable length of tracks (m), for loading/unloading
7. Number and usable length of tracks (m), for marshalling/shunting
8. Number of gantry cranes
9. Number of reach stackers
10. Available services



# EXAMPLE OF A TERMINAL ANALYSIS: TOULOUSE – FENOUILLET CONTAINER TERMINAL (NAVILAND)



**Length of the tracks**



**Number of gantry cranes**



**Number of reachstackers**

INTERMODAL TERMINAL CHARACTERISTICS				
<b>MAIN INFORMATION</b>		<b>Terminal Name: Toulouse-Fenouillet</b>		
		Terminal Operator: NAVILAND		
		Latitude °, Longitude °: 43.420169, 1.234257		
		Address: Route Nationale 20, 31150, Fenouillet		
		Contact person: Stéphane Tordjman		
		Function: Service Commercial		
		General e-mail: stordjman@naviland-cargo.com		
		General Phone: +33 (0) 5 61 37 51 51		
		website: <a href="http://http://www.naviland-cargo.com/implantations/toulouse">http://http://www.naviland-cargo.com/implantations/toulouse</a>		
	CONCEPTS	Present conditions	Future conditions	
			expected expansion	year
1	Modes served:	Road	YES	
		Rail	YES	
		Barge	-	
		Ferry	-	
		Sea Vessel	-	
		Piggyback	-	
2	Opening hours: from: - to:	Mo-Fr	07:00 - 18:30	
		Saturday	-	
		Sunday	-	
3	Handling of:	Container	YES	
		Swap Body	-	
		Semitrailer	-	
		Bulk	-	
4	Total Terminal Area (m2):	74.941		
	Capacity for containers storage (m2, TEU)	-		
	Capacity for swap body storage (m2, no.)	-		
	Reefers connection capacity (m2, TEU)	-		
	Additional capacity for other products storage	-		
	Cars (m2, no.)	-		
	Chemicals and dangerous goods (m2)	-		
Bulk, etc. (m2)	-			
Additional Buffer Areas (m2, TEU)		-		
5	Rail	1 x 340 6 x 550	x x x x	
	Number of tracks x Usable length (m) / gauge		x	
Total no. of tracks / Total usable length (m)		7 x 3.640	/	
Marshalling yard capability YES / NO		YES		
If not, name of next marshalling yard and distance (m)				
Connection with main rail lines (name/bounds)				



# PRELIMINARY CLASSIFICATION OF THE EXISTING INTERMODAL TERMINALS (EU)

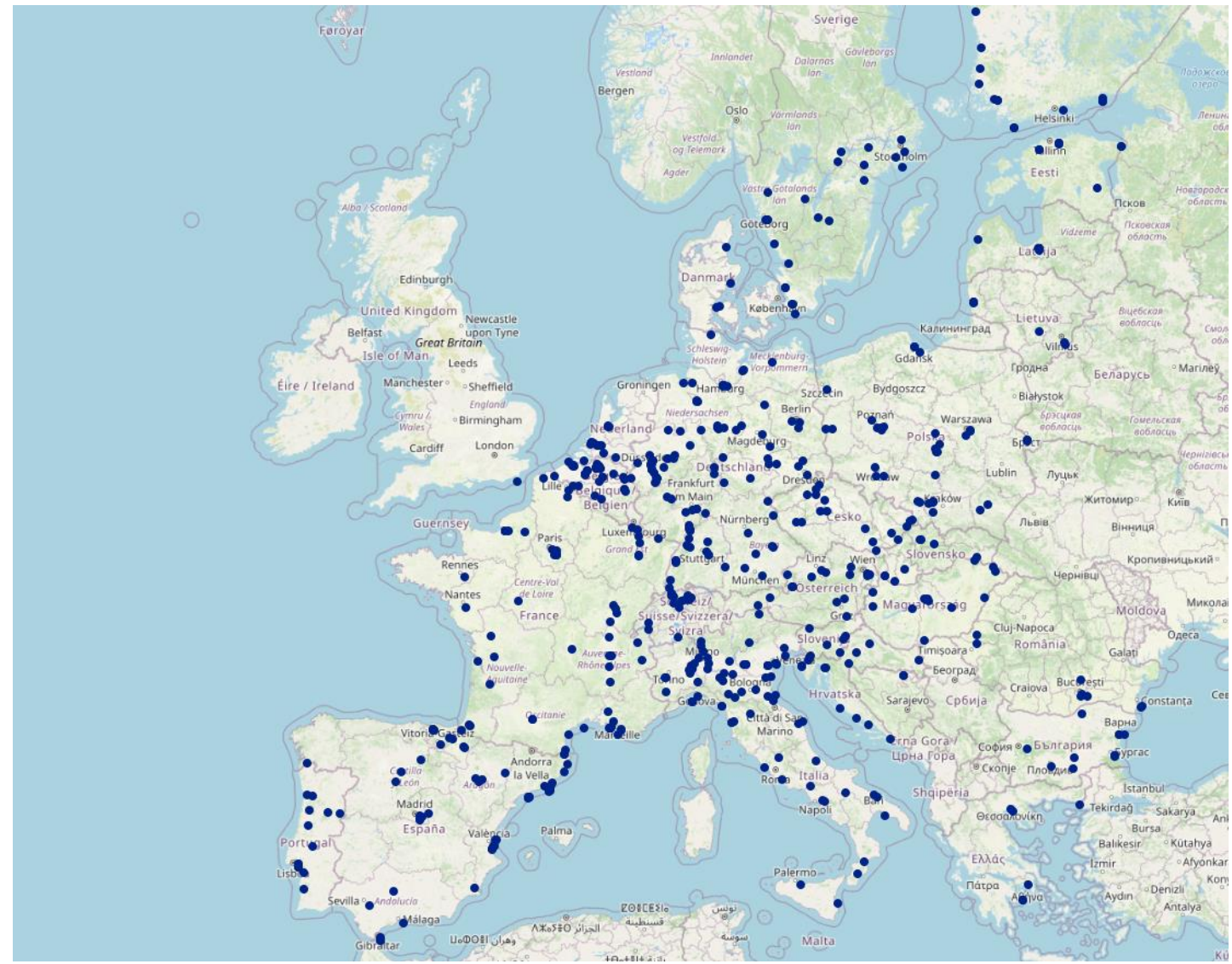
Classification of L/U		EUROPE	percentage
< 250m	A	118	19.44%
251m - 500m	B	265	43.66%
501m - 700m	C	154	25.37%
701m - 750m	D	44	7.25%
> 750m	E	26	4.28%
	<b>total</b>	<b>607</b>	
	<b>pass through</b>	72	<b>11.86%</b>
	<b>possible pass through</b>	66	<b>10.87%</b>
	<b>C possible enlargement (750m)</b>	5	

# CLASSIFICATION OF THE EXISTING INTERMODAL TERMINALS (SPAIN)

Classification of L/U		SPAIN	percentage	pass through	possible pass through
< 250m	A	9	14.75%		
251m - 500m	B	34	55.74%	5	5
501m - 700m	C	7	11.48%	2	4
701m -750m	D	8	13.11%	1	
> 750m	E	3	4.92%		
	<b>total</b>	<b>61</b>			
	<b>pass through</b>	<b>8</b>	<b>13.11%</b>		
	<b>possible pass through</b>	<b>9</b>	<b>14.75%</b>		
	<b>C possible enlargement (750m)</b>				



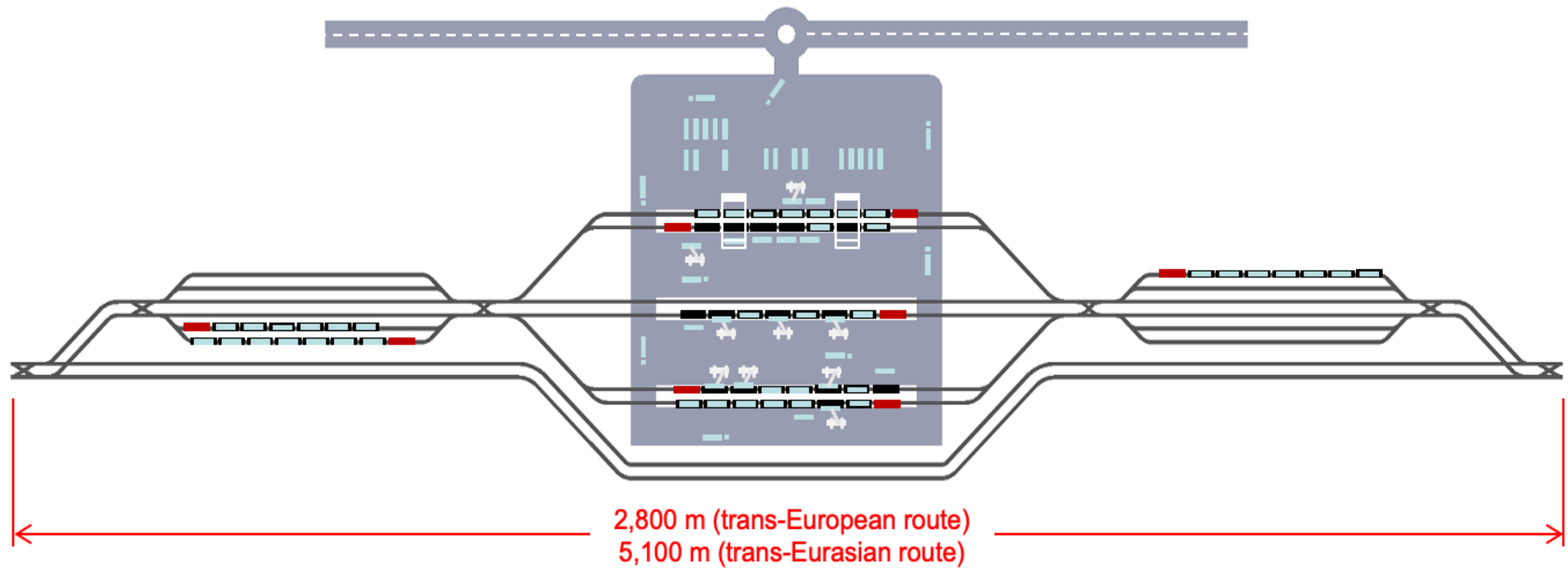
# MAP OF EXISTING INTERMODAL TERMINALS IN THE EU (Preliminary)





# INTERMODAL TERMINALS NEW CONCEPT

## +FIRrst STRATEGIC TERMINAL (A)





**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# SELECTION AND ANALYSIS OF MAIN INTERCONNECTION, BACK-UP AND FEEDER LINKS

# SELECTION OF MAIN INTERCONNECTION, BACK-UP, AND FEEDER LINKS INTERCONNECTING THE MAIN LOGISTICS HUBS

## Infrastructure characteristics' data collection

The first step of selection and analysis of interconnection links is to collect data, including the key infrastructure and operation parameters to consider as requirements

### **We have collected data on the following:**

- Length of the trains
- Loading gauge
- ERTMS implementation
- International track gauge
- Number of tracks
- Electrification
- Train Speed acceptance
- Track Gradient
- Operation issues
- Rolling stock issues
- Link section traffic saturation (Bottlenecks)

# SELECTION OF MAIN INTERCONNECTION, BACK-UP, AND FEEDER LINKS INTERCONNECTING THE MAIN LOGISTICS HUBS

CORRIDOR		RAILWAY																			
NAME	INTERCONNECTION LINK M- Main B- Back-up F- Feeder	SECTION				NUMBER OF TRACKS	SIDING TRACKS	MAXIMUM CAPACITY					TRACK GAUGE (mm)	ELECTRIFICATION		CONTROL SIGNALING		MAXIMUM LENGTH FREIGHT TRAINS (M)	LOADING GAUGE	TRAIN SPEED (KM/H)	GRADIENT (0/00)
		NUM.	FROM	TO	Kms			Trains / day				Saturation		YES/NO	TYPE OF CURRENT	ERTMS Y/N/YEAR	NATIONAL				
								Freight	Passenger	TOTAL	Acceptance										
Mediterranean	M	1	Bobadilla	Dos Hermanas	118,0	1		0	18	18	95	-77	1.668	N		N > 2023	ASFA	500	45/364GHE16	V > 100	17
Mediterranean	M	2	Dos Hermanas	Sevilla	8,0	2		0	114	114	190	-76	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11
Mediterranean	M	3	Sevilla	Cordoba	127,0	1		8	12	20	95	-75	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	13
Mediterranean	M	4	Córdoba	Linares/Baeza	127,0	1		10	12	22	95	-73	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	550	45/364GHE16	V > 100	13
Mediterranean	M	5	Linares/Baeza	Manzanares	109,0	1#2		10	15	25	95	-70	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11
Mediterranean	M	6	Manzanares	Alcázar de San Juan	49,0	2		11	26	37	190	-153	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	9
Mediterranean	M	7	Alcázar de San Juan	Aranjuez	84,0	2		26	33	59	190	-131	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	6
Mediterranean	M	8	Aranjuez	Madrid	48,0	2		26	141	167	190	-23	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	5
Mediterranean	M	9	Algeciras	Bobadilla	187,0	1		2	11	13	95	-82	1.668	N		N > 2023	ASFA	500	45/364GHE16	90 < V < 100	23
Mediterranean	M	10	Bobadilla	La Roda	5,0	2		0	48	48	190	-142	1.435	Y	25KvAC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	90 < V < 100	22
Mediterranean	M	11	Bobadilla	La Roda	5,0	1		2	12	14	95	-81	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	17
Mediterranean	M	12	La Roda	Córdoba	118,0	2		0	48	48	190	-142	1.435	Y	25KvAC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	15
Mediterranean	M	13	La Roda	Córdoba	118,0	1		3	1	4	95	-91	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	14
Mediterranean	M	14	Sevilla	Cordoba HSL	127,0	2		0	54	54	190	-136	1.435	Y	25KvAC	Y	LZB	750	45/364GHE16	V > 100	12
Mediterranean	M	15	Córdoba	Puerto Llano HSL	150,0	2		0	96	96	190	-94	1.435	Y	25KvAC	Y	LZB	750	45/364GHE16	V > 100	12
Mediterranean	M	16	Puertollano	Madrid-HSL	240,0	2		0	96	96	190	-94	1.435	Y	25KvAC	Y	LZB	500	45/364GHE16	V > 100	12
Mediterranean	F	17	Alcázar de San Juan	Albacete	157,0	2		17	25	42	190	-148	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	10
Mediterranean	F	18	Albacete	Chinchilla	20,0	2		17	10	27	190	-163	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	9
Mediterranean	F	19	Chinchilla	La Encina	78,0	2		17	10	27	190	-163	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	13
Mediterranean	F	20	Chinchilla	Cieza	99,0	1		3	9	12	95	-83	1.668	N		N	ASFA	500	45/364GHE16	V > 100	12
Mediterranean	F	21	Cieza	Murcia/Alcantarilla	58,0	1		2	9	11	95	-84	1.668	N		N	ASFA	500	45/364GHE16	V > 100	13
Mediterranean	F	22	Zaragoza	Caudiel	259,0	1		1	7	8	95	-87	1.668	N		N	ASFA	450	45/364GHE16	V > 100	15
Mediterranean	F	23	Caudiel	Sagunt	55,0	1		1	7	8	95	-87	1.668	N		N	ASFA	450	45/364GHE16	V > 100	9
Medit / Atlantic	F	24	Altsasu	Pamplona-Castejón	141,0	1		9	25	34	95	-61	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	550	45/364GHE16	V > 100	17
Medit / Atlantic	F	25	Miranda de Ebro	Castejón	145,0	1		13	16	29	95	-66	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	550	45/364GHE16	V > 100	13
Medit / Atlantic	F	26	Castejón	Casetas	78,0	2		22	37	59	190	-131	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	550	45/364GHE16	V > 100	8
Mediterranean	M	27	Madrid	Guadalajara	57,0	2		15	124	139	190	-51	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	8
Mediterranean	M	28	Guadalajara	Casetas	295,0	2		15	9	24	190	-166	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	14
Mediterranean	M	29	Casetas	Zaragoza	9,0	2		29	71	100	190	-90	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	17
Mediterranean	M	30	Madrid-HSL	Zaragoza	320,0	2		0	70	70	190	-120	1.435	Y	25KvAC	Y		750	GCC	V > 100	13
Mediterranean	M	31	Zaragoza - HSL	Lleida HSL	150,0	2		0	70	70	190	-120	1.435	Y	25KvAC	Y		750	GCC	V > 100	10
Mediterranean	M	32	Lleida - HSL	Tarragona	100,0	2		0	79	79	190	-111	1.435	Y	25KvAC	Y		750	GCC	V > 100	16
Mediterranean	B	33	Zaragoza	Monzón	136,0	1		16	7	23	95	-72	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	17
Mediterranean	B	34	Monzón	Lleida	52,0	1		17	7	24	95	-71	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	16
Mediterranean	B	35	Lleida	Manresa	126,0	1		0	6	6	95	-89	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	450	45/364GHE16	V > 100	13



# SELECTION OF MAIN INTERCONNECTION, BACK-UP, AND FEEDER LINKS INTERCONNECTING THE MAIN LOGISTICS HUBS

CORRIDOR		RAILWAY																			
NAME	INTERCONNECTION M- Main B- Back-up F- Feeder	SECTION				NUMBER OF TRACKS	SIDING TRACKS	MAXIMUM CAPACITY					TRACK GAUGE (mm)	ELECTRIFICATION		CONTROL SIGNALING		MAXIMUM LENGTH FREIGHT TRAINS (M)	LOADING GAUGE	TRAIN SPEED (KM/H)	GRADIENT (0/00)
		NUM.	FROM	TO	Kms			Trains / day				Saturation		YES/NO	TYPE OF CURRENT	ERTMS Y/N/YEAR	NATIONAL				
								Freight	Passenger	TOTAL	Acceptance										
Mediterranean	B	36	Manresa	Terrassa	32,0	2	3	63	66	190	-124	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	450	45/364GHE16	V > 100	17	
Mediterranean	B	37	Terrassa	Cerdanyola	18,0	2	3	148	151	190	-39	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	14	
Mediterranean	B	38	Cerdanyola	Montcada	5,0	2	3	210	213	190	23	1.668	Y	3KvDC	N	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11	
Mediterranean	M	39	Lleida	Picamoixons	69,0	1	17	28	45	95	-50	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	16	
Mediterranean	M	40	Picamoixons	Reus	21,0	1	11	21	32	95	-63	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	8	
Mediterranean	M	41	Zaragoza	Samper	63,0	1	14	8	22	95	-73	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	19	
Mediterranean	M	42	Samper	Flix	121,0	1	17	8	25	95	-70	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	17	
Mediterranean	M	43	Flix	Reus	48,0	1	19	13	32	95	-63	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11	
Mediterranean	M	44	Reus	Tarragona	18,0	2	32	48	80	190	-110	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	2	
Mediterranean	M	45	Málaga	Alora	34,0	1	0	38	38	95	-57	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	450	45/364GHE16	V > 100	24	
Mediterranean	M	46	Alora	Bobadilla	32,0	1	0	14	14	95	-81	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	450	45/364GHE16	V > 100	22	
Mediterranean	M	47	Bobadilla	Moreda	157,0	1	0	8	8	95	-87	1.668	N		N > 2023	ASFA	500	45/364GHE16	90 < V < 100	23	
Mediterranean	M	48	Moreda	Almería	124,0	1	0	12	12	95	-83	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	450	45/364GHE16	75 < V < 90	28	
Mediterranean	M	49	Almería	Lorca	147,0	1	0	0	0	0	0	1.435	Y	25KvAC			750				
Mediterranean	F	50	Águilas	Lorca	54,0	1	0	7	7	95	-88	1.668	N		N > 2023	ASFA	500	45/364GHE16	90 < V < 100	13	
Mediterranean	M	51	Lorca	Alcantarilla	56,0	1	0	31	31	95	-64	1.668	N		N > 2023	ASFA	500	45/364GHE16	V > 100	9	
Mediterranean	M	52	Alcantarilla	Murcia	16,0	1	2	9	11	95	-84	1.668	N		N > 2023	ASFA	500	45/364GHE16	V > 100	9	
Mediterranean	M	53	Murcia	El Reguerón	10,0	2	1	67	68	190	-122	1.668	N		N > 2023	ASFA	500	45/364GHE16	V > 100	4	
Mediterranean	M	54	Cartagena	El Reguerón	53,0	1	1	47	48	95	-47	1.668	N		N > 2023	ASFA	500	45/364GHE16	75 < V < 90	16	
Mediterranean	M	55	El Reguerón	Alacant	68,0	1	0	47	47	95	-48	1.668	N		N > 2023	ASFA	350	45/364GHE16	75 < V < 90	14	
Mediterranean	M	56	Alacant (S.Vicent Raspeig)	Font de La Figuera	79,0	1	0	27	27	95	-68	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	450	45/364GHE16	90 < V < 100	17	
Mediterranean	M	57	Font de la F/La Encina	Xàtiva	41,0	2	15	34	49	190	-141	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	10	
Mediterranean	M	58	Xàtiva	Silla	44,0	2	15	118	133	190	-57	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	7	
Mediterranean	M	59	Silla	València	12,0	2	19	190	209	190	19	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	5	
Mediterranean	M	60	València	Sagunt	27,0	2	13	103	116	190	-74	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11	
Mediterranean	M	61	Sagunt	Castelló	43,0	2	10	91	101	190	-89	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	7	
Mediterranean	M	62	Castelló	Vandellós	140,0	2	9	39	48	190	-142	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	15	
Mediterranean	M	63	Vandellós	Tarragona	38,0	2	9	43	52	190	-138	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	11	
Mediterranean	M	64	Tarragona	Sant Vicenç	25,0	2	30	92	122	190	-68	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	450	45/364GHE16	V > 100	9	
Mediterranean	F	65	Picamoixons	Sant Vicenç	36,0	1	6	9	15	190	-175	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	13	
Mediterranean	M	66	Sant Vicenç	Martorell	49,0	2	36	72	108	190	-82	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	14	
Mediterranean	M	67	Martorell	Castellbisbal	8,0	2	46	162	208	190	18	1.668	Y	3KvDC	N / 2020	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	7	
Mediterranean	M	68	Barcelona (Port/ZF)	Castellbisbal	27,0	4	37	3	40	380	-340	1668#1435	Y	25KvAC#3KvDC	Y	ASFA/LZB/EBIC	750	45/364GHE16	V > 100	15	
Mediterranean	M	69	Castellbisbal	Mollet	27,0	4	18	62	80	380	-300	1668#1435	Y	25KvAC#3KvDC	Y	ASFA/LZB/EBIC	750	45/364GHE16	V > 100	15	
Mediterranean	M	70	Mollet HSL	Figueres	110,0	2	3	29	32	190	-158	1.435	Y	25KvAC	Y		750	GCC	V > 100	18	
Mediterranean	M	71	Figueres HSL	Le Pérthus	20,0	2	3	11	14	190	-176	1.435	Y	25KvAC	Y		750	GCC	V > 100	18	
Mediterranean	M	72	Barcelona	Mollet	18,0	2	0	200	200	190	10	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	14	
Mediterranean	M	73	Mollet	Granollers	10,0	2	13	151	164	190	-26	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	12	
Mediterranean	M	74	Granollers	Sant Celoni	22,0	2	12	113	125	190	-65	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	15	
Mediterranean	M	75	Sant Celoni	Figueres	91,0	2	12	52	64	190	-126	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	15	
Mediterranean	M	76	Figueres	Portbou	30,0	2	12	32	44	190	-146	1.668	Y	3KvDC	N > 2023	ASFA/LZB/EBIC	500	45/364GHE16	V > 100	15	





**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

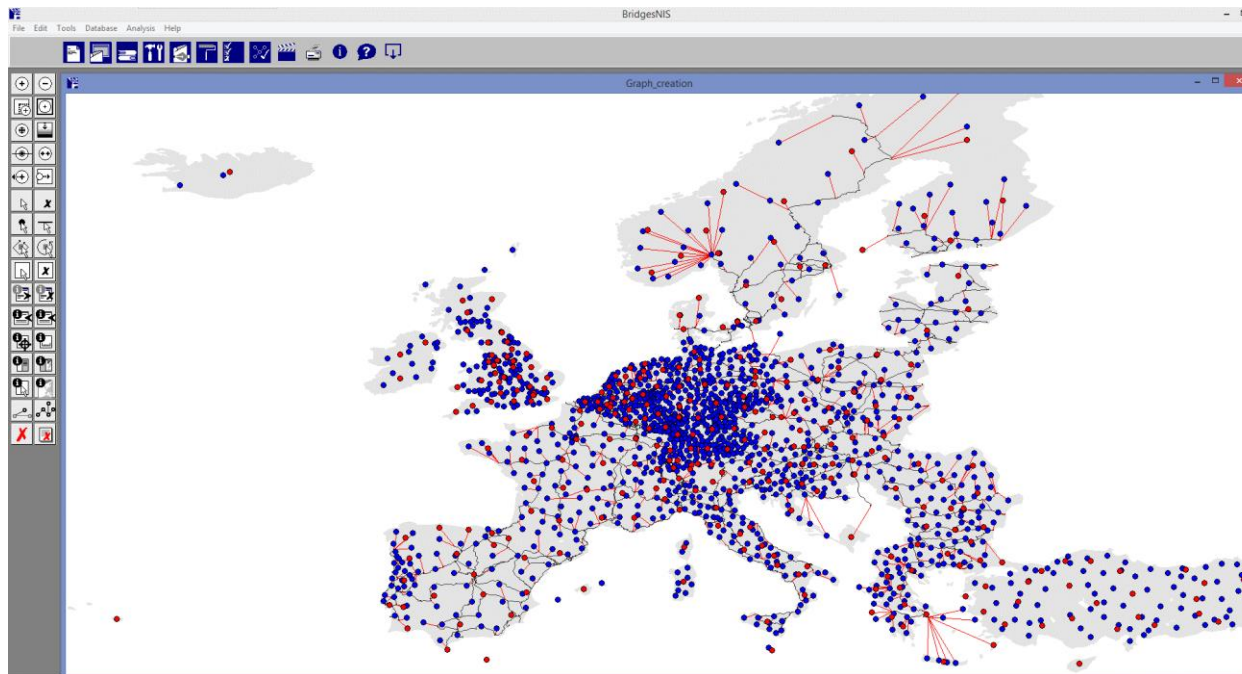
# FORECASTED TRAFFIC SCENARIOS AND MODELING OF ORIGIN-DESTINATION MATRICES

# FORECAST TRAFFIC SCENARIOS

## ❖ Preparation of the traffic model

We have built a modelling tool based on existing data:

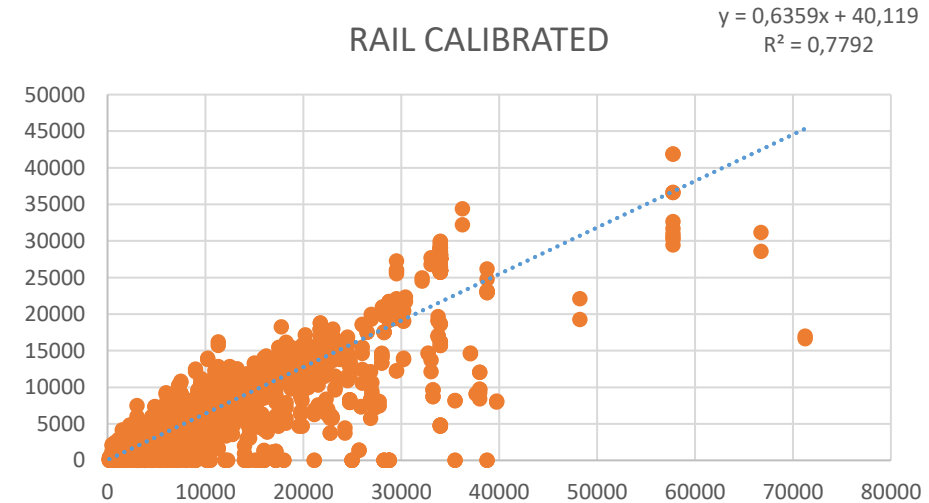
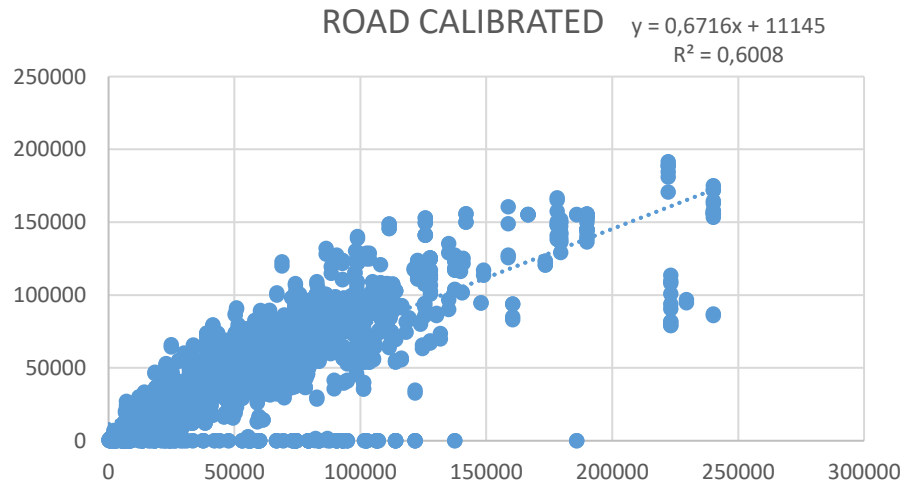
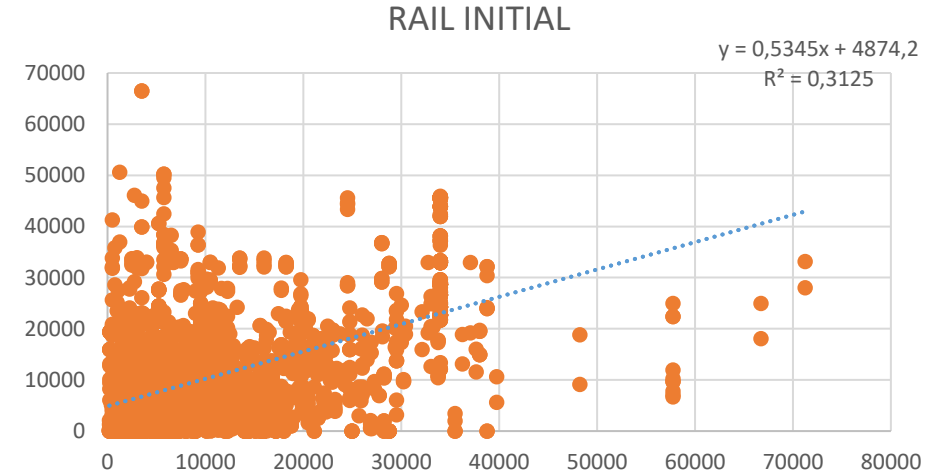
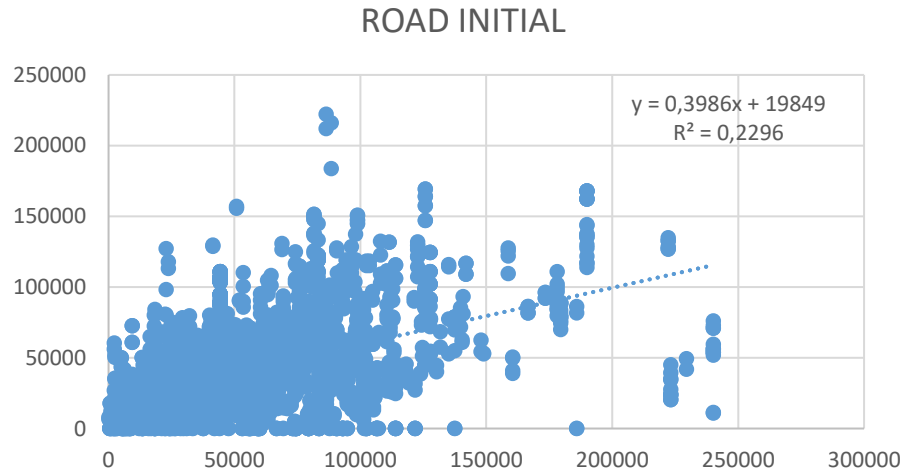
- *Zoning by NUTS3*
- *Network coming from the digitization of sections during the data collection phase*
- *Origin-Destination matrices by mode (road, rail, IWW) coming from ETISPLUS project (official ones used by DGMOVE)*



- 1,462 NUTS3
- 318 NUTS2
- 2,016 segments
- ↔ 1.5M OD pairs

# FORECAST TRAFFIC SCENARIOS

## ❖ Calibration of the model - From ETISPLUS to 2015 data





# FORECAST TRAFFIC SCENARIOS

## ❖ Mid term stagnant (2025)

- The target is **23%** of tonne-km by rail on **average in Europe** and in each **individual country** (as much as possible).

## ❖ Long term stagnant (2030)

- The target is **30%** of tonne-km by rail on **average in Europe** and in each **individual country** (as much as possible).

## ❖ Long term (2030) 20% increase

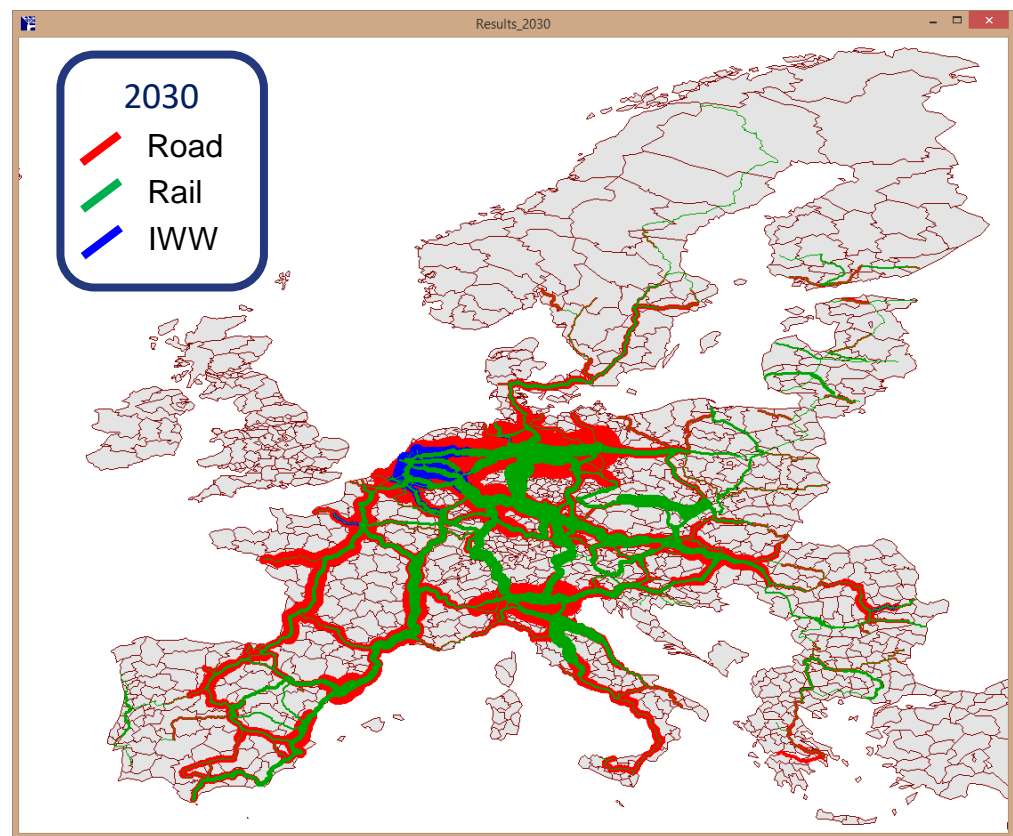
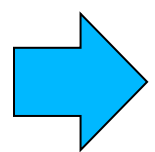
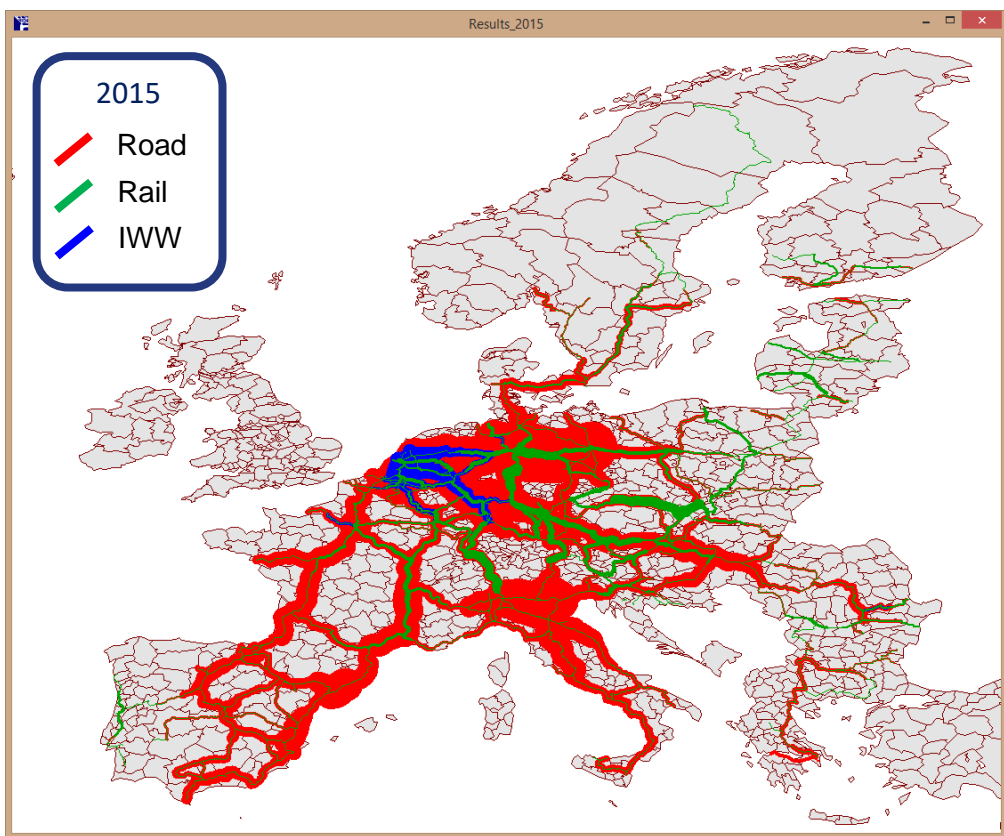
- We start from the 2030 stagnant scenario
- On top of it we add globally 20% traffic in all sections and modes

## ❖ Long term (2030) +20% with port traffic reequilibrium

- We start from the 2030 +20% scenario
- The assumption that the increase of traffic in the Mediterranean – Eurasian route in the future will be: 20% on the Northern basin and 80% on the Southern basin, until reaching approximately a 60/40 share north/south

# FORECAST TRAFFIC SCENARIOS

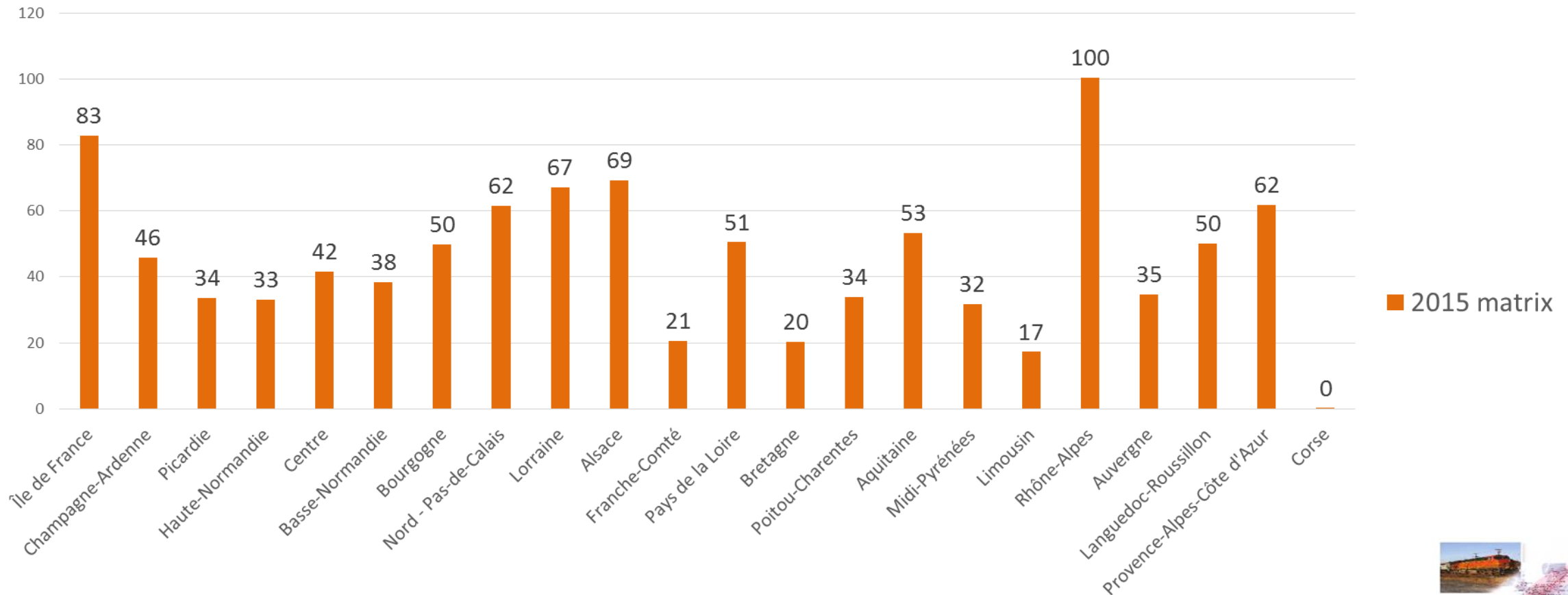
*Origin-Destination matrices by mode (road, rail, IWW) coming from ETISPLUS project (official ones used by DGMOVE)*



# INFLOW-OUTFLOW IN FRENCH NUTS

## FRANCE (NUTS2) (Over 300km)

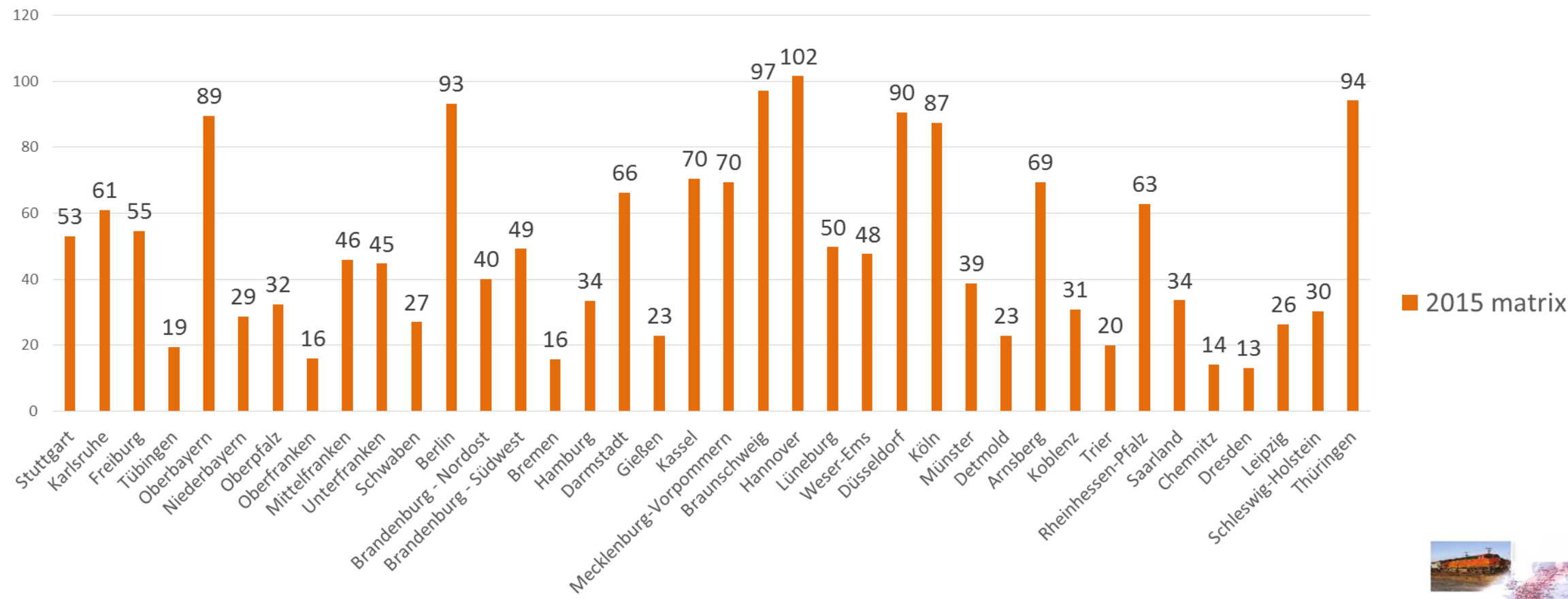
M tonnes handled by NUTS2 (road+rail+IWW in nodes connected to the backbone network)



# INFLOW-OUTFLOW IN GERMAN NUTS

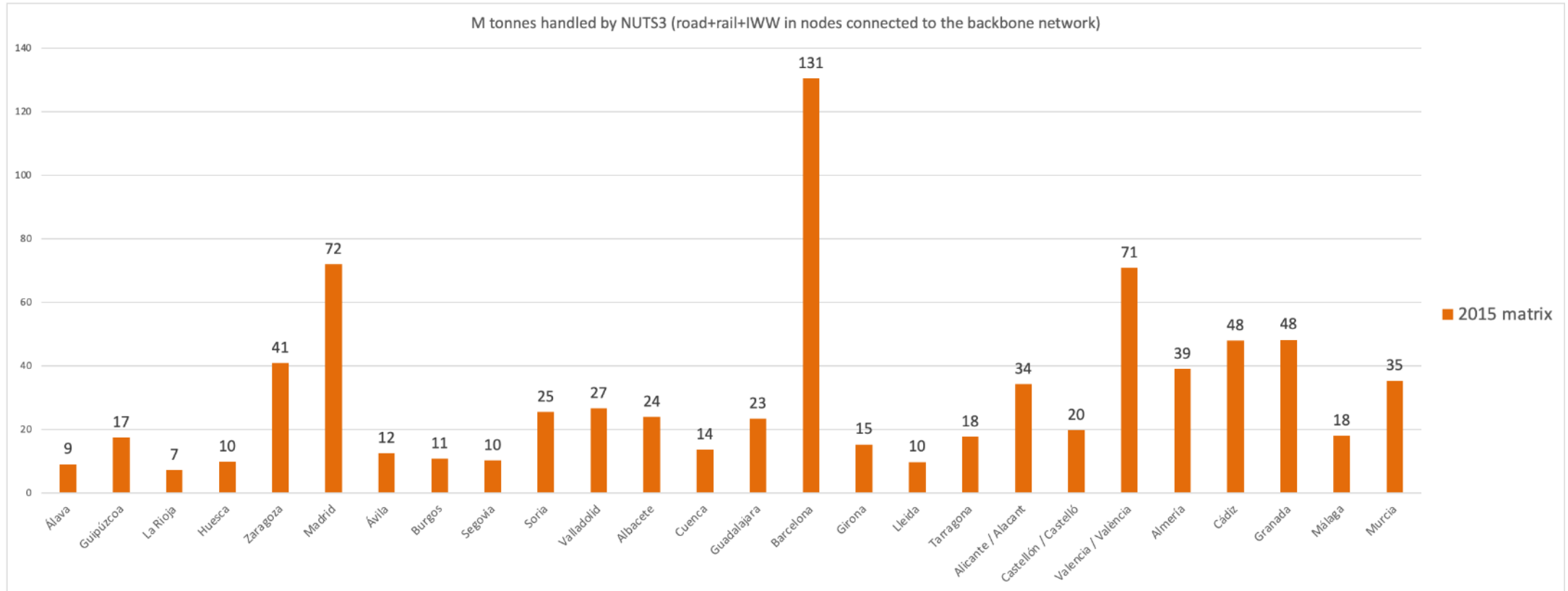
## GERMANY (NUTS2) (Over 300km)

M tonnes handled by NUTS2 (road+rail+IWW in nodes connected to the backbone network)



# INFLOW-OUTFLOW IN SPANISH NUTS

## SPAIN (NUTS3) (Over 300km)





**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# ANALYSIS OF THE IMPACT OF TRAFFIC SCENARIOS IN INTERMODAL TERMINALS AND INTERCONNECTION LINKS

# TABLE OF TERMINAL CAPACITY IN 2030

TERMINAL	Global traffic Rail + Road 2015 (30%)	PTP Rail traffic 2015	PTP		FIRRST	
			2030 stagnant	2030 $\Delta$ 20%	2030 stagnant	2030 $\Delta$ 20%
<b>STUTTGART</b>	<b>58.800</b>	<b>26.000</b>	<b>28600</b>	<b>34320</b>	<b>30.200</b>	<b>36240</b>
Car terminal in Illingen			1.000	1.000		
DUSS container terminal in Kormwestheim (Stuttgart)			25.760	25.760		
DP World in Neckarhafen (Stuttgart)			4.200	4.200		
DUSS container terminal in Neckarhafen (Stuttgart)			5.320	5.320		
Neckarhafen in Stuttgart			400	400		
New +FIRRST mini terminal in Stuttgart					800	800
New +FIRRST strategic hub semi-compact terminal in Heilbronn (A6)					18.400	18.400
New +FIRRST strategic hub terminal between Mühlacker - Illingen					18.400	18.400
DUSS trimodales container terminal in Heilbronn			2.380	2.380		
Südzucker in Heilbronn			500	500		
Audi car factory in Neckarslum			450	450		
Neckarhafen in Heilbronn			650	650		
<b>Total:</b>			<b>40.660</b>	<b>40.660</b>	<b>37.600</b>	<b>37.600</b>
<b>Difference:</b>			<b>12.060</b>	<b>6.340</b>	<b>7.400</b>	<b>1.360</b>



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

TERMINAL	Global traffic Rail + Road 2015 (30%)	PTP Rail traffic 2015	PTP		FIRRST		PTP Port Share scenario 60/40	
			2030 stagnant	2030 Δ20%	2030 stagnant	2030 Δ20%	PTP 2030 Δ20% 60/40	FIRRST 2030 Δ20% 60/40
<b>GIRONA</b>	<b>20,700</b>	<b>2,000</b>	<b>2,600</b>	<b>3,120</b>	<b>18,100</b>	<b>21,720</b>	<b>3,120</b>	<b>21,720</b>
Vilamalla terminal			2,800	2,800			2,800	
New +FIRRST terminal in South Vilamalla					9,200	9,200		9,200
New +FIRRST mini terminal in Celrà					800	800	800	800
Girona mercaderies terminal (passing-through)			2,800	2,800			2,800	
New +FIRRST semicomcompact terminal between Riudellots de la Selva and Caldes de Malavella					14,000	14,000		14,000
<b>Total:</b>			<b>5,600</b>	<b>5,600</b>	<b>24,000</b>	<b>24,000</b>	<b>6,400</b>	<b>24,000</b>
<b>Difference:</b>			<b>3,000</b>	<b>2,480</b>	<b>5,900</b>	<b>2,280</b>	<b>3,280</b>	<b>2,280</b>
<b>BARCELONA</b>	<b>97,500</b>	<b>16,000</b>	<b>20,800</b>	<b>24,960</b>	<b>76,700</b>	<b>92,040</b>	<b>50,960</b>	<b>92,040</b>
Granollers mercaderies (enlargement) +FIRRST-C semi-compact terminal			8,960	8,960	22,400	22,400	8,960	22,400
Pastas Gallo (bulk) in Granollers			1,800	1,800				
Repsol (liquid) in Montornés del Vallès			1,400	1,400			1,400	
La Llagosta car terminal			3,000	3,000			3,000	
New +FIRRST semi-compact terminal between la Florida and Ripollet					18,400	18,400		18,400
Castellbisbal terminal (enlargement) +FIRRST System					4,400	4,400		4,400
CELSA in Castellbisbal			2,000	2,000			2,000	
Gonvarri Barcelona in Castellbisbal			400	400			400	





# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

New +FIRRST semi-compact terminal in the old riverbed of the Llobregat river			28,800	28,800		28,800
BEST Port terminal (Port of Barcelona)	9,940	9,940			9,940	
2 new terminals in the Southern dock of the Port of Barcelona	19,880	19,880			19,880	
Grupo Alonso Setemar terminal (Port of Barcelona)	5,180	5,180			5,180	
Morrot port terminal (Port of Barcelona)	26,460	26,460			26,460	
APM terminal (Port of Barcelona)	9,940	9,940			9,940	
ICL Iberia terminal (Port of Barcelona)	800	800			800	
SEAT terminal in Martorell	2,200	2,200			2,200	
SEAT factory in Barcelona Zona Franca*	2,000	2,000				
Autoterminal (Port of Barcelona)	2,400	2,400			2,400	
SETRAM car terminal 1 (Port of Barcelona)	1,000	1,000			1,000	
SETRAM car terminal 2 (Port of Barcelona)	1,000	1,000			1,000	
Railsider Mediterráneo in Port of Barcelona	50	50			50	
Molenbervative in Port of Barcelona	50	50			50	
Bergé logistics in Port of Barcelona	50	50			50	
Naeko logistic in Port of Barcelona	50	50			50	
Relisa in Port of Barcelona	450	450			450	
Transfesa Port of Barcelona	450	450			450	
Ergransa (bulk) in Port of Barcelona	800	800			800	
New +FIRRST terminal in Igualada			18,400	18,400		18,400
Alstom factory in Sta. Perpètua de la Mogoda	40	40			40	
TEPSA Moll Energía	3,375	3,375				
Transportes ferroviarios especiales - Moll Energia	1,500	1,500				
Inovyn Martorell (chemical plant)	400	400			400	
Cargill Martorell (chemical plant)	200	200			200	
New +FIRRST intermediate full terminal between Vic and Manlleu (C-25/C-17)			4,800	4,800		4,800
Bulk terminal in Gurb-Vic (cereals)	200	200			200	
New +FIRRST mini terminal in Manresa			800	800		800
Harinera Vilafranquina in els Monjos	900	900				
<b>Total:</b>	<b>106,875</b>	<b>106,875</b>	<b>98,000</b>	<b>98,000</b>	<b>97,300</b>	<b>98,000</b>
<b>Difference:</b>	<b>84,075</b>	<b>79,915</b>	<b>21,300</b>	<b>5,960</b>	<b>46,340</b>	<b>5,960</b>



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

TARRAGONA	23,400	3,000	3,900	4,680	19,500	23400	5,069	23400
LOGIS Penedès +FIRRST semi-compact terminal in l'Arboç					8,800	8,800		8,800
La Boella terminal (enlargement) (Port of Tarragona) + +FIRRST System			9,940	9,940	4,400	4,400	9,940	4,400
PUERTO TARRAGONA EUROENERGO (liquid fuel)			300	300				
PUERTO DE TARRAGONA CATALUNA (Coal)			2,000	2,000				
PUERTO DE TARRAGONA SITASA CASTILLA			3,000	3,000				
PUERTO DE TARRAGONA SITASA ARAGÓN			3,000	3,000				
Europort Cargo Iberica car terminal (Port of Tarragona)			3,000	3,000			3,000	
Entrevies terminal			5,600	5,600			5,600	
Repsol (liquid) in el Morell			1,000	1,000			1,000	
Repsol butà in Tarragona			900	900			900	
Bayer (liquid) in Tarragona			1,500	1,500			1,500	
Ercros (liquid) in Vilaseca			650	650			650	
Constantí terminal (enlargement) + +FIRRST System			9,940	9,940	800	800	9,940	800
New +FIRRST terminal between Valls and Nulles					5,200	5,200		5,200
New +FIRRST semi-compact terminal in Montblanc					5,200	5,200		5,200
New +FIRRST mini terminal in l'Aldea					800	800		800
Ercros (fosfat dicàlcic) in Flix			200	200			200	
<b>Total:</b>			<b>40,830</b>	<b>40,830</b>	<b>25,200</b>	<b>25,200</b>	<b>32,530</b>	<b>25,200</b>
<b>Difference:</b>			<b>36,930</b>	<b>36,150</b>	<b>5,700</b>	<b>1,800</b>	<b>27,461</b>	<b>1,800</b>



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

<b>CASTELLÓ</b>	<b>30,900</b>	<b>2,000</b>	<b>2,600</b>	<b>3,120</b>	<b>28,300</b>	<b>33960</b>
New +FIRRST intermediate small termina in Les Palmes					4,400	4,400
Port of Castelló (future expansion Darsena Sur)			8,400	8,400		
New terminal between Vilareal and Borriana					8,000	8,000
New +FIRRST-C + C semicompact terminal in Nules					17,600	17,600
<b>Total:</b>			<b>8,400</b>	<b>8,400</b>	<b>30,000</b>	<b>30,000</b>
<b>Difference:</b>			<b>5,800</b>	<b>5,280</b>	<b>1,700</b>	<b>-3,960</b>
<b>VALÈNCIA</b>	<b>62,700</b>	<b>6,000</b>	<b>7,800</b>	<b>9,360</b>	<b>54,900</b>	<b>65,880</b>
Sagunt mercaderies terminal			2,800	2,800		
Sagunt siderúrgica terminal (RailSider)			1,120	1,120		
Car terminal in Port of Sagunt			2,400	2,400		
Coil terminal in Port of Sagunt			1,120	1,120		
New +FIRRST terminal between polígono Port Sagunt and Parc Sagunt					18,400	18,400
CSP Iberian port terminal (Port of València)			6,900	6,900		
APM Terminal (Port of València)			11,200	11,200		
Tamagra bulk terminal (Port of València)			1,500	1,500		
Europa car terminal (Port of València)			1,000	1,000		
2 New terminals in the Northern Dock (Port of València)			22,400	22,400		
FORD Factory terminal			1,500	1,500		
Font de Sant Lluís terminal (enlargement) + FIRRST System					23,600	23,600
Silla terminal			15,600	15,600		
New +FIRRST terminal between Montesa and Canals (A35/A7)					12,800	12,800
<b>Total:</b>			<b>67,540</b>	<b>67,540</b>	<b>54,800</b>	<b>54,800</b>
<b>Difference:</b>			<b>59,740</b>	<b>58,180</b>	<b>-100</b>	<b>-11,080</b>
<b>ALACANT</b>	<b>52,500</b>	<b>7,000</b>	<b>9,100</b>	<b>10,920</b>	<b>43,400</b>	<b>52080</b>
New +FIRRST terminal in Novelda					13,600	13,600
New +FIRRST-C semi-compact terminal in Torre del Pla (Between Elx and Alacant)			8,400	8,400	18,400	18,400
New +FIRRST intermediate small full in la Encina (A31/A33)					4,400	4,400
<b>Total:</b>			<b>8,400</b>	<b>8,400</b>	<b>36,400</b>	<b>36,400</b>
<b>Difference:</b>			<b>-700</b>	<b>-2,520</b>	<b>-7,000</b>	<b>-15,680</b>



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

<b>MURCIA</b>	<b>33,000</b>	<b>3,000</b>	<b>3,900</b>	<b>4,680</b>	<b>29,100</b>	<b>34920</b>
Port of Cartagena (liquid terminal Escombreras)			1,500	1,500		
Port of Cartagena (bulk terminal Escombreras)			200	200		
Port of Cartagena (coal terminal Escombreras)			200	200		
New terminal in Port of Cartagena (dock el Gorguel first phase)			11,200	11,200		
New terminal in Port of Cartagena (dock el Gorguel second phase)			11,200	11,200		
Murcia mercancías terminal			2,700	2,700		
New +FIRRST-C terminal in Almendricos			4,200	4,200	18,400	18,400
New +FIRRST in el Reguerón					18,400	18,400
<b>Total:</b>			<b>31,200</b>	<b>31,200</b>	<b>36,800</b>	<b>36,800</b>
<b>Difference:</b>			<b>27,300</b>	<b>26,520</b>	<b>7,700</b>	<b>1,880</b>
<b>ALMERÍA</b>	<b>17,700</b>	<b>1,000</b>	<b>1,300</b>	<b>1,560</b>	<b>16,400</b>	<b>19,680</b>
New +FIRRST-C terminal between Almería and Níjar					18,400	18,400
Port of Almería terminal			19,600	19,600		
New FIRRST-C terminal in Olula del Río					4,400	4,400
<b>Total:</b>			<b>19,600</b>	<b>19,600</b>	<b>22,800</b>	<b>22,800</b>
<b>Difference:</b>			<b>18,300</b>	<b>18,040</b>	<b>6,400</b>	<b>3,120</b>
<b>GRANADA</b>	<b>24,600</b>	<b>1,000</b>	<b>1,300</b>	<b>1,560</b>	<b>23,300</b>	<b>27960</b>
New +FIRRST terminal in Motril					9,200	9,200
New +FIRRST terminal in Moreda					17,600	17,600
<b>Total:</b>			<b>0</b>	<b>0</b>	<b>26,800</b>	<b>26,800</b>
<b>Difference:</b>			<b>-1,300</b>	<b>-1,560</b>	<b>3,500</b>	<b>-1,160</b>
<b>MÁLAGA</b>	<b>28,800</b>	<b>2,000</b>	<b>2,600</b>	<b>3,120</b>	<b>26,200</b>	<b>31440</b>
New +FIRRST semicomcompact terminal in Antequera					17,600	17,600
Port of Málaga container terminal (railway line required)			1,680	1,680		
Port of Málaga car terminal (railway line required)			1,200	1,200		
Los Prados terminal (enlargement) + FIRRST System					12,000	12,000
<b>Total:</b>			<b>2,880</b>	<b>2,880</b>	<b>29,600</b>	<b>29,600</b>
<b>Difference:</b>			<b>280</b>	<b>-240</b>	<b>3,400</b>	<b>-1,840</b>
<b>CÁDIZ</b>	<b>30,000</b>	<b>5,000</b>	<b>6,500</b>	<b>7,800</b>	<b>23,500</b>	<b>28200</b>
Isla verde terminal (Port of Algeciras)			7,800	7,800		
SAN ROQUE MERCANCÍAS ( ADIF)			6,020	6,020		
TOTAL TERMINAL INTERNATIONAL TTI - PUERTO DE ALGECIRAS			7,800	7,800		
New terminal in the future southern dock of isla verde (Port of Algeciras)			6,700	6,700		
APM terminal (Port of Algeciras)			2,500	2,500		
San Roque mercancías terminal (enlargement) + +FIRRST System					15,200	15,200
<b>Total:</b>			<b>30,820</b>	<b>30,820</b>	<b>15,200</b>	<b>15,200</b>
<b>Difference:</b>			<b>24,320</b>	<b>23,020</b>	<b>-8,300</b>	<b>-13,000</b>



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

<b>LLEIDA</b>	<b>35,400</b>	<b>2,000</b>	<b>2,600</b>	<b>3,120</b>	<b>32,800</b>	<b>39360</b>	<b>3,120</b>	<b>39360</b>
Vilanova terminal			2,800	2,800			2,800	
New +FIRRST-C terminal in Lleida area (with alternative in Raïmat / Torreblanca)					18,400	18,400	8,400	18,400
New +FIRRST terminal between Bellpuig and Vilagrassa					17,600	17,600		17,600
New +FIRRST terminal between Juneda and Borges Blanques					4,400	4,400		4,400
<b>Total:</b>			<b>2,800</b>	<b>2,800</b>	<b>40,400</b>	<b>40,400</b>	<b>11,200</b>	<b>40,400</b>
<b>Difference:</b>			<b>200</b>	<b>-320</b>	<b>7,600</b>	<b>1,040</b>	<b>8,080</b>	<b>1,040</b>
<b>HUESCA</b>	<b>12,900</b>	<b>2,000</b>	<b>2,600</b>	<b>3,120</b>	<b>10,300</b>	<b>12360</b>		
Monzón container terminal (enlargement)			8,400	8,400				
Alvitre factory terminal			1,500	1,500				
New +FIRRSR terminal Ponentia in Tamarit de la Llitera					14,000	14,000		
New terminal in el Torricó/Tamarit de la Llitera			1,400	1,400				
<b>Total:</b>			<b>11,300</b>	<b>11,300</b>	<b>14,000</b>	<b>14,000</b>		
<b>Difference:</b>			<b>8,700</b>	<b>8,180</b>	<b>3,700</b>	<b>1,640</b>		
<b>ZARAGOZA</b>	<b>24,900</b>	<b>8,000</b>	<b>10,400</b>	<b>12,480</b>	<b>14,500</b>	<b>17400</b>		
TMZ terminal (works for conversion passing-through)			8,100	8,100				
Plaza container terminal + FIRRST System (A2)			5,600	5,600	13,600	13,600		
GM/Opel terminal (Grisén)			2,000	2,000				
New +FIRRST intermediate small terminal in Huerva (A23)					4,400	4,400		
<b>Total:</b>			<b>15,700</b>	<b>15,700</b>	<b>18,000</b>	<b>18,000</b>		
<b>Difference:</b>			<b>5,300</b>	<b>3,220</b>	<b>3,500</b>	<b>600</b>		
<b>NAVARRA</b>	<b>12,900</b>	<b>1,000</b>	<b>1,300</b>	<b>1,560</b>	<b>11,600</b>	<b>13920</b>		
New +FIRRST semi-compact terminal in Castejón de Ebro (AP-15)					4,400	4,400		
Noain terminal (passing-through)			1,900	1,900				
Volkswagen car terminal			1,300	1,300				
New +FIRRST-C + C Altsasu (Burunda Valley) terminal					12,800	12,800		
<b>Total:</b>			<b>3,200</b>	<b>3,200</b>	<b>17,200</b>	<b>17,200</b>		
<b>Difference:</b>			<b>1,900</b>	<b>1,640</b>	<b>5,600</b>	<b>3,280</b>		



# TABLE OF THE ANALYSES OF THE CAPACITY OF THE TERMINALS IN FUTURE SCENARIOS

TOTAL VOLUMES SPAIN (total tonnes)	Railway traffic target 2030 (global traffic Rail + Road 2015 (30%))	PTP Rail traffic 2015	PTP Rail traffic 2030 stagnant (with a 10% of increase)	PTP Rail traffic 2030 + Δ20%	FIRRST Rail traffic 2030 stagnant	FIRRST Rail traffic 2030 + Δ20%
	(a)	(b)	(c) = (b) * 1,1	(d) = (c) * 1,2	(e) = (a) - (c)	(f) = (e) * 1,2
	780,600	102,000	132,000	158,760	648,600	778,320
TOTAL MAXIMUM THEORETICAL CAPACITY OF THE TERMINALS IN SPAIN (total tonnes)	Efficiency	Current terminals & industries	Current terminals & industries	New +FIRRST Terminals	New +FIRRST Terminals	
		(g)	3 shifts 7 days per week	638,306	638,306	706,100
	(h) = (g) *0,66	2 shifts 7 days per week	421,282	421,282	466,026	466,026
	(i) = (g) *6 / 7	2 shifts 6 days per week	361,099	361,099	399,451	399,451
	(j) = (g) *5,5 / 7	2 shifts 5,5 days per week	331,007	331,007	366,163	366,163
BALANCE BETWEEN THE MAXIMUM CAPACITY OF THE TERMINALS AND TOTAL VOLUME HANDELED (maximum capacity - total volumes)	(k) = (g) - (c)	3 shifts 7 days per week	506,306	479,546	57,500	-72,220
	(l) = (h) - (c)	2 shifts 7 days per week	289,282	262,522	-182,574	-312,294
	(m) = (i) - (c)	2 shifts 6 days per week	229,099	202,339	-249,149	-378,869
	(n) = (j) - (c)	2 shifts 5,5 days per week	199,007	172,247	-282,437	-412,157
FIRRST TERMINALS EFFICIENCY PERFORMANCE REQUIRED (total volume / total maximum capacity)						
					0.92	1.10



# RAILWAY TRAFFIC GROWTH AND IDENTIFICATION OF BOTTLENECKS (1)

## Freight Trains

The number of trains is calculated according to the transport volume of the different scenarios, considering that in 2030 the average net tonnes carried by train is 700 tonnes (except in the countries that today have an average of 700 net tonnes or more: in these cases, we keep the present figures, as they are now, for 2030).

## Passenger Trains

The traffic growth considered until 2030 is calculated according to the EC (SWD) estimation of 24% increase for conventional lines and 55% in HSL.



# RAILWAY TRAFFIC GROWTH AND IDENTIFICATION OF BOTTLENECKS (3)

## EXISTING PLANE TRAFFIC RELATED TO PARIS – ÎLE DE FRANCE. POSSIBLE TRANSFER TO RAIL

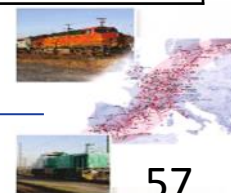
HUB	CONNECTION	FLIGHTS/DAY	PASSENGER	TRANSFER %	PASSENGER/TRANSFER	TOTALTRAIN
Paris-Île de France	PAR-Lyon	12	1.800	90	1.620	3
	PAR-Marseille	26	3.900	80	3.120	6
	PAR-Toulouse	14	2.100	60	1.260	3
	PAR-Bordeaux	14	2.100	80	1.680	3
	PAR-Strasbourg	6	900	5	45	0
	PAR-Perpignan	12	1.800	60	1.080	2
	PAR-Barcelona	54	8.200	50	4.100	8
	PAR-Bilbao/San Sebastian	23	3.450	50	1.725	3
	PAR-Brussels	4	600	0	0	0
	PAR-Amsterdam/Rotterdam	15	2.250	50	1.125	2
	PAR-Hamburg	22	3.300	50	1.650	3
	PAR-Dusseldorf	14	2.100	60	1.260	3
	PAR-Berlin	15	2.250	10	225	0
	PAR-Viena	19	2.850	10	285	1
	PAR-Budapest	9	1.350	10	135	0
	PAR-Madrid	26	4.200	10	420	1
	PAR-Milan	18	2.700	40	1.080	2





# TRAFFIC GROWTH AND IDENTIFICATION OF BOTTLENECKS SPAIN (MEDITERRANEAN CORRIDOR I)

SECTION				ACTUAL TRAFFIC 2015			FORECASTED TRAFFIC 2025			FORECASTED TRAFFIC 2030			FORECASTED TRAFFIC 2030 (Δ 20 %)			FORECASTED TRAFFIC 2030 (Δ 20 %) + PORT REEQUILIBRIUM (60/40)		
FROM	TO	Km	Nº of tracks	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day
Figueres	Portbou	30	2	32	12	<b>44</b>	35	113	<b>148</b>	40	100	<b>139</b>	40	120	<b>159</b>	40	171	<b>211</b>
Sant Celoni	Figueres	91	2	52	12	<b>64</b>	57	88	<b>145</b>	64	75	<b>139</b>	64	90	<b>154</b>	64	142	<b>207</b>
Granollers	Sant Celoni	22	2	113	12	<b>125</b>	124	46	<b>171</b>	140	38	<b>178</b>	140	45	<b>185</b>	140	97	<b>238</b>
Mollet	Granollers	10	2	151	13	<b>164</b>	166	50	<b>216</b>	187	41	<b>228</b>	187	49	<b>236</b>	187	101	<b>288</b>
Figueres HSL	<b>Le Pérthus (French border)</b>	20	2	0	3	<b>3</b>	0	3	<b>3</b>	0	2	<b>2</b>	0	2	<b>2</b>	0	2	<b>2</b>
Mollet HSL	Figueres HSL	110	2	0	3	<b>3</b>	0	3	<b>3</b>	0	2	<b>2</b>	0	2	<b>2</b>	0	2	<b>2</b>
Castellbisbal	Mollet	27	4	62	18	<b>80</b>	68	69	<b>138</b>	77	57	<b>133</b>	77	68	<b>145</b>	77	120	<b>197</b>
Castellbisbal	Mollet	27	4	62	18	<b>80</b>	68	69	<b>138</b>	77	57	<b>133</b>	77	68	<b>145</b>	77	120	<b>197</b>
Barcelona (Port/ZF)	Castellbisbal	27	4	3	37	<b>40</b>	3	37	<b>40</b>	4	21	<b>25</b>	4	25	<b>29</b>	4	25	<b>29</b>
Martorell	Castellbisbal	8	2	162	46	<b>208</b>	178	131	<b>309</b>	201	94	<b>294</b>	201	112	<b>313</b>	201	146	<b>347</b>
Sant Vicenç	Martorell	49	2	72	36	<b>108</b>	79	102	<b>182</b>	89	73	<b>163</b>	89	88	<b>177</b>	89	121	<b>211</b>
Picamoixons	Sant Vicenç	36	1	9	6	<b>15</b>	10	6	<b>16</b>	11	3	<b>15</b>	11	4	<b>15</b>	11	4	<b>15</b>
Tarragona	Sant Vicenç	25	2	92	30	<b>122</b>	101	151	<b>252</b>	114	113	<b>228</b>	114	136	<b>250</b>	114	169	<b>284</b>
Vandellós	Tarragona	38	2	53	9	<b>62</b>	58	60	<b>119</b>	66	46	<b>112</b>	66	55	<b>121</b>	66	82	<b>148</b>
Castelló	Vandellós	140	2	39	9	<b>48</b>	43	86	<b>129</b>	48	67	<b>115</b>	48	80	<b>129</b>	48	107	<b>155</b>
Sagunt	Castelló	43	2	91	10	<b>101</b>	100	88	<b>188</b>	113	67	<b>180</b>	113	81	<b>194</b>	113	107	<b>220</b>
València	Sagunt	27	2	103	13	<b>116</b>	113	65	<b>178</b>	128	49	<b>176</b>	128	58	<b>186</b>	128	91	<b>219</b>
Silla	València	12	2	190	19	<b>209</b>	209	94	<b>303</b>	236	70	<b>305</b>	236	83	<b>319</b>	236	117	<b>352</b>
Xàtiva	Silla	44	2	118	15	<b>133</b>	130	70	<b>200</b>	146	52	<b>199</b>	146	63	<b>209</b>	146	73	<b>220</b>
Font de la Figuera/La Encina	Xàtiva	41	2	34	15	<b>49</b>	37	70	<b>107</b>	42	52	<b>94</b>	42	63	<b>105</b>	42	73	<b>116</b>
Alacant (S.Vicent Raspeig)	Font de la Figuera/La Encina	79	1	27	0	<b>27</b>	30	36	<b>66</b>	33	27	<b>61</b>	33	33	<b>66</b>	33	72	<b>105</b>
El Reguerón	Alacant	68	1	47	0	<b>47</b>	52	46	<b>97</b>	58	36	<b>94</b>	58	43	<b>101</b>	58	90	<b>148</b>
Cartagena	El Reguerón	53	1	47	1	<b>48</b>	52	1	<b>53</b>	58	1	<b>59</b>	58	1	<b>59</b>	58	2	<b>60</b>
Murcia	El Reguerón	10	2	67	1	<b>68</b>	74	19	<b>93</b>	83	15	<b>98</b>	83	18	<b>101</b>	83	23	<b>106</b>
Alcantarilla	Murcia	16	1	9	2	<b>11</b>	10	39	<b>49</b>	11	30	<b>41</b>	11	36	<b>47</b>	11	41	<b>52</b>
Lorca	Alcantarilla	56	1	31	0	<b>31</b>	34	49	<b>84</b>	38	38	<b>77</b>	38	46	<b>84</b>	38	96	<b>134</b>



# TRAFFIC GROWTH AND IDENTIFICATION OF BOTTLENECKS SPAIN (MEDITERRANEAN CORRIDOR II)

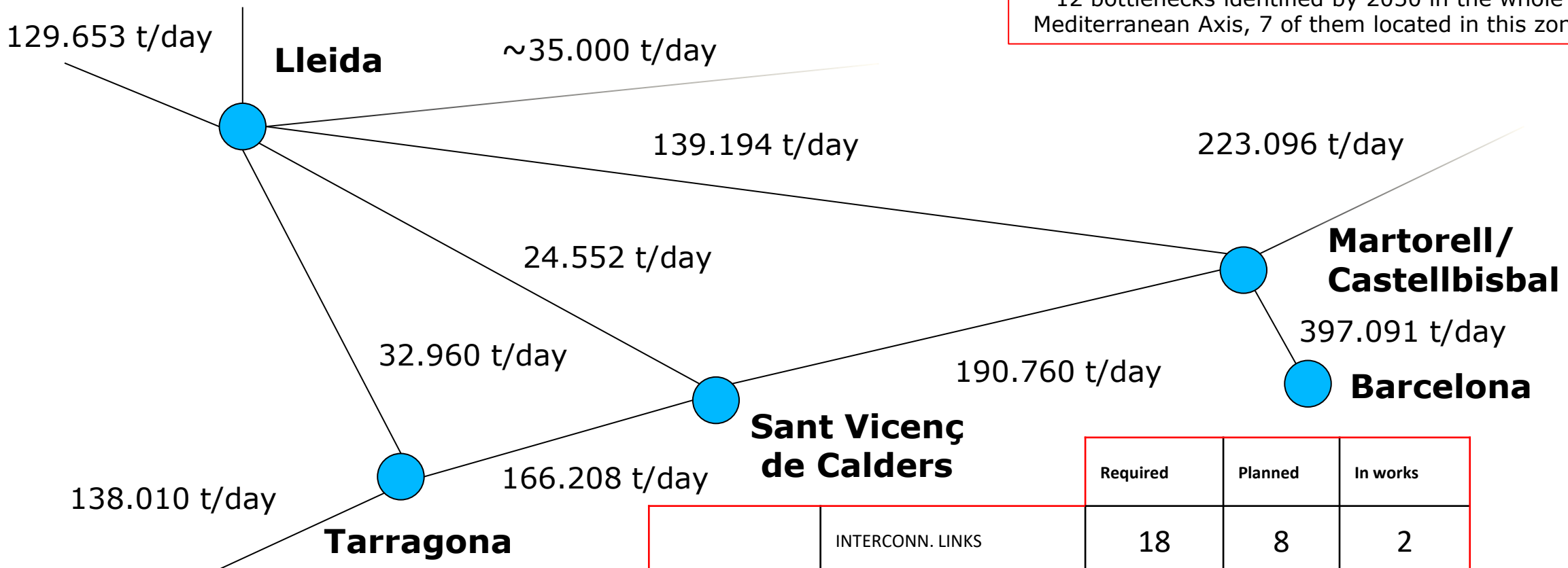
SECTION				ACTUAL TRAFFIC 2015			FORECASTED TRAFFIC 2025			FORECASTED TRAFFIC 2030			FORECASTED TRAFFIC 2030 (Δ 20 %)			FORECASTED TRAFFIC 2030 (Δ 20 %) + PORT REEQUILIBRIUM (60/40)		
FROM	TO	Km	Nº of tracks	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day	Passenger Trains / Day	Freight Trains / Day	Total trains / Day
Aguilas	Lorca	54	1	7	0	7	8	0	8	9	0	9	9	0	9	9	0	9
Almería	Lorca	147	1	0	0	0	0	47	47	0	37	37	0	44	44	0	92	92
Moreda	Almería	124	1	12	0	12	13	38	51	15	28	43	15	34	49	15	71	86
Bobadilla	Moreda	157	1	6	0	6	7	40	47	7	29	37	7	35	43	7	73	81
Alora	Bobadilla	32	1	14	0	14	15	0	15	17	0	17	17	0	17	17	0	17
Málaga	Alora	34	1	38	0	38	42	0	42	47	0	47	47	0	47	47	0	47
Reus	Nus de Vilaseca/Tarragona	18	2	48	32	80	53	32	85	60	18	78	60	22	81	60	22	81
Flix	Reus	48	1	13	19	32	14	19	33	16	11	27	16	13	29	16	13	29
Samper	Flix	121	1	8	17	25	9	17	26	10	10	20	10	12	22	10	12	22
Zaragoza	Samper	63	1	8	14	22	9	14	23	10	8	18	10	10	20	10	11	21
Picamoixons	Reus	21	1	10	11	21	11	61	72	12	45	57	12	53	66	12	63	75
Lleida	Picamoixons	69	1	11	17	28	12	94	107	14	69	83	14	83	96	14	92	106
Cerdanyola	Montcada	5	2	210	3	213	231	3	234	260	2	262	260	2	262	260	2	262
Terrassa	Cerdanyola	18	2	148	1	149	163	1	164	184	1	184	184	1	184	184	1	184
Manresa	Terrassa	32	2	63	1	64	69	1	70	78	1	79	78	1	79	78	1	79
Lleida	Manresa	126	1	23	18	41	25	18	43	29	10	39	29	12	41	29	12	41
Monzón	Lleida	52	1	7	17	24	8	17	25	9	10	18	9	12	20	9	12	20
Zaragoza	Monzón	136	1	7	16	23	8	16	24	9	9	18	9	11	20	9	11	20
Lleida - HSL	Tarragona HSL	100	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zaragoza - HSL	Lleida HSL	150	2	7	17	24	8	79	86	9	56	65	9	68	76	9	74	83
Casetas	Zaragoza	9	2	71	29	100	78	71	149	88	48	136	88	58	146	88	72	160
Arcos de Jalon	Casetas	145	2	9	15	24	10	43	53	11	31	42	11	37	48	11	40	51
Guadalajara	Arcos de Jalon	150	2	9	15	24	10	43	53	11	31	42	11	37	48	11	40	51
Madrid	Guadalajara	57	2	124	15	139	136	48	185	154	34	188	154	41	195	154	44	198
Castejón	Casetas	78	2	37	22	59	41	34	74	46	23	68	46	27	73	46	39	85
Miranda de Ebro	Castejón	145	1	16	13	29	18	20	38	20	13	33	20	15	35	20	20	40
Chinchilla	La Encina	78	2	0	15	15	0	30	30	0	21	21	0	25	25	0	31	31



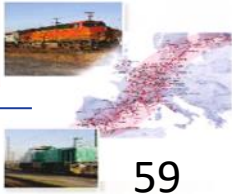
# CONFLUENCE BETWEEN EBRO AXIS – MEDITERRANEAN AXIS (DAILY FREIGHT VOLUMES)

(EU threshold (65%) = 122,000 t/day)

12 bottlenecks identified by 2030 in the whole Mediterranean Axis, 7 of them located in this zone



		Required	Planned	In works
		INTERCONN. LINKS		18
Required actions	INTERMODAL TERMINALS			
	NEW	13	4	-
	UPGR.	4	1	1





**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# REQUIRED IMPROVEMENT ACTIONS (SPAIN)

## MEMBER STATE ACTIONS IDENTIFIED (SPAIN)

- 1,347 km of new lines
- 4,991 km of upgraded existing lines (ERTMS, P-410 loading gauge implementation, 25kV AC, and adaptation of the lines for trains up to 740m length)
- 1 upgraded existing terminal
- **Total: 49,707M€**

## SUMMARY OF PROPOSED ADDITIONAL ACTIONS IN SPAIN

### FERRMED Proposals

- 1,404 km of new lines
- 1,525 km of upgraded existing lines (international track gauge, ERTMS, P-410 loading gauge implementation, 25 kV AC and adaptation of the lines for trains up to 740m length)
- 47 new +FIRRSST terminals
  
- New lines: 20,347M€
- Existing line upgrading: 11,393M€
- New terminals: 1,277M€
- Upgraded terminals: 131M€
- **Total: 33,107M€**



## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW LINES

- Portbou – Figueres change one track to UIC gauge
- Sant Celoni – Mollet - Construction of a new track for freight with UIC gauge segregated from the conventional passenger one. Recommended to implement UIC gauge instead of mixed gauge
- Mollet – Castellbisbal - To construct an additional track with UIC gauge for freight in order to avoid future bottlenecks with the increase of commuter trains
- To construct an additional track between Montcada and Manlleu (UIC gauge)
- New by-pass Castellbisbal-Martorell/SEAT (mixed gauge)
- To implement the UIC gauge in the line Sant Vicenç de Calders – Valls – Picamoixons
- To implement the UIC gauge in the Barcelona – Vilanova i la Geltrú – Sant Vicenç
- Vila-Seca node - Connection between the Reus-Tarragona line and the Castelló-Tarragona line in all ways
- Direct interconnection Valls-Reus in Picamoixons



## FERRMED'S PROPOSED ACTIONS (SPAIN) : NEW LINES

- To recover the old line between Roda de Berà – Reus in mix gauge
- New railway by-pass in Reus from Southern Reus to Western Constantí
- Vila-Seca-Castelló – New HSL parallel to the existing one for segregating passenger trains from freight trains (4 tracks with UIC gauge)
- Construction of Valencia's Tunel Pasante (UIC gauge) and Parc Central tunnel
- Xàtiva – Font de la Figuera - We consider that the conventional line should be double track in order to avoid future bottlenecks
- Construction of a new line for freight with UIC gauge and double track between Alacant/Montfort del Cid and Murcia
- To construct an additional track with UIC gauge in order to double the line between La Encina and Alacant
- El Reguerón – Cartagena - Construction of one additional track for freight with UIC gauge next to the existing line, including the connection towards Alacant





## FERRMED'S PROPOSED ACTIONS (SPAIN) : NEW LINES

- To recover the former railway line between Almendricos and Baza through the Almanzora river valley with a new layout
- To construct a new railway by-pass in Málaga connecting it to the Málaga - Alora section
- To construct a new double track line with UIC between Almería – Motril – Málaga – Algeciras
- To add an additional track between Lleida and Cervera and a new line Cervera-Igualada-Martorell (UIC gauge)
- To double the line Zaragoza-Lleida-Tarragona, and to convert to UIC gauge
- To construct a new complementary single track line for freight between Madrid and Guadalajara
- Escorial-Villalba - New single track line with mixed gauge for freight
- To implement the P-410 loading gauge and sidings for 740m long trains in all sections of Central and Extended backbone



## FERRMED'S PROPOSED ACTIONS (SPAIN): UPGRADING EXISTING TERMINALS

- Castejón de Ebro terminal enlargement and +FIRIRST System implementation: 1 fast track + 1 fast/moderate track. To construct 2 siding tracks of 800m
- Constantí terminal enlargement (pass-through terminal) and +FIRIRST System implementation: the 2 northern tracks must be enlarged until reaching 740m under the bridge. The 3 southern tracks should be enlarged (as long as possible). + 2 fast tracks
- Enlargement of Castellbisbal terminal with +FIRIRST System: currently it has no platform for containers. To construct 1 fast track + 1 fast moderate track
- Enlargement of Font de Sant Lluís: to construct 6 new tracks for loading/unloading of 740m (under the current terminal) and making the terminal a passing-through terminal.
- Enlargement of Monzón terminal: to enlarge the current tracks until reaching 750m. It must have a double connection to the conventional line.



## FERRMED'S PROPOSED ACTIONS (SPAIN): UPGRADING EXISTING TERMINALS

- Enlargement of the Port of Almería terminal: currently it has 1 paved track (out of service) which must be restaured. To add 1 additional paved track for the piggyback + 2 new paved tracks for the piggyback in the new expanded dock (total number of tracks for the piggyback: 4) + 2 new tracks for loading/unloading of 740m in the new expanded dock
- Granollers mercaderies terminal with +FIRRST system implementation: currently it has 4 tracks between 340 and 400m for containers. These tracks must be enlarged to the South until reaching 750m and must be converted to +FIRRST tracks and passing-through. To construct 2 new tracks for the +FIRRST system so that the terminal would have a total number of 6 tracks for the +FIRRST: 1 fast track + 2 fast/moderate tracks + 3 moderate/slow tracks. The composition tracks will be able for 1.500m long trains.
- Jundiz terminal (enlargement): to enlarge the 5 current northern track until reaching 740 an making the terminal passing-through. To construct 2 siding tracks of 800m



## FERRMED'S PROPOSED ACTIONS (SPAIN): UPGRADING EXISTING TERMINALS

- Madrid Vicálvaro terminal (enlargement): currently there are 4 tracks of 400m that should be enlarged to the south until reaching 740m. + to add 6 new tracks for containers of 740m (total n° of tracks for containers 10) + to add 2 tracks for the piggyback of 740m + 5 gantry cranes + 4 reach stackers
- Murcia mercancías terminal enlargement: currently it has 6 tracks, which must be enlarged to the east until reaching 740m making the terminal a passing-through terminal. To construct 2 tracks of 800m for siding
- Noain terminal: currently it has 3 400m-long-track for containers. To enlarge them until reaching 740m and to add 1 gantry crane of the terminal. The northern tracks for composition should be enlarged until reaching 740m
- Port of Alacant terminal (enlargement): currently there are 3 paved-short tracks, but only 1 is useful at the same time (the loading/unloading is carried out with reach stackers). To construct 2 new 740m long tracks (total number of tracks: 3)



## FERRMED'S PROPOSED ACTIONS (SPAIN): UPGRADING EXISTING TERMINALS

- Port of Málaga car terminal enlargement : to construct 2 additional tracks for loading/unloading cars
- Port of Tarragona terminal la Boella (enlargement) + +FIRRST system implementation: currently there are 4 tracks for containers. To add 1 new fast track + 1 new fast/moderate track
- TMZ enlargement: enlargement of the existing 3 tracks until reaching 740m and construction of 2 additional tracks on the left side of the terminal (total amount of tracks for loading/unloading 5). To construct a new northern access to let the terminal be a passing terminal. To enlarge the marshalling from the southern acces of the terminal to the A-2 bridge until reaching 740m. To adapt the tracks with mix gauge

## FERRMED'S PROPOSED ACTIONS (SPAIN): UPGRADING EXISTING TERMINALS

- Zaragoza Plaza enlargement: in total, it must have 10 tracks for container (6 gantry cranes) + 1 fast track of 750m + 1 f/m track of 750m + 2 m/s tracks of 750m + 10 composition tracks of 750m on the right side passing the roundabout. To adapt the tracks with mix gauge and connect the western tracks with 2 new tracks parallel to the HSL until reaching the conventional line in Grisén and direction Madrid
- (en blanco)
- Pancorbo terminal (enlargement): to enlarge the current 3 tracks for containers of 620m until reaching 740m to the south-west + to connect the tracks to the northern part in order to make the terminal passing-through
- To foresee a space for the construction of a marshalling yard for trains up to 740m just before the junction between the links going to the Escombreras dock and the future Gorguel dock



## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New +FIRRST in Manlleu
- New +FIRRST in Manresa
- New +FIRRST intermediate small full terminal between Vilareal and Borriana: 1 fast track + 2 fast/moderate tracks
- New +FIRRST intermediate + semi-compact terminal in el Recajo: 2 fast tracks + 2 fast/moderate tracks + 1 moderate/slow track
- New +FIRRST intermediate small compact terminal in Huerva: 1 fast track + 1 fast/moderate track
- New +FIRRST intermediate small compact terminal in Motril: 1 fast track + 1 fast/moderate track + 1 moderate/slow track
- New +FIRRST intermediate small full in Ávila: 1 fast track + 1 fast/moderate track + 1 moderate/slow track
- New +FIRRST intermediate small full terminal between Valls and Nulles: 2 fast tracks + 1 fast/moderate



## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New +FIRRST intermediate small full terminal in la Encina: 1 fast track + 1 fast-moderate track
- New +FIRRST intermediate small full terminal in les Borges Blanques: 1 fast track + 1 fast/moderate track
- New +FIRRST intermediate small full terminal in Vilamalla: 1 fast track + 1 fast/moderate + 1 moderate/slow track. Able for 1.500m long trains
- New +FIRRST intermediate small semi-compact terminal in les Palmes: 1 fast track + 1 fast/moderate track
- New +FIRRST intermediate small semi-compact terminal in Montblanc: 2 fast tracks + 1 fast/moderate track
- New +FIRRST intermediate+ compact in Moreda: 1 fast track + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST intermediate+ compact terminal in Antequera: 1 fast track + 2 fast/moderate tracks + 2 moderate/slow tracks





## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New +FIRRST intermediate+ full terminal between Bellpuig and Vilagrassa: 1 fast track + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST intermediate+ semi-compact between Montesa and Canals: 1 fast track + 2 fast/moderate tracks + 1 moderate/slow track
- New +FIRRST intermediate+ semi-compact between Riudellots de la Selva and Caldes de Malavella: 1 fast track + 1 fast/moderate track + 2 moderate/slow tracks able for 1500m long trains
- New +FIRRST intermediate+ semi-compact terminal in l'Arboç: 2 fast tracks + 2 fast/moderate tracks
- New +FIRRST intermediate+ semi-compact terminal in Novelda: 2 fast tracks + 2 fast-moderate tracks + 1 moderate/slow track
- New +FIRRST intermediate+ semi-compact terminal in Nules: 1 fast track + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST mini in l'Aldea: 1 fast track



## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New +FIRRST mini terminal in Celrà: 1 fast track able for 1500m long trains
- New +FIRRST strategic compact terminal between Almería and Nijar: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic full terminal in Albacete: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic full terminal in Alcazar de San Juan: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic full terminal in Almendricos: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic full terminal in Igualada: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic semi-compact in Port of Sagunt: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks



## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New +FIRRST strategic semi-compact terminal in La Florida: 2 fast tracks + 2 fast/moderate track + 2 moderate/slow tracks able for 1500m long trains
- New +FIRRST strategic semi-compact terminal in Lleida: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks. To connect the terminal with the Lleida-Manresa line
- New +FIRRST strategic semi-compact terminal in the old roverbred of the Llobregat river: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks able for 1500m trains
- New +FIRRST strategic terminal in El Reguerón: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New +FIRRST strategic terminal in Torre del Pla: 2 fast tracks + 2 fast/moderate tracks + 2 moderate/slow tracks
- New container terminal in Tamarit de Llitera: 2 fast/moderate tracks + 2 moderate/slow tracks



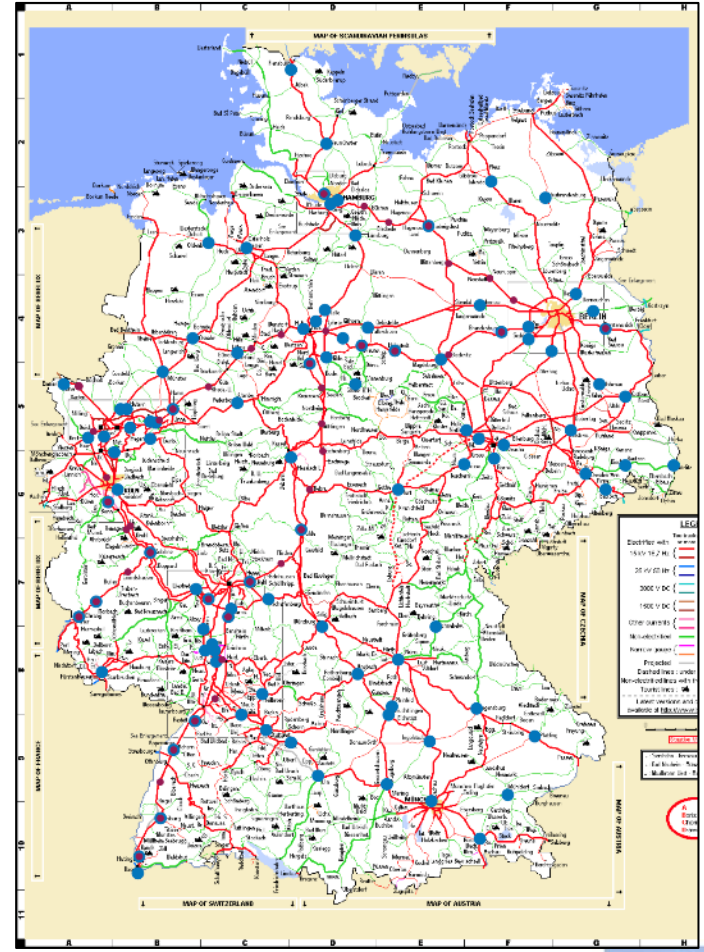
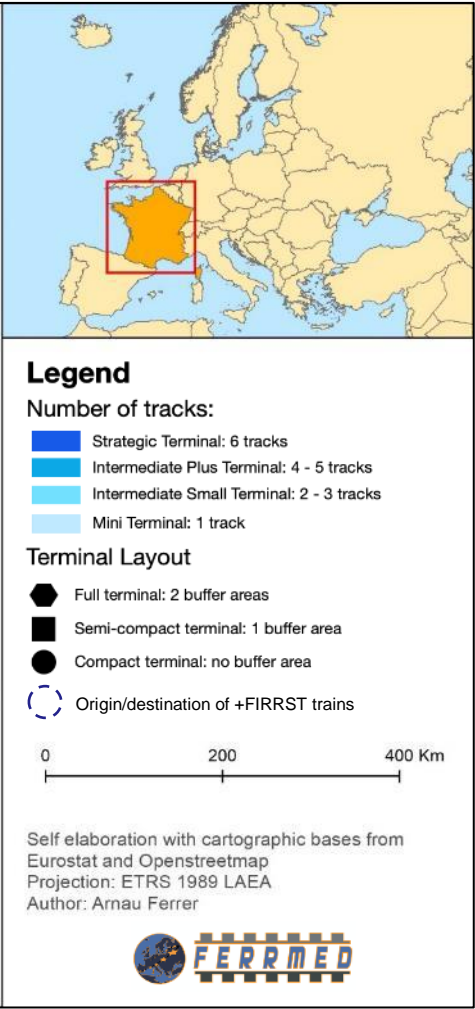
## FERRMED'S PROPOSED ACTIONS (SPAIN): NEW TERMINALS

- New container terminal in Olula del Río: 2 tracks of 800m
- New container terminal in Port of Castelló: 2 tracks for containers of 740m. To be constructed in the empty space between the current docks
- New terminal in polígono el Serrallo (Castelló): 2 tracks for containers of 740m. To be constructed in the future southern access to the port

# +FIRRSR TERMINALS IN SPAIN AND PORTUGAL



# +FIRrst TERMINALS IN EUROPE



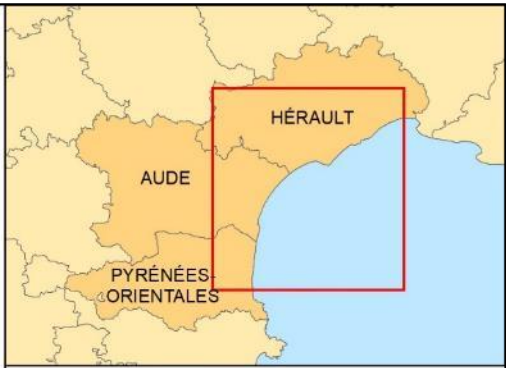
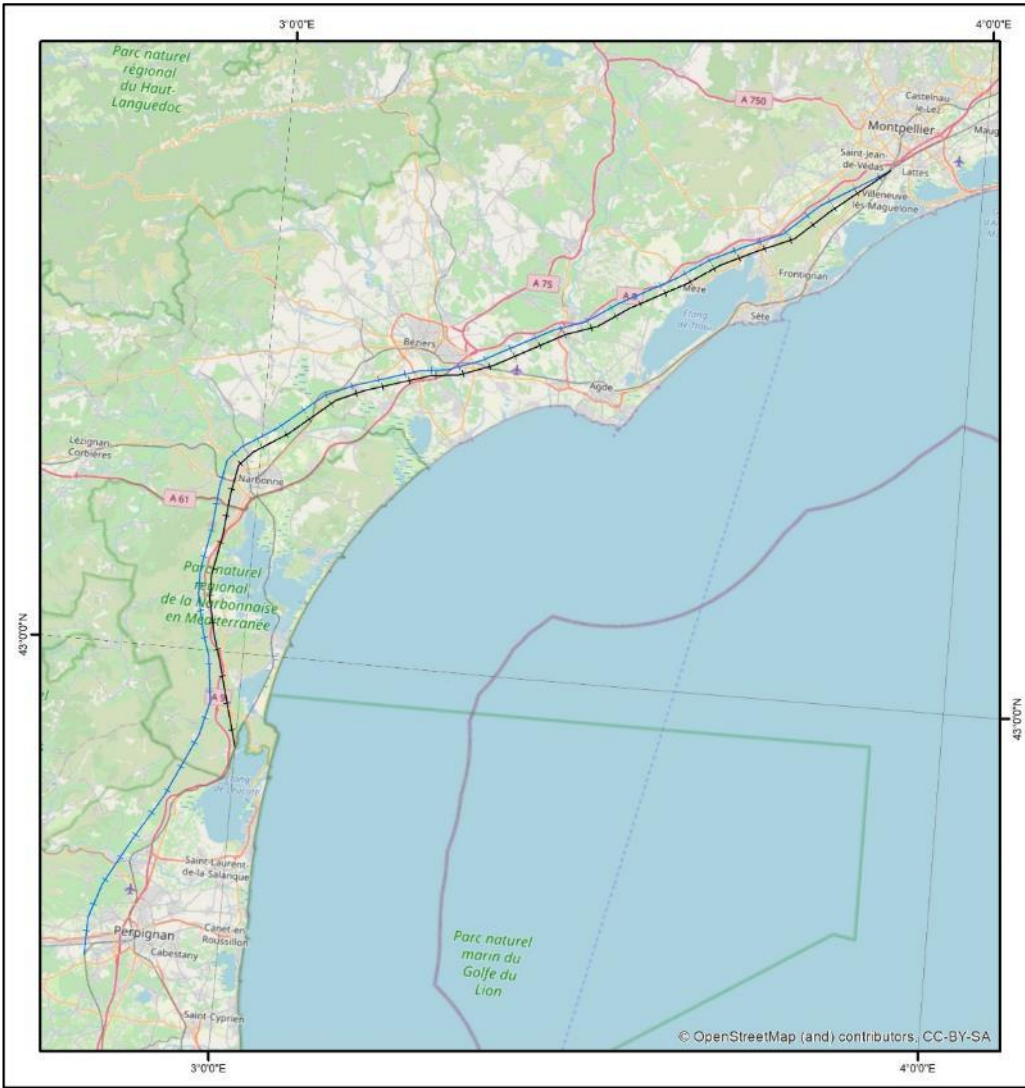


**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# EXAMPLES OF NEW INTERCONNECTION LINES

# NEW LINE MONTPELLIER-PERPIGNAN



### Legend

- +--- New Freight Line
- +— New High Speed Line

Self elaboration with cartographic bases from Eurostat and Openstreetmap  
 Projection: ETRS 1989 LAEA  
 Author: Arnau Ferrer

New railway line from Montpellier to Perpignan:

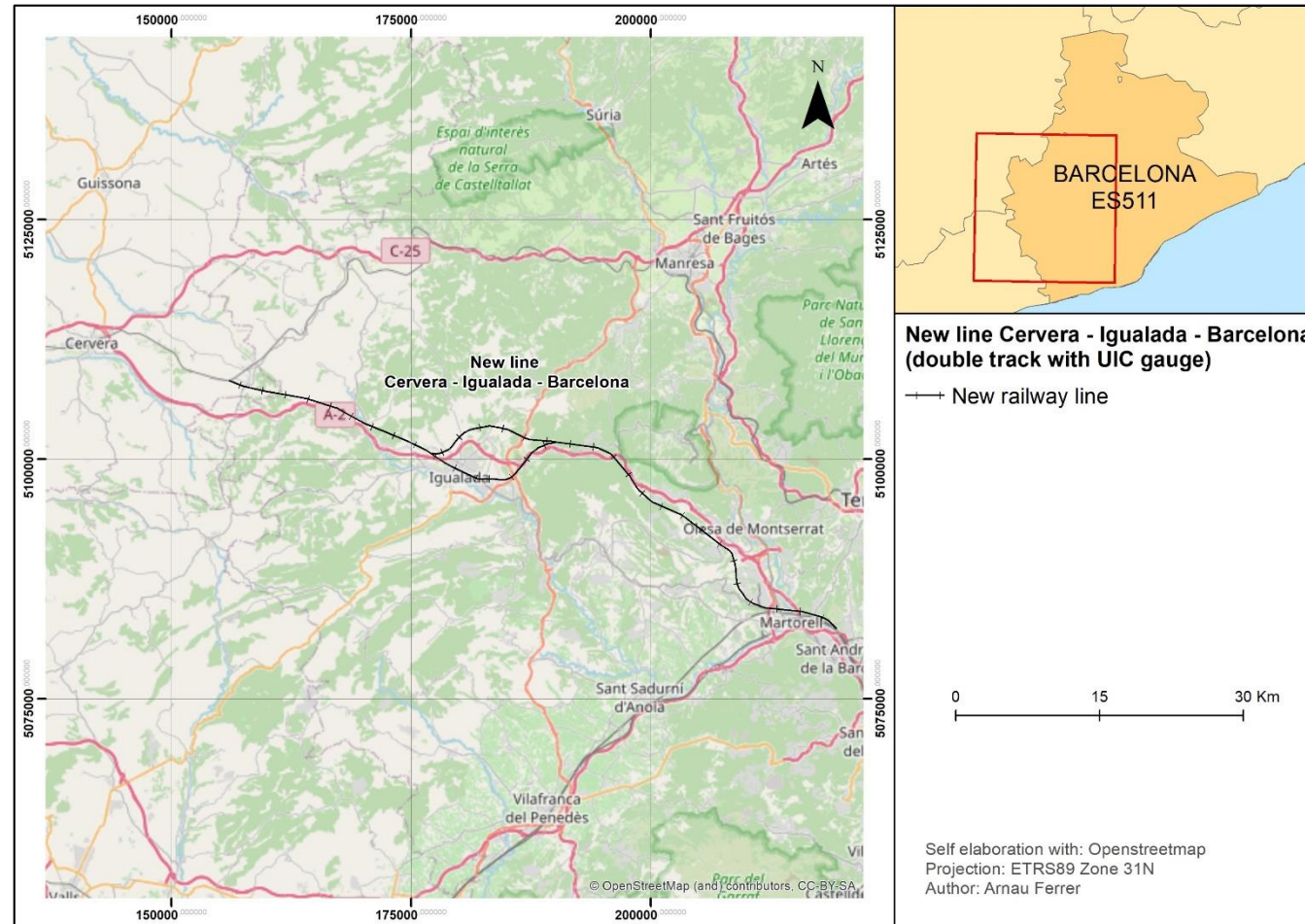
- To construct a new HSL for passengers with the possibility to accept freight trains.
- Two phases envisaged:
  - Montpellier-Beziers
  - Beziers-Perpignan





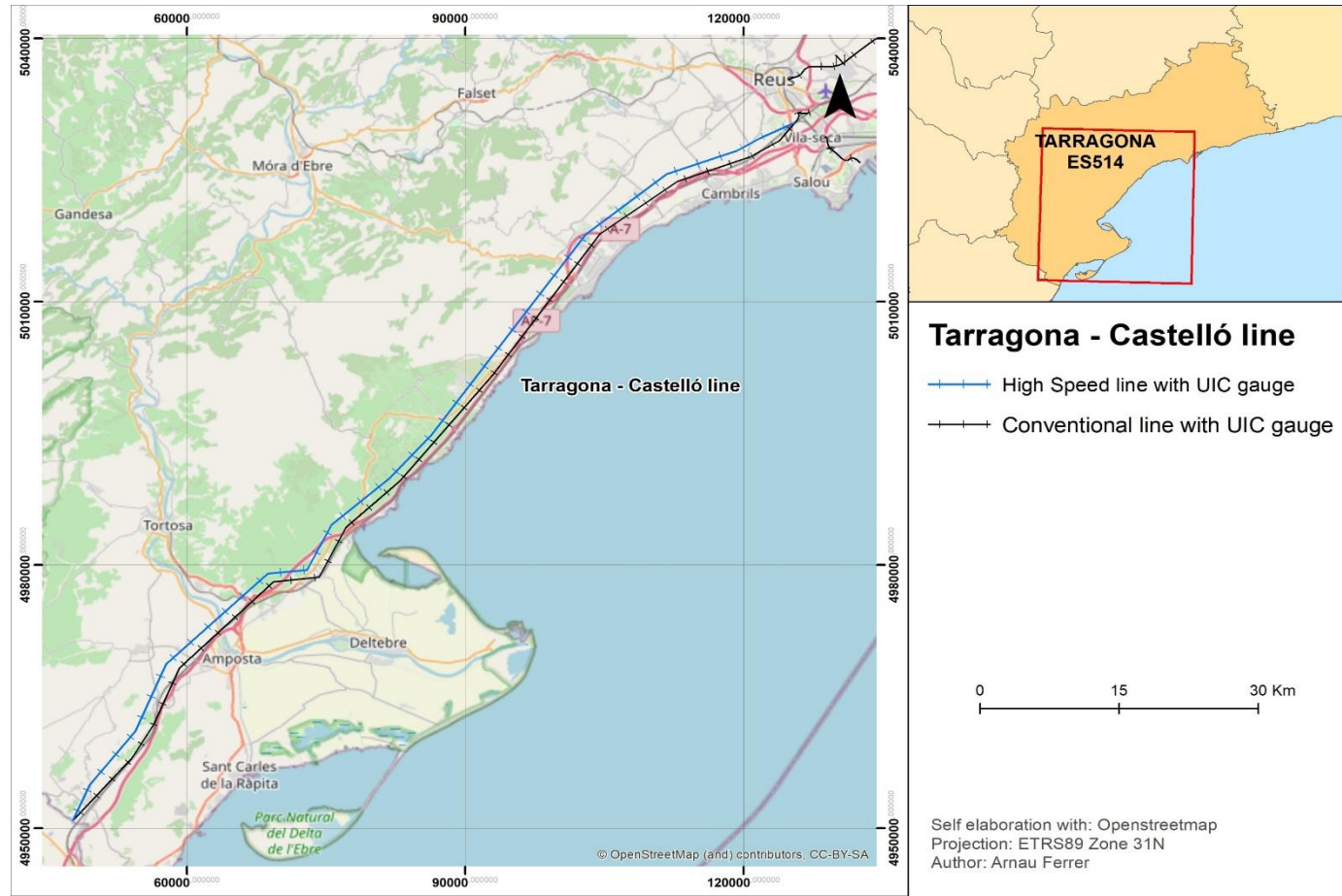
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New railway line between Cervera and Martorell



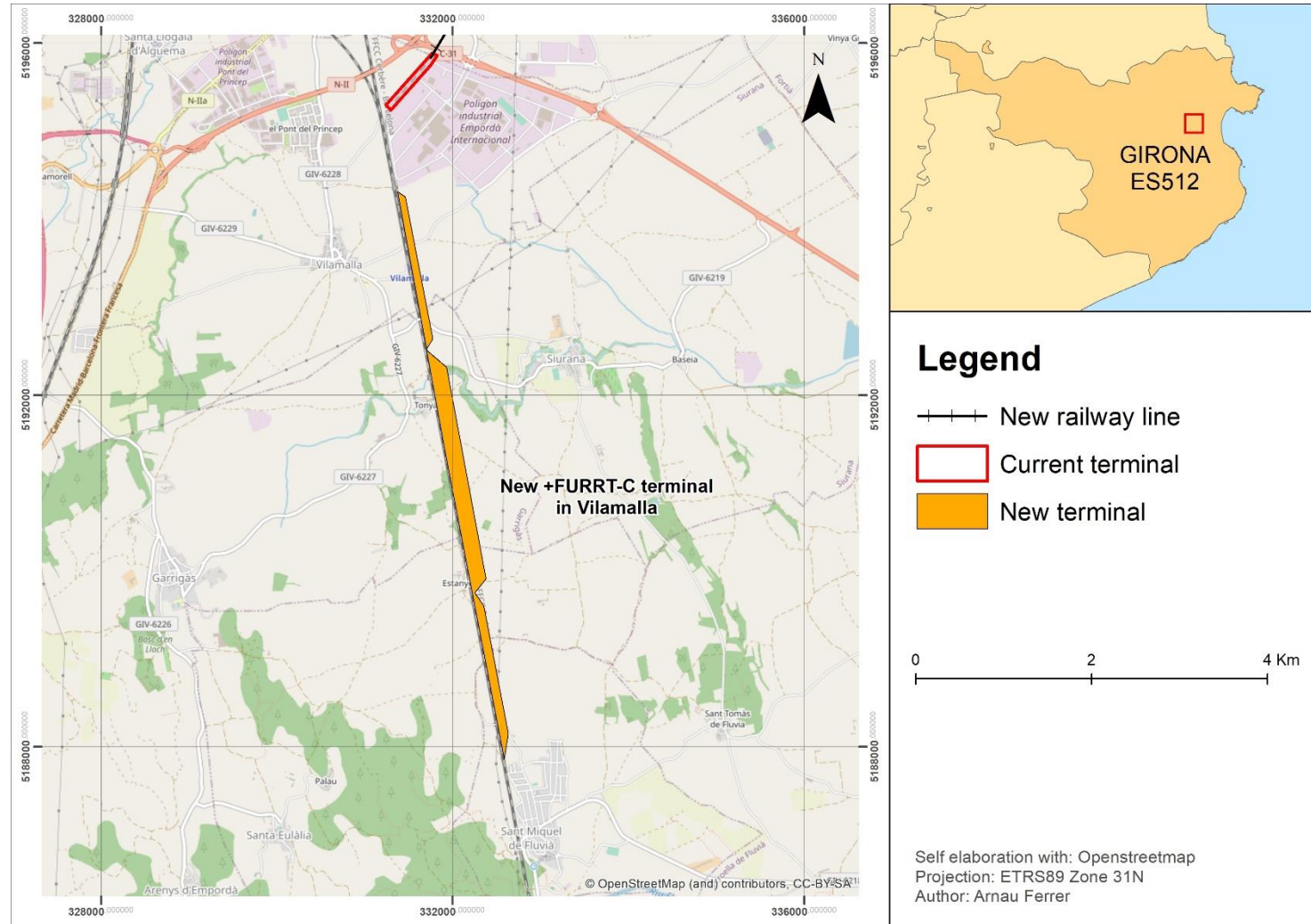
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New railway line between Tarragona and Castelló



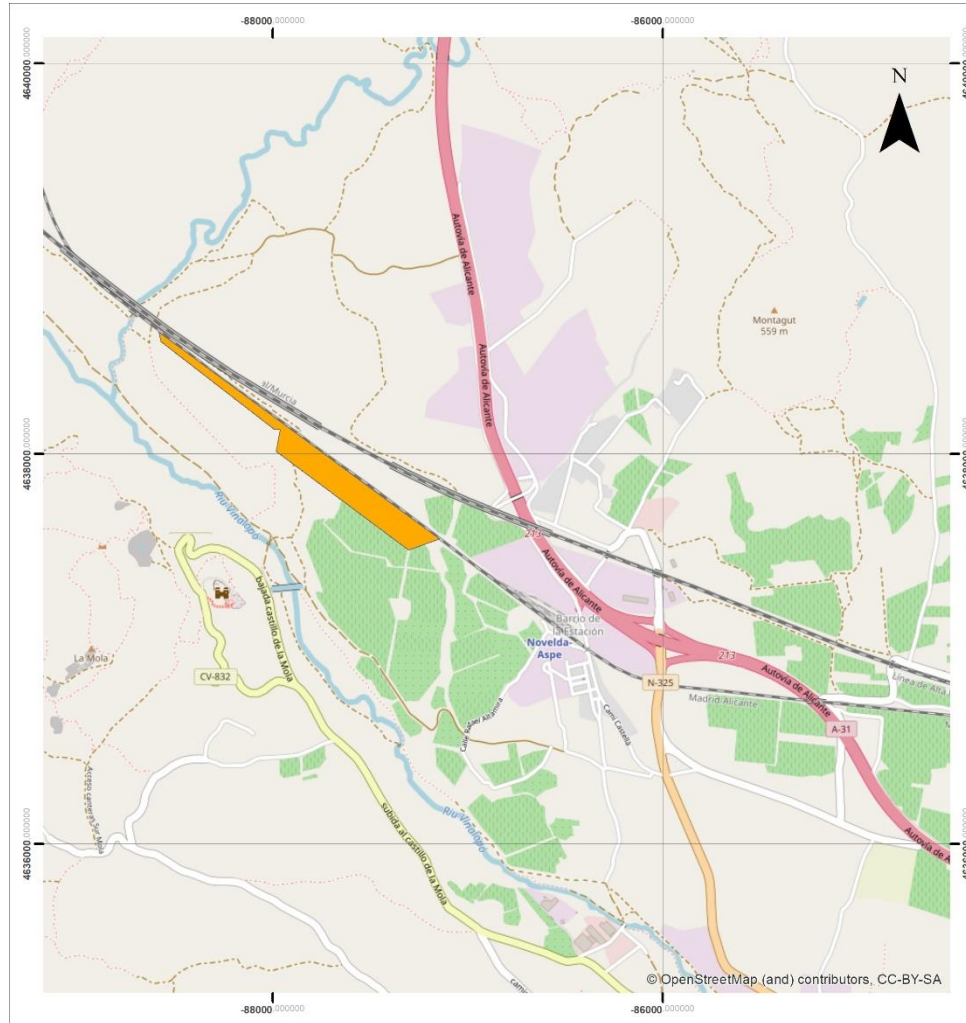
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New +FIRRST terminal in Vilamalla



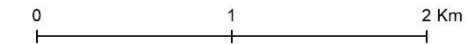
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New +FIRRST terminal in Novelda



### Legend

 New terminal

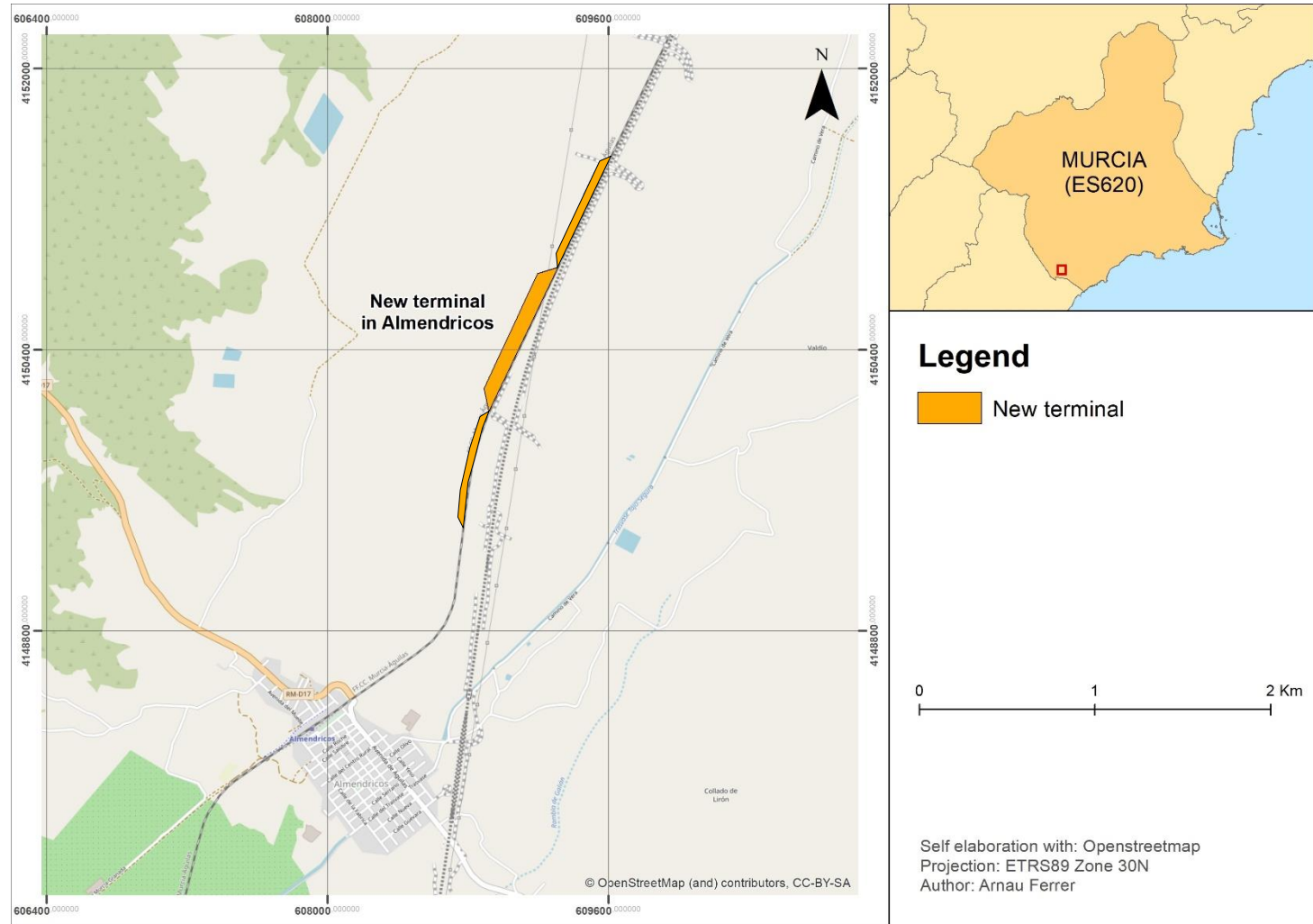


Self elaboration with Openstreetmap  
 Projection: Mercator  
 Author: Arnau Ferrer Martí



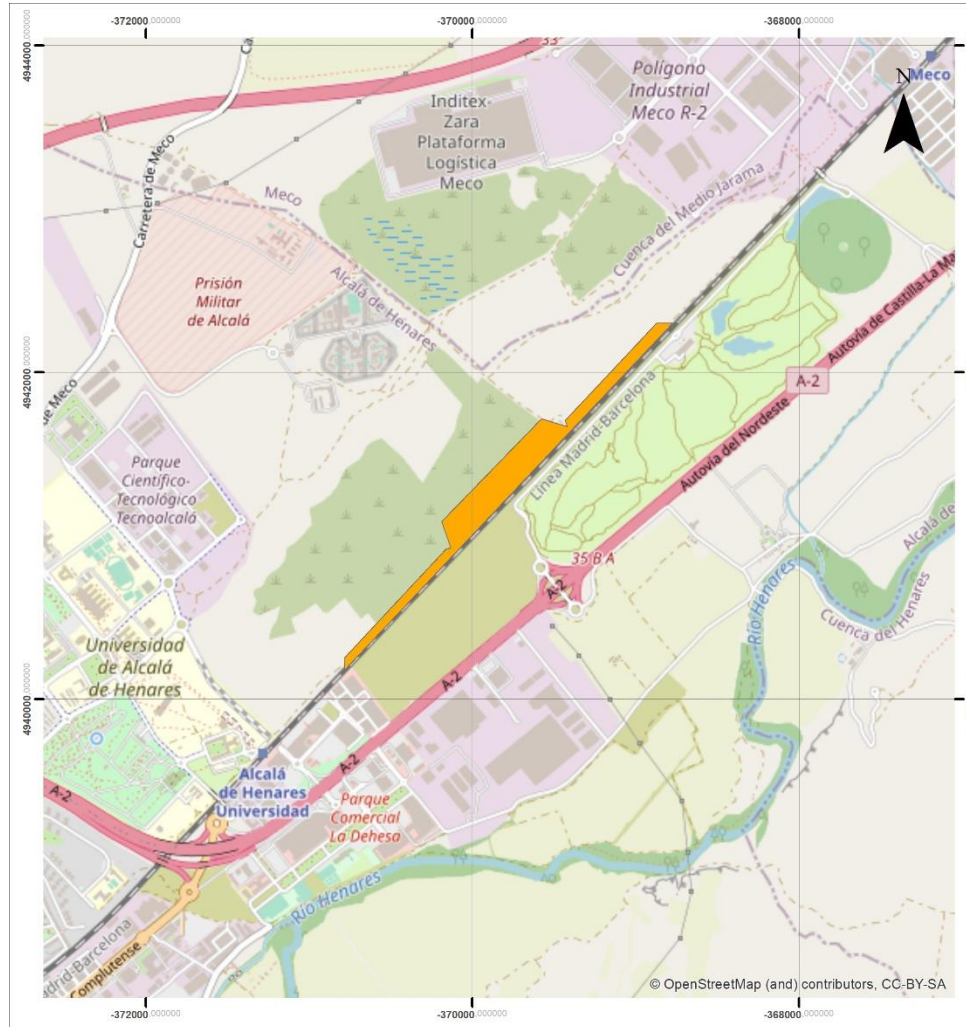
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New +FIRRST terminal in Almendricos



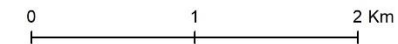
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New +FIRRST terminal in Alcalá de Henares



### Legend

 New terminal

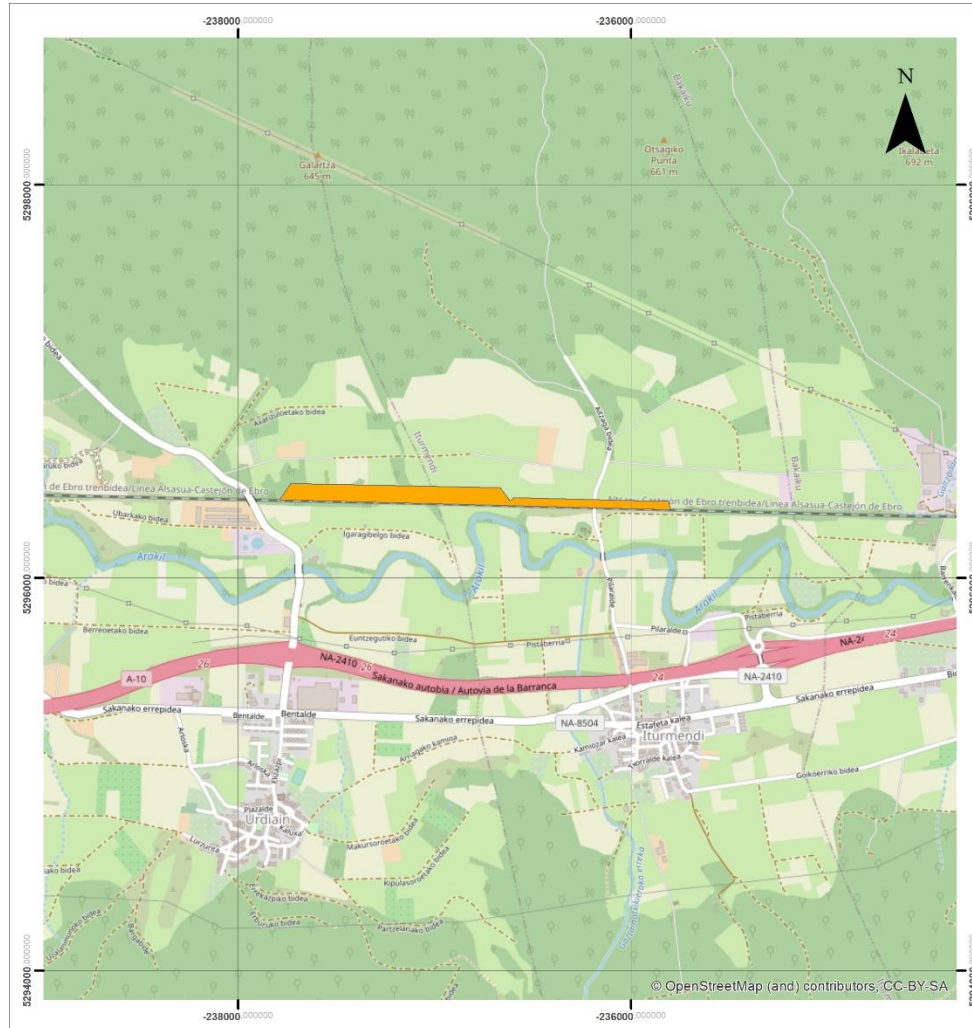


Self elaboration with Openstreetmap  
 Projection: Mercator  
 Author: Arnau Ferrer Martí



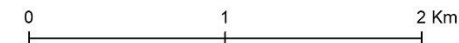
# IMPROVEMENT ACTIONS IN THE INTERMODAL TERMINALS & INTERCONNECTION LINKS

## New +FIRRST terminal in Altsasu



### Legend

 New terminal



Self elaboration with Openstreetmap  
 Projection: Mercator  
 Author: Arnau Ferrer Martí





**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# OPERATION AND ROLLING STOCK

FERRMED, FAST, FLEXIBLE INTEGRATED  
RAIL-ROAD SYSTEM OF TRANSPORT  
(+FIRIRST)



# OPERATION AND ROLLING STOCK

## Combined transport: Road to Rail/ Horizontal loading

Different systems to load the trains

### ❖ LOHR system



# OPERATION AND ROLLING STOCK

## Combined transport: Road to Rail/ Horizontal loading

Different systems to load the trains

### ❖ CargoBeamer



# OPERATION AND ROLLING STOCK

## Combined transport: Road to Rail/ Vertical loading

Different systems to load the trains

### ❖ Craneable semitrailers



## +FIRRST

### FERRMED, FAST, FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRST) (1)

#### + FIRRST System. Introduction:

According to the FERRMED Study of Traffic and Modal Shift Optimisation in the EU considerations', **the only way to achieve the EC targets of road freight transfer to rail is to incorporate a system that can move isolated semi-trailers, containers and swap-bodies (ILUs) from/to different destinations in a **fast, flexible integrated rail-road system of transport. It is a novel way of organising multimodal rail-road transport in the form of "Mobility as a Service (MaaS).****

**+FIRRST is a combined transport system aligned with the road (as the most flexible mode).**

#### Kind of trains provided:

**Point to point (Ptp), Stop at intermediate terminals (Sai) and Stop at request (Sor)**

#### Network considered (first priority)

**EU Backbone Network (Central plus Extended) and additional feeder links. Approx.: 27.000 kms**



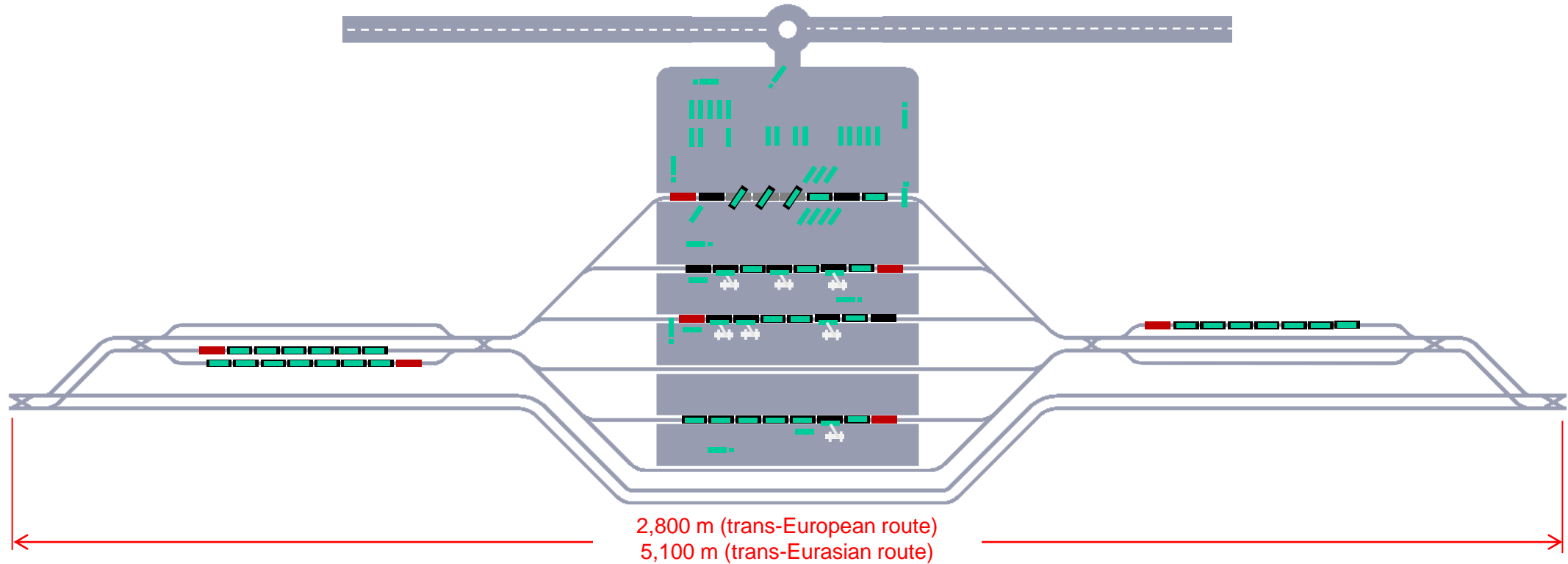
# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRST System)

## +FIRRST System requirements:

- **A set of specific intelligent freight trains**, with wagons that can carry truck trailers, swap bodies and containers (minimum length 740 m), reaching the EU strategic hubs' intermodal terminals and intermediate terminals in the interconnection links between hubs, all over the EU Backbone Network.
- **A set of dual locomotives** (electric + electric batteries/diesel) able to carry freight trains of 1800 – 2000 t gross weight.
- **A set of “pass-through”** flexible intermodal terminals able for fast load/unload truck trailers and/or containers in the freight trains all over the EU Backbone Network.
- **An integrated rail-road freight flow control system** (in the ERTMS or similar framework)

# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRSST System)

## +FIRRSST STRATEGIC TERMINAL

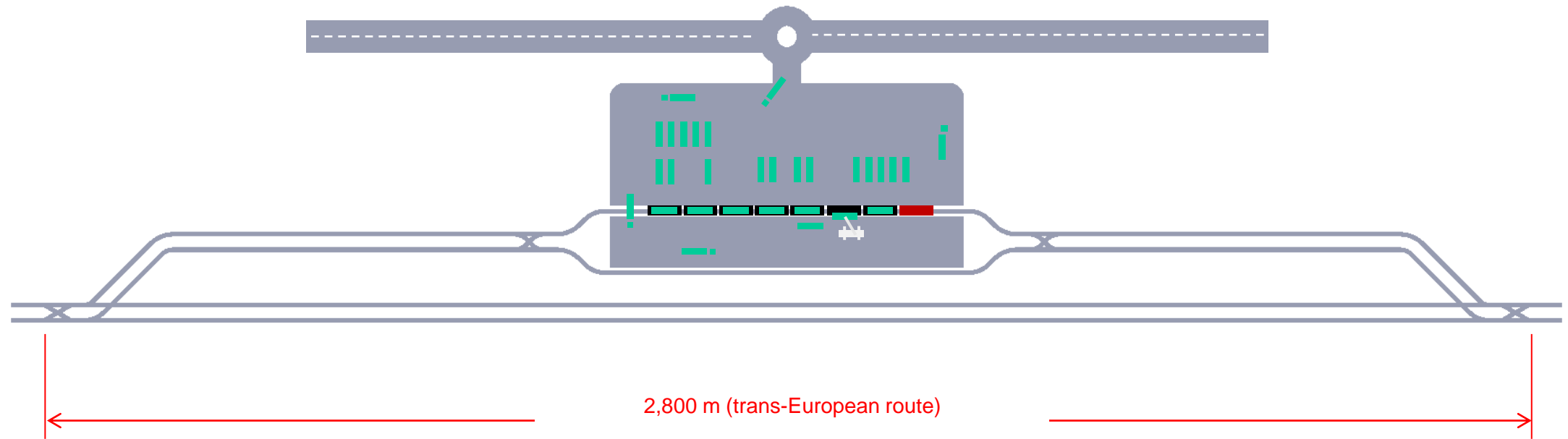


2,800 m (trans-European route)  
5,100 m (trans-Eurasian route)



# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRSST System)

## +FIRRSST INTERMEDIATE SMALL TERMINAL



# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRST System)

To take advantage of semi-abandoned marshalling yards to install the +FIRRST terminals





# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRSST System)

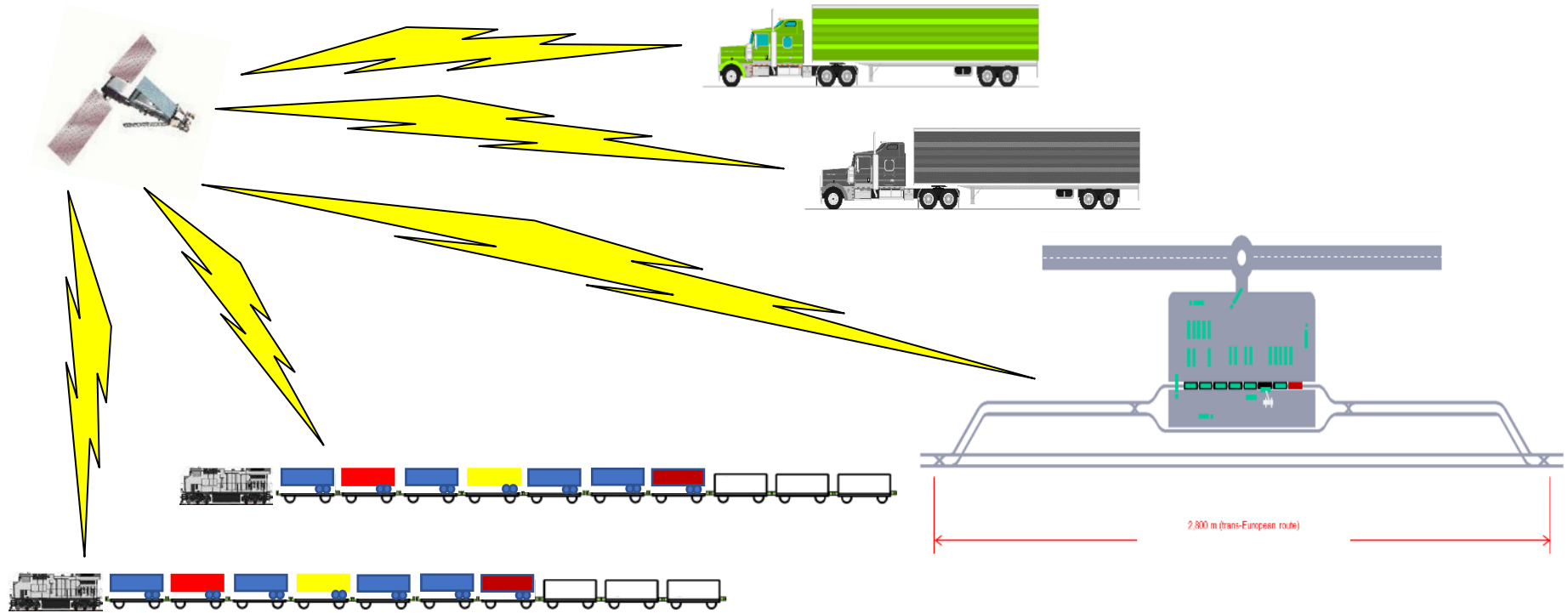


# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRSST System)



# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRST System)

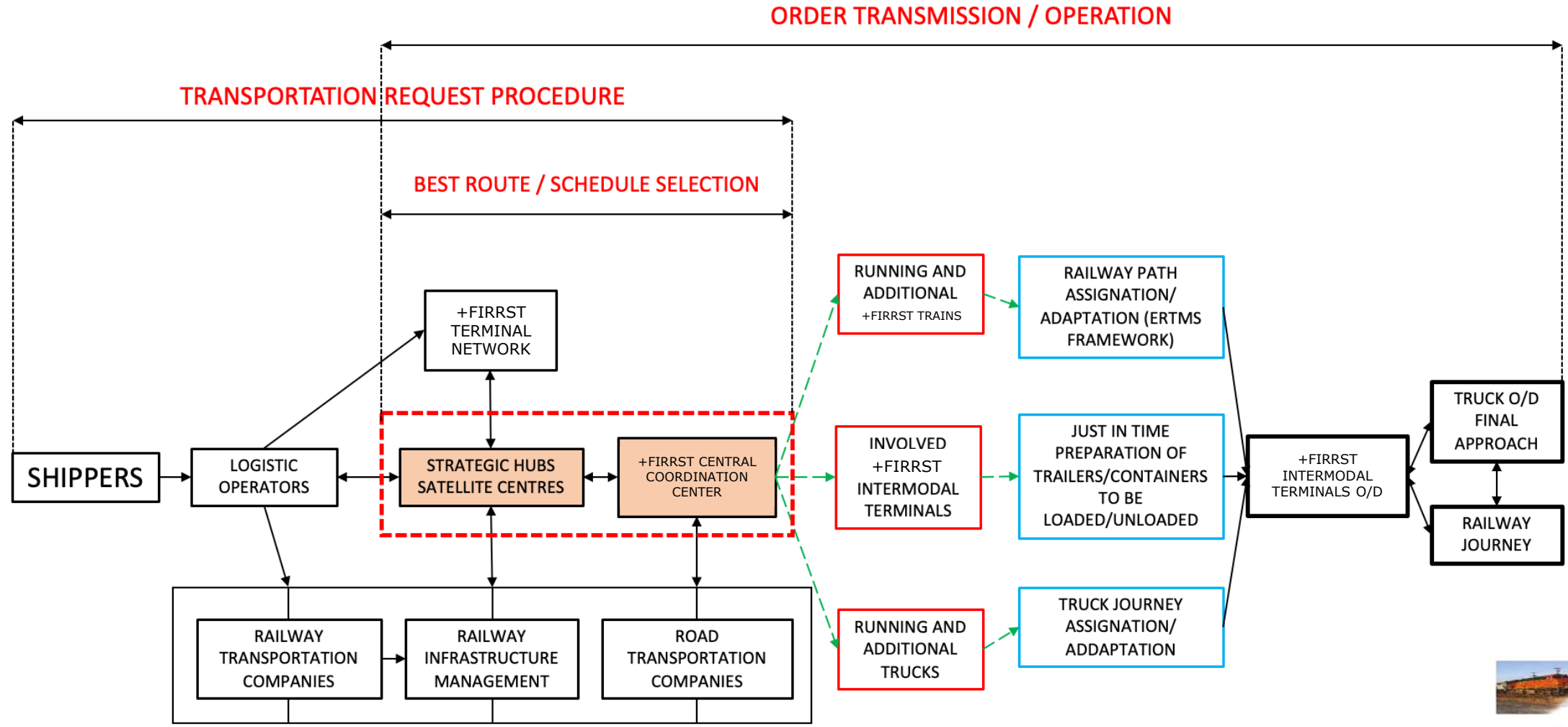
+FIRRST is a combined transport system at the service of the road (as the most flexible mode), with stops at request (From Ptp to Sai/Sor freight trains)



Hybrid/Dual locomotives plus “multipurpose wagons” (electrically linked), semi-trailers, containers and swapbodies duly interconnected with trucks and +FIRRST Terminals

# FERRMED FAST FLEXIBLE INTEGRATED RAIL-ROAD SYSTEM OF TRANSPORT (+FIRRSST System)

## +FIRRSST SYSTEM OPERATIONAL PROCEDURE SCHEME



## DETERMINATION OF +FIRRST TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)

First approach:

Analysis of the inflow-outflow of the 30 preselected main hubs:

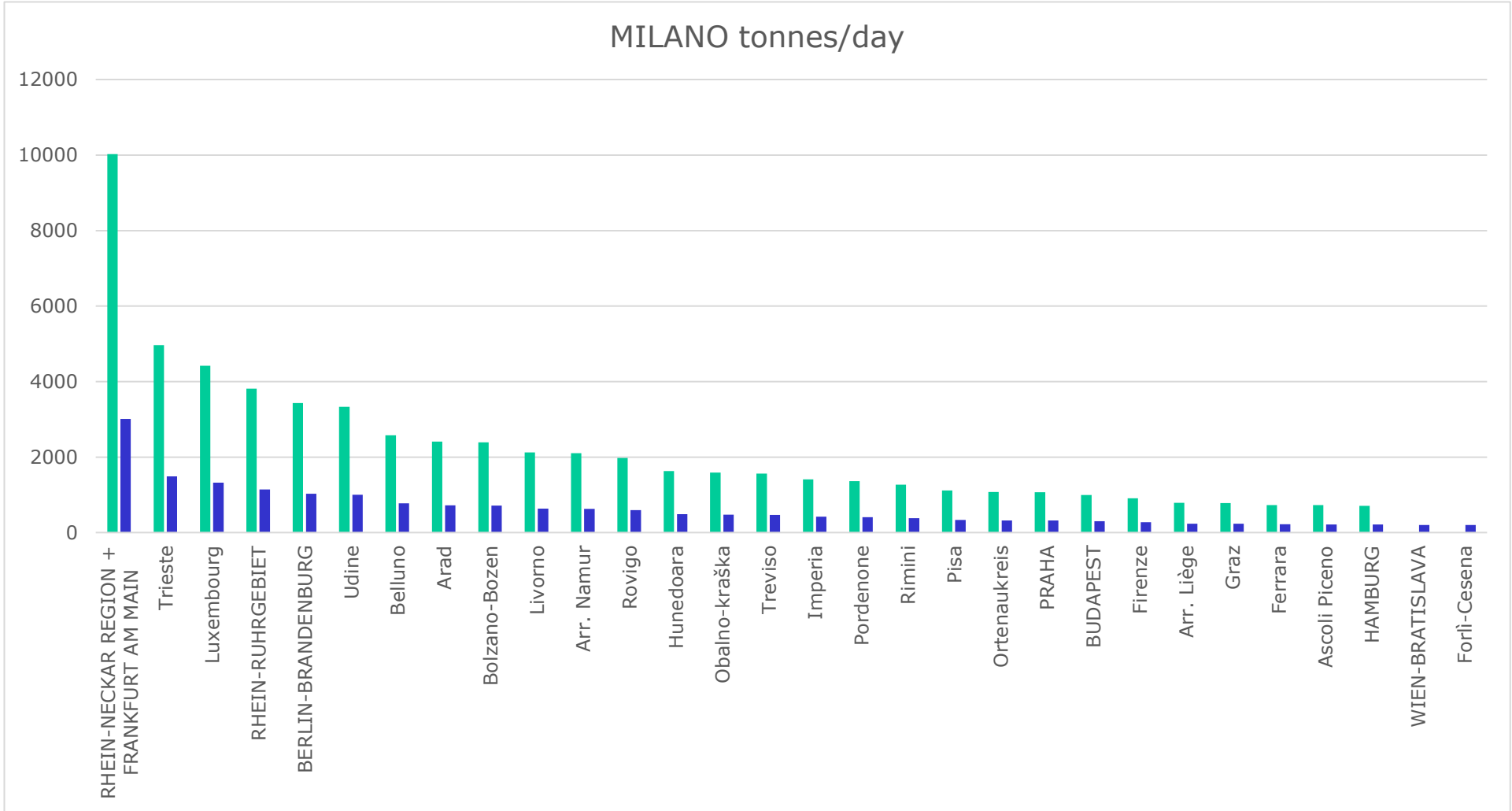
- Determination of:
  - ABC graphic flows from/to every hub
  - Destinations with the possibility of Ptp trains from the preselected hubs.
  - Destinations that require Sai / Sar trains because of the lac of volume for Ptp trains.
  - Suitable +FIRRST trains routes to interlink the main 30 hubs.

Analysis of the inflow-outflow of the intermediate hubs located in the +FIRRST trains routes:

- Determination of:
  - The number of +FIRRST trains origin/destination main hubs that are not fully completed
  - Additional stops in the route to absorb the inflow-outflow traffic of the involved intermediate hubs (terminals)
  - Number of Sai/Sor required trains in the route



# DETERMINATION OF +FIRrst TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)

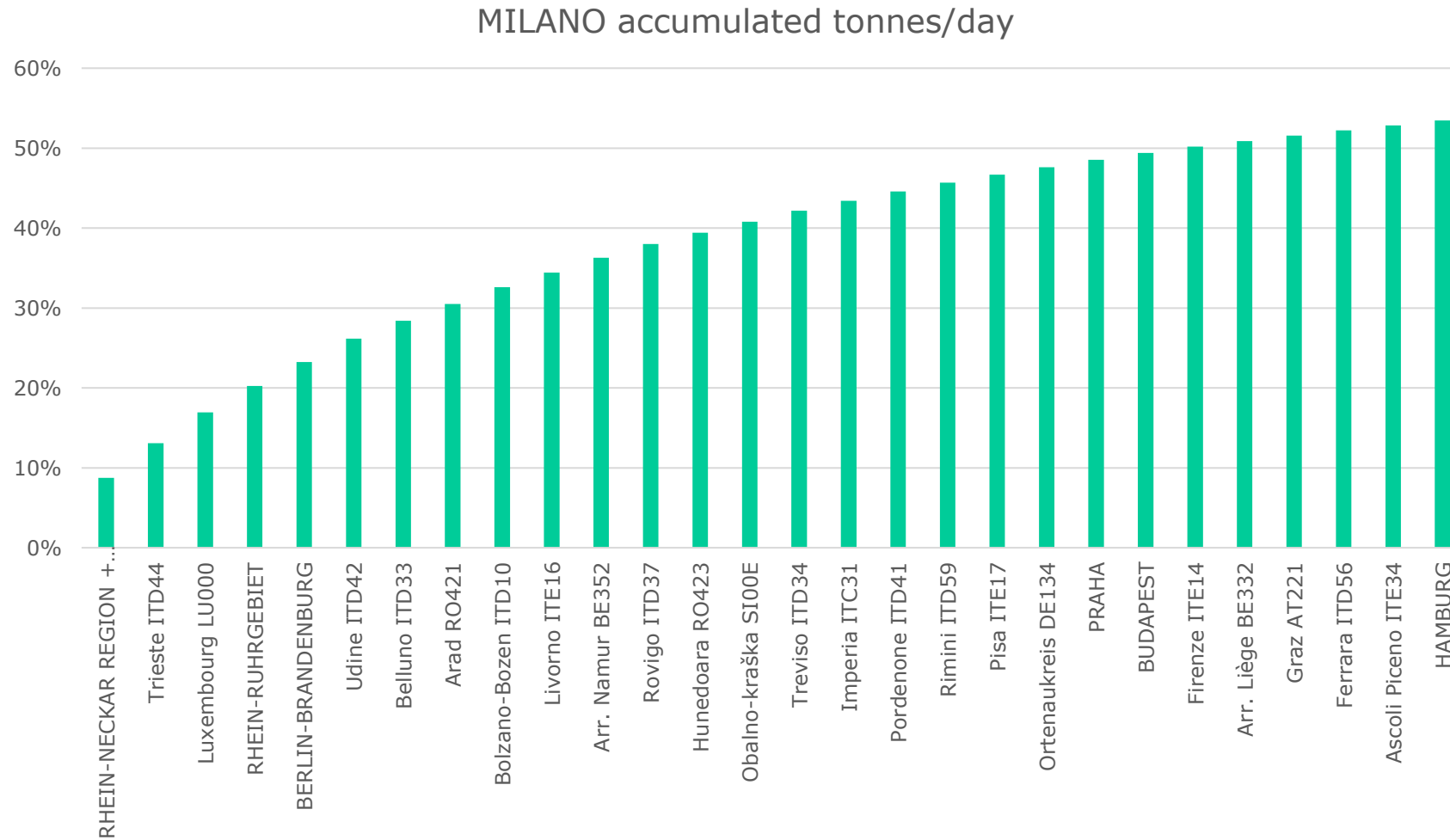


■ Total land traffic

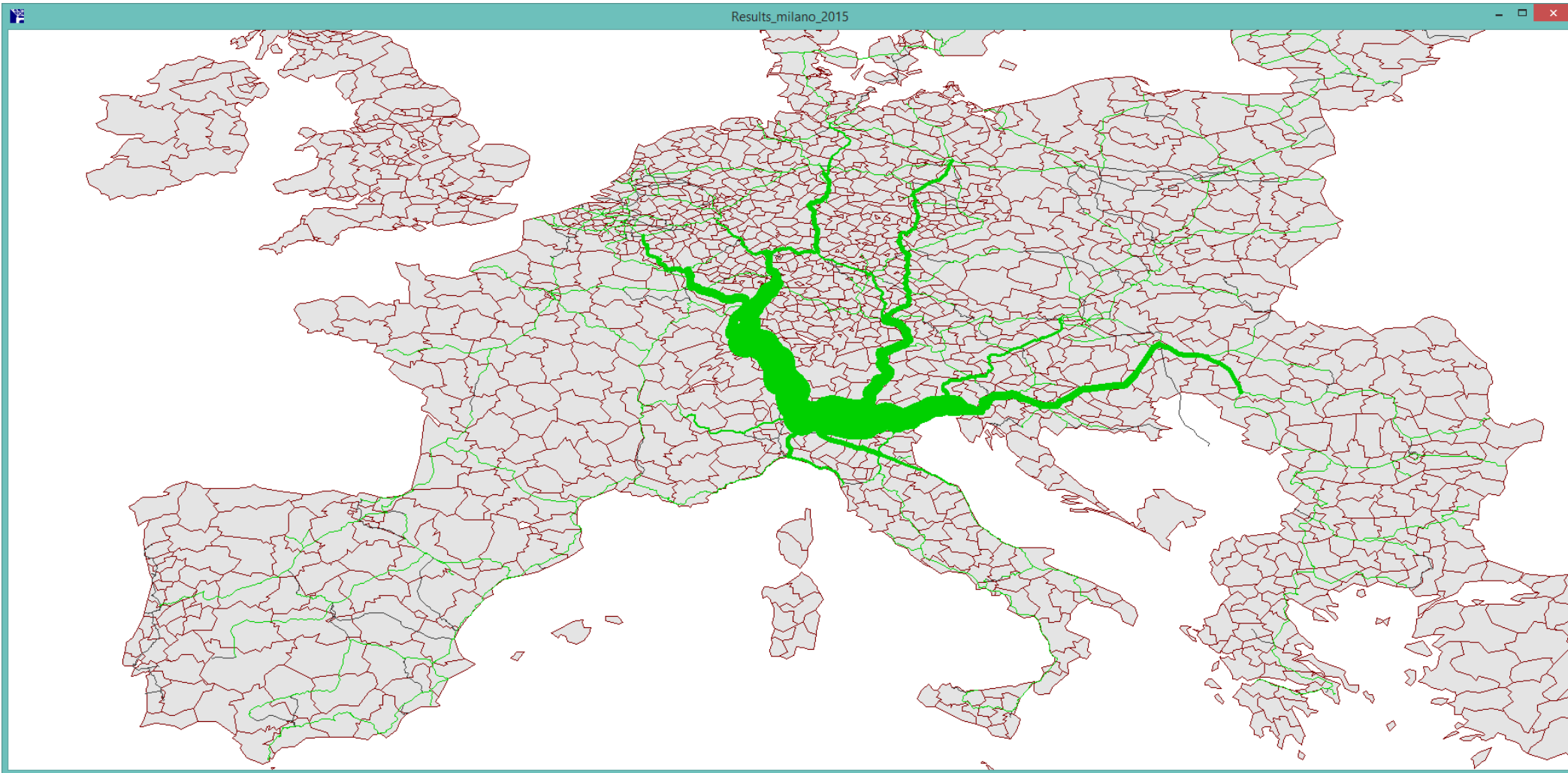
■ 30% of the land traffic



# DETERMINATION OF +FIRrst TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)

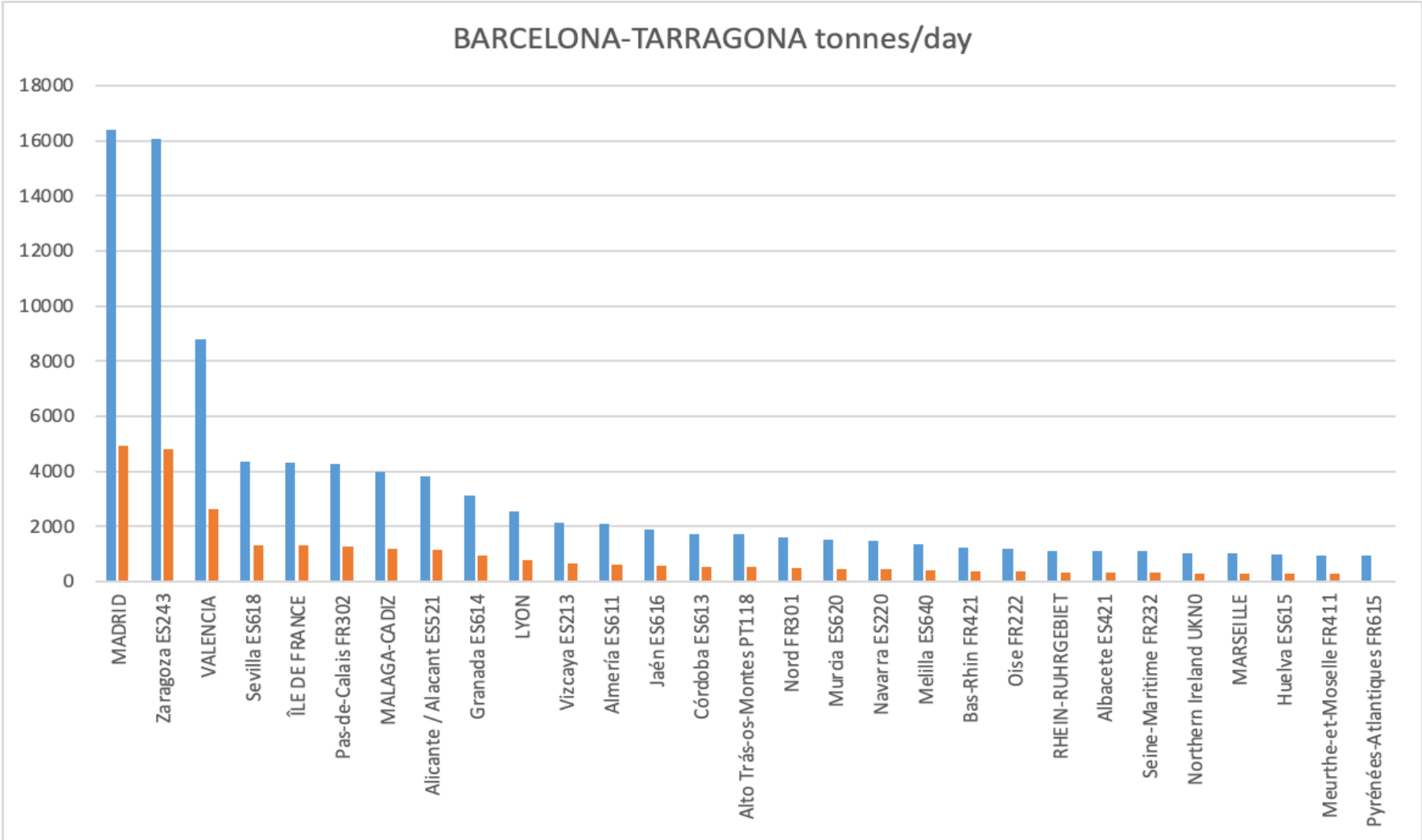


# DETERMINATION OF +FIRST TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)





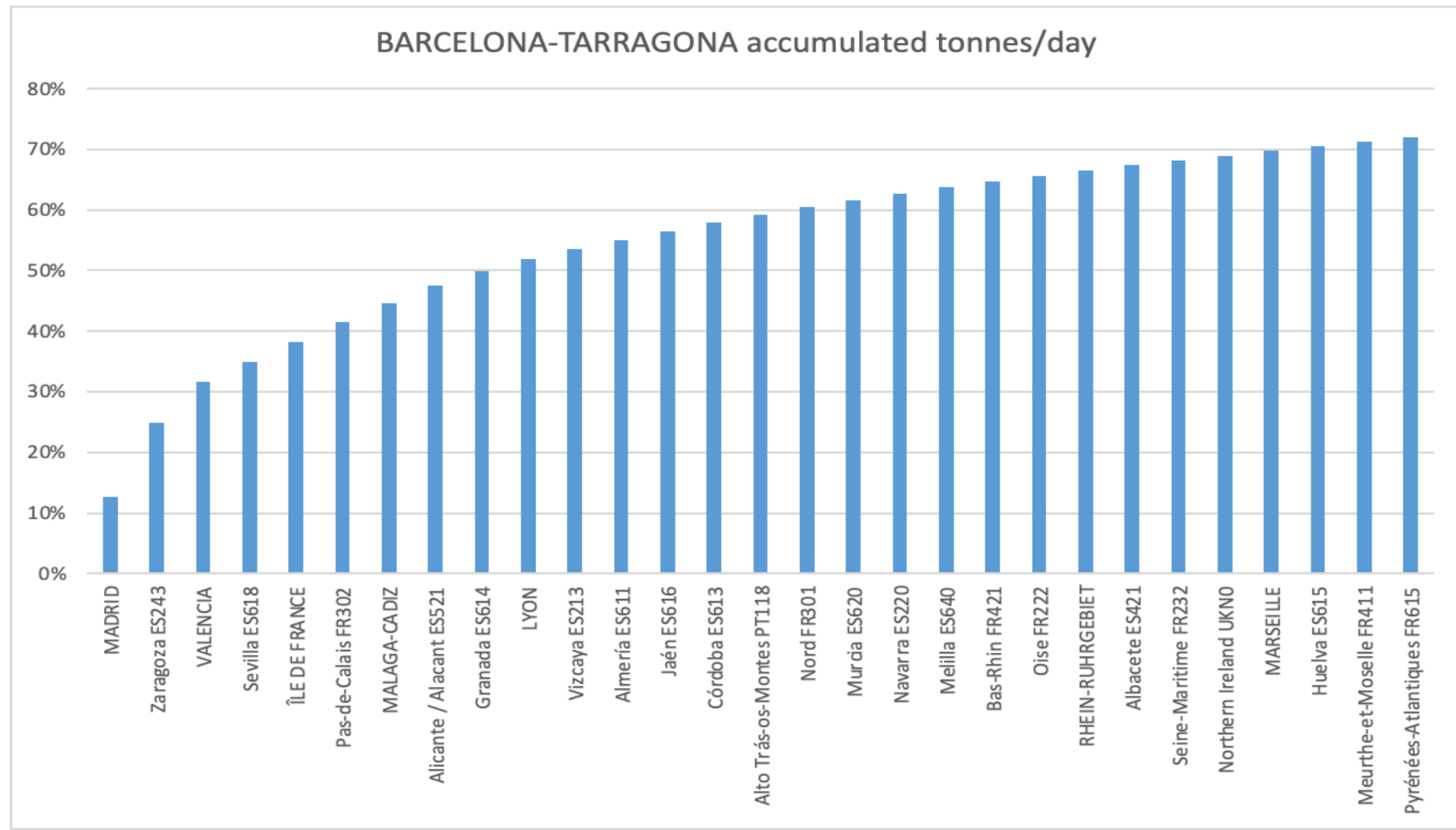
# DETERMINATION OF +FIRrst TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)



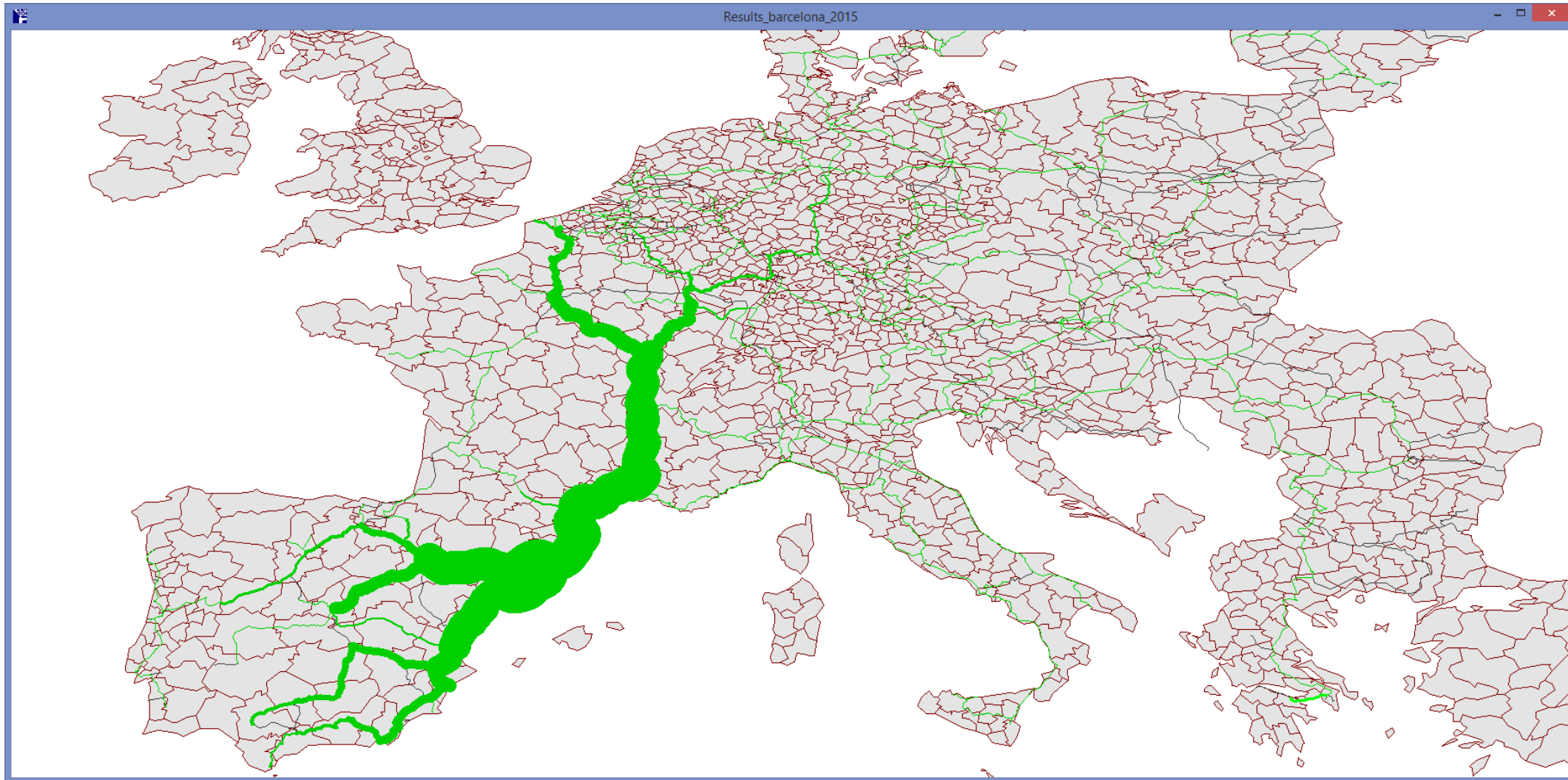
■ Total land traffic  
■ 30% of the land traffic



# DETERMINATION OF +FIRrst TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)



# DETERMINATION OF +FIRST TRAINS INTERCONNECTION ROUTES (Ptp – Sai – Sor)



## +FIRrst ROLLING STOCK MULTIPURPOSE WAGONS (EXAMPLES)



One of the most flexible and appropriate wagon to be used is the **Sdggmrss** (T3000e or TWIN)

Axle load	= 22,5 t
Tara	= 35 t
Max. payload	= 100 t
Length over buffers	= 34,2 m
Loading length	= 2x16,4 m or 4x7,82 m
Maximum speed	= 120 Km/h

This double pocket six-axle wagon is designed for the transportation of

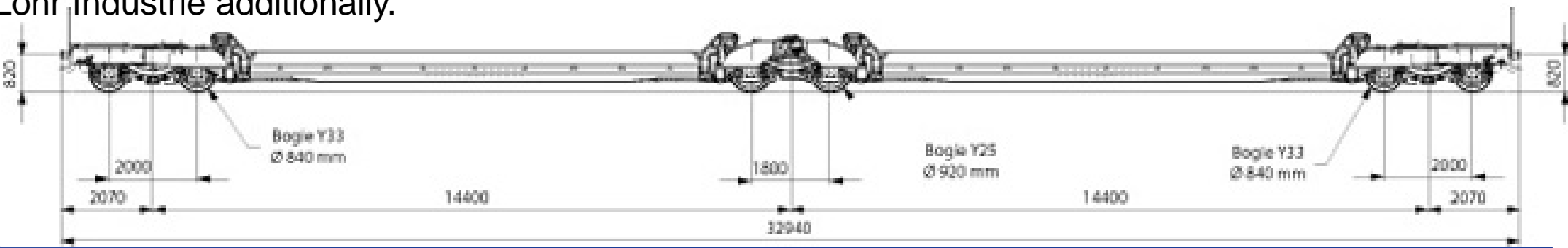
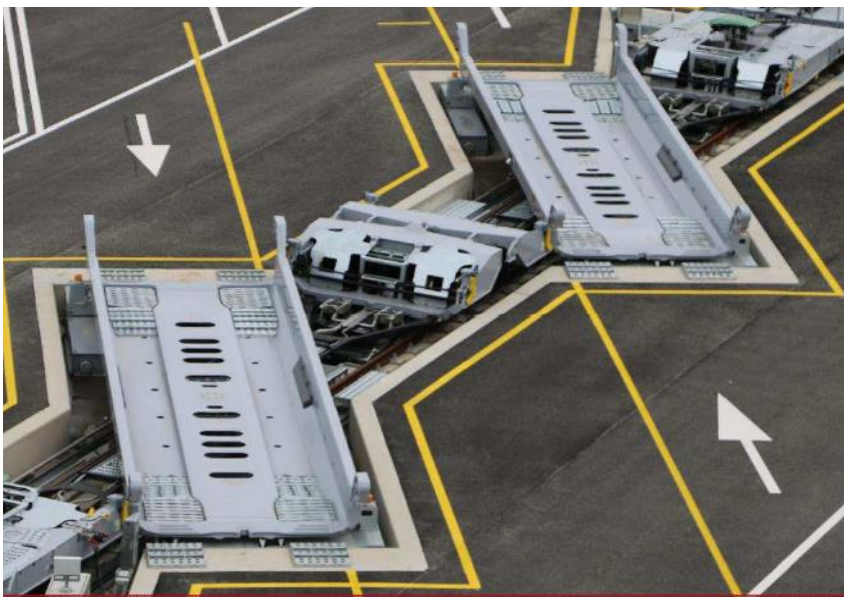
- craneable semi-trailers and Megatrailers, Kögel Euro trailers and Big-MAXX
- up to 4 x 20' Containers or swap bodies (4x20', 2x30' or 2,40')

# + FIRRST ROLLING STOCK MULTIPURPOSE WAGONS (EXAMPLES)

## MODALOHR

The double-pocket articulated wagon specially designed to transfer from road to rail all types of EU standard semi-trailers and allows very rapid transfer due to horizontal loading principle.

Also could be loaded truck tractors, pickups and some military vehicles. The possibility to load containers and swap bodies is to be discussed with Lohr Industrie additionally.

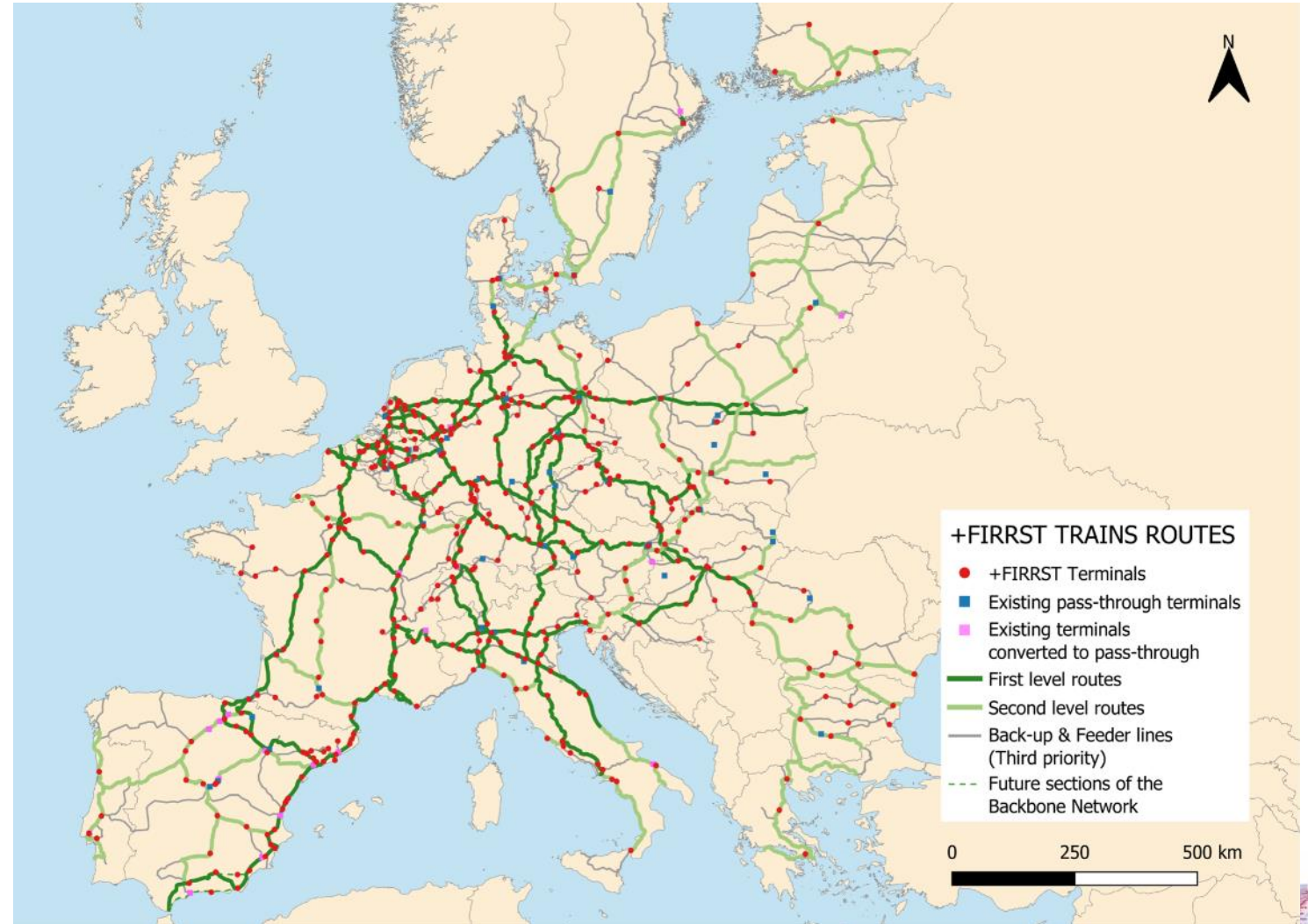


# +FIRRSST TRAIN ROUTES (approach)

## +FIRRSST train routes definition

+FIRRSST train routes will be developed following the corridors included in the Central and Extended EU backbone network, linking the +FIRRSST terminals and the existing conventional pass-through terminals.

The Origin/Destination of the trains will be the intermodal terminals of the EU main logistics hubs, with possible stops in intermediate terminals according to the real time demand information.



## TEST OF THE +FIRRST SYSTEM

### Proposed corridors:

- Northern Sea – Alpine and Mediterranean

### Involved countries:

- The Netherlands, Belgium, Luxembourg (Germany), France and Spain

### Previous conditions:

- High freight transport volume in the sections of the selected corridor
- Adequate number of pass-through existing intermodal terminals
- FIRRST terminals implemented (or simulated)
- ERTMS (or similar) fully implemented
- Loading gauge able for unaccompanied combined transport
- +Intelligent trains including the availability of adequate locomotives and wagons
- Reinforcement of the role of the European Railway Agency (single European railway space) (At least, in the involved corridors, to perform the test)
- +FIRRST Central Coordination Center located in ERA, linked with Member States “satellite” centres



# TEST OF THE +FIRRST SYSTEM

## Proposed Test Partners:

- CER
- ERA
- ERFA
- ESC
- EWG Intermodal Terminal
- FERRMED
- Infrastructure Managers
- IRU
- Logistics operators
- Railway operators
- Road transporters
- UIRR
- ...







**FERRMED**

Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

# TRANS-EURASIAN MAIN RAILWAY NETWORK ENHANCEMENT

# TRANS-EURASIAN MAIN RAILWAY NETWORK ENHANCEMENT

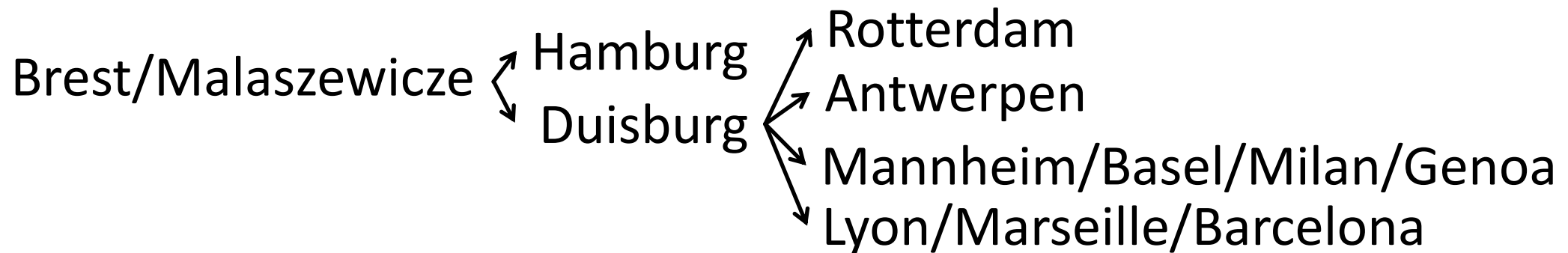


Train length:  
 1.500m  
 750m



# MAIN TRANS-EURASIAN ROUTES IN THE EU, ABLE FOR LONG TRAINS (UNTIL 1.500 m - LENGTH)

## MAIN ROUTES



## OTHER COMPLEMENTARY MAIN ROUTES

- Ukrainian border – Slawkow – Katowice – Ostrava
- Ukrainian border – Fényeslitke – Budapest – Vienna – Milan – Lyon

## TRAIN LENGTH IN TRANS-EURASIAN MAIN ROUTES

### Gradual evolution from 600 m to 1.500 m length



Freight trains with two engines and 72 wagons of length 1,524 metres and weight 4.020 tons. Trial conducted in France between the towns of Sibelin and Nîmes in the first quarter of 2014. Project Marathon.



Promotion du Grand Axe Ferroviaire de marchandises  
Scandinavie-Rhin-Rhône-Méditerranée Occidentale A.S.B.L

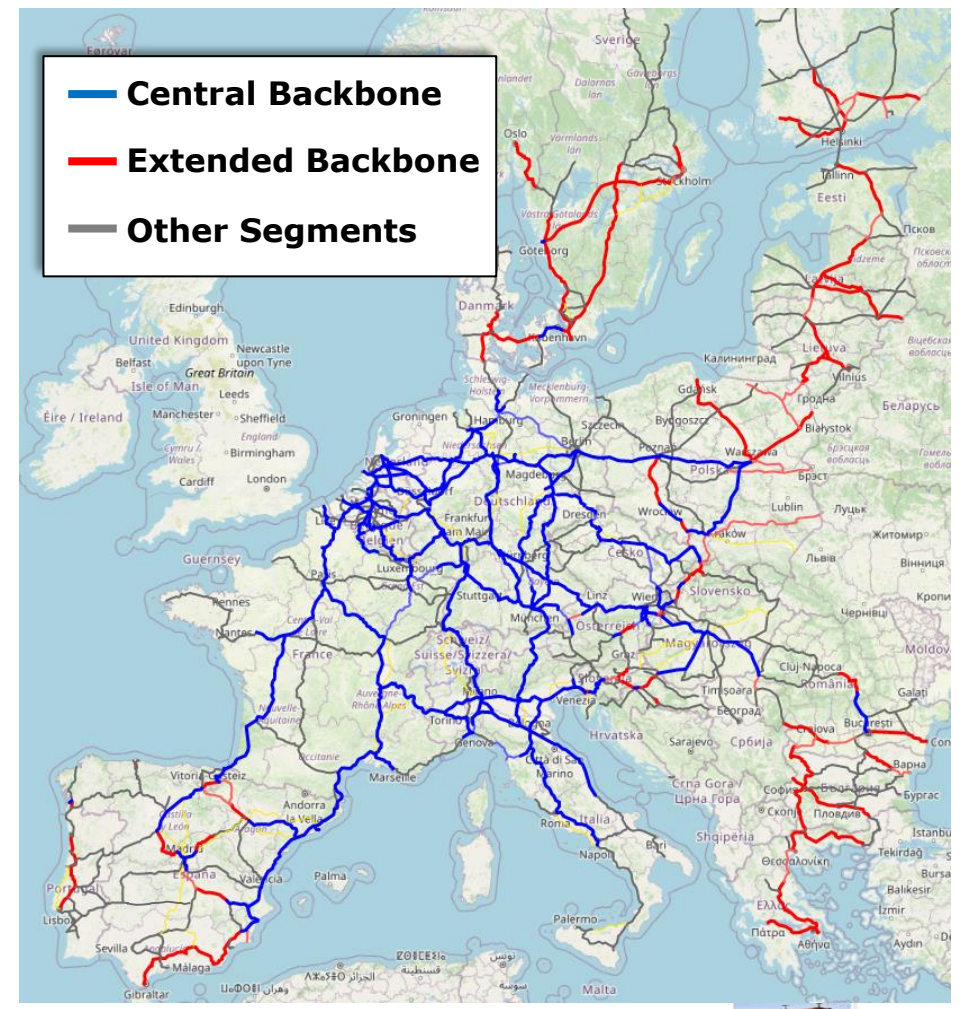
# SOCIO-ECONOMIC AND ENVIRONMENTAL ANALYSIS

# In this section we share some of the main takeaways from our socio-economic & environmental impact analysis

The purpose of this section is to assess the socio-economic and environmental impact of FERRMED's recommendations.

Its scope therefore encompasses analyses of:

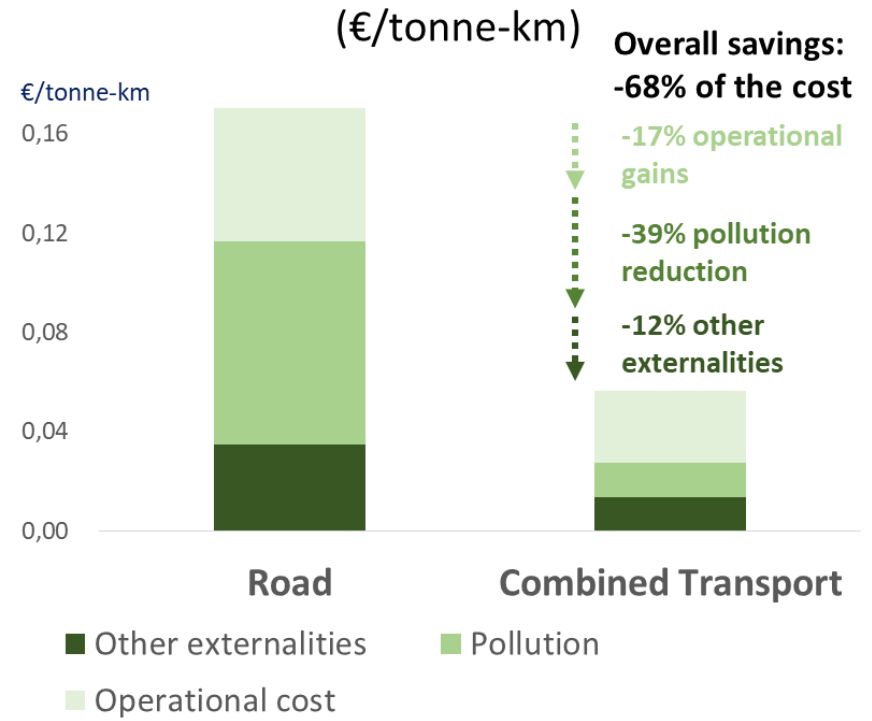
- ❖ Operational efficiency improvements due to the recommended shift from road to combined transport
- ❖ Related externality cost reductions (e.g. pollution, CO<sub>2</sub>, etc.)
- ❖ Investment costs required to generate these benefits
- ❖ Net Present Value (NPV), Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR)
- ❖ Potential for new +FIRRST terminal privatisation



# In Europe, the segments of the Central Backbone generate 99% of the TEN-T programme value

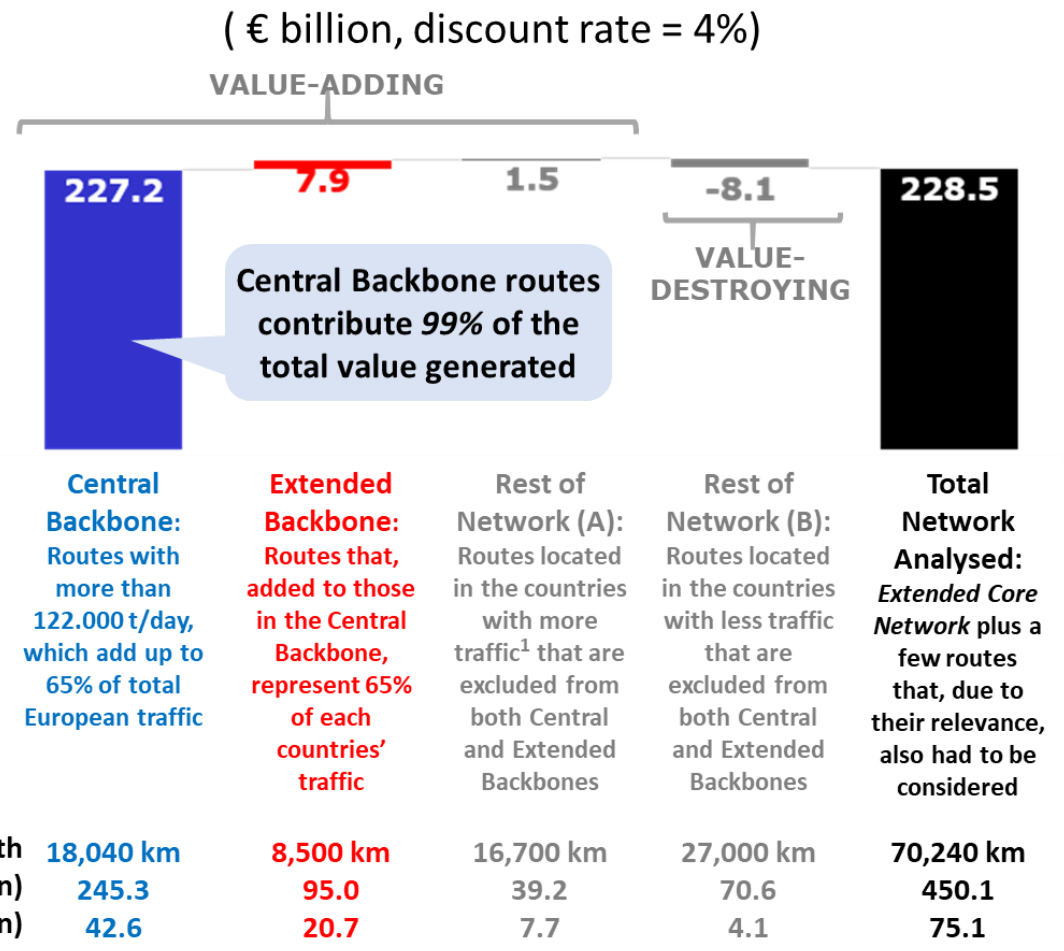
**PRELIMINARY**

## 1. Marginal economic cost of transport (€/tonne-km)



- ❖ **Operational cost reduction.** Road vs +FIRRST combined transport (including taxes): 58%
- ❖ **Externality reduction.** Road vs +FIRRST combined transport: 76%

## 2. Net present value contribution (€ billion, discount rate = 4%)



	Central Backbone	Extended Backbone	Rest of Network (A)	Rest of Network (B)	Total Network Analysed
Length	18,040 km	8,500 km	16,700 km	27,000 km	70,240 km
TEN-T investment (1€ billion)	245.3	95.0	39.2	70.6	450.1
FERRMED investment (1€ billion)	42.6	20.7	7.7	4.1	75.1

1. These countries are Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, Netherlands, Slovakia and Switzerland.  
 Source: FERRMED, preliminary data as of May 2023 (some details might differ from those published in the final report to be issued later in 2023).

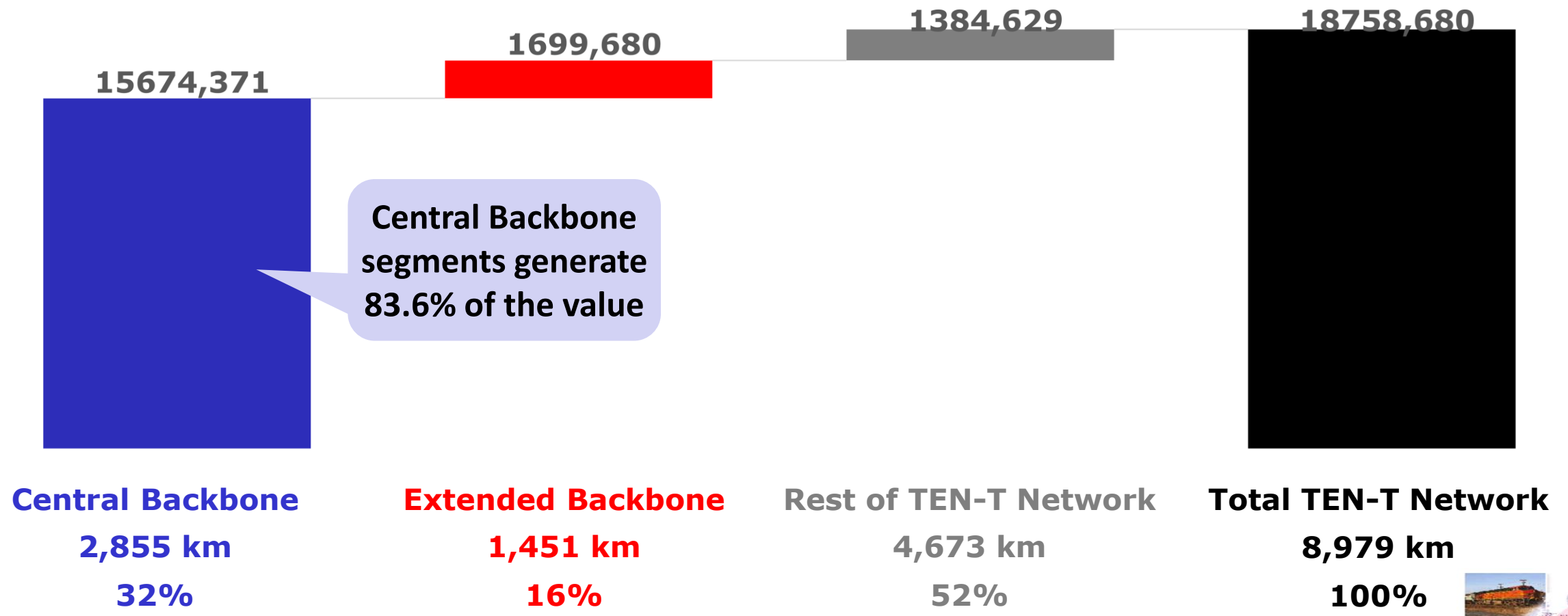




**In Spain, Central Backbone segments provide 83.6% of the TEN-T programme net present value in the country**

**TEN-T Programme Net Present Value (NPV) in Spain**  
(€ million; real discount rate = 4%)

**PRELIMINARY**

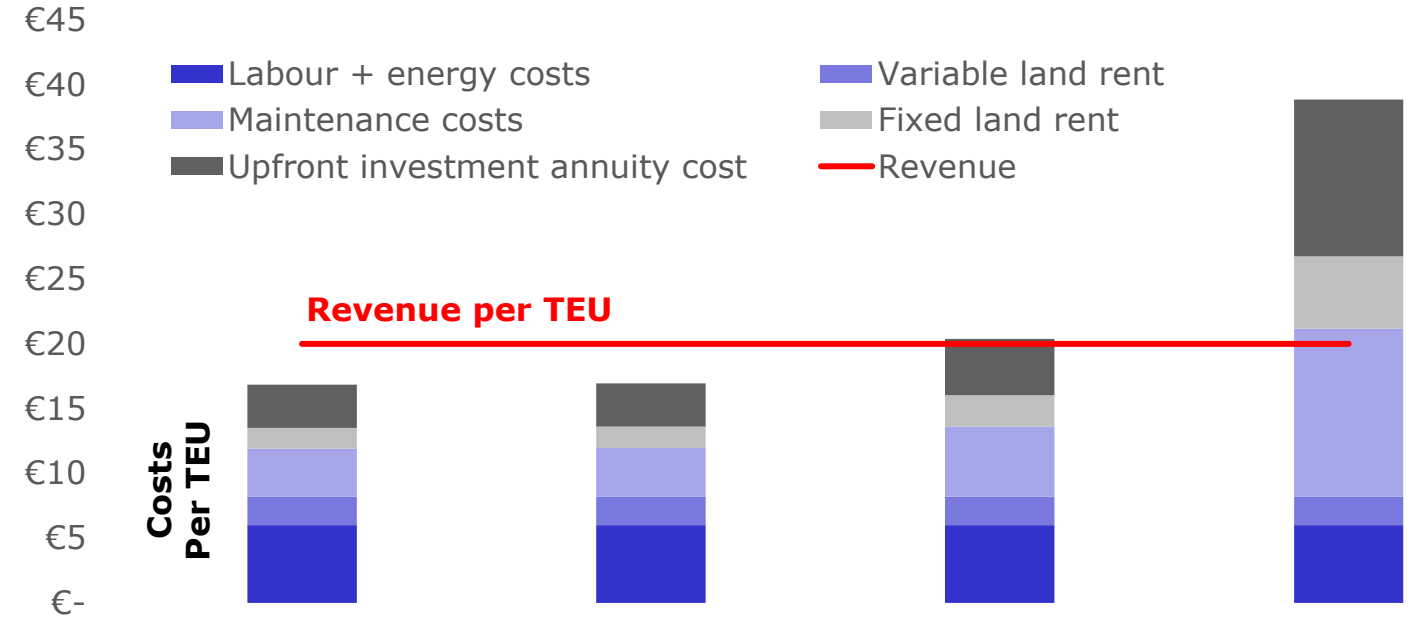




# A high-level assessment also suggests large & mid-sized +FIRRST terminals could attract private investors (2/2)

- ❖ We have developed a high-level profitability assessment of the recommended new terminals.
- ❖ Revenues and costs are based on expert input combined with steady state TEU flow forecast.
- ❖ At any rate, **Strategic** (i.e. large) & **intermediate+** (i.e. upper-range of the mid-sized) **terminals could be attractive to private investors.**

**New +FIRRST terminals' average cost vs. revenue per TEU (under steady state conditions)**  
**Lower volume scenario**



	<b>Strategic</b>	<b>Intermediate+</b>	<b>Intermediate-</b>	<b>Mini</b>
<b>TEU / year ('000)</b>	<b>814</b>	<b>583</b>	<b>277</b>	<b>35</b>
<b>Surface (ha)</b>	<b>19.9</b>	<b>14.4</b>	<b>9.4</b>	<b>3.0</b>
<b>Upfront investment (€ '000)</b>	<b>41,422</b>	<b>28,690</b>	<b>16,998</b>	<b>6,462</b>

## PRELIMINARY CONCLUSIONS DEMONSTRATE THAT

Investing in 26% of the EU Extended Core Network generates 99% of net present value contribution, socio economically and environmentally.

Implementing the Fast Flexible Integrated Rail-Road System of Transport (+FIRRST) to move all kind of ILUs (semitrailers, containers and swap bodies) to different destinations in the form of “Mobility as a service (Maas), is the best way to reverse the stagnant share of the railway in land freight transport.

Properly interlinking the identified EU Strategic logistic hubs and key interconnection nodes with the +FIRRST system, including the intermodal terminals new concept, is key for the Green Deal targets’ achievement on transport.

# FERRMED Study of Traffic and Modal Shift Optimization in the EU



**MUCHAS GRACIAS POR SU ATENCIÓN**  
**THANK YOU VERY MUCH FOR YOUR**  
**ATTENTION**  
**MOLTES GRÀCIES PER LA VOSTRA**  
**ATENCIÓ**