Feasibility Study of a Container Shuttle Train between Ligurian Ports and the Corridor Hinterland

Action 8, Work Package 3

Uniontrasporti
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Agenda

1 Objective

2 Status Quo Analysis

3 Impact on the Position of Ligurian Ports with Regard to Competitors

4 Assessment of Ligurian Ports & Main Container Operator

5 Operational Costs

6 Key Findings

Agenda

1 Objective

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The lion's share of the container throughput in Europe is handled by Northern ports despite the favourable location of Southern ports

Initial Situation

- Continental Europe is mainly served via the Northern ports though the sea route is longer than for the Southern ports
- Particularly in the container sector, the transport volume has doubled between 2000 and 2010
- As a consequence, many ports have begun to increase their capacities prior to the economic crisis, so competition has increased
- This results in bottlenecks in hinterland transport

Hinterland bottlenecks, short lead time expectations and the increasing importance of CO_2 accounting suggest a potential for Ligurian ports

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The target of the study is to check the conditions for the feasibility of a hinterland shuttle from the Ligurian ports along the corridor

	Status Quo	Position of Ligurian Ports with Regard to Competitors	Assessment of Ligurian Ports & Main Container Operator	Operating Costs	Key Findings
Content	▪ Cargo Volume ▪ General Railway Framework ▪ Port Railway Framework	▪ Relevant competitors ▪ Unique Selling proposition (USP) ▪ Product definition ▪ Hinterland definition ▪ Market strategy ▪ Success factors	▪ Port of Genoa ▪ Port of La Spezia ▪ Port of Savona ▪ *Intermodal operator position*	▪ Traction ▪ Equipment ▪ Infrastructure ▪ Energy ▪ Staff ▪ Shunting	
Objective	**Overview about the current transport flows and the railway system along Rhine corridor**	**Positioning strategy for Ligurian Ports**	**Evaluation of Positioning strategy**	**Calculate costs for a potential shuttle train concept**	**Lessons learned** **Action list including next steps**

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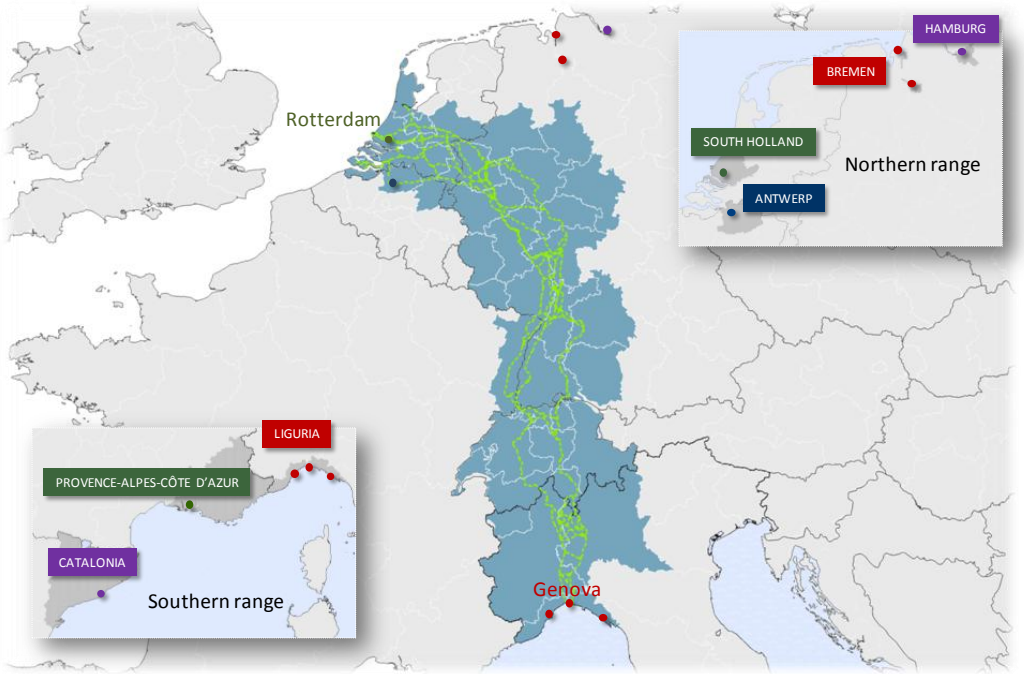
CODE 24 (NUTS II Core Regions Definition)

Rhine-Ruhr, Rhine-Neckar, Switzerland and the Lombardy area are in the focus of the analysis



Main Southern and Northern range ports have been selected as the focus of the demand analysis. Since origin/destination data on ports container flows are not available at the required level of detail, data for the corresponding NUTS II regions were used (see table and map):

RANGE	NUTS II REGION	PORTS
SOUTH	LIGURIA	Genoa, Savona, La Spezia
	PROVENCE - ALPES - COTE D'AZUR	Marseille-Fos
	CATALONIA	Barcelona
NORTH	ANTWERP	Antwerp
	SOUTH HOLLAND	Rotterdam
	BREMEN	Bremen, Bremerhaven
	HAMBURG	Hamburg

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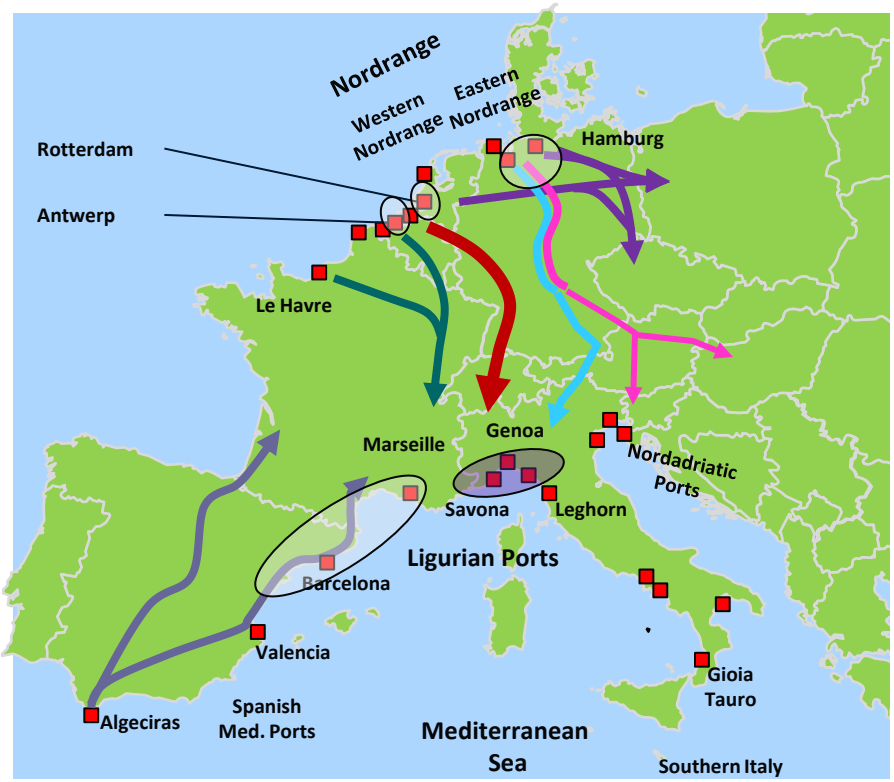
The focus of the analysis will be on the role of Ligurian ports

Major Continental European Container Ports and Hinterland Rail Corridors



Ligurian Ports
- Genoa
- La Spezia
- Savona

Competitors
- Hamburg
- Bremerhaven
- Rotterdam
- Antwerp
- Marseille
- Barcelona

Rhine Axis (Code 24)

Agenda

2 Status Quo Analysis

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Structure of Status Quo Analysis

	Cargo Volume	General Railway Framework	Port Railway Framework
Content	▪ General Overview ▪ Hinterland Container Volume ▪ UIRR volume ▪ Intermodal Terminals ▪ Train volume	▪ Liberalization ▪ Energy & Safety ▪ Rail Net Europe ▪ TEN-T ▪ Rail profile ▪ Intermodal profile	▪ Railway hinterland connections ▪ Port railway infrastructure ▪ Established intermodal services ▪ Port business models
Objective	**Basic overview** current transport flows on corridor Rotterdam - Genoa	**Basic overview** general railway framework	**Basic overview** port railway framework

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Volume will be analyzed on NUTS-2 level

Code 24 core regions definition*

Netherlands (NL)		Belgium (BE)		Germany (DE)		France (FR)		Switzerland (CH)		Italy (IT)	
Core Regions	Gelderland	Core Reg.	Antwerp	Baden-Württemberg	Stuttgart	CorReg.	Alsace	Core Regions	Lake Geneva	Norhwestern Italy	Piedmont
	Utrecht		Limburg		Karlsruhe				Mittelland		Aosta Valley
	N. Holland				Freiburg				NorthwesternCH		Liguria
	S. Holland				Tübingen				Zurich		Lombardy
	Zeeland			Hessen	Darmstadt				Eastern CH		
	N. Brabant				Gießen				Central CH		
	Limburg				Kassel				Ticino		
				North-Rhine Westfalia	Düsseldorf						
					Cologne						
					Münster						
					Detmold						
					Arnsberg						
				Rhineland-Palatinate	Koblenz						
					Rheinh.-Pfalz						
					Trier						
				Saarland							

**See page 6.*

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Demand analysis shows high transport flows from Northern Range*

		FROM Northern Range (NUTS II areas) – Mio. t				
TO Country "core regions" **	**Country**	**South Holland**	**Antwerp**	**Bremen**	**Hamburg**	
Netherlands + Belgium	NL, BE	100,5	55,3	0,5	1,6	Rhine Corridor
Nordrhein Westfalia	DE	5,6	2,3	2,2	2,3	
Baden Württemberg + Alsace	DE, FR	3,9	1,4	0,7	0,9	
Rhineland-Palatinate + Hessen + Saarland	DE	3,5	0,9	1,1	1,3	
Switzerland	CH	1,2	0,6	0,2	0,6	
North West Italy	IT	0,9	0,6	0,2	0,6	
TOTAL		**115,6**	**61,1**	**4,9**	**7,3**	

TO Country "remaining regions" ***	**Country**	**South Holland**	**Antwerp**	**Bremen**	**Hamburg**	
Netherlands + Belgium	NL, BE	14,6	11,7	0,5	1,3	Enlarged Area
Germany + France	DE, FR	15,2	4,6	23,8	48,2	
North East Italy	IT	0,7	0,5	0,1	0,4	
TOTAL		**30,5**	**16,8**	**24,4**	**49,9**	

Commodity: NSTR 1 digit level (CODE 0-9)
Mode: Road, Rail, Inland navigation, Sea
Regional detail: NUTS 2 or similar regional detail where no classification is valid

** As defined on page 6.*
*** As defined on page 10 (here are the aggregation per Country)*
****The difference between the all Country and the "core regions"*

Source:
WORLDNET - Worldwide Cargo Flows, a research project funded by the European Commission (DG-TREN), within the 6th Framework Program

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Visualization of Netherlands Cargo Flows by Rail

It is interesting to see what are the **major international destinations for the Netherlands**.

Most cargo transported by rail in Netherlands has a **German destination**.

The relationship with **Italy** focuses on the transport of containers to and from the heavily industrialized **northern area of the country**.

Source:
Spoor in Cijfres 2012

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Today nearly no transport flows from Liguria to CODE 24 core regions beyond Italy

		FROM Southern Range* (NUTS II areas) – Mio. t				
TO Country "core regions" **	**Country**	**Catalonia**	**Paca**	**Liguria**	**NW Italy**	
Netherlands + Belgium	NL, BE	1,0	1,3	0,08	1,4	Rhine Corridor
Nordrhein Westfalia	DE	0,5	0,3	0,10	2,1	
Baden Württemberg + Alsace	DE, FR	0,4	0,7	0,04	1,3	
Rhineland-Palatinate + Hessen + Saarland	DE	0,2	0,1	0,02	0,7	
Switzerland	CH	0,1	0,6	0,12	1,8	
North West Italy	IT	0,7	0,6	25,20	369,2	
TOTAL		**2,9**	**3,6**	**25,56**	**376,5**	

TO Country "remaining regions" ***	**Country**	**Catalonia**	**Paca**	**Liguria**	**NW Italy**	
Netherlands + Belgium	NL, BE	0,6	1,3	0,05	1,0	Enlarged Area
Germany + France	DE, FR	1,1	1,3	0,10	3,0	
North East Italy	IT	0,5	0,3	3,94	36,9	
TOTAL		**2,2**	**2,9**	**4,09**	**40,9**	

Commodity: NSTR 1 digit level (CODE 0-9)
Mode: Road, Rail, Inland navigation, Sea
Regional detail: NUTS 2 or similar regional detail where no classification is valid

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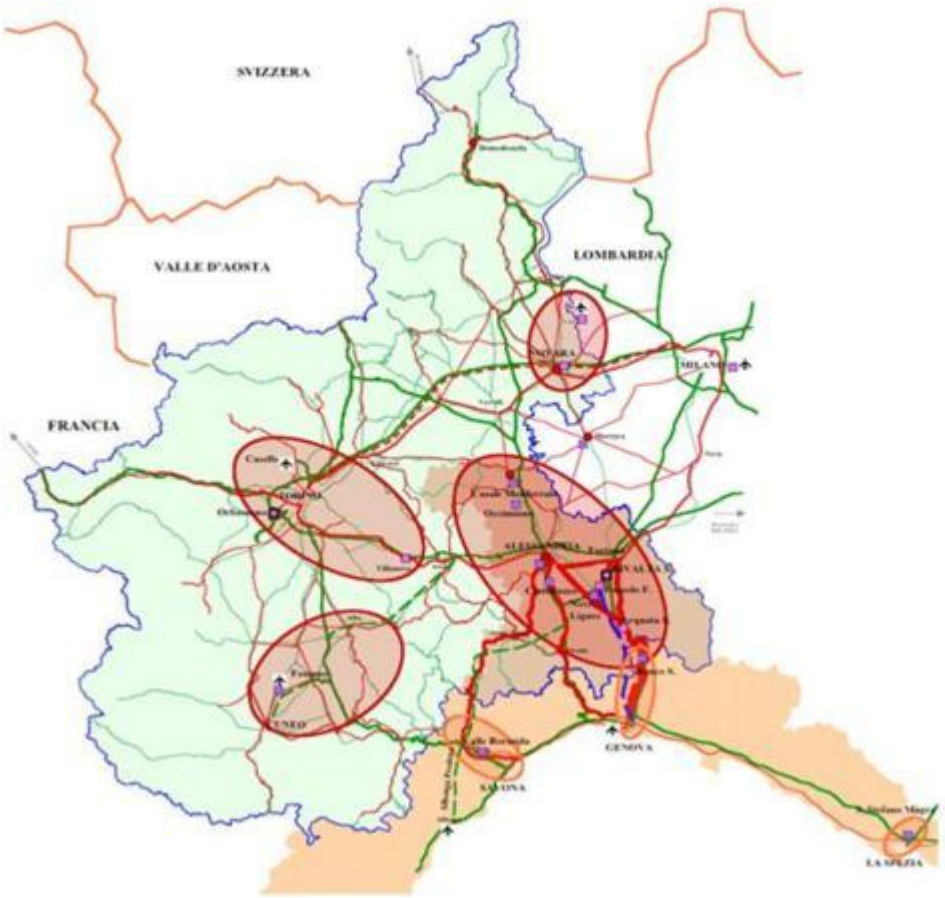
Region Liguria: Logistics Areas and Economic Impact



- **Lombardy absorbs 51%** of the freight volumes originated from Port of Genoa and originates 47% of the freight volumes to Port of Genoa.
- Main origin/destination rail routes from port of Genoa are national.
- Modal split in Genoa port:
  - Road vs. rail : 87% vs. 13%
  - Trains/day: 37

A deep analysis of freight volumes in North West Italy as macro-region towards Code24 core regions is needed.

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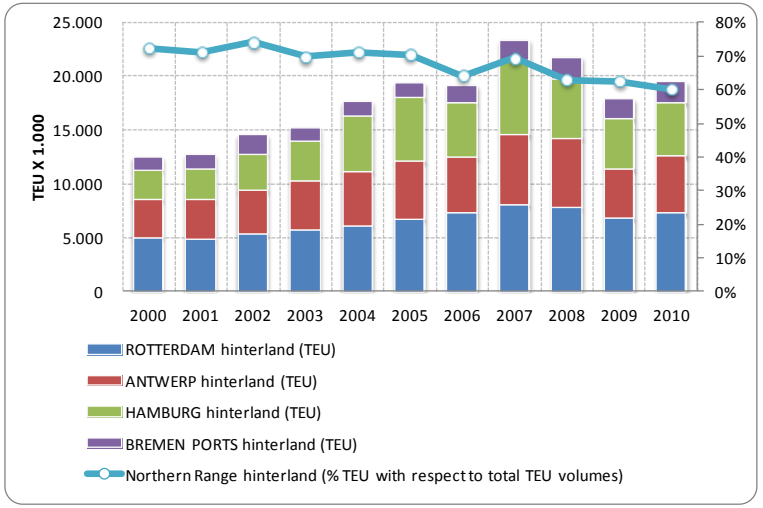
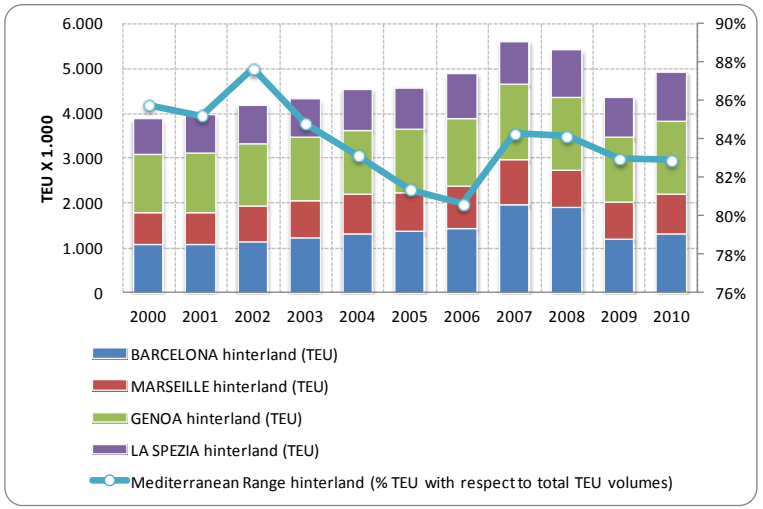
Hinterland container volume in Northern Range ports 4 times higher than in Southern Europe ports

CAGR	00-08	08-09	00-10	09-10	05-10	00-05
I. Northern Range	**7,1%**	**-17,9%**	**4,5%**	**9,0%**	**0,1%**	**9,1%**
1 Rotterdam	5,7%	-12,3%	3,9%	7,1%	1,6%	6,1%
2 Antwerp	7,8%	-29,1%	4,1%	15,9%	-0,1%	8,4%
3 Hamburg	9,2%	-14,6%	6,2%	5,5%	-3,6%	16,9%
4 Bremen Ports	5,9%	-12,3%	4,1%	7,9%	6,1%	2,1%



CAGR	00-08	08-09	00-10	09-10	05-10	00-05
II. Mediterranean Range	**4,3%**	**-19,5%**	**2,4%**	**13,0%**	**1,5%**	**3,4%**
1 Barcelona	7,3%	-37,6%	1,8%	9,0%	-0,9%	4,6%
2 Marseille	2,1%	0,5%	2,6%	8,7%	1,2%	4,0%
3 Genoa	2,7%	-11,3%	2,1%	12,4%	2,3%	2,0%
4 La Spezia	3,7%	-14,5%	3,5%	23,5%	3,7%	3,3%



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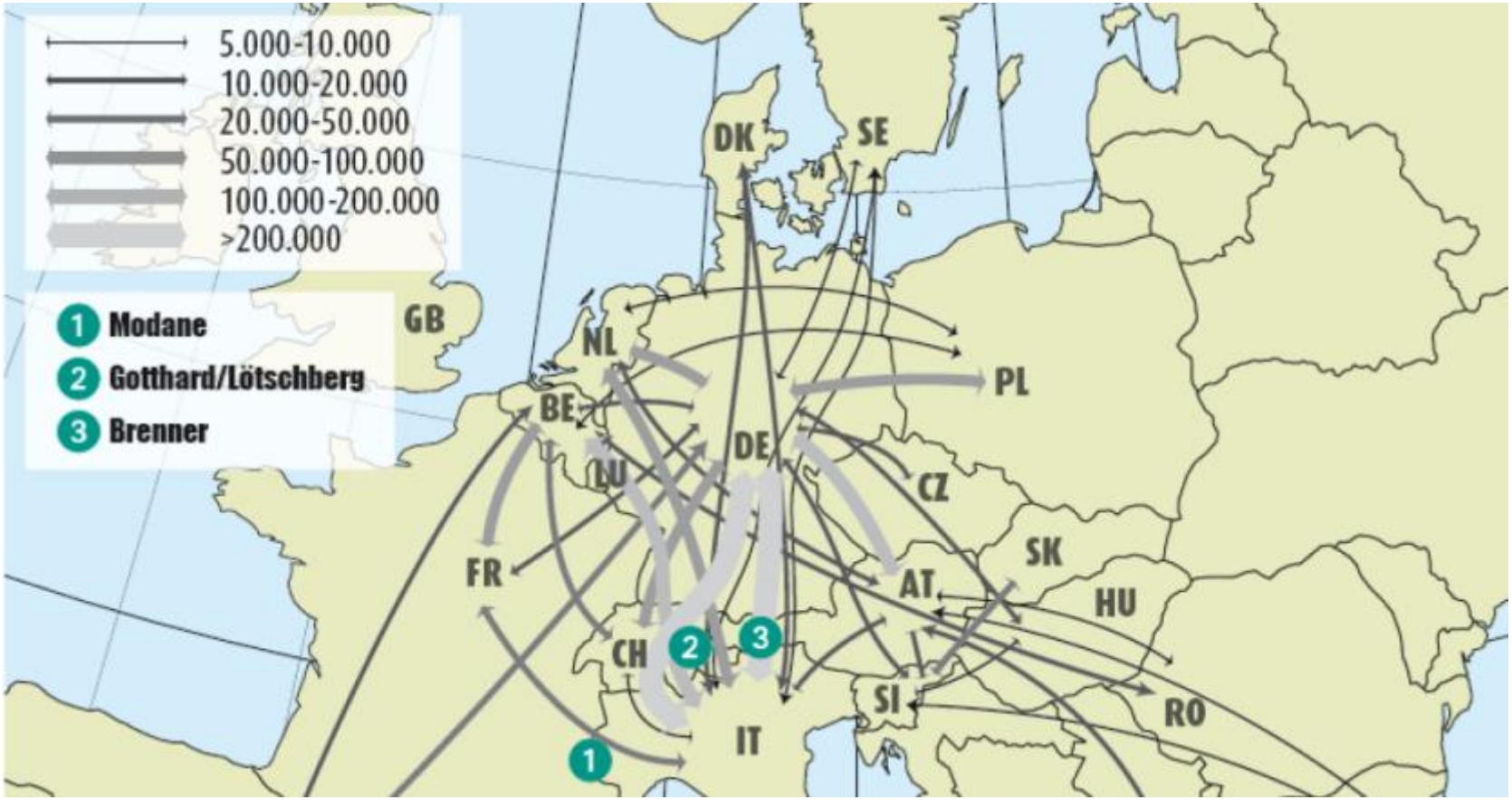
UIRR intermodal operators' core business is alpine crossing along the corridor Rotterdam-Genoa



Source: UIRR - International Union of Combined Road-Rail Transport Companies

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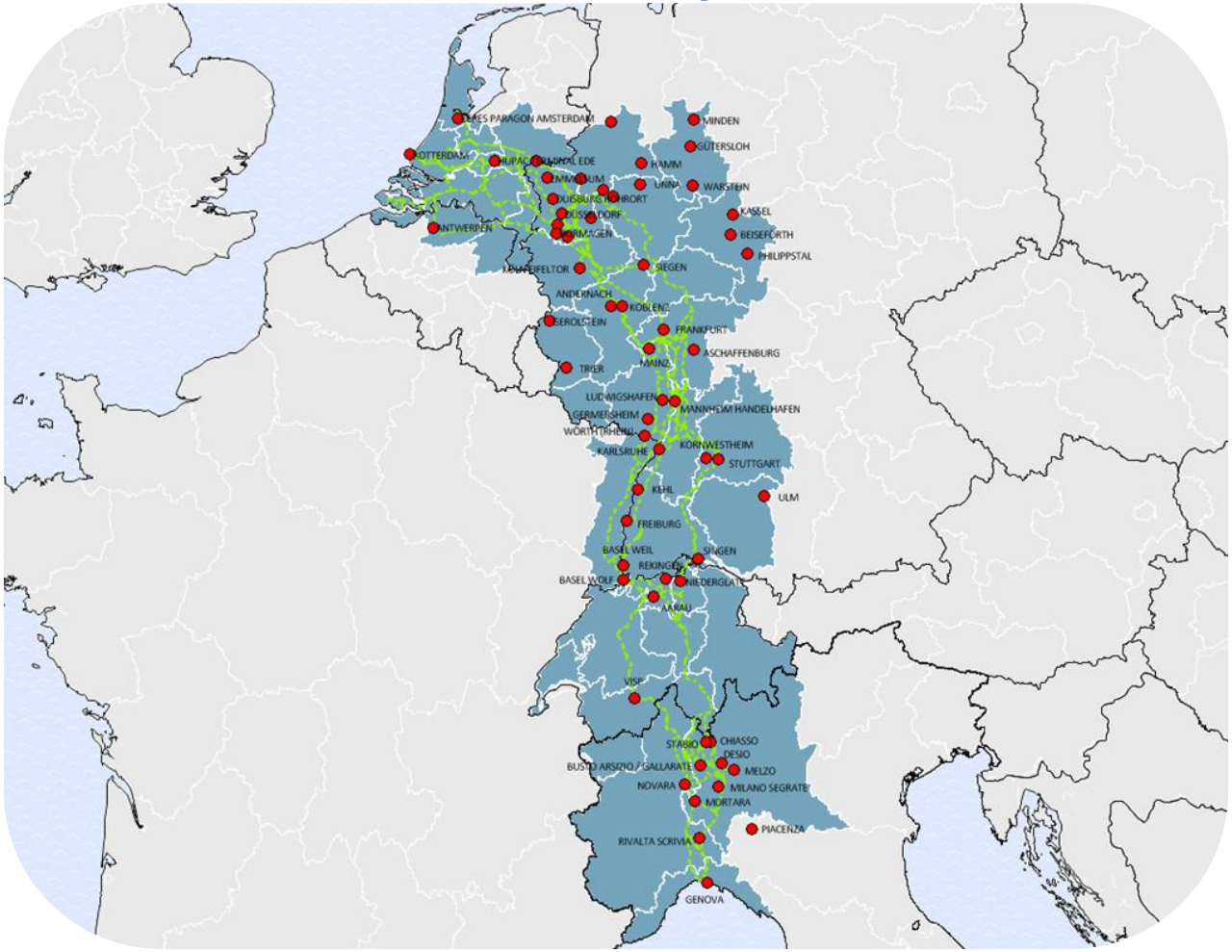
Selection of intermodal terminals along the corridor Rotterdam-Genoa



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Number of alpine crossing intermodal train couples per week from/to Northern Italy (country based), 2011

Terminal	DE	BE	NL	FR	CH	PL/CZ	DK	LU	TOT
Busto A. - Gallarate	92	29	9		10	18	11		**169**
Novara	72	46	24	23					**165**
Milano - Segrate	6	24		3				3	**36**
Milano - Certosa	14								**14**
Melzo (MI)	5	4	22		3				**34**
Mortara (PV)			5						**5**
Piacenza	2	6		3					**11**
Brescia	6								**6**
Verona QE	81	10	6				5		**102**
Other terminals		6		1				2	9
TOT	**278**	**125**	**66**	**30**	**13**	**18**	**16**	**5**	**551**

Source: C-LOG, LIUC University "*Il sistema logistico in Lombardia: trasformazioni in atto e scenari evolutivi*", 2011

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Trains per week between Italian and German main terminals, 2011

Terminal	Duisburg	Hamburg	Freiburg	Köln	Hannover	Ludwigshafen	Singen	Lübeck	TOT
Busto A. – Gallarate	5	6		36	5	31	5		**88**
Novara	4		62	4				2	**72**
Milano Certosa							14		**14**
Brescia							6		**6**
Verona QE		10		15	6	8			**39**
TOT	**9**	**16**	**62**	**55**	**11**	**39**	**25**	**2**	**219**

Source: C-LOG, LIUC University "*Il sistema logistico in Lombardia: trasformazioni in atto e scenari evolutivi*", 2011

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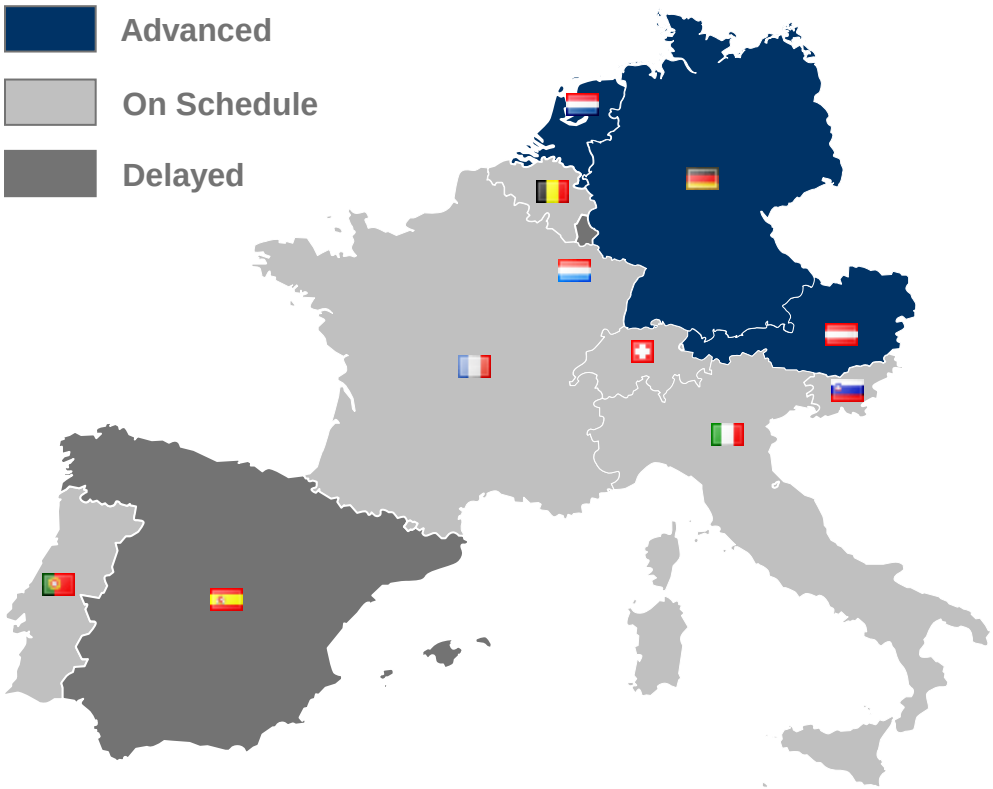
Status of liberalization of rail transportation market: Germany, Netherlands and Austria advanced



- In most countries external railway carriers are already licensed and involved in freight transport
- Liberalization is considered “advanced” in Germany, Austria and the Netherlands in IBM rail liberalization index 2011
- Market opening in Spain is delayed
- Liberalization index for most countries has increased compared to the previous survey in 2007

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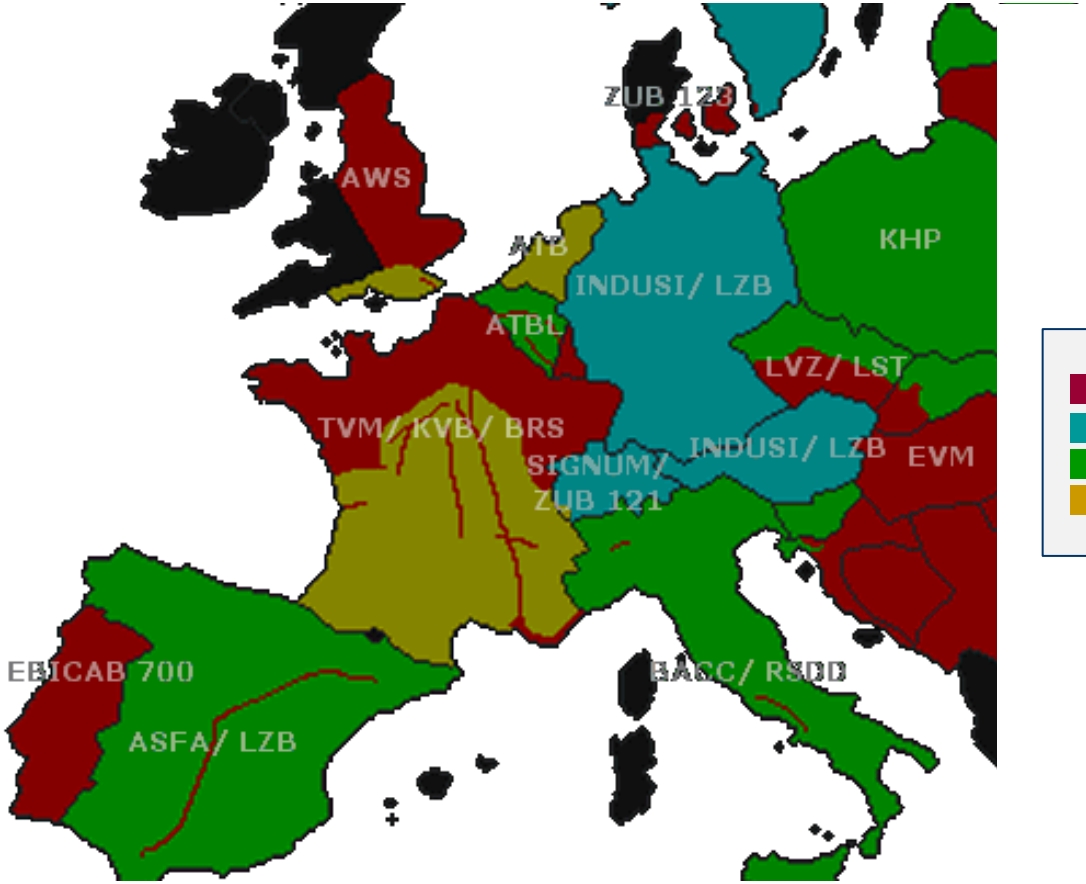
Diversification of energy and safety systems: Trains from Netherlands to Italy need engines with 3 different energy systems



- 25 kV 50 Hz AC
- 15 kV 16,7 Hz AC
- 3 kV DC
- ≤1,5 kV DC

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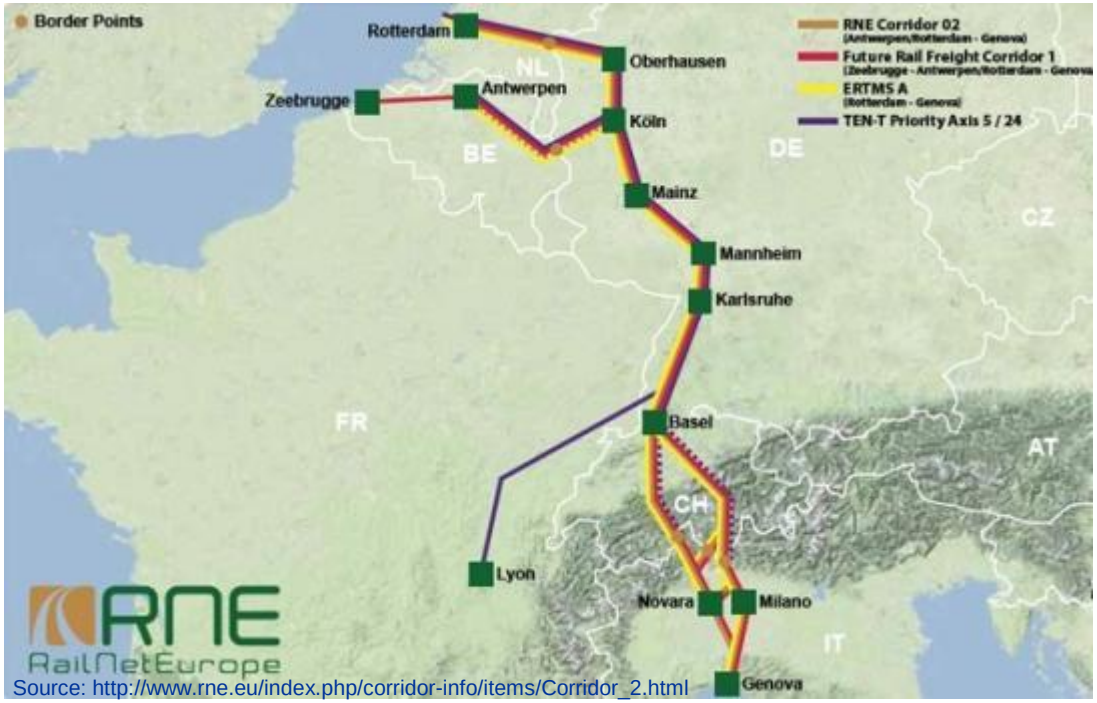
RailNetEurope (RNE)

- RNE Corridor **C02** Antwerpen/Rotterdam - Köln - Mannheim - Basel – Genoa
- **Future** Rail Freight Corridor 1 Zeebrugge - Antwerpen/Rotterdam - Köln - Mannheim - Basel - Genoa



Source: http://www.rne.eu/index.php/corridor-info/items/Corridor_2.html

RailNetEurope (RNE)
Association set up by a majority of European Rail Infrastructure Managers and Allocation Bodies to enable fast and easy access to European rail, as well as to increase the quality and efficiency of international rail traffic.

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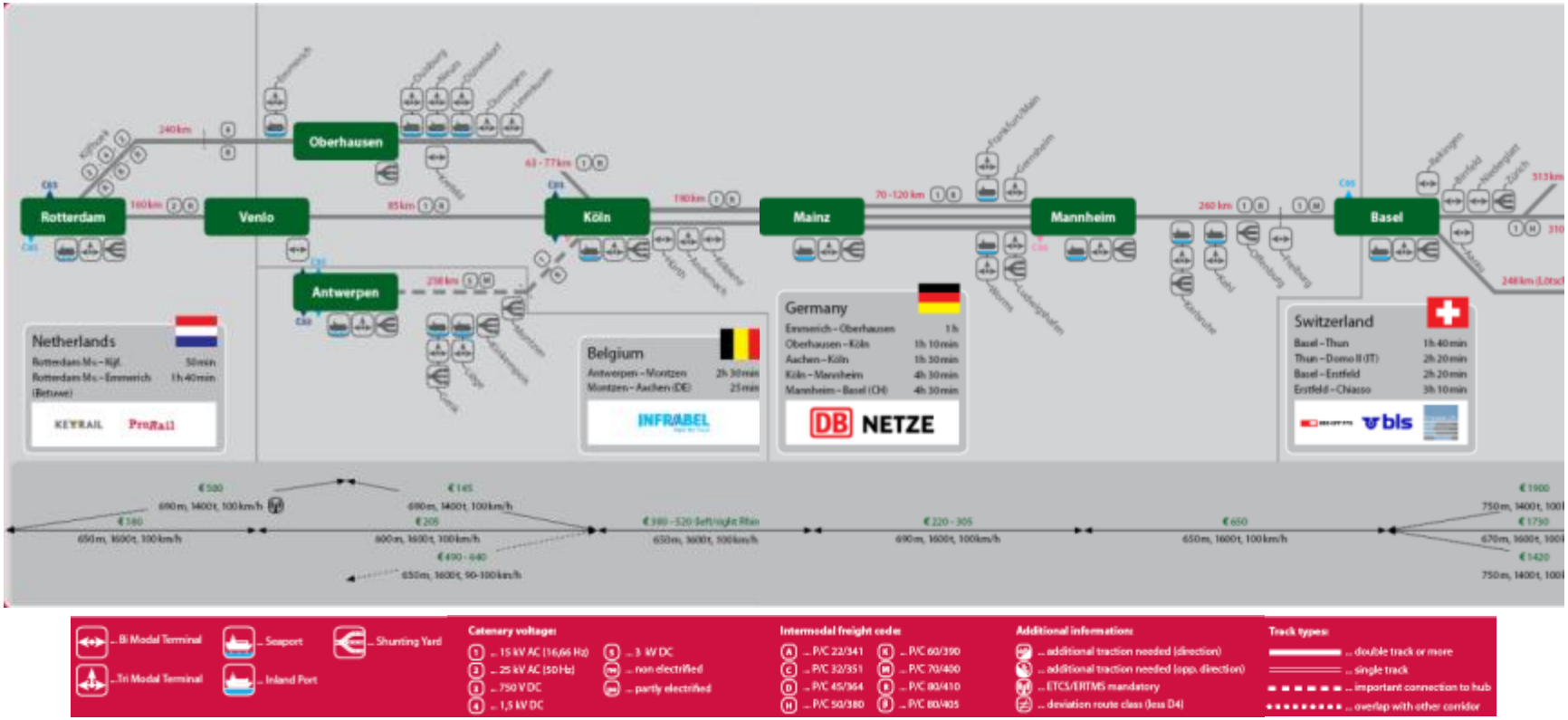
Rail Net Europe - RNE Corridor C02 (Northern Part)



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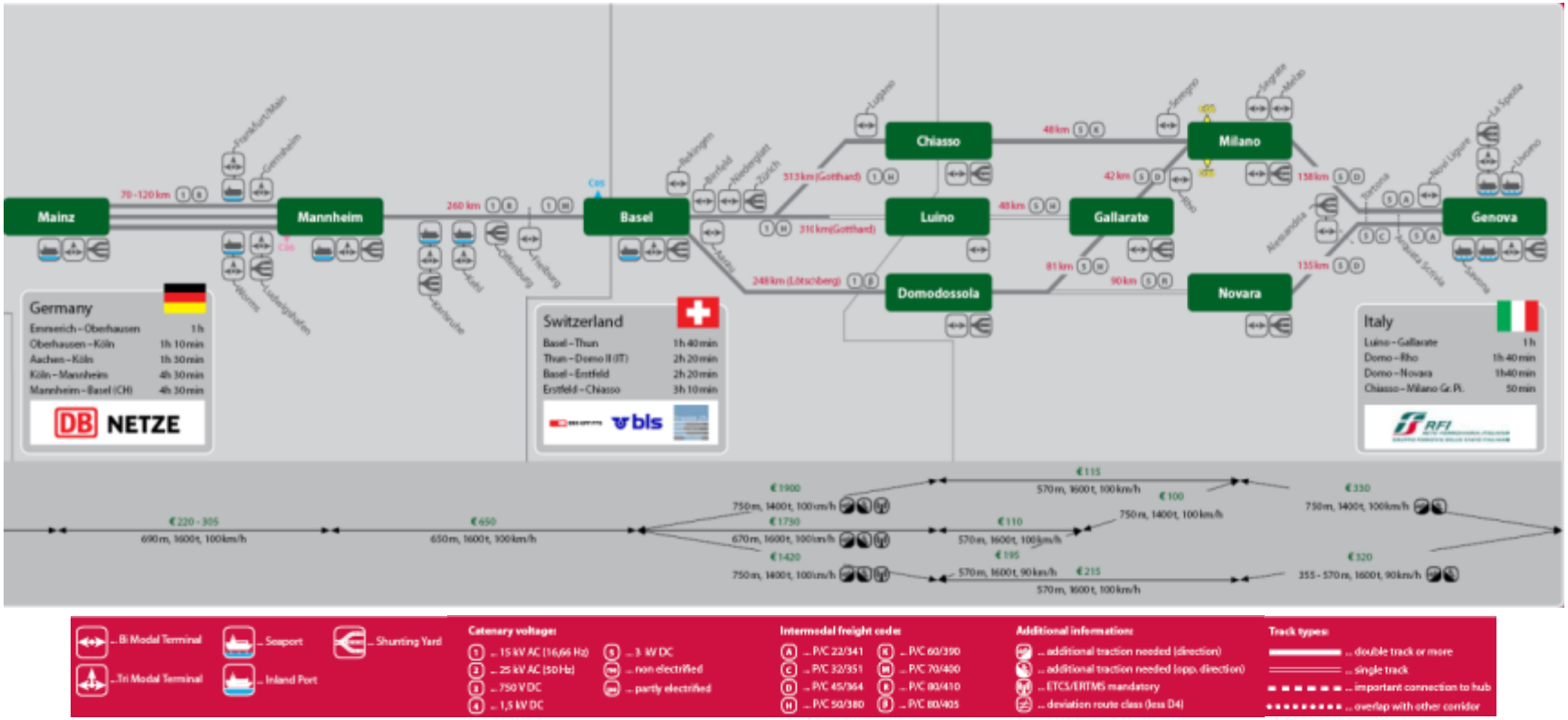
Rail Net Europe - RNE Corridor C02 (Southern Part)



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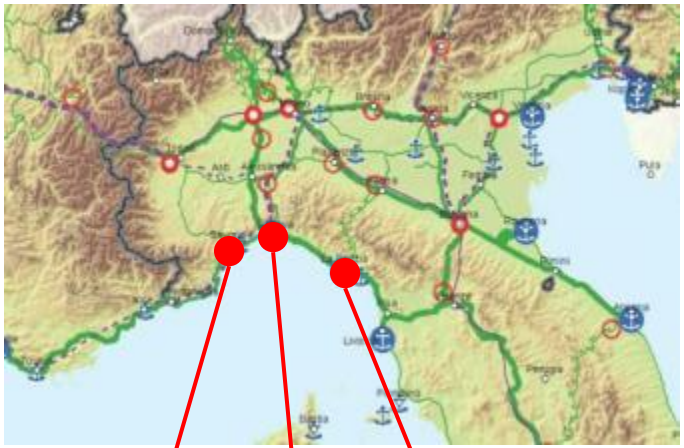
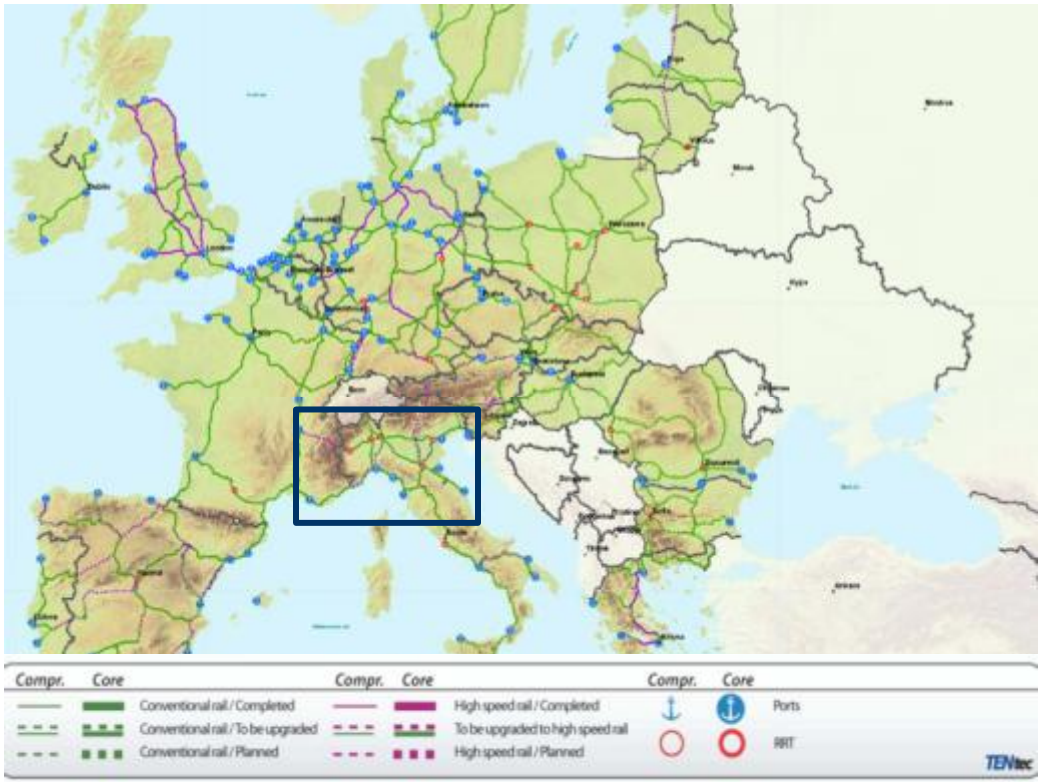
Trans-European Transport Network (TEN-T)
Freight Railways, Ports and Rail-Road-Terminals (RRT)

- Ports of Southern Range have direct access to the Trans-European rail network





Source: ec.europa.eu/transport/infrastructure/doc/com(2011)_650_final_2_annex_i_part02.pdf
ec.europa.eu/transport/infrastructure/doc/com(2011)_650_final_2_annex_i_part18.pdf

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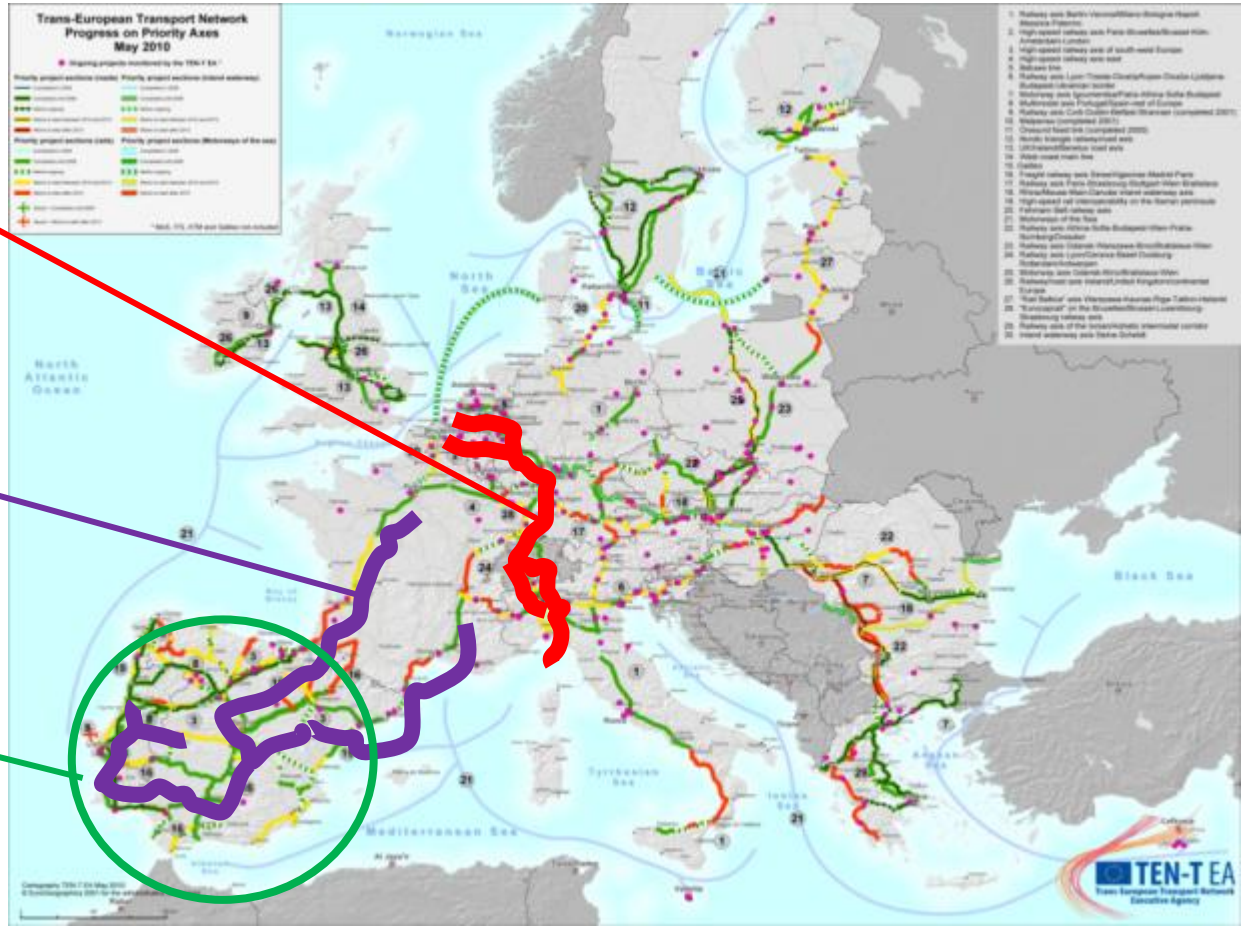
Trans-European Transport Network (TEN-T): Relevant Priority Projects

- Ligurian Ports and Port of Marseille:
  - Priority Project 24: Railway axis Lyon/Genoa - Basel - Rotterdam (RNE Corridor C02)
- Port of Barcelona:
  - Priority Project 3: High speed railway axis Southwest Europe (RNE Corridor C06)
  - Priority Project 19: Rail interoperability on Iberian Peninsula (RNE Corridor C06)



Source: tentea.ec.europa.eu/en/ten-t_projects/30_priority_projects/30_priority_projects.htm

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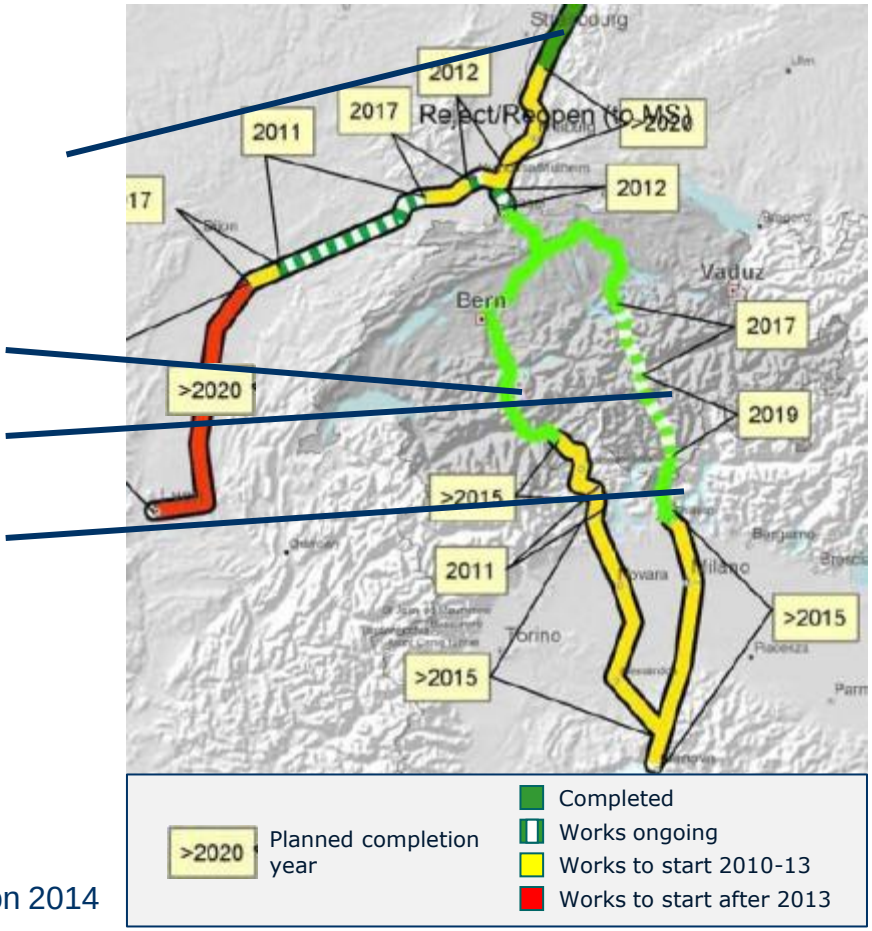
Status of Priority Project 24 (Germany - Switzerland - Italy Only)

- Basel-Karlsruhe (four-track layout):
  - Karlsruhe-Rastatt/Rastatt-Offenburg: Completed
  - Katzenbergtunnel: Completed
  - Remaining sections: Early planning stages
- NRLA
  - Lötschberg Base Tunnel: In operation since 2007; completion of second track postponed
  - Gotthard Base Tunnel: Cut-through 2010/2011; planned inauguration 2016/2017
  - Ceneri Base Tunnel: Roughly 50% excavated; planned inauguration 2019
- NRLA southern links
  - Luino transit section: Various improvements (finished)
  - Several capacity upgrades/interconnections at preliminary stages (e.g. second track Rho-Gallarate)
  - New Appennine crossing between Milan/Novara and Genoa (Terzo Valico project) under construction
  - Lugano-Mendrisio-Malpensa line: Planned inauguration 2014



Source: TEN-T Priority Projects 2010 – A Detailed Analysis, ec.europa.eu/transport/infrastructure/ten-t-implementation/priority-projects/priority-projects_en.htm; Deutsche Verkehrszeitung

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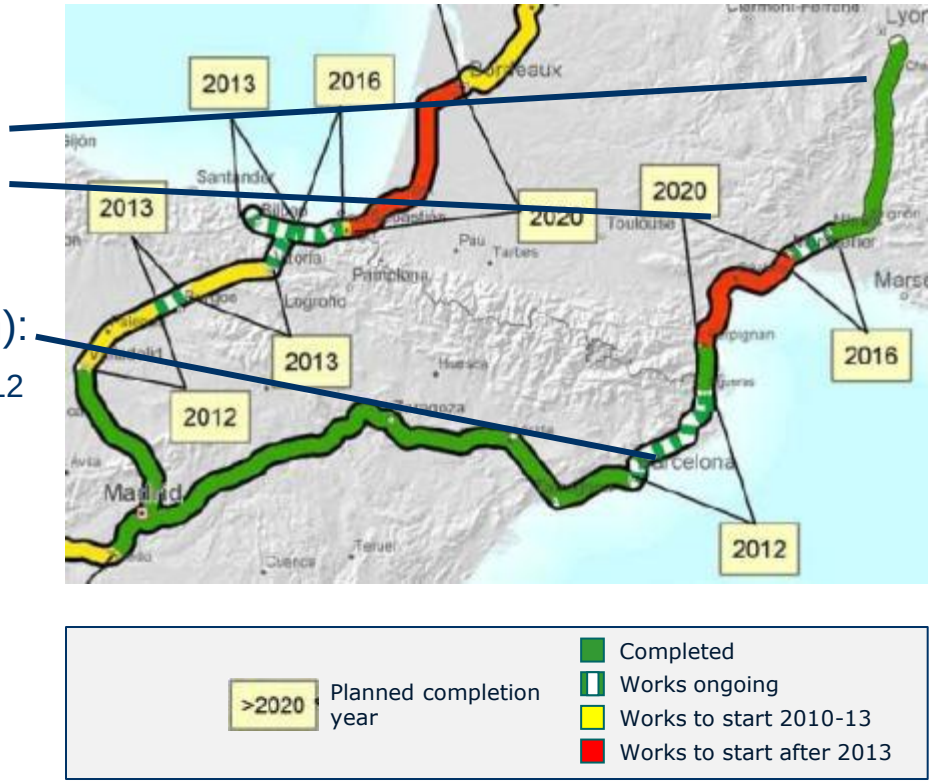
Connecting Spain to the Rotterdam-Genoa Axis (Status of Selected Projects)

- New route (French section):
  - Dijon-Mulhouse: First phase completed
  - Dole-Lyon: Early planning stage
  - Lyon-Montpellier: Completed
  - Montpellier-Figueras: Early planning stage
- New route (Spanish Section; 1.435 mm):
  - Madrid-Perpignan may become operational in 2012
  - Barcelona-Figueras: >55% finished
  - Gap between Figueras and Girona currently bridged by a bypass line (see next slide)
- Complementary measures in Spain:
  - Freight Railway Axis Sines-Madrid-Paris: New high capacity line through the Pyrenees (long-term perspective)
  - Several high-speed lines on Iberian Peninsula



Source: TEN-T Priority Projects 2010 – A Detailed Analysis, ec.europa.eu/transport/infrastructure/ten-t-implementation/priority-projects/priority-projects_en.htm

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New Standard Gauge Railway Line Perpignan - Figueras

- Inauguration December 2010
- Designated for passenger and freight trains
- The intermodal terminals in Barcelona are now connected by standard gauge (1.435 mm)
- Transshipment procedure between Iberian gauge and standard gauge

Source: International Railway Journal

2.2 General Railway Framework

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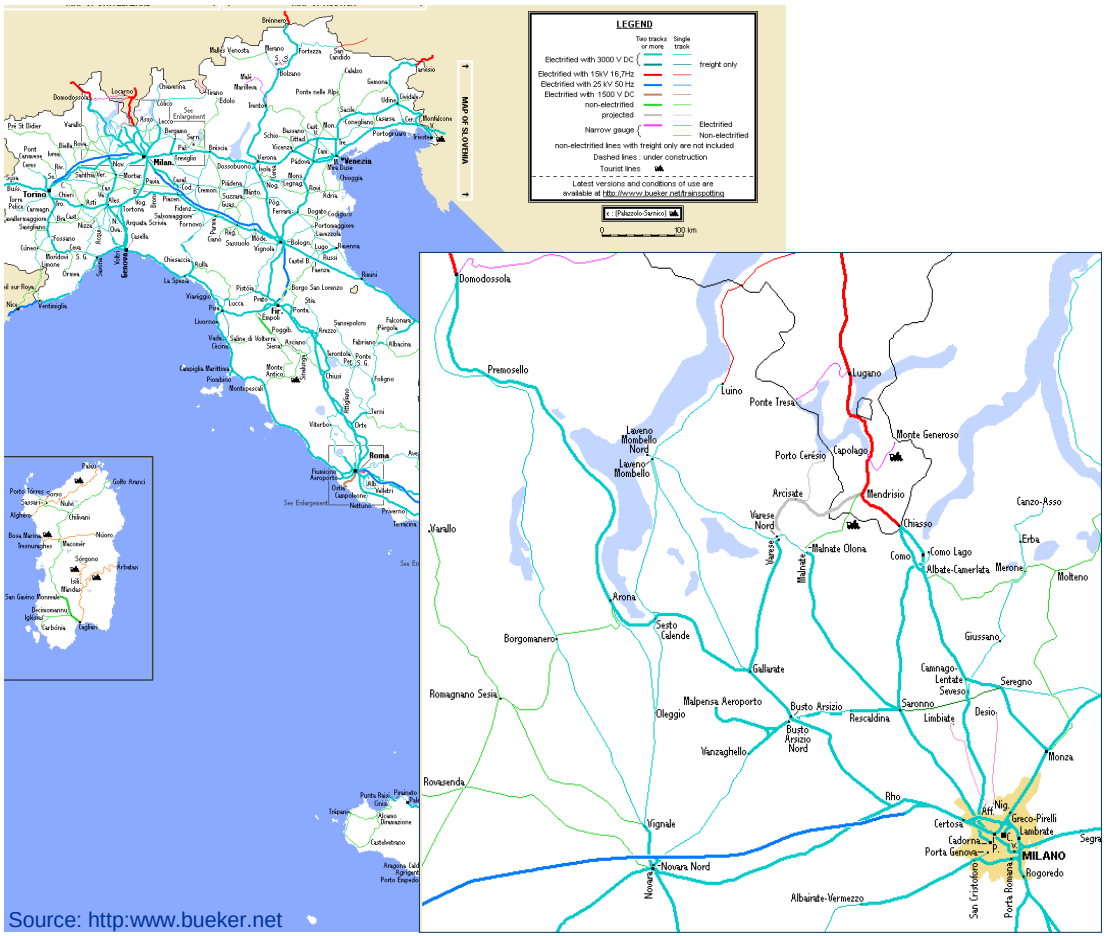
Rail Network Italy



Source: http:www.bueker.net

- Gauge
  - 1.435 mm
- Electricity
  - 3 kV DC
  - 25 kV 50 Hz AC (high speed lines)
- Train Length
  - max. 570 m

2.2 General Railway Framework

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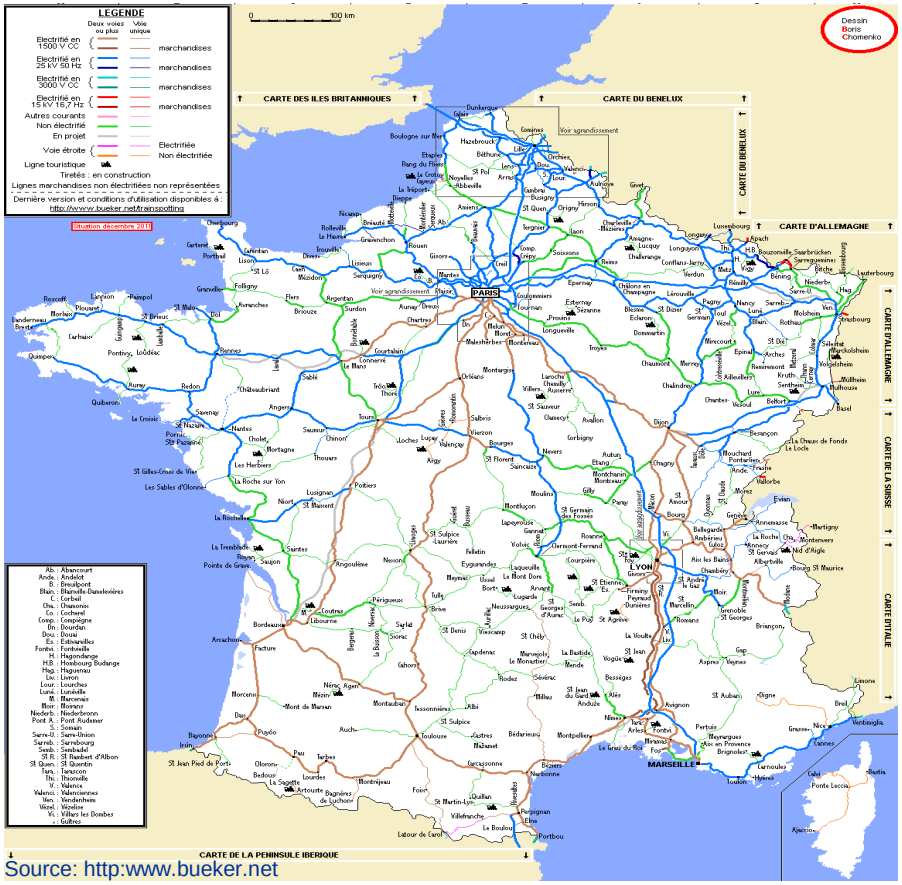
Rail Network France



Source: http:www.bueker.net

- Gauge
  - 1.435 mm
- Electricity
  - 25 kV 50 Hz AC (northern part, high speed lines)
  - 1,5 kV DC (southern part)
- Train Length
  - max. 750 m

2.2 General Railway Framework

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Rail Network Spain

Source: http:www.bueker.net

- Gauge
  - 1.668 mm
  - 1.435 mm (high speed lines)
- Electricity
  - 3 kV DC
  - 25 kV 50 Hz AC (high speed lines)
- Train Length
  - max. 500-550 m

2.2 General Railway Framework

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Rail Profile Codification System for Containers and Swap Bodies (Excerpt)

Code	Max. Width [mm]	Calculation Formula	Max. Height [cm]	Intermodal Transport Units
C xx	≤ 2.550	xx + 245	xx + 245	-
C 22	≤ 2.550	22 + 245	267	ISO, SB
C 50	≤ 2.550	50 + 245	295	ISO, ISO-HC, SB
C 70	≤ 2.550	70 + 245	315	ISO, ISO-HC, SB, Jumbo-SB
C 80	≤ 2.550	80 + 245	325	
C xxx	> 2.550 ≤ 2.600	xxx - 85	xxx - 85	-
C 341	> 2.550 ≤ 2.600	341 - 85	256	ISO, SB
C 384	> 2.550 ≤ 2.600	384 - 85	299	ISO, ISO-HC, SB
C 400	> 2.550 ≤ 2.600	400 - 85	315	ISO, ISO-HC, SB, Jumbo-SB
C 410	> 2.550 ≤ 2.600	410 - 85	325	

ISO = Standard Container 20/40 Feet, ISO-HC = Standard Container High Cube 40/45 Feet, SB = Swap Body, Jumbo-SB = SB 3 m Height Inside

Source: www.uirr.com/de/media-centre/leaflet-and-studies/mediacentre/66-map-of-the-railway-lines-in-ct-version-2011.html

2.2 General Railway Framework

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Rail Profile Codification System for Semi-Trailers (Excerpt)

Code	Max. Width [mm]	Calculation Formula	Max. Height [cm]	Intermodal Transport Units
P xx	≤ 2.550	xx + 330	xx + 330	-
P 22	≤ 2.550	22 + 330	352	Standard Trailer
P 50	≤ 2.550	50 + 330	380	
P 70	≤ 2.550	70 + 330	400	
P 80	≤ 2.550	80 + 330	410	
P xxx	> 2.550 ≤ 2.600	xxx	xxx	-
P 341	> 2.550 ≤ 2.600	341	341	Standard and Reefer Trailer
P 384	> 2.550 ≤ 2.600	384	384	
P 400	> 2.550 ≤ 2.600	400	400	
P 410	> 2.550 ≤ 2.600	410	410	

Source: www.bueker.net

2.2 General Railway Framework

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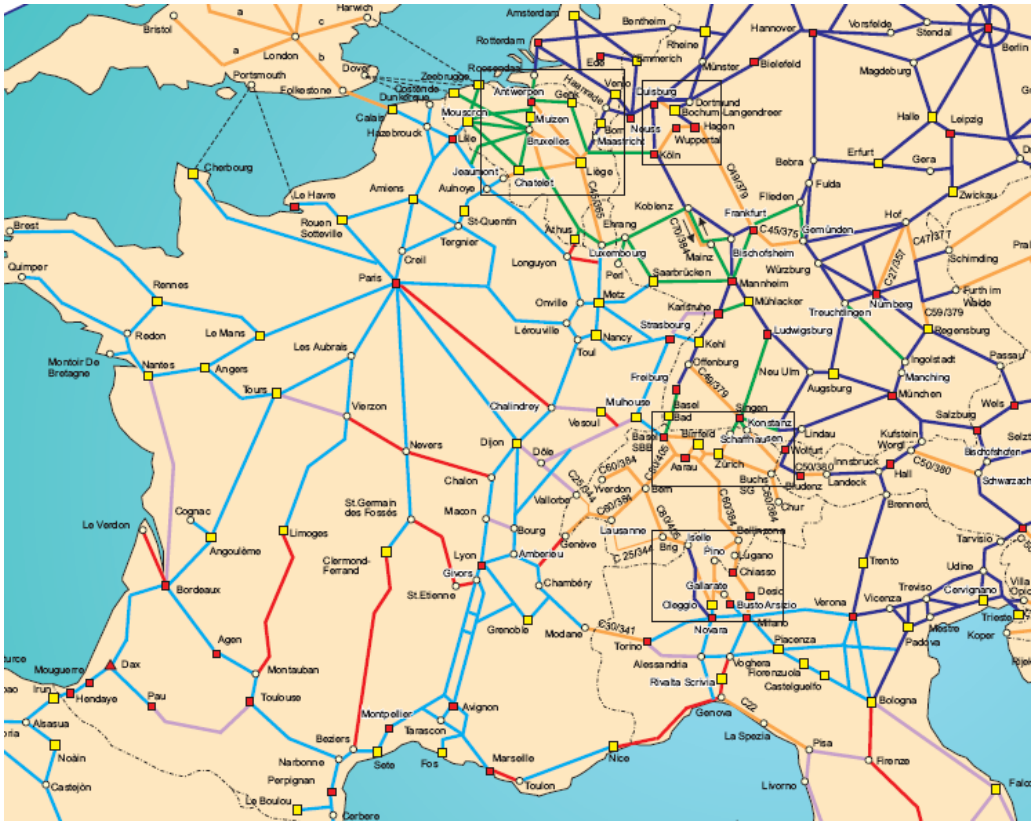
Sections with minimal Rail Profiles for Combined Transport (Containers, Swap Bodies and Semi – Trailers)

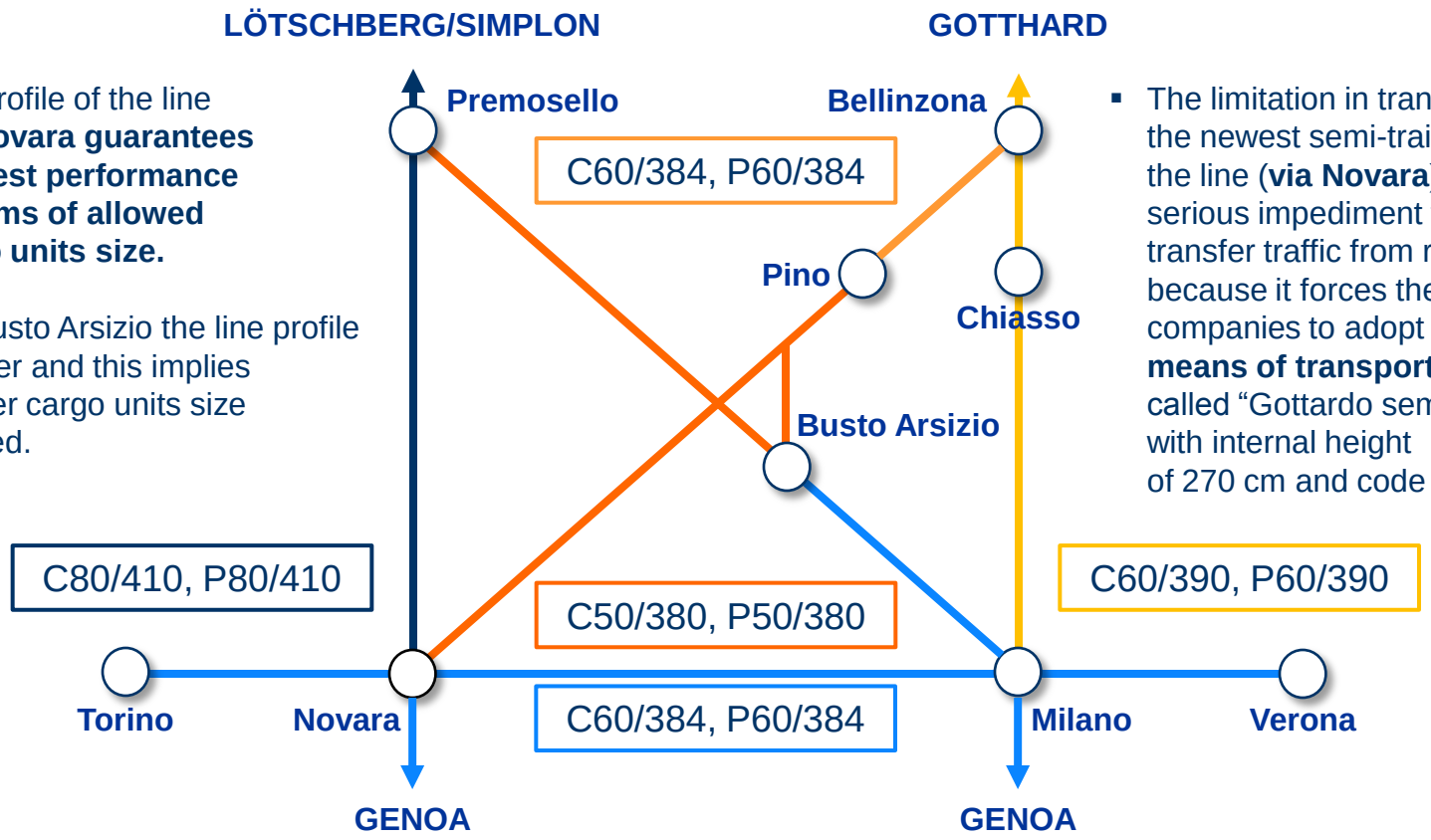
- **P/C22**
  - Genoa - La Spezia
  - Genoa - Voghera
- **P/C32**
  - Genoa – Savona
- **P/C45**
  - Voghera - Milano
  - Genoa - Novara
  - Avignon - Lyon
  - Barcelona - Avignon



Source: www.uirr.com/de/media-centre/leaflet-and-studies/mediacentre/66-map-of-the-railway-lines-in-ct-version-2011.html

Rail Profile Restrictions in Northern Italy

- The profile of the line **via Novara guarantees the best performance in terms of allowed cargo units size.**
- Via Busto Arsizio the line profile is lower and this implies smaller cargo units size allowed.



- The limitation in transporting the newest semi-trailers on the line (**via Novara**) causes serious impediment to transfer traffic from road to rail because it forces the companies to adopt **specific means of transport** (the so-called “Gottardo semi-trailers” with internal height of 270 cm and code P386).

2.2 General Railway Framework

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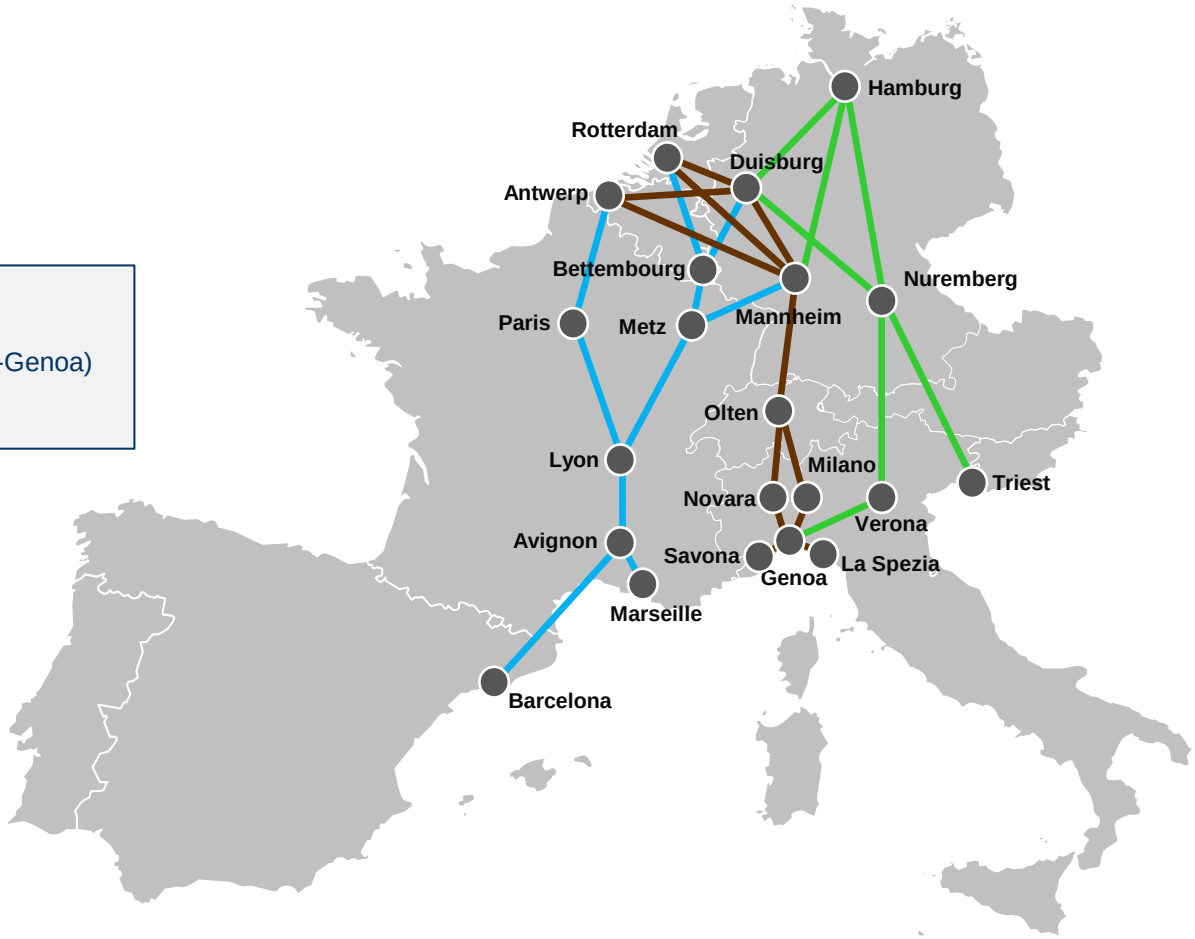
Summary General Railway Framework

- Development of hinterland transport corridors is mainly of international matter
- Technical harmonization in Europe is going on and increases the accessibility to national rail networks
- Multimodal equipment enables the use in several countries
- Interoperability difficulties especially concerning the Iberian Peninsula are already in change
- Main operative restrictions for Alpine intermodal transit from/to the Ligurian Ports are caused by the rail profile of southern railway links to NRLA (via Lötschberg/Simplon and Gotthard)

Important Railway Hinterland Corridors in Central and Western Europe

- A. Central Corridor
- B. Rhine Axis (Corridor Rotterdam-Genoa)
- C. West Corridor



2.3 Port Railway Framework

Investing in Opportunities
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Major Railway Hinterland Routes for Ligurian Ports via Simplon/Lötschberg

significant bottleneck

Section	Distance [km]	Number of Tracks	Electrification	Gradient [‰]	Rail Profile Code System
Genoa - Novara	146	double	3 kV DC	16	C45/364 P45/364
Novara - Domodossola[3]	90	single[2]	3 kV DC	max.16 (south-north)	C80/410 P80/410
Domodossola - Iselle	19	double	15 kV 16,7 Hz	max. 25 (south-north)	C80/410 P80/410
Iselle - Simplon - Lötschberg[1]- Bern	127	double	15 kV 16,7 Hz	max. 15 (north-south)	C80/405 P80/405
Bern - Basel	102	double	15 kV 16,7 Hz	< 10	C80/405 P80/405
Basel – Freiburg	66	double	15 kV 16,7 Hz	< 10	C70/400 P70/400
Freiburg - Mannheim	208	double	15 kV 16,7 Hz	< 10	C80/410 P80/410

[1] via Lötschberg Base Tunnel, [2] 3 km double track between Novara and Vignale, [3] via Gozzano

Source: TransCare

2.3 Port Railway Framework

Investing in Opportunities
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Major Railway Hinterland Routes for Ligurian Ports via Gotthard

significant bottleneck

Section	Distance [km]	Number of Tracks	Electrification	Gradient [‰]	Rail Profile Code System
Genoa - Voghera	85	double	3 kV DC	16	C22/341 P22/341
Voghera - Milano	53	double	3 kV DC	< 10	C45/364 P45/364
Milano - Chiasso	48	double	3 kV DC	max. 14 (south-north)	C60/390 P60/390
Chiasso – Gotthard[1]	98	double	15 kV 16,7 Hz	< 10	C60/384 P60/384
Gotthard - Basel	173	double	15 kV 16,7 Hz	max. 15 (north-south)	C60/384 P60/384
Basel - Freiburg	66	double	15 kV 16,7 Hz	< 10	C70/400 P70/400
Freiburg - Mannheim	208	double	15 kV 16,7 Hz	< 10	C80/410 P80/410

[1] via Ceneri Base Tunnel and Gotthard Base Tunnel

Source: TransCare

2.3 Port Railway Framework

Investing in Opportunities
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Major Railway Hinterland Routes for Ligurian Ports via Luino Line/Gotthard

significant bottleneck

Section	Distance [km]	Number of Tracks	Electrification	Gradient [‰]	Rail Profile Code System
Genoa - Novara	146	double	3 kV DC	16	C45/364 P45/364
Novara - Pino	81	single[2]	3 kV DC	max. 12 (south-north)	C50/380 P50/380
Pino - Bellinzona	25	single	15 kV 16,7 Hz	max. 12 (north-south)	C60/384 P60/384
Bellinzona – Gotthard[1]	51	double	15 kV 16,7 Hz	< 10	C60/384 P60/384
Gotthard - Basel	173	double	15 kV 16,7 Hz	max. 15 (north-south)	C60/384 P60/384
Basel - Freiburg	66	double	15 kV 16,7 Hz	< 10	C70/400 P70/400
Freiburg - Mannheim	208	double	15 kV 16,7 Hz	< 10	C80/410 P80/410

Source: TransCare

[1] via Lötschberg Base Tunnel, [2] 3 km double track between Novara and Vignale

2.3 Port Railway Framework

Investing in Opportunities
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Major Railway Hinterland Routes for Ports of Barcelona/Marseille

significant bottleneck

Section	Distance [km]	Number of Tracks	Electrification	Gradient [‰]	Rail Profile Code System
Barcelona - Portbou	184	double	1,5 kV DC	max. 15 (south-north)	C45/364 P45/364
Portbou - Avignon	321	double	1,5 kV DC	n.a.	C45/364 P45/359
Marseille - Avignon	110	double	1,5 kV DC	n.a.	C45/364 P45/359
Avignon - Lyon	243	double	1,5 kV DC	n.a.	C45/364 P45/359
Lyon - Dijon - Metz	458	double	25 kV 50 Hz	n.a.	C45/364 P45/359
Lyon - Paris	440	double	25 kV 50 Hz	n.a.	C45/364 P45/359

Source: TransCare

2.3 Port Railway Framework

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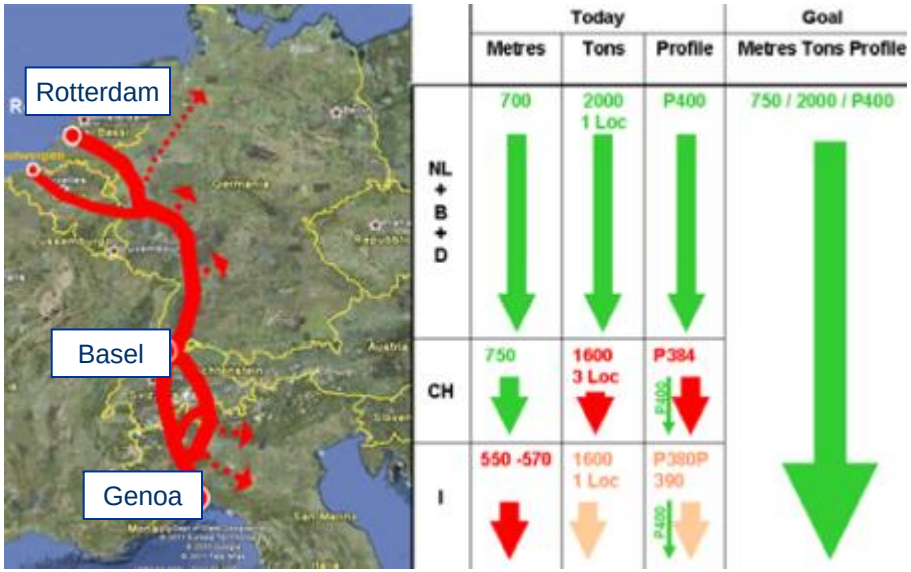
Infrastructure Restrictions for Intermodal Transport on Corridor C02

- The productivity and competitiveness of intermodal transport depends on train lengths of 700-750 m and train gross weights of 2.000 tons
- For the important semitrailer segment, modal shift also requires expansion to the four-meter profile
- These factors must be implemented along the entire corridor so that combined transport can operate commercially without subsidies
- As the Gotthard and Ceneri base tunnels enter service, the current restrictions on the south side of the Alps via Domodossola, Luino and Chiasso remain a bottleneck factor



Source: www.uirr.com/en/media-centre/press-releases-and-position-papers/2012/mediacentre/491-serious-limitations-on-key-north-south-european-rail-freight-axis.html

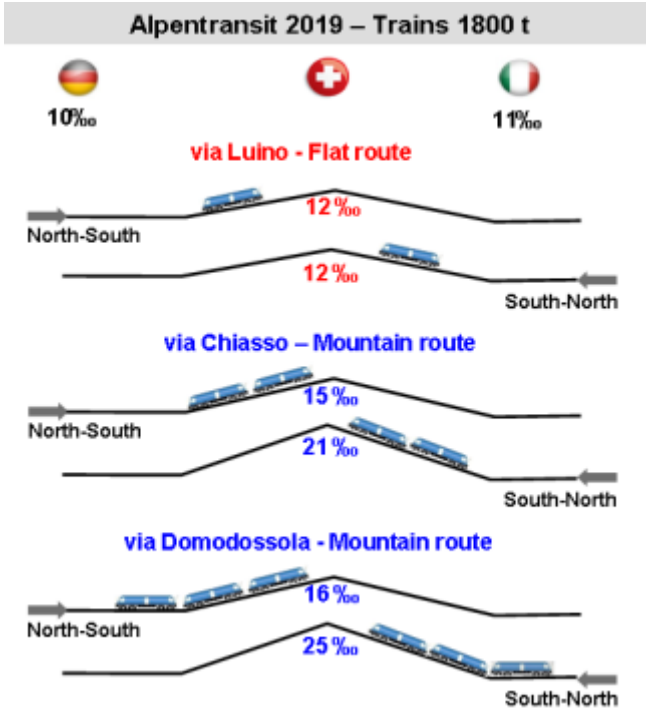
Key Role of Luino Railway Line for Intermodal Transport in Corridor C02

- 75% of unaccompanied intermodal transport via Gotthard is carried on the Bellinzona - Luino - Novara Line
  - The Luino Line has been systematically expanded for freight transport over many decades
  - Despite being a single-track line, it is an important element in the Italian concept of "gronda" (edges) to bypass Milan
- The major terminals in northern Italy are connected to the Luino Line
  - Busto Arsizio-Gallarate, Novara, Oleggio and other smaller terminals are located at the intersection of the Luino and Simplon Line
  - These terminals can only be reached via Chiasso with great effort, if at all

Source: www.uirr.com/en/media-centre/press-releases-and-position-papers/2012/mediacentre/491-serious-limitations-on-key-north-south-european-rail-freight-axis.html

Key Role of Luino Railway Line for Intermodal Transport in Corridor C02

- The Luino Line is set to be the only flat railway through Switzerland
- With a maximum gradient of 12‰, after the opening of the Gotthard base tunnel it will be the only truly flat railway route on the Rotterdam - Genoa corridor
- In future it will be possible to run 1.800-ton trains via Luino with just one locomotive
- On the Chiasso Line, by contrast, there are still gradients of 15 to 21‰ around Mendrisio
- This means that freight trains will still require cost-intensive double traction in the future despite the Gotthard and Ceneri base tunnels



Steep gradients on routes make freight transport far less economical: they restrict train weight or necessitate expensive multiple traction

Source: www.uirr.com/en/media-centre/press-releases-and-position-papers/2012/mediacentre/491-serious-limitations-on-key-north-south-european-rail-freight-axis.html

2.3 Port Railway Framework

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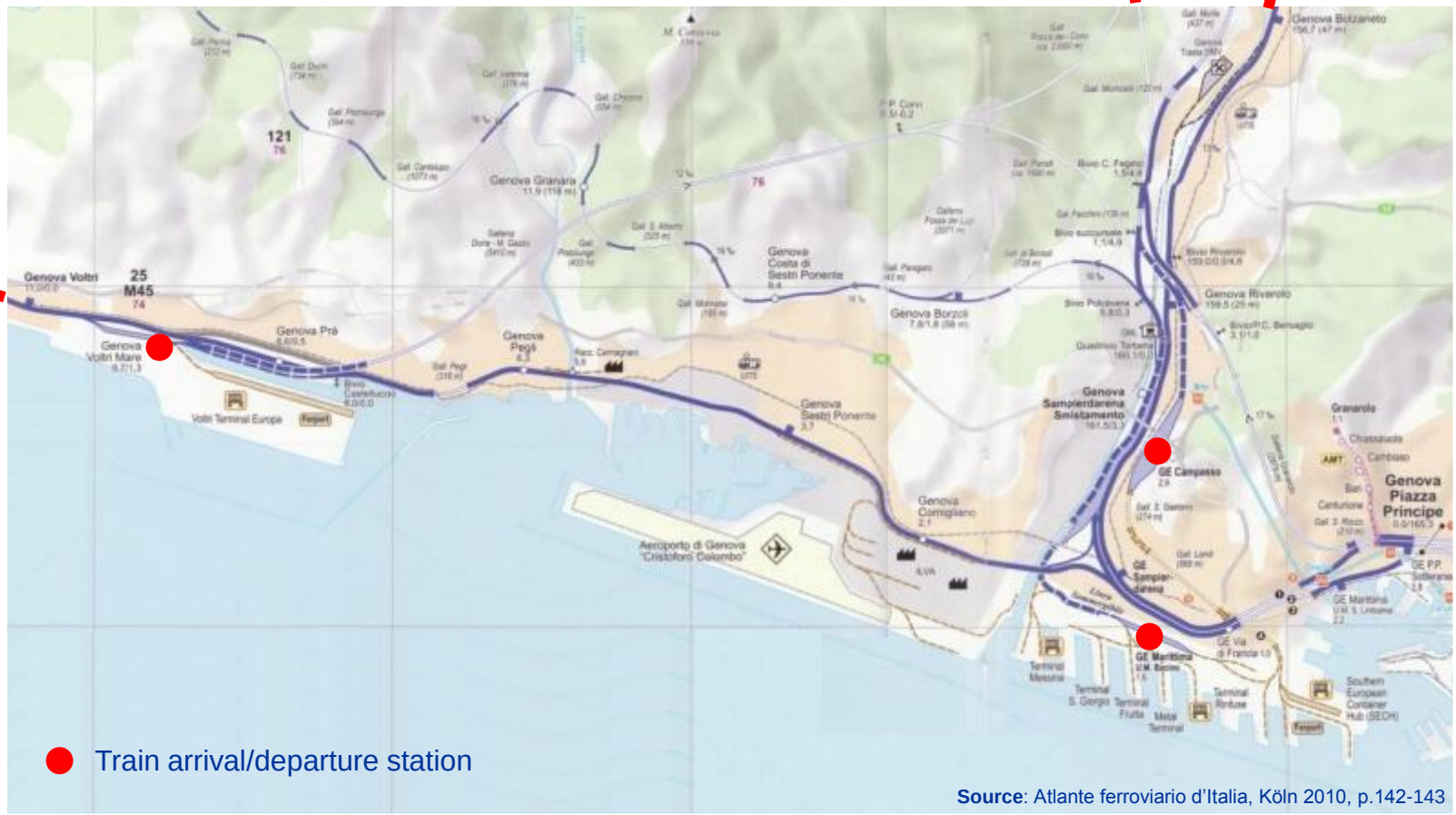
Port of Genoa - Rail Infrastructure Links and Facilities



Source: Atlante ferroviario d'Italia, Köln 2010, p.142-143

2.3 Port Railway Framework

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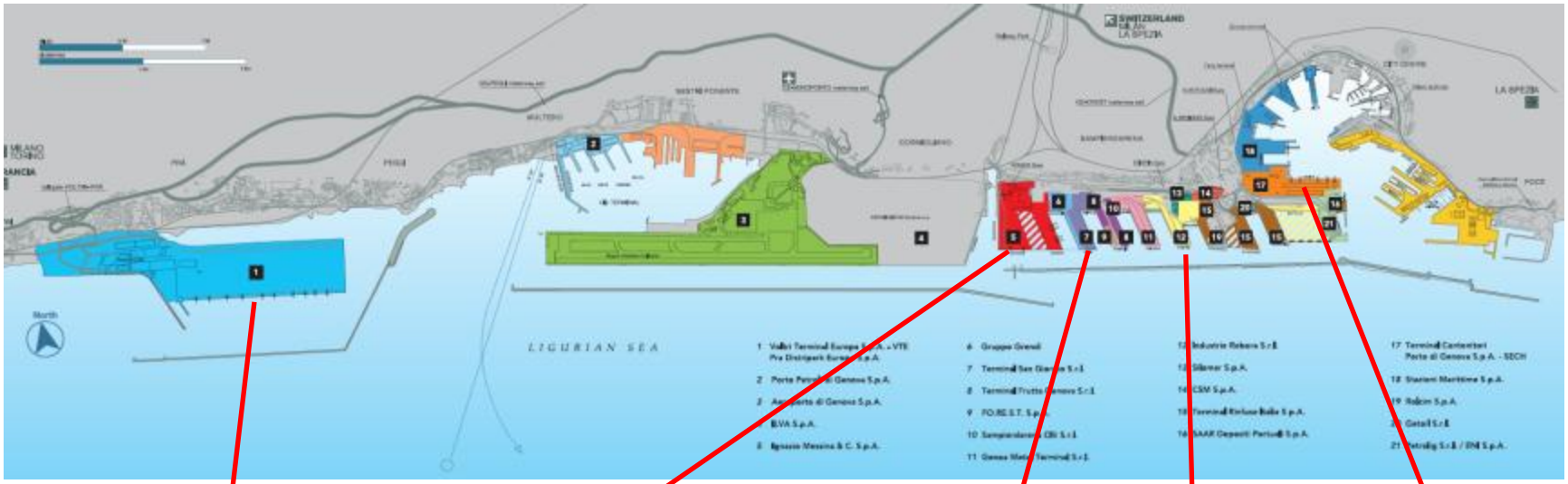
Port of Genoa - Container Terminals



Voltri Terminal Europa S.p.A.

Ignazio Messina & C. S.p.A.

Terminal San Giorgio S.r.l.

Industrie Rebora S.r.l. Gruppo Spinelli

SECH - Terminal Contenitori Porto di Genoa S.p.A.

Source: www.bueker.net

2.3 Port Railway Framework

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Port of Genoa - Container Terminals and Rail Infrastructure

Terminal Operator	Stakeholder	Quay Length [m]	Draft [m]	Dock Rail Tracks	Handling Equipment	Volume Handled in 2010 [kTEU]
Voltri Terminal Europa	PSA International (100%)	1.450	15	8 x 650 m	10 dockside gantries 20 RTGs 3 RMGs	980
SECH-Terminal Contenitori Porto di Genoa	fully owned	526	14,5	3 x 370 m	5 dockside gantries 8 RTGs 6 RMGs 15 reach stackers 8 forklifts 25 tractors	320
Ignazio Messina & C.	fully owned	1.687	10/12,5	5 x 440 m	7 dockside gantries 4 RMGs 9 reach stackers 54 forklifts 20 tractors	240
Terminal San Giorgio	Gavio S.p.A. (> 51%) Finservice S.r.l. (< 49%)	600	11/12	2 x 350 m	3 mobile cranes 2 reach stackers 3 front stackers 8 tractors 50 RoRo trailers	40
Industrie Rebora Gruppo Spinelli	fully owned	1.200	10,3/11,3	1.800 m[1]	14 mobile cranes 9 spreaders 12 forklifts 80 RoRo trailers	120

[1] Installation of a second rail link of 400 m, Abbreviations: RMG = Rail Mounted Gantry; RTG = Rubber Tired Gantry

Source: Port Authority Genoa, Terminal Publications

2.3 Port Railway Framework

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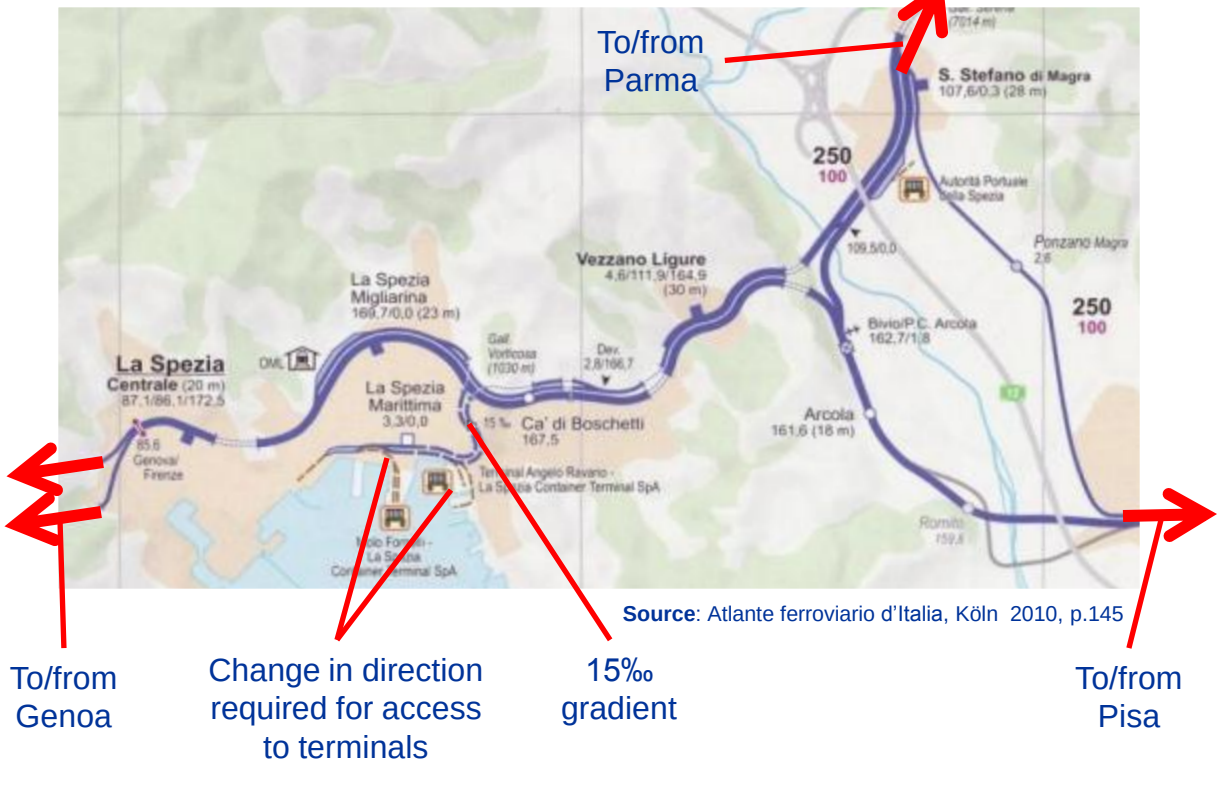
Ports of La Spezia and Savona/Vado - Rail Infrastructure Links and Facilities



Source: Atlante ferroviario d'Italia, Köln 2010, p.145

Source: Atlante ferroviario d'Italia, Köln 2010, p.44

2.3 Port Railway Framework

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Port of La Spezia - Container Terminals

La Spezia Container Terminal

Terminal del Golfo

Source: Port Authority La Spezia

2.3 Port Railway Framework

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Port of La Spezia - Container Terminals and Rail Infrastructure

Terminal	Stakeholder	Quay Length [m]	Draft [m]	Dock Rail Tracks	Handling Equipment	Volume Handled in 2008 [kTEU]
La Spezia Container Terminal	Contship Italia (EUROKAI KGaA 66,6% + EUROGATE GmbH & Co KG 33,4%)	1.403	14	n.a.	9 dockside gantries 2 mobile dock gantries 10 RTGs 8 RMGs 16 reach stackers	1.050
Terminal del Golfo	Tarros Group (100%)	337	12	4 x 200 m	1 dockside gantry 2 mobile dock gantries 9 reach stackers 14 forklifts	160

Abbreviations: RMG = Rail Mounted Gantry; RTG = Rubber Tired Gantry

2.3 Port Railway Framework

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Port of Savona-Vado - Container Terminals

Reefer Terminal

Forship

APM Terminal
(planned inauguration in 2014)

Note: The port consists of two parts (Savona and Vado-Ligure).
In Savona, there are only specialized terminals, with the exception of loading and unloading of rail vehicles at the Savona Auto Terminal.

Source: Port Authority Savona-Vado

2.3 Port Railway Framework

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Port of Savona-Vado - Container Terminals and Rail Infrastructure

Terminal	Stakeholder	Quay Length [m]	Draft [m]	Dock Rail Tracks	Handling Equipment	Volume Handled in 2010 [kTEU]
Reefer Terminal	fully owned	465	14,5	-	4 dockside gantries 2 mobile dock gantries 2 RMGs	190
Forship	Partnership with Corsica Ferries France	(4 RoRo berths)	9,5	-	-	10
APM Terminal (scheduled 2014)	fully owned	700	15-22	MetroCargo system	6 dockside gantries 24 RMGs 22 tractors	n.a.

Abbreviations: RMG = Rail Mounted Gantry; RTG = Rubber Tired Gantry

2.3 Port Railway Framework

Investing in Opportunities
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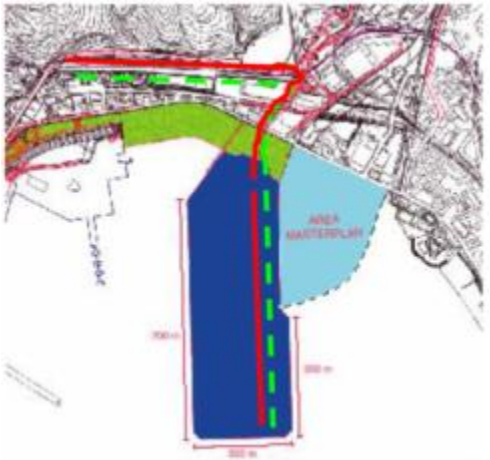
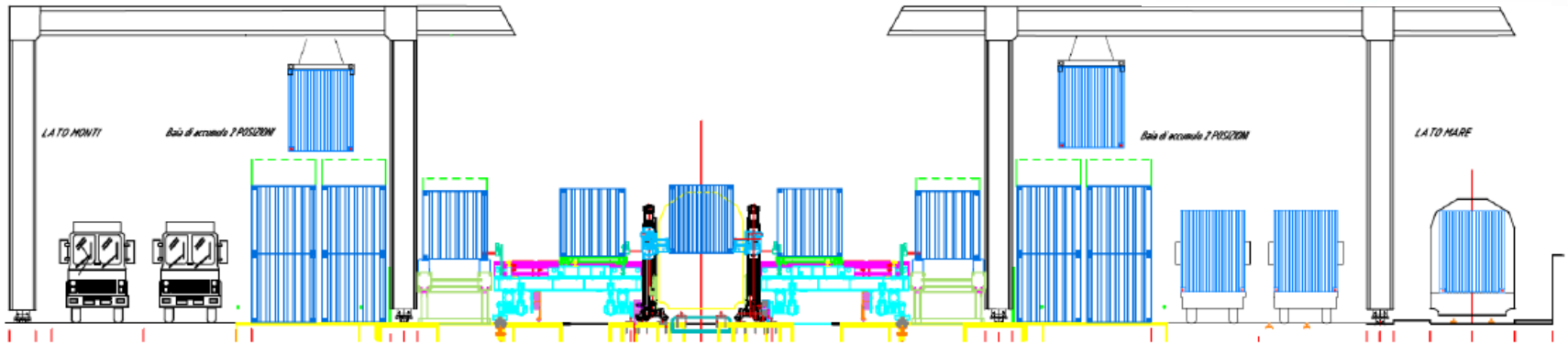
Port of Savona-Vado - APM Terminal MetroCargo

- MetroCargo is an automated system for fast loading/unloading of trains
- It will be implemented in the future off-dock rail terminal
- The dock will be connected to the rail terminal through a pallet transport system for containers
- Because of spatial restrictions, max. train length will be 400 m





Source : www.metrocargoautomazioni.it/images/materiale_informativo/deu.pdf

2.3 Port Railway Framework

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Port of Marseille - Container Terminals

Western Harbours - Gulf of Fos

Fos Container Terminal

Eastern Harbours - Port of Marseille

MED Europe Terminal

2.3 Port Railway Framework

Investing in Opportunities
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Port of Marseille - Container Terminals and Rail Infrastructure

Terminal	Stakeholder	Quay Length [m]	Draft [m]	Dock Rail Tracks	Handling Equipment	Volume Containers 2011 [kTEU] (estimate)
FCT (Seayard)	Sealogis Group (SNCF Geodis 100%)	1.200	14,5	4 x 600 m 2 x 240 m 1 x 300 m 2 x 850 m 4 x 550 m	no data available	290
FCT (Eurofos)	MGM (CMA CGM 50% + DP World 50%).		14,5		no data available	480
MET		950	11,4	3 x 340 m 1 x 450 m 2 x 160 m	5 dockside gantries 13 RTGs 4 reach stackers 13 forklifts 5 tractors	190

Abbreviations: RMG = Rail Mounted Gantry; RTG = Rubber Tired Gantry

Source: Terminal publications

2.3 Port Railway Framework

Investing in Opportunities
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Port of Marseille - Rail Infrastructure Links and Facilities (1/2)

Source: Port Authority Marseile-Fos

2.3 Port Railway Framework

Investing in Opportunities
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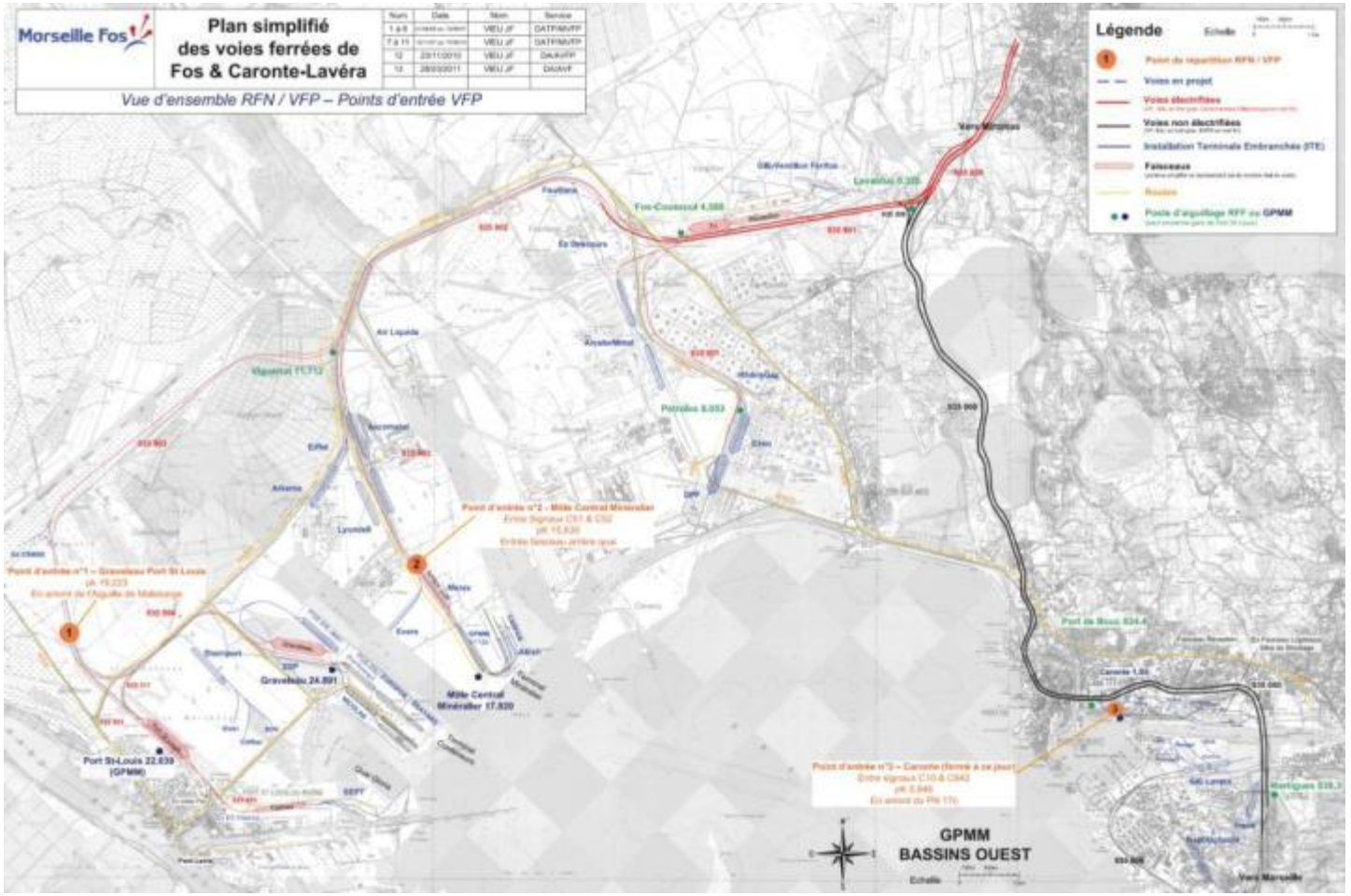
Port of Marseille - Rail Infrastructure Links and Facilities (2/2)



Source: Port Authority Marseile-Fos

2.3 Port Railway Framework

Investing in Opportunities
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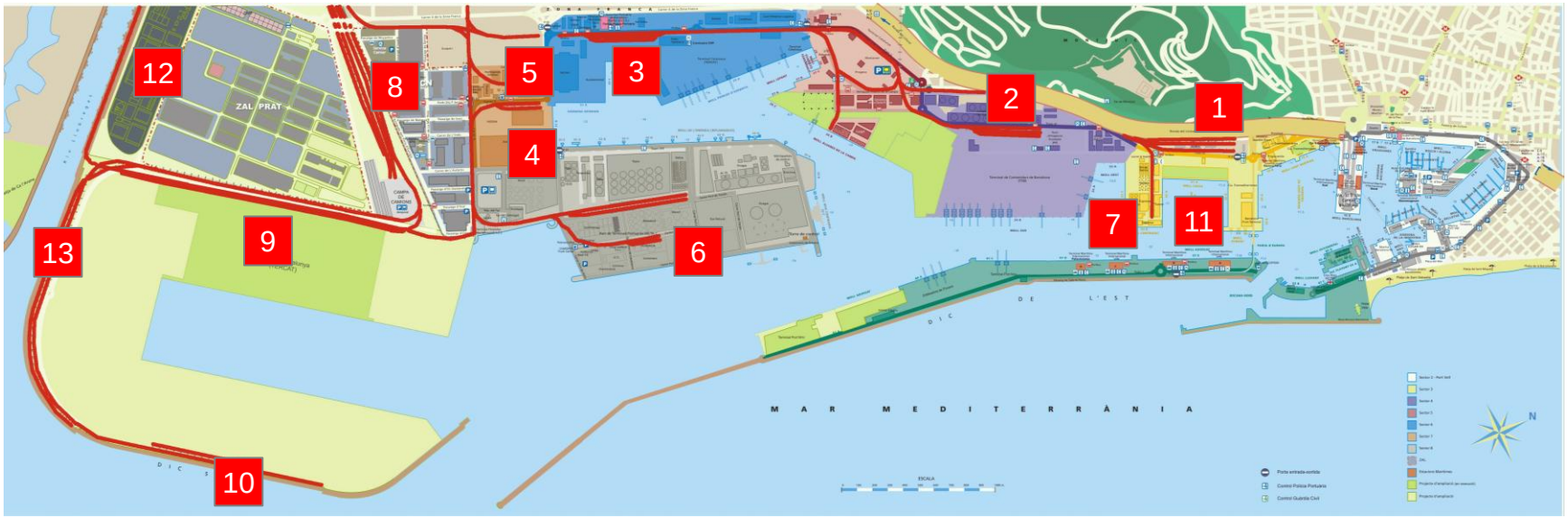
Port of Barcelona - Rail Infrastructure Links and Facilities



Container terminals

1. Morrot
2. Sud wharf
3. Príncep d'Espanya

Car terminals

4. Sud basin
5. Campa Z
6. Energy wharf

Bulk terminals

7. Contradic wharf
8. Energy wharf

Planned terminals

8. ZAL Prat - Containers
9. Containers
10. Containers
11. Costa wharf
12. New Llobregat terminal
13. South seawall

Source: Barcelona Port Authority

2.3 Port Railway Framework

Investing in Opportunities
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Port of Barcelona - Container Terminals

TCB extension at Prat Wharf
(planned inauguration: 2012)

TerCat
(Terminal Catalunya)

TCB
(Terminal de Contenidors de Barcelona)

2.3 Port Railway Framework

Investing in Opportunities
This project has received European Regional Development Funding through INTERREG IV B.
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Port of Barcelona - Container Terminals and Rail Infrastructure

Terminal	Stakeholder	Quay Length [m]	Draft [m]	Dock Rail Tracks	Handling Equipment	Volume Containers 2010 [kTEU] (estimate)
TerCat (Muelle Principe de Espana)	Hutchinson Port Holding	1.380	14	2 x 450 m	9 dockside gantries 11 RTGs 33 reach stackers	1.031
TCB (Muelle Sur Terminal)	Grup TCB	1.085	8,7/14	4 x 420 m	14 dockside gantries 64 RTGs 2 reach stackers 40 forklifts	915

Abbreviations: RMG = Rail Mounted Gantry; RTG = Rubber Tired Gantry

Port of Genoa - Overview of Rail Destinations (1/2)

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Italcontainer	Trenitalia	G.-Voltri	Padova	IT	8	n.a. (345 km)
Italcontainer	Trenitalia	G.-Voltri	Modena	IT	7	n.a. (254 km)
Italcontainer	Trenitalia	G.-Voltri	Milano Segrate	IT	2	n.a. (150 km)
Italcontainer	Trenitalia	G.-Voltri	Bologna	IT	1	n.a. (298 km)
Italcontainer	Trenitalia	G.-Voltri	Venezia	IT	1	n.a. (404 km)
Italcontainer	Trenitalia	G.-Campasso[1]	Padova	IT	2	n.a. (333 km)
Italcontainer	Trenitalia	G.-Samp.[1]	Milano Segrate	IT	1	n.a. (140 km)

[1] SECH Terminal

Source: www.containerzug.de

2.3 Port Railway Framework

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Port of Genoa - Overview of Rail Destinations (2/2)

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Messina	Messina	G.-Marittima	Dinazzano	IT	6	n.a. (240 km)
Messina	Messina	G.-Marittima	Jesi	IT	2	n.a. (490 km)
Messina	Messina	G.-Marittima	Milano Segrate	IT	not available	n.a. (141 km)
Messina	Messina	G.-Marittima	Vicenza	IT	5	n.a. (315 km)
Messina	Messina	G.-Marittima	Arezzo	IT	not available	n.a. (320 km)
Messina	Messina	G.-Marittima	Brescia	IT	3	n.a. (211 km)
Sogemar	Contship Italia	Genova	Melzo	IT	5/6	not available
Sogemar	Contship Italia	Genova	Milano Rho	IT	not available	not available

Source: www.containerzug.de, Port of Genoa

2.3 Port Railway Framework

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Port of La Spezia - Overview of Rail Destinations

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Italcontainer	Trenitalia	La Spezia	Padova Int.	IT	9	not available
Italcontainer	Trenitalia	La Spezia	Bologna Int.	IT	7	not available
Italcontainer	Trenitalia	La Spezia	Melzo	IT	5	not available
Italcontainer	Trenitalia	La Spezia	Modena	IT	3	not available
Italcontainer	Trenitalia	La Spezia	Milano Segrate	IT	2	not available
Italcontainer	Trenitalia	La Spezia	Rubiera	IT	2	not available
Italcontainer	Trenitalia	La Spezia	Venezia	IT	1	not available
Oceanogate Italia	Contship Italia	La Spezia	Milano Rho	IT	not available	not available
Oceanogate Italia	Contship Italia	La Spezia	Melzo	IT	not available	not available
CePIM	not available	La Spezia	Parma	IT	not available	not available

Source: www.containerzug.de

2.3 Port Railway Framework

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Port of Savona - Overview of Rail Destinations

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Fer.Net	SerFer	Vado Ligure	Mortara	IT	5	not available

Source: www.containerzug.de, www.terminalmortara.it

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Port of Marseille - Overview of Rail Destinations (1/4)

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Naviland	SNCF Fret	Fos/Arenc	Toulouse	FR	4	1 day
Naviland	SNCF Fret	Fos/Arenc	Bordeaux	FR	3	1 day
Naviland	SNCF Fret	Canet/Fos	Lyon	FR	3/5	1 day
Naviland	SNCF Fret	Canet/Fos	Strasbourg	FR	3/3	4/3 days
Naviland	SNCF Fret	Canet	Paris-Valenton	FR	3	4 days
Naviland	SNCF Fret	Canet/Fos	Zeebrugge	BE	8/5	3 days
Naviland	SNCF Fret	Canet/Fos	Antwerpen	BE	6/8	3 days
Naviland	SNCF Fret	Canet/Fos	Ludwigshafen	DE	3/5	4/3 days

Source: Naviland Cargo

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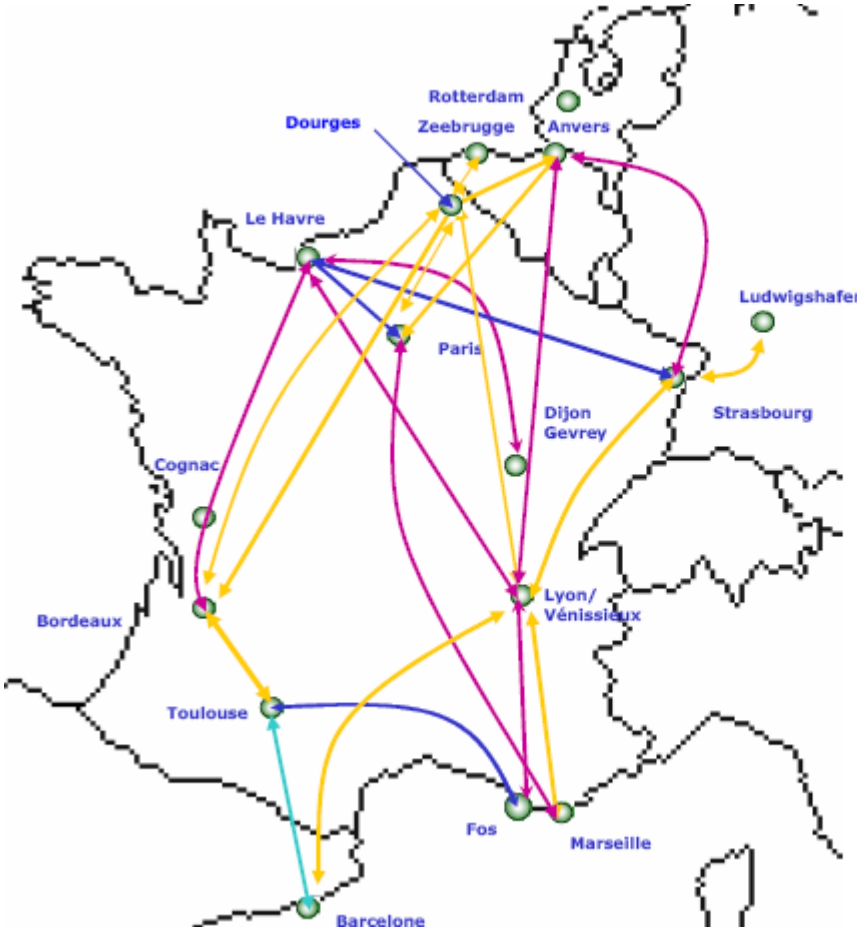
Port of Marseille - Overview of Rail Destinations (2/4)



Departures per week:

- 5
- 4
- 3
- 2

Source: Naviland Cargo

Port of Marseille - Overview of Rail Destinations (3/4)

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Rail Link Europe	CMA Rail	Intramar Transagrue	Lyon	FR	5	A-B/D
Rail Link Europe	CMA Rail	Intramar Transagrue	Rennes	FR	5	A-C/E/F
Rail Link Europe	CMA Rail	Intramar Transagrue	Le Havre	FR	3	A-C/D
Rail Link Europe	CMA Rail	Intramar Transagrue	Dourges	FR	2	A-B/D
Rail Link Europe	CMA Rail	Intramar Transagrue	Paris	FR	2	A-B/E
Rail Link Europe	CMA Rail	Intramar Transagrue	Chalon sur Saone	FR	1	A-D
Rail Link Europe	CMA Rail	Intramar Transagrue	Dunkerque	FR	1	A-F
Rail Link Europe	CMA Rail	Intramar Transagrue	Antwerpen	BE	3	A-D/E/F
Rail Link Europe	CMA Rail	Intramar Transagrue	Ludwigshafen	DE	3	A-C/E

Source: Rail Link Europe

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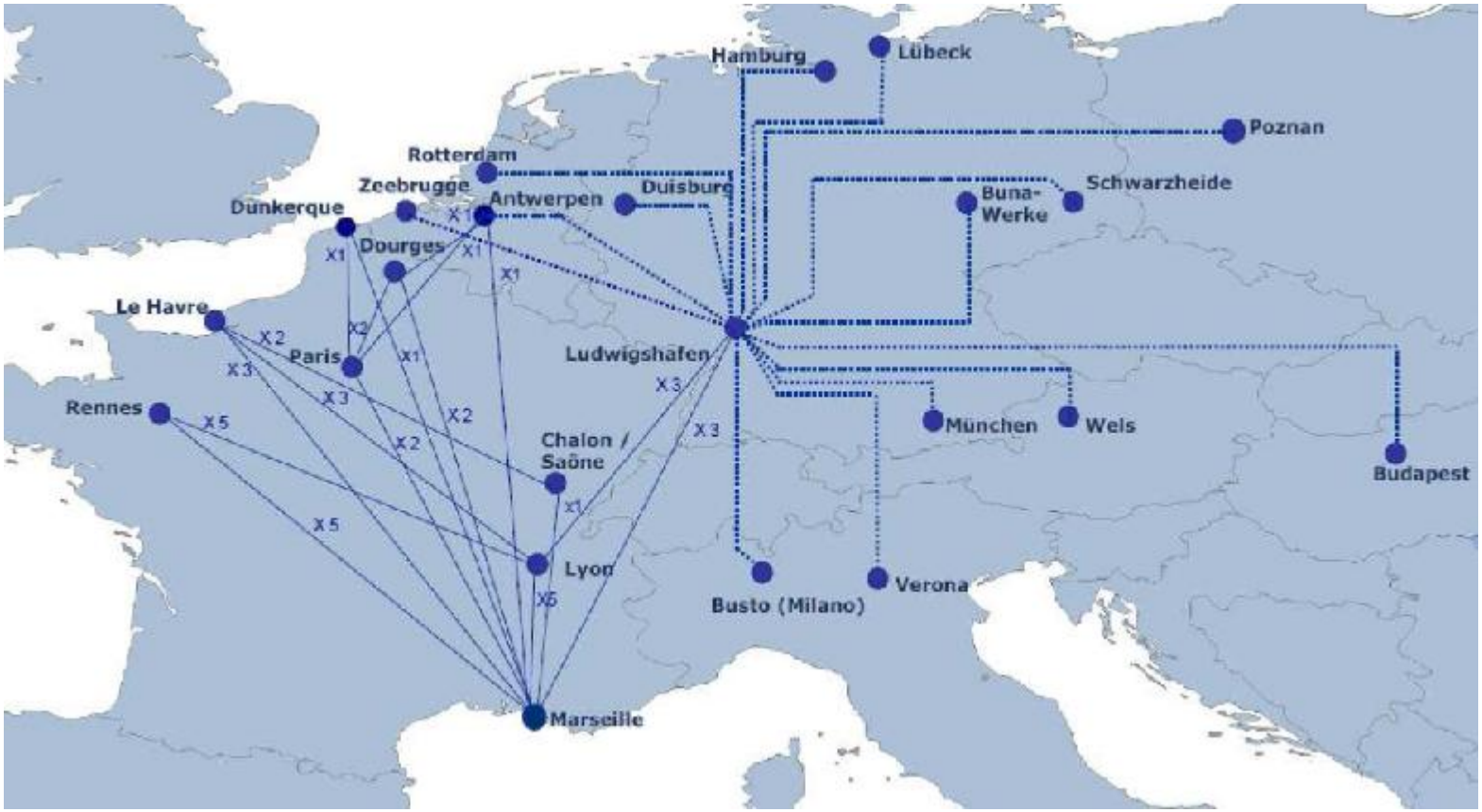
Port of Marseille - Overview of Rail Destinations (4/4)



Source: Rail Link Europe

2.3 Port Railway Framework

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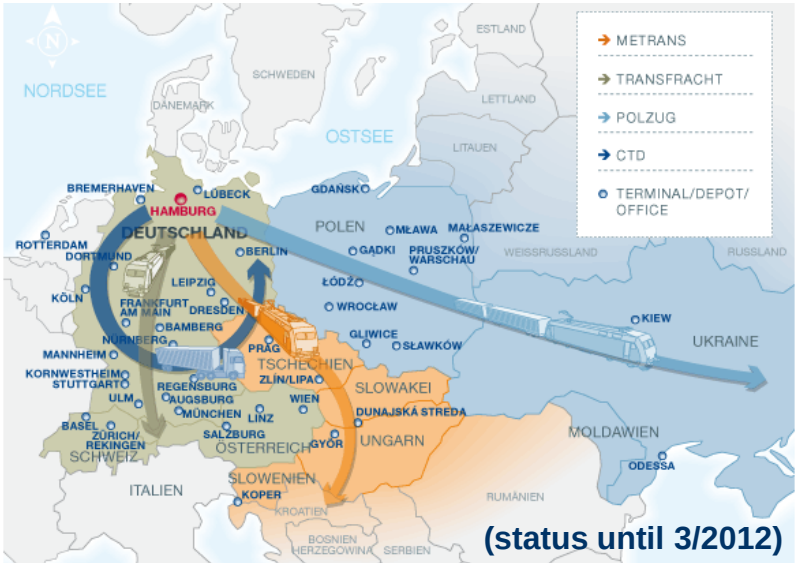
Port of Barcelona - Overview of Rail Destinations (Only Direction FR/DE)

Operator	Rail Traction Company	From	To	Country	Departures per Week	Running Time
Naviland	Renfe/SNCF Fret	TCB/TerCat	Lyon	FR	3	2 days
Naviland	Renfe/SNCF Fret	TCB/TerCat	Bordeaux	FR	2	4 days
Naviland	Renfe/SNCF Fret	TCB/TerCat	Toulouse	FR	2	3 days

Source: www.containerzug.de

Organization of Container Hinterland Transport – Port of Hamburg (1/2)

- Hamburg Port Authority (HPA)
  - HPA is owner and in charge to manage the railway infrastructure in the port , maintenance and service is done with own staff and equipment
  - HPA does not have operational or stakeholder activities in rail hinterland transportation as well as a railway-operator license (and is not planning to apply one)
  - HPA's goal is to have a non-discriminatory and free market, open for all rail service providers
- HHLA Intermodal
  - HHLA offers an intermodal network with hinterland connections for German sea ports particularly to Middle and Eastern Europe
  - HHLA owns subsidiaries and shareholdings in geographical market segments with various requirements in rail hinterland transportation



(status until 3/2012)

Source: www.hhla.de/de/intermodal/hinterlandnetzwerk.html

2.3 Port Railway Framework

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Organization of Container Hinterland Transport – Port of Hamburg (2/2)

	Metrans	Polzug	Transfracht	CTD
Shareholders (**status until 3/2012**)	51,5% HHLA Intermodal 35% DB Schenker Rail 13,5% Management	33,3% HHLA Intermodal 33,3% DB Mobility Logistics 33,3% PKP Cargo	50% HHLA Intermodal 50% DB Mobility Logistics	100% subsidiary
Hinterland	CZ/SK/HU/SI	Poland/CIS	DE/AT/CH	local/regional
Services	80 trains/week from Hamburg/Rotterdam to CZ/SK with extension to HU/SI	Trains from Hamburg/Rotterdam to Poland, with connections to CIS	Train system Albatros-Express via 22 Hub-Terminals in 12-36 h	Container transfer in the areas of Hamburg, Bremen, Berlin and long distance transport
Assets	Container flat wagons, 5 own terminals in CZ/SK (Prag, Zlin, Dunajska Streda)	4 own terminals and 4 partner-terminals in Poland; access to locos/wagons	Hinterland depots, terminal shareholdings	150 traction vehicles + 250 Chassis

Source: www.hhla.de/de/intermodal/hinterlandnetzwerk.html

2.3 Port Railway Framework

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Organization of Container Hinterland Transport – Port of Rotterdam/Antwerp

- Both are acting as a neutral administration body for development, construction, management and operation of the port area
- The national railway infrastructure providers are the owner of the railway infrastructure inside the port (Prorail in Rotterdam and Infrabel in Antwerp), they are also responsible for maintenance and investment decisions
- In the Port of Rotterdam, Keyrail is managing the port railway infrastructure (shareholders: Port of Rotterdam 35%, Port of Amsterdam 15%, Prorail 50%)
- Rotterdam would like to reach a friendship agreement with operators concerning modal split targets until 2035 (rail 20%, road 35% and barge 45%)
- Increase of intermodal transport volumes in Antwerp due to construction of new Terminal HTA (HUPAC) and Terminal Combinant (BASF/HUPAC/IFB)
- Port of Antwerp has organized the Intermodal Solutions Project (AIS II) in cooperation with the 3 largest shipping companies and five largest forwarders (results are the above mentioned new terminals and five new train connections)

2.3 Port Railway Framework

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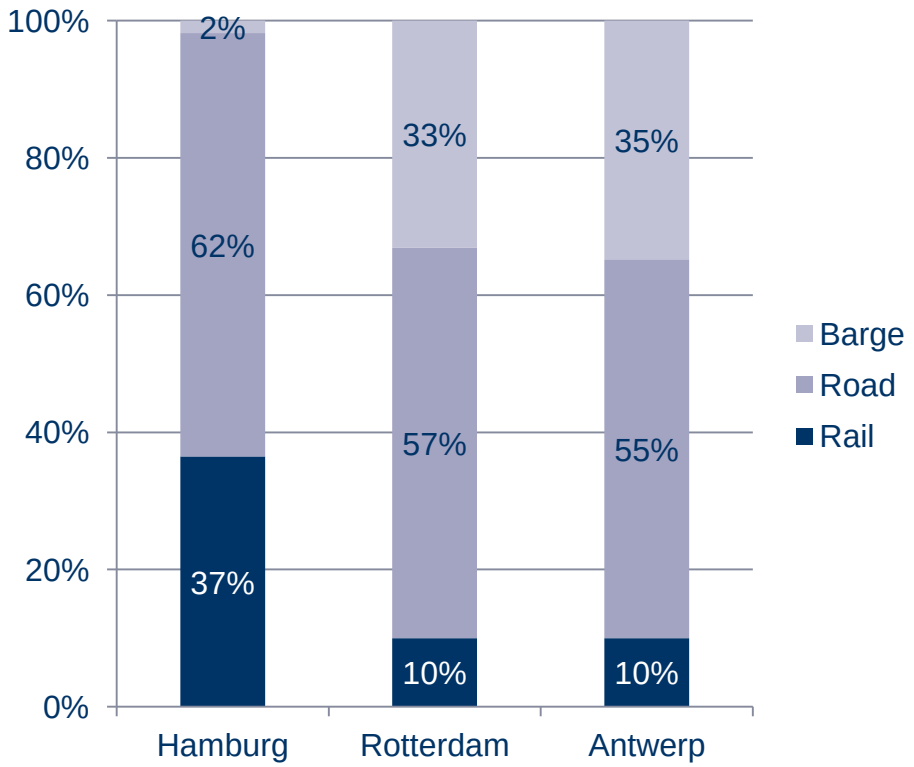
Comparison of Modal Split in Container Hinterland Traffic for Ports of Northern and Western Range

- The Hamburg Port Authority has no direct influence on rail operations inside the port but HHLA has several activities in rail hinterland operations
- The Rotterdam Port Authority is currently not involved in rail hinterland operations
- The Antwerp Port Authority is thinking about increasing their influence on transport chains
- There is an impact of different port business models on the rail modal split (Hamburg 37%)



Source: Port Authorities, Hamburg/Rotterdam: 2010 data, Antwerp: 2009 data
Reporting methods may be inconsistent (container-based vs. TEU-based)

2.3 Port Railway Framework

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Comparison of South European Ports

Section	Genoa	La Spezia	Savona Vado Ligure	Marseille	Barcelona
Mio. TEU 2010 Hinterland Cargo Rail Share	1,61 0,22 (14%)	1,07 0,27 (25%)	0,20 0,01 (5%)	0,91 0,12 (13%)	1,31 0,10 (8%)
Planned Completion Projects TEN-T	Gotthard Base Tunnel (2017), Ceneri Base Tunnel (2019), Genoa - Novara - Domodossola (>2015), Genoa - Milano - Chiasso (>2015), Basel - Freiburg (>2020)			Figueras - Montpellier (2020), Montpellier - Nimes (2016), Lyon - Mulhouse (>2020)	
Restrictions Rail Profile	C/P 22/341 (Genoa - Voghera) and C/P 45/364 Genoa - Novara			C45/364 and P45/359 (SNCF)	
Single Track Sections	Novara - Domodossola and Novara - Bellinzona (Luino-Line) (lower capacity and main reason for long run times)			none	
Restrictions Train Length	max. 550-570 m (Genoa - Novara - Domodossola and Genoa - Milano - Chiasso)			max. 750 m	max. 450-500 m
Gradient south-north	max. 25‰ via Simplon; max. 15‰ via Luino Line (flat route) with completion of Gotthard/Ceneri Base Tunnel max.15‰			max. < 10‰	max. 15‰
Established Intermodal Services	various services to inland terminals in Northern Italy but lack of direct international connections or via gateways (e.g. Busto Arsizio)			national services, Antwerpen (BE), Ludwigshafen (DE) but 3 days runtime	national services, Lyon (FR)

2.3 Port Railway Framework

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Summary - Ligurian Ports in Comparison to Port of Barcelona/Marseille

- The rail infrastructure framework covers railway hinterland connections as well as port railway infrastructure and determines basically the economical operation of container shuttle trains
- Ligurian Ports do not have relevant weaknesses in comparison to Port of **Barcelona** concerning the rail infrastructure framework
- In comparison to Port of **Marseille** there are the following weaknesses
  - Capacity bottleneck due to single track section (esp. Novara - Domodossola)
  - Max. train length of 550-570 m on Italian rail routes Genoa - Switzerland
  - Max. gradient (south-north) of 21-25 ‰ via Simplon or Gotthard;
    after completion of Gotthard/Ceneri Base Tunnel 2017/19 max. 15 ‰ flat route
- Rail profile C45/364 as general restriction for Ligurian Ports and Port of Marseille
- Port of Marseille already has established international container shuttle trains (e.g. to Ludwigshafen in Southern Germany) but runtime is quite long (3 days)

Agenda

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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Based on the Initial Situation, the question arises whether it is economically feasible for the Ligurian ports to set up a rail-based port-hinterland Shuttle

Questions for set up of a rail shuttle:

1	Who are the relevant competitors?
2	What is the Unique Selling proposition (**USP**) of the Ligurian ports in comparison to competitors?
3	What does the perfect product look like ?
4	What is the perfect hinterland? What are the perfect terminals in the dedicated area?
5	Which market strategy (costs vs. quality, sub vs. total market) shall be chosen?
6	What is critical for success?
7	What does the strategy look like?

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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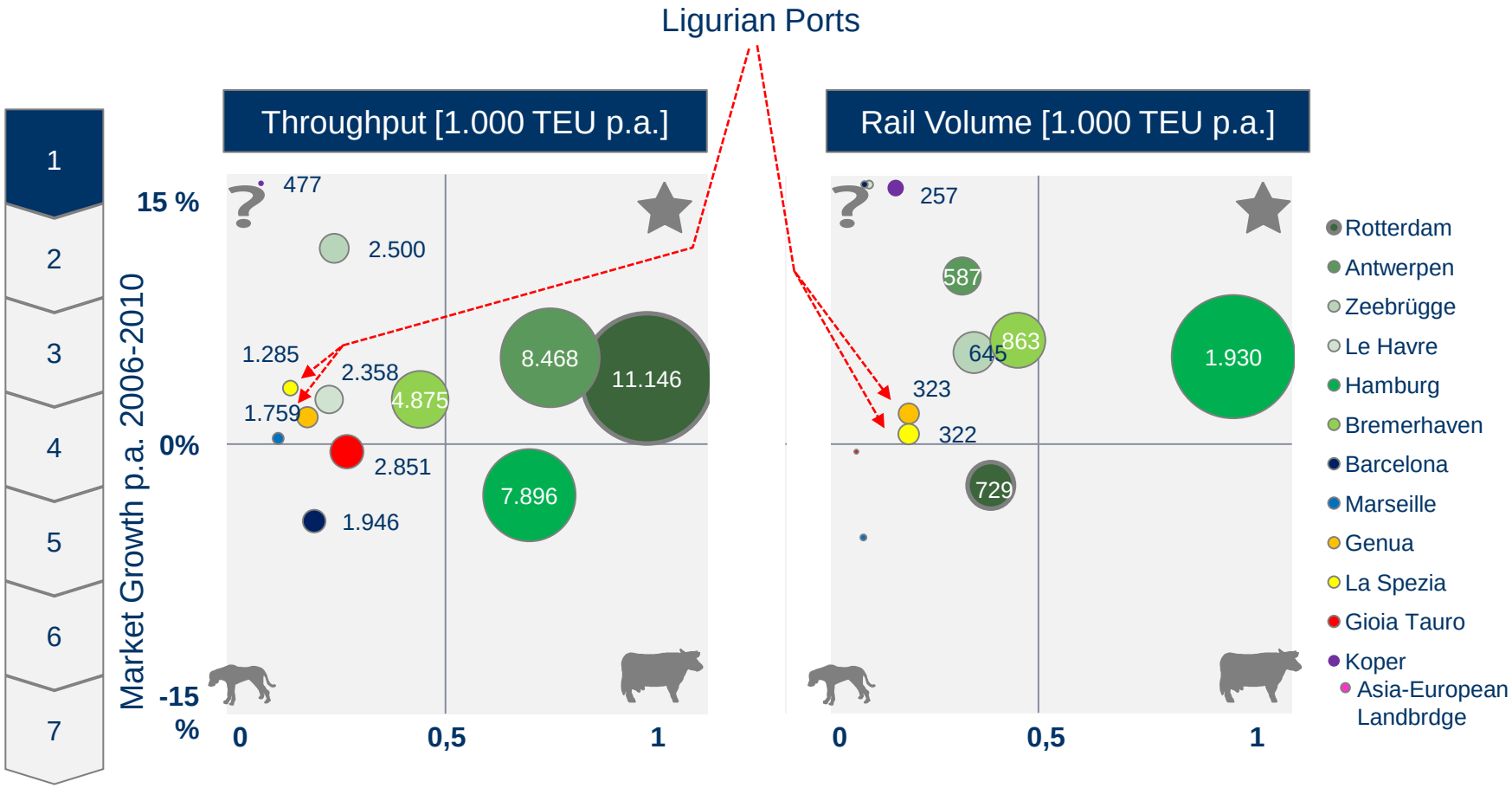
Competition: Stars and cash cows only in the Northern Range, Ligurian ports are question marks



3 Impact on the Position of Ligurian Ports with Regard to Competitors

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USP of Ligurian Ports could be the shorter seaway to Asia and South America, anti-cyclic routing in Hinterland transport and low CO_2 emission

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Positioning of the Ligurian ports in hinterland rail traffic

- Ligurian ports have too little market power to attract volumes as large as the Northern ports' volumes in the long run...
- ...but due to their geographical location, Ligurian ports have time, flexibility and climate advantages
  - Time: saving distance (and hopefully time) – shortest way from Asia or South America to Europe
  - Flexiblity: Southern ports could benefit from favorable northbound rates on the Rhine axis and on the central axis due to a considerable imbalance between northbound and southbound transalpine traffic
  - Climate: Significant reductions of emissions due to shorter distance (by approx. 1/3 of sea route from Asia) are possible

The Unique Selling Proposition of Ligurian ports should be applied for future hinterland service products

3 Impact on the Position of Ligurian Ports with Regard to Competitors

Investing in Opportunities
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The ideal cargo could be time-critical and valuable goods sent from Asia/South America to Central Europe or vice versa

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Product Definition

The perfect product could be...

- ...have an origin in Asia/South America
- ...be **time-critical or valuable**, e.g. automotive parts, tropical fruits, electronics products
- …faster and possibly cheaper to operate via Ligurian ports than Northern range ones
- …aligned along the total transport chain (source to destination)

It provides a forwarder (customer) value which is not covered by today's existing services

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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The most relevant hinterland for the development of a shuttle train is located along the corridor Rotterdam-Genoa from Milan to the Ruhr region

Hinterland Definition

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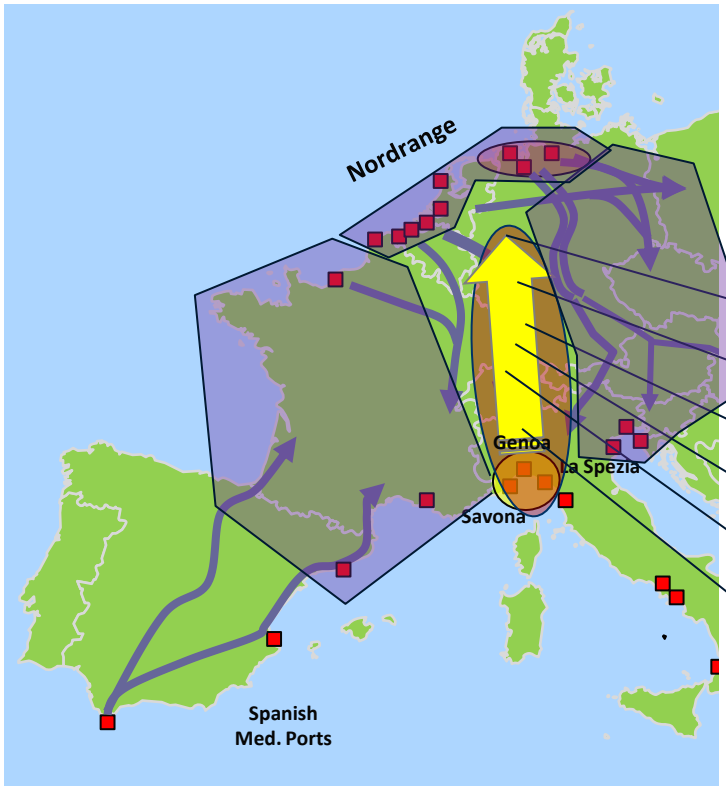

The competition level is very high on all hinterland axes. Significant time benefits can only be gained on the Rhine axis

Rhine-Ruhr

Rhine-Main

Rhine-Neckar

Upper Rhine Region

Switzerland

Lombardy

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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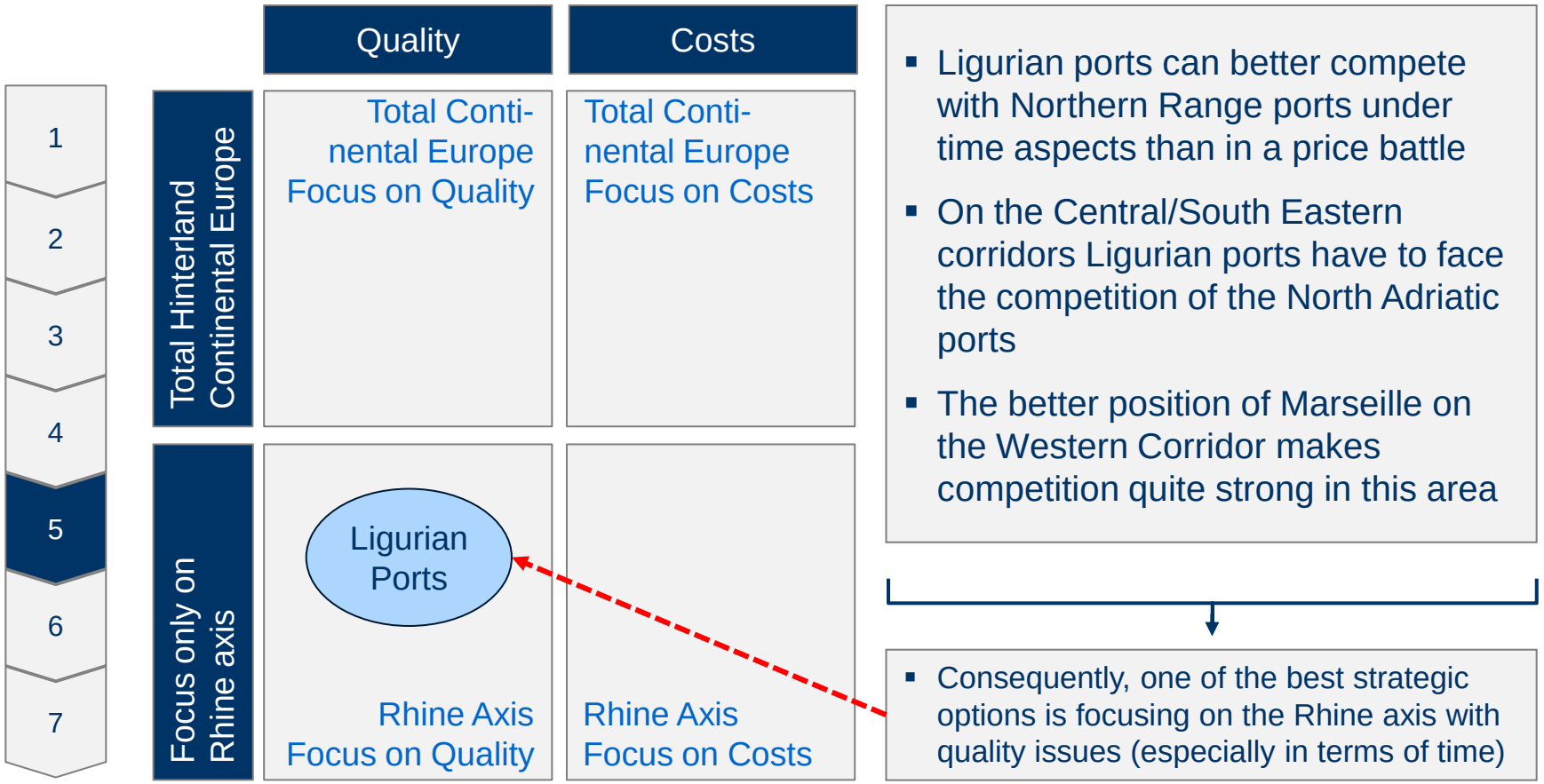
Vision: Quality leader for time-critical goods on the Rhine axis



- Ligurian ports can better compete with Northern Range ports under time aspects than in a price battle
- On the Central/South Eastern corridors Ligurian ports have to face the competition of the North Adriatic ports
- The better position of Marseille on the Western Corridor makes competition quite strong in this area

- Consequently, one of the best strategic options is focusing on the Rhine axis with quality issues (especially in terms of time)

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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Strategy: Ligurian ports could support aligned time-optimized transport chains between Asia/South America and Europe

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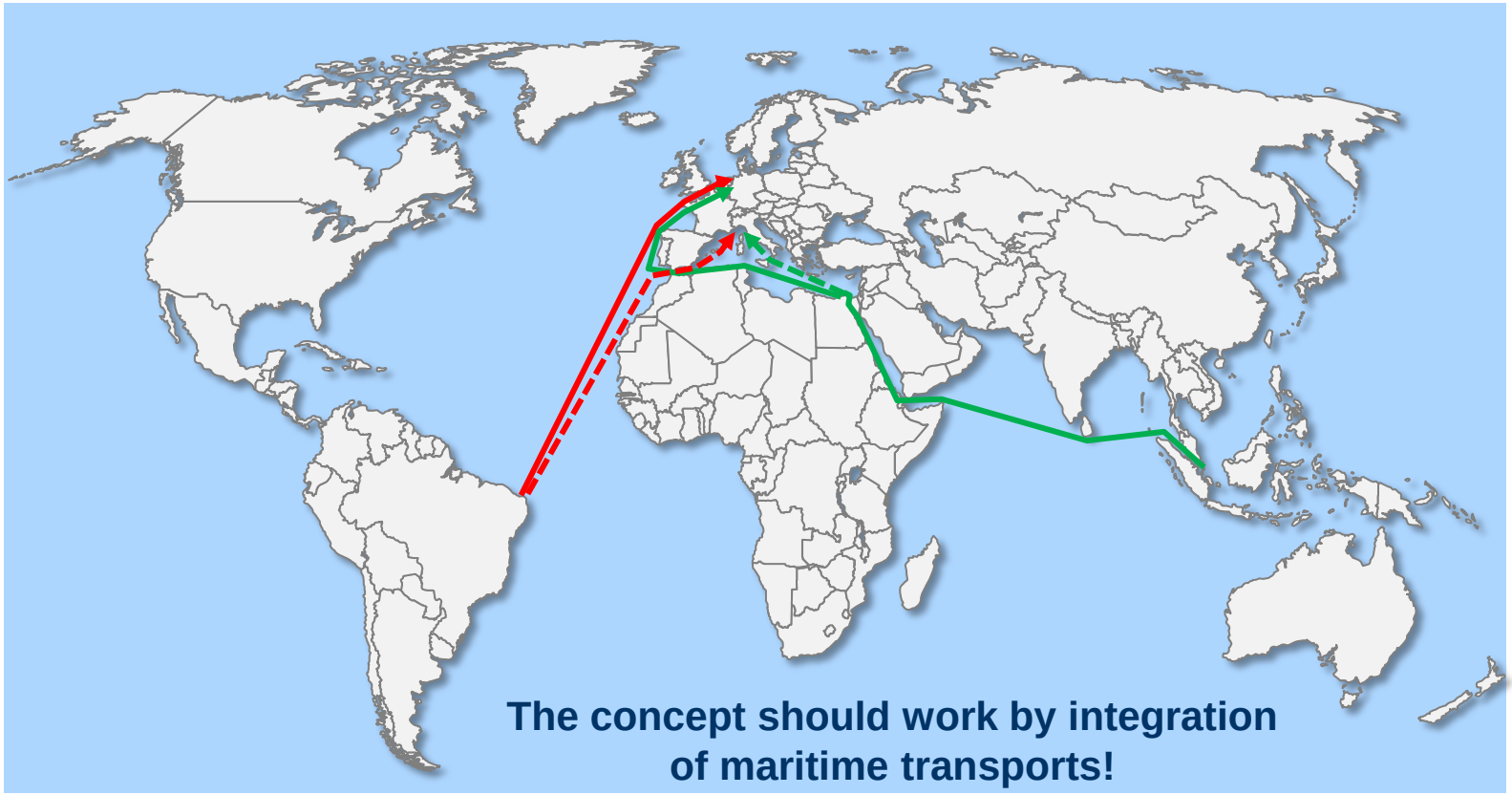

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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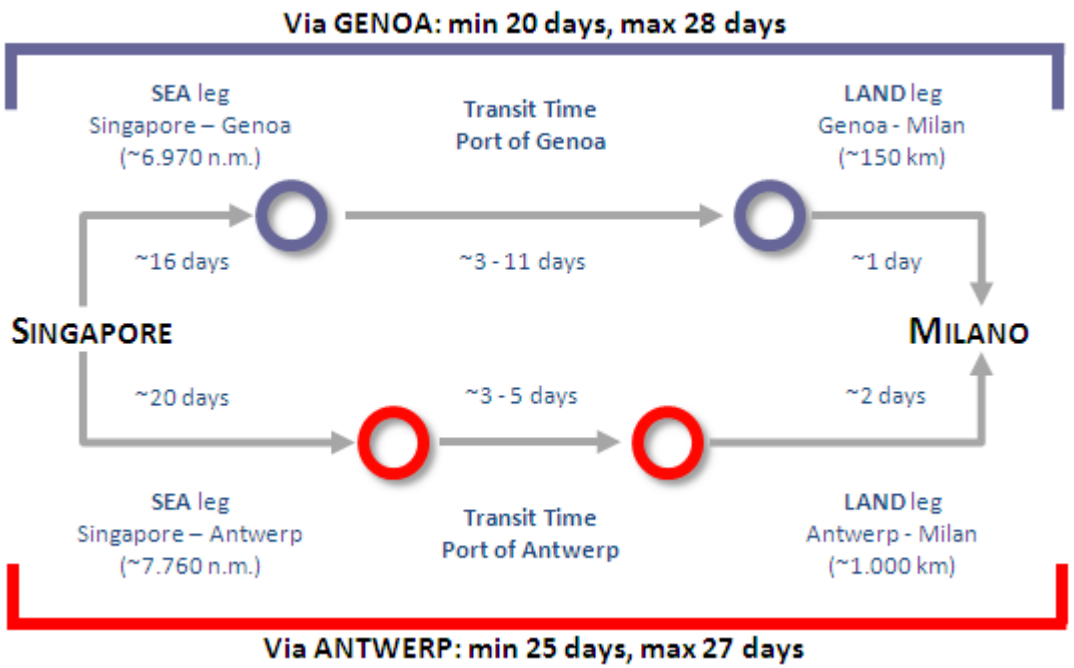
A shuttle train <u>without</u> the involvement of a shipper is not competitive and is so doomed to failure, BUT Italy's geographical advantage for container handling along the route Far East-Europe is reduced by <u>delays and uncertainty of times</u>

Competition of Intermodal Transport Chains



Source: A.T. Kearney, 2011

Considering **a hypothetical route Singapore - Milan** via Genoa *vs* via Antwerp, it comes up that, despite the favorable geographical position of the port of Genoa (which would save nearly 800 nautical miles), the **variability of transit times is bigger** than for Antwerp.

Operators tend to prefer reliability to speed.

Result: Genoa is in a good position, but services must become more regular and reliable.

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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Sucess of the strategy is predominately determined by volume and routing control

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Control of volumes

Guarantees a minimum level of utilization is the first basic element for a solid concept

Control of routing

Guarantees the shortest transit time is the second basic element for a solid concept

Only both elements together lead to success

Success is only possible in cooperation with shippers (Best Practices: Maersk: boxXpress.de, ERS, CMA- CGM: Rail-link Europe)

The essential point is to link the Ligurian ports to the Milan region; existing trains may be used from there

3 Impact on the Position of Ligurian Ports with Regard to Competitors

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A potential strategy approach considers the following factors:

- USP of Ligurian ports can be a shorter seaway from Asia and South America, anti-cyclic routing in Hinterland transport and less CO_2 emission
- The ideal product could be the transport of time-critical and valuable goods between Asia/South America and Central Europe
- The main ideal Hinterland for the development of a shuttle train is located along the corridor Rotterdam-Genoa from Milan to the Ruhr region

A potential strategy approach considers:

- Vision: Quality leader for time-critical goods on the Rhine axis
- Strategy: Ligurian ports could offer aligned time-optimized transport chains between Asia/South America and Europe
- A shuttle train without the involvement of a shipper is unlikely to be competitive and is thus doomed to failure
- Success of the strategy is predominately determined by volume and routing control

Agenda

***** *Hupac*

Genoa – Development Strategies

Port of Genoa's development plans on logistics and intermodality along the Corridor 24 are dependent on:

- Port traffic volumes (demand) *vs* Port maximum capacity (supply) forecasts --- > **mega container ships (increase in size of ships coupled with higher speeds)**
- Objective to transfer goods from road transport mode to rail transport mode (Goal: 50% modal split railway/road) ➡ **improving hinterland and last mile connections**

At the moment, Voltri is the biggest terminal in Genoa (2 millions TEU capacity) and cannot manage more traffic.

Current traffic volumes and development forecasts

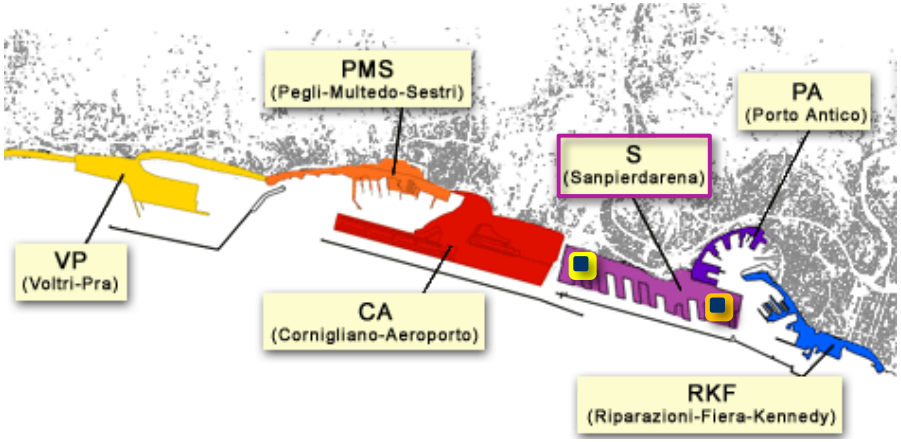
- **2011:** 1,85 Mio. TEU - 51,6 million tonnes
- **2020:** 4 Mio. TEU (Maximum capacity container traffic forecasts)

Evolution of rail traffic

- **2011:** 37 couples of trains (daily average)
- **2020:** 130 couples of trains (daily average) by carrying out interventions on infrastructures and services

Main infrastructural projects currently in progress (SAMPIERDARENA)

- Land reclamation Ronco - Canepa (under way)
- New container terminal Calata Bettolo (under way)



4.1 Port of Genoa

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Genoa Sampierdarena Basin

Source: Direzione Tecnica – AP Genova

Calata Bettolo

- New container terminal: **550.000 TEUs/year** maximum capacity and new maritime dock
- Quay lengh 750 m, yard 180.000 sqm, berth for ships up to 15.000 TEUs cargo capacity
- Works in progress, completion forecasted by the end of 2015

Ronco - Canepa

- New terminal container: **400.000 TEUs/year** maximum capacity
- South quay 640 m and 300.000 sqm yard
- Berth for ships up to 5.000 TEUs cargo capacity
- Works in progress, completion forecasted by the end of 2015

4.1 Port of Genoa

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Genoa Rail Node Accessibility

The Genoa node represents a strategic point for the national and international rail network as a fundamental center of exchange between the port system and railway lines on the Genoa - Ventimiglia, Tyrrhenian and Milan – Genoa axes. The node itself is also the most efficient system for railway mobility as part of its metropolitan area.

The planned interventions aim to:

- Separate traffic flows: long-distance passengers and goods from regional and metropolitan passengers
- Establish a connection between the Ligurian ports and the fundamental national network in both directions (east-west and north-south)
- Upgrade and automate the infrastructure and facilities of the node to develop the supply of urban mobility
- Adapt Genoa station facilities in Voltri, Sampierdarena and Brignole, and services in the Terralba and Brignole railway station, to promote intermodality.

The above-mentioned interventions revolve around the following projects:

- Upgrading infrastructure Voltri-Brignole
- Strengthening Genoa system of command and control
- Variant of the Genoa-Ventimiglia line between Pegli and Voltri
- Rationalization of systems and stops for strengthening Genoa regional rail node
- Multi-ACC

Completion forecasted by the end of 2015

4.2 Port of Savona

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Savona Development Strategies (1/2)

- The Port Authority's main goal is to give continuity and prospect to the socio-economic growth of the port and of the region involved by its activities, through the development of port functions and the enhancement of the architectural, historical and environmental assets on the waterfront.

- The main development project is the construction of the multipurpose platform in the bay of **Vado Ligure**, a work that will be realized thanks to the convergence between public and private interest: the Port Authority and the AP Moeller **Maersk group**, the world leading shipping operator, signed a partnership for the financing and construction of **a new container terminal** with a capacity of over **700.000 TEU**, which will be operational **in 2016** (works started in Summer 2012). When the Maersk platform in Vado will be completed, **40% of the containers will be shipped by rail to Rivalta or Mortara** via San Giuseppe di Cairo, linked with Savona by the two tracks crossing the Apennines. Berths for dry bulk will have a **22 meters draft**, while the ones for liquid bulk will reach 12,5 meters.

  ➡ This situation of **cooperation between Terminal Operators and Port** is almost unique in Italy.

- With regard to Savona, the aims are to optimize port-space use, **improve port accessibility**, and complete the **waterfront revitalization** plan. As for cargo, in order to develop the trade of bitumen (of which Italy is exporting country), a new facility will be installed on a recently reclaimed area.

- Many initiatives also concern energy consumption reduction and **pollution prevention**: in particular, the Port Authority aims at energy efficiency improvement and renewable resources development. Thanks to the installation of a photovoltaic plant, since 2010 the cruise terminal has been able to gain most of its energy needs from the sun; similar systems will soon be installed on the roofs of the cargo warehouses, while a wind energy plant will be installed along the breakwater.

4.2 Port of Savona

Investing in Opportunities
This project has received European Regional Development Funding through INTERREG IV B.
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Savona Development Strategies (2/2)

- In the port of Vado, thanks to the installation of a “cold ironing” system, ships can be supplied with electric power directly from the dock, allowing the shutdown of generators on board while in port and thus significantly reducing pollution from ships.
- Furthermore, the dedicated railway system with **Metrocargo** handling system installation in Vado Ligure obtained important advances in terms of efficiency and reliability.
- Considering rail service a key development factor, the Port Authority has worked out a system to ensure an effective and independent connection between the port and its hinterland, taking advantage of the little-used lines from Savona towards Turin and Alessandria.
- The port shunting service and the shuttle service to the inland storage areas and intermodal centres are assigned to **Serfer** (a company controlled by FS Cargo S.p.A.), while Fer.net (a company owned by logistics and port operators) deals with rail service marketing.
- The Port Authority’s rolling stock fleet, consisting of 6 electric engines (four E645 and two TRAXX F140DC - E483, delivered in 2009 by Bombardier Transportation), plus 6 diesel locomotives and 2 loco-tractors, is used by Serfer to provide the shuttle service and the shunting service respectively.
- With the aim to **improve intermodal transport services** between the port and the internal markets, the Port Authority believes it is essential to exploit the synergies with the hinterland logistics centers. In this regard, memoranda of understanding were signed in 2010 with **Rivalta Scrivia Intermodal Centre** and **Mortara Logistics Pole**, aimed at promoting the fast rail-transfer of cargo from the docks to the inland storage areas, from where goods can then be distributed to their final destinations. The Port Authority also pays great attention to the development project of a new logistics facility on the **Mondovì-Cuneo**-Turin corridor, where a significant share of port high added value traffic heads to.

4.3 Port of La Spezia

Investing in Opportunities
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La Spezia Development Strategies (1/2)

- The port of La Spezia was a **precursor of the policy of privatization of port terminals**, through a model of economic development characterized by criteria of efficiency and profitability that have placed the first places among the ports of the Mediterranean.
- Despite **a port structure that does not currently allow to meet all the demands of the market**, in 2011 the port has reached a traffic volume of 17,1 million tonnes of cargo and 1,3 millions of TEUs.
- Thanks to its **strategic geographical location** and direct motorway and rail axis Tirreno-Brenner, the port of La Spezia is able to effectively serve **large markets and industrial areas of northern Italy and southern Europe**, from the Po Valley to the Switzerland, from Germany to Austria.
- Due to the high use of rail transport **La Spezia is among the top three European ports in terms of technology for intermodal transport**: **in 2011 23% of container traffic was handled by rail**, excluding transshipment.
- With regard to maritime connections La Spezia is connected to more than 200 ports in the world with weekly or bi-weekly departures to Asia, North and South America, Europe, Africa and Middle East. The port is situated within a harbor of 150 acres, protected by a breakwater that allows to easily operate all year round protected from all weather conditions.

4.3 Port of La Spezia

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La Spezia Development Strategies (2/2)

- La Spezia has more than **5 km of quays** and **575.000 sqm of port area** served by a system of **17.000 meters of rail tracks** and 3.500 meters of roads. The **draught reaches 14 meters**, while cranes and lifting equipment supplied have capacity up to 100 tons with covered warehouses for more than 13.000 square meters. The pilotage, towage and mooring permit operability for 24 hours a day, 365 days a year. In the port of La Spezia operate **two container terminals**, three multipurpose terminal, a terminal for coal and refined products, a terminal for oil products, a terminal for liquefied natural gas, a grain terminal, a terminal for dry bulk terminal and two for cement.
- One of the major objective is the strengthening of intermodal transport with the **intention of moving by rail a 50% share of container traffic**, enhancing the inland rail terminal of **Santo Stefano di Magra**.
- The project involves the construction, in the areas behind the port of Santo Stefano di Magra, of an equipped intermodal platform intermodal, which will reduce road traffic by using the areas of port direct service.
- The work will allow direct connection through shuttle service between the port of La Spezia, S. Stefano Magra and CEPIM logistic centre (in Parma), significantly reducing time and costs of rail transport and, at the same time, developing infrastructure connections and logistics activities up to the territories of the province of Verona.

Completion forecasted by the end of 2015

4.4 SWOT Analysis

Investing in Opportunities
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STRENGTHS

- Savona, Genoa and La Spezia have a socio-economic balance established over time
- Good positioning in relation to major routes and European markets
- Good accessibility (sea side)
- Presence of global and local players
- Multi business ports
- A customers portfolio with all the main line's operators
- Good co-operation between operators, shipping lines and port
- Presence of a wide and diversified cluster in the field of transportation, auxiliary and ancillary services
- New potential attractiveness of port city (Genoa): technologies, tourism, transport
- Starting solutions of technological and organizational integration at port and network level

4.4 SWOT Analysis

Investing in Opportunities
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WEAKNESSES

- Land accessibility and operability constraints due to vessels' size growing (ship gigantism)
- Lack of intermodal services competitiveness
- Geographical and spatial features (e.g. rail route gradient and lack of possibility of expansion of ports close to the urban core)
- Infrastructural and organizational constraints along the transport chain
- National dimension of the internal market
- Lack of effective managerial and financial autonomy (administrative rigidity)
- Lack of an integrated transport policy at national level
- Slowness in the control of operations and procedures related to loading/unloading
- Operability of customs offices

4.4 SWOT Analysis

Investing in Opportunities
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OPPORTUNITIES

- The use of areas “behind” the port (inland terminals)
- Cooperation with shipping companies
- Strengthening rail network (electrification last mile, longer trains, etc.)
- Accessibility to larger vessels
- “Capture” the traffic in the core of Europe (Switzerland, South Germany)
- Rail “core network” European policies and realization of Terzo Valico (Milano-Genoa High Speed / High capacity railway project)
- Motorways of the Sea and economic integration in the Mediterranean area development
- Innovatives technologies applied to transports and to port sector
- Trade and economic integration development with Southern Mediterranean Countries
- Achievement of critical mass to gain economies of scale in volumes transported by rail

4.4 SWOT Analysis

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THREATS

- Shortage of public funds
- Northern Europe competition (e.g. recently opened German first mega ocean terminal for large container ships, Wilhelmshaven)
- Mediterranean competition (e.g. in Barcelona was inaugurated the new Terminal Barcelona Europe South Terminal - BEST, there are 100 million of investment in the existing terminal, on 15th of October a container shuttle train between Ludwigshafen and Barcelona ran, that is a direct intermodal link between Germany and Spain through the new tunnel in the Pyrenees)
- Continuous increase of vessels size
- Time reduction of concessions (depending on Brussels specifications)
- Reduction of the demand (in terms of container volumes)
- Reorganization of East-West line services from/to Europe
- Uncertainty of the macroeconomic forecasts and the strong power of the financial markets

4.5 INTERMODAL OPERATOR POSITION

Investing in Opportunities
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➢ LIGURIAN PORTS AND THEIR ROLE INTO THE HINTERLAND

Infrastructure restrictions in Northern Italy due to longer distances towards Central Europe from Genoa with respect to Rotterdam and **high gradients** (Alps crossings) are well known. Furthermore, it is **the shipowners** who **choose the routes to the European hinterland**. The **Ligurian ports** have very different characteristics from those of Northern Europe. There is a **lack of space** to park and to handle the containers due to the characteristics of the territory, while **in Northern Europe, logistics has become** one of the predominant business activities.

It is not that the Southern ports no longer play a significant role in hinterland transport, but they struggle to compete. Considering the same distance, there are worse framework conditions in the South due to **restrictions on train length and weight** (gradients). The vocation of the Ligurian ports has a lot of question marks. They need container storage space, and moving containers to a dry port is not a solution since it is even more expensive.

Anyway, **also the Northern ports begin to show the first signs of congestion**, so Maersk, considering the future development, begins to look at the Ligurian ports.

From the geographical point of view, there are regions for which the Ligurian ports can offer benefits in terms of transit time and on which they coud focus (e.g. Switzerland).

4.5 INTERMODAL OPERATOR POSITION

Investing in Opportunities
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➢ WHAT SHOULD BE DONE TO MAKE THE SOUTHERN RANGE PORTS MORE ATTRACTIVE AND COMPETITIVE

After some experiences in the past, Hupac (the leading combined transport operator through Switzerland and one of the market leaders in Europe) does not currently operate any train **from the Milan area to the Southern ports**. Trains from Switzerland go to Busto Arsizio and then Hupac coordinates the last mile towards Genoa, La Spezia and Savona Vado. The **trains** that actually are organized by other operators are reliable, but oriented **only** towards **domestic traffic**.

According to market information, in the Italian ports the **costs are higher with respect to Northern ports** (e.g. customs, handling,...). **Different aspects (infrastructural, administrative, commercial, procedural, ...) should be taken into account**. Reducing the environmental impacts would also help (The Alps constraints).

➢ THE ROLE OF THE ROUTES VIA FRANCE REGARDING THE CONNECTION BETWEEN MILAN AND ANTWERP

France, in the European rail context, is **conservative**. The problem basically is the reliability. The frequent strikes have a strong impact because they block the system. In France the way of managing the infrastructure seems to ignore the needs of the market (e.g. the works are not announced), there is **a disconnection between infrastructure and market**. In general, the route to France could allow to save time, but it is not reliable. In addition, France has **a port system** that cannot be ignored.

4.5 INTERMODAL OPERATOR POSITION

Investing in Opportunities
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➢ THE IMPACT OF GOTTHARD AND LÖTSCHBERG/SIMPLON AXES EXTENSION ON COMBINED HINTERLAND TRANSPORT, IN PARTICULAR ON THE SOUTHERN RANGE PORTS

The objective is to be able to use **longer** (750 m), **heavier** (2000 tons) and **higher** (P400) **trains** across all the Countries affected by the Corridor. This requires **adequate rail infrastructure** in Switzerland and, **especially, Italy**. With the extension of the Gotthard and Lötschberg/Simplon axes, the rail infrastructure restrictions would be substantially reduced (although, probably, there will be an important toll). Many advantages will come for railway undertakings.

➢ SOUTHERN RANGE PORT OPERATORS' POSSIBILITIES TO OPERATE A SHUTTLE TRAIN WITH AN INTERMODAL OPERATOR

An intermodal operator definitely could imagine to operate shuttle trains with one of the operators of the Southern ports if there is a **critical mass**. It is difficult to think about trains towards the South of Germany with a low frequency (1 train per week does not make sense). It is better, instead, to think of an **intermediate point, such as Busto Arsizio**, and to connect it to the North at sufficient frequencies of at least 3/4 trains per week.

To retrieve critical mass there are two options:

- to find a **shipowner** interested in starting a direct long-distance connection
- **cooperating with a port operator** who uses the terminal of Busto Arsizio as a node in order to concentrate the transit of goods (a more realistic scenario).

4.5 INTERMODAL OPERATOR POSITION

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➢ ARGUMENTS FOR USING THE SOUTHERN RANGE PORTS IN INTERNATIONAL CONTAINER TRANSPORT ROUTES (IN ADDITION TO THE GEOGRAPHICAL ASPECTS)

The container traffic in the **Northern ports is often "unbalanced"**. They have become so attractive that they are often congested. Besides this, in the North the weather is more unpredictable. **Competition with the North involves multiple transport modes** (road, rail, barge). Barge prices are competitive, but they are subject to change e.g. depending on water levels. **The ports of the South** are a great alternative, but they **must have a minimum regular activity**.

➢ THE SITUATION OF THE SOUTHERN RANGE PORTS REGARDING THEIR HINTERLAND CONNECTION VIA THE CORRIDOR ROTTERDAM - GENOA

Once the infrastructure will be in order, there will be far fewer limitations. **Liberalization** is definitely a benefit. The market should be more forward-looking, **conservatism does not help**. It takes a firm commitment to build the required **railway infrastructure, especially in the north of Milan**. 75% of the combined traffic coming from the Gotthard go on the Luino line (still 1 track), the natural route of goods (passenger traffic is marginal). It would be better to focus on the Chiasso line, but it has capacity problems and the "Gronda Est" line will become available only in 2030-2035. **Trains should be lengthened to 700-750 meters, even on the Luino line**. The optimum is achieved by playing on weight and length, this is why the Luino line is more urgent and the Chiasso line is more important. To the east of Milan there is **a lack of terminal capacity** at the moment.

4.5 INTERMODAL OPERATOR POSITION

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Synthesis of intermodal operator main position

- The intermodal operator is working to make the various stakeholders aware of the need for a corridor-wide improvement of freight transport parameters to meet European standards. Investments in a high-performance freight transport corridor will pay off quickly and allow the phasing out of operating contributions, such as currently granted in Switzerland to compensate existing infrastructure deficits. Achieving the parameters for high-capacity railway freight transports (**train length of 750 meters, train weight of 2000 tons with one engine, P400 profile**) for all transit routes across the corridor, specifically Chiasso, Luino and Lötschberg/Simplon, is a key factor.

- The Chiasso-Seregno-Milan line has great potential, but at the present time, it is hampered by capacity bottlenecks and it will take the Seregno-Bergamo bypass to alleviate these. **The Luino-Gallarate-Novara line, on the other hand, currently handles 75% of unaccompanied intermodal transports via the Gotthard to service the large terminals west of Milan**. To take advantage of the benefits offered by the Gotthard base tunnel as quickly as possible, is therefore important pursuing a pragmatic approach: “The Chiasso line is more important, the Luino line is more urgent”.

- The **letter of intent signed by Switzerland and Italy in December 2012** is a significant step toward this goal. With this document the two Countries agreed to a cross-border adaptation of the access lines. Now this project will have to be tackled promptly to ensure the start-up of operations in 2020, as scheduled.

4.5 INTERMODAL OPERATOR POSITION

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Gradual Implementation of the Southern Connections "Chiasso more important – Luino more urgent"

4.5 INTERMODAL OPERATOR POSITION

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Strategy for Terminals in Northern Italy

Memorandum of Understanding RFI/ Cemat/ Hupac signed 11th of May 2012 in Lugano

Construction/expansion of the following intermodal terminals (**East of Milan**):

- Milano Smistamento
- Piacenza
- Brescia

With financial support from the Confederation of Switzerland according to law.

First achievements within 2016

4.5 INTERMODAL OPERATOR POSITION

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Pre-requisites for the Future of Combined Transport

- Acceleration of the railway liberalization at European level
- Establishment of infrastructures in time
- Efficient terminals
- Sufficient route capacities
- Harmonization of rules, reduction of obstacles
- Promoting programmes applied over the long-term
- Firm framework agreements for the protection of investments in combined transport
- Europe is in need of modern rail infrastructures

Agenda

5 Operational Costs

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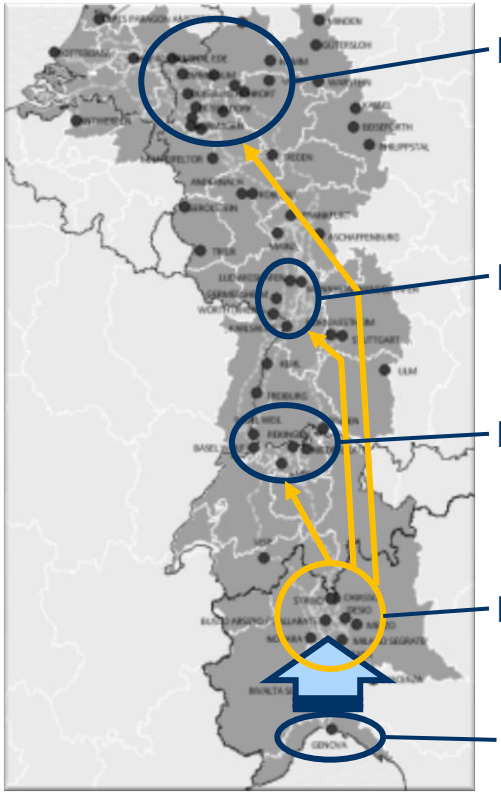
Idea: Consolidated Shuttle Train to the North of Milano and Distribution Along the Corridor

Target Regions



Concept

- Consolidate volumes for all regions
- Hub in Milano area
- Use existing trains from Milano area along the corridor to distribute volumes along the corridor
- Today price level Northbound from Milano along the corridor is only about 1/2 to 1/3 of Southbound price (due to high North-South and low South-North demand)

The best solution seems to install a shuttle train between Ligurian ports and the Milano area

5 Operational Costs

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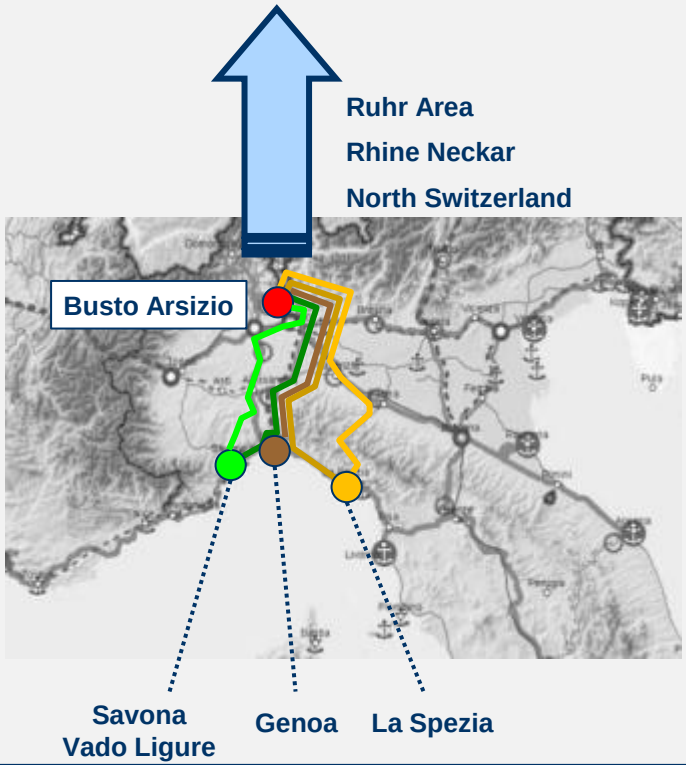
5 potential routings will be considered – Routing via Genoa yields the best results for all ports in terms of distance and gradient

Potential Routings



Routing	Distance	Maximum Gradient (Northbound)
Vado Ligure		
via Ferrania	241 km	25‰
via Genoa	218 km	16‰
Genoa		
via Pavia	185 km	16‰
La Spezia		
via Genoa	258 km	16‰
via Piacenza	260 km	25‰

5 Operational Costs

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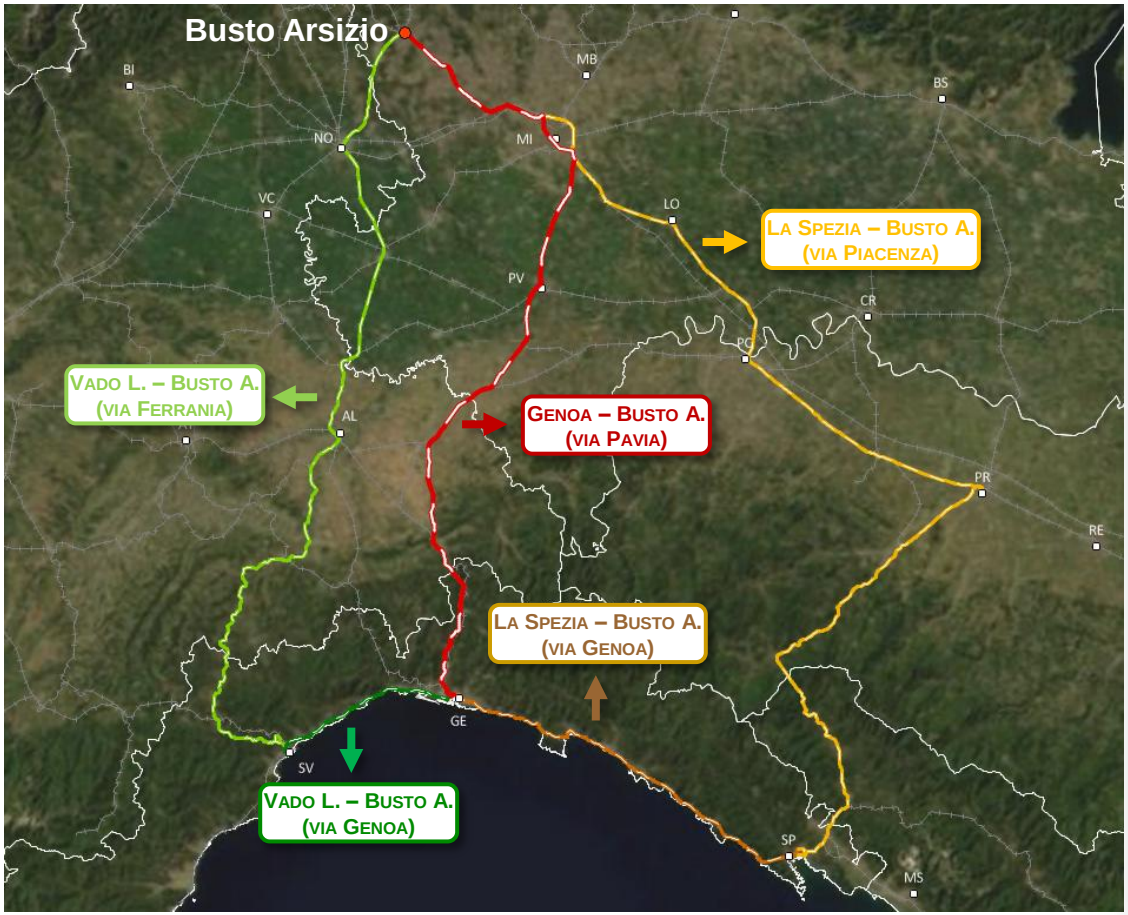
5 potential routings will be considered – Routing via Genoa yields the best results for all ports in terms of distance and gradient

Detailed maps on the 5 rail routes



5 Operational Costs

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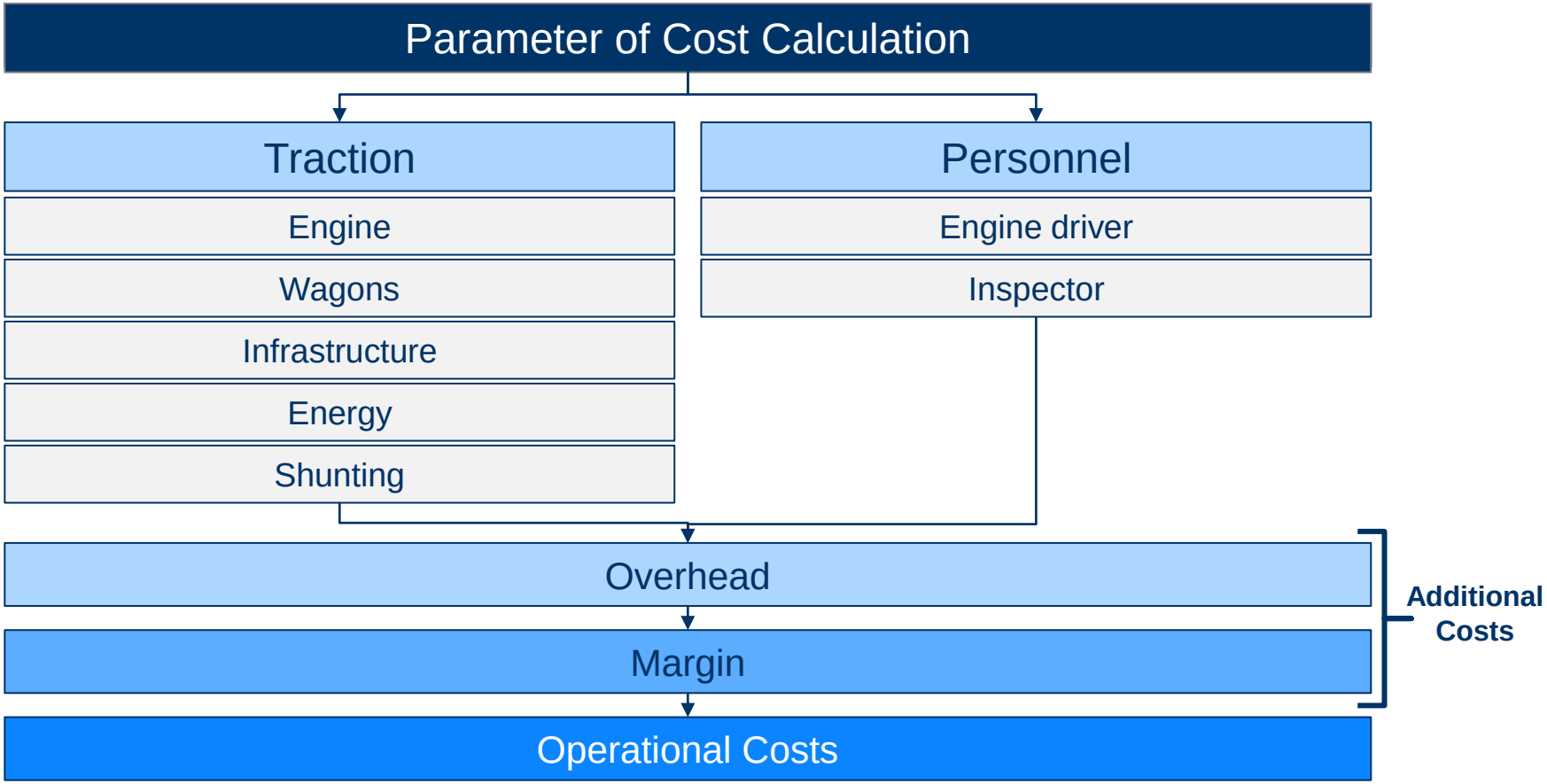
The following factors are considered in the calculation of operational costs



5 Operational Costs

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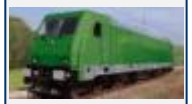
The following assumptions apply for a typical container shuttle train

Assumptions on train composition and infrastructure costs		
 Source: Bombardier	Engine	▪ DC power system engine, type Bombardier Traxx 140 DC
 Source: AAE	Wagons	▪ 6 axle, 80 ft container wagons, type Sggrss 80
 Source: BASF	Infrastructure	▪ Infrastructure costs according to Italian Network Operator RFI (≈ 2,50 - 3,00 EUR per train-km)
 Source: DDP.de	Energy	▪ 0,15 EUR/kWh
	Shunting	▪ Fixed ratio per terminal stop (≈ 500 EUR per process terminal in + out)

Source: eriksmail.de

5 Operational Costs

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Personnel costs and overhead/margin assumptions are based on benchmark values

Personnel Costs		
 Source: abendblatt.de	Engine Driver	▪ Reference value based on trade union data (42 EUR per h)
 Source: ÖBB	Inspector	▪ Reference value based on trade union data (35 EUR per h)

Additional Costs	
Overhead	▪ 20% allocated overhead costs
Margin	▪ 5% profit margin

5 Operational Costs

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Incomplete utilization of train capacities and the need for spare wagons are considered in the calculation

Train Constellation – General Assumptions	
TEU capacity per wagon	4
Utilization	70-90%
Weight per TEU incl. Box	12 t
Frequency	5 x per week and direction (1 round trip per day)
Spare wagon fleet	10% (2 wagons)

5 Operational Costs

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The calculation includes the full locomotive costs since locomotives cannot be used for other purposes during idle time

Engine costs Traxx F140 DC

Source: Bombardier

from	Vado Ligure		Genoa	La Spezia	
via	Ferrania	Genoa	Pavia	Genoa	Piacenza
to	Busto Arsizio				
Distance (one way)	241	218	185	258	260
Purchase price[EUR]	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000
Variable costs per km [EUR]	0,65	0,65	0,65	0,65	0,65
Mileage p.a. [km]	120.500	109.000	92.500	129.000	130.000
Depreciation [years]	25	25	25	25	25
Interest rate [%] on 50% of invest	4,00%	4,00%	4,00%	4,00%	4,00%
Insurance [%]	1,00%	1,00%	1,00%	1,00%	1,00%
Fixed maintenance cost [%]	1,00%	1,00%	1,00%	1,00%	1,00%
Depreciation [EUR]	112.000	112.000	112.000	112.000	112.000
Variable costs [EUR]	78.325	70.850	60.125	83.850	84.500
Interest rate [EUR] on 50% of invest	56.000	56.000	56.000	56.000	56.000
Insurance [EUR]	28.000	28.000	28.000	28.000	28.000
Fixed maintenance cost [EUR]	28.000	28.000	28.000	28.000	28.000
Cost p.a.	302.325	294.850	284.125	307.850	308.500
Cost p. month	25.194	24.571	23.677	25.654	25.708
Cost p. operation day	**1.209**	**1.179**	**1.137**	**1.231**	**1.234**
Cost p. hour	76	74	71	77	77
Calculated operation days p.a.	250	250	250	250	250
Calculated hours in service p.d.	16	16	16	16	16

Train requires two engines

Wagon costs Sggrss 80

Source: AAE

Rent per unit and calendar day	35,00 EUR	
Maintenance per unit and day	3,50 EUR	10%
Total Costs per unit and day	**38,50 EUR**	
Calendar days p.a.	360 d	
Total cost p. unit and year	13.860,00 EUR	
Operation days p.a.	250 d	
Total Cost per unit and operation day	**55,44 EUR**	
Wagons	18 Units	
Spare	2 Units	10%
Total number of wagons	**20 Units**	
Total wagon costs per operation day	**1.108,80 EUR**	

5 Operational Costs

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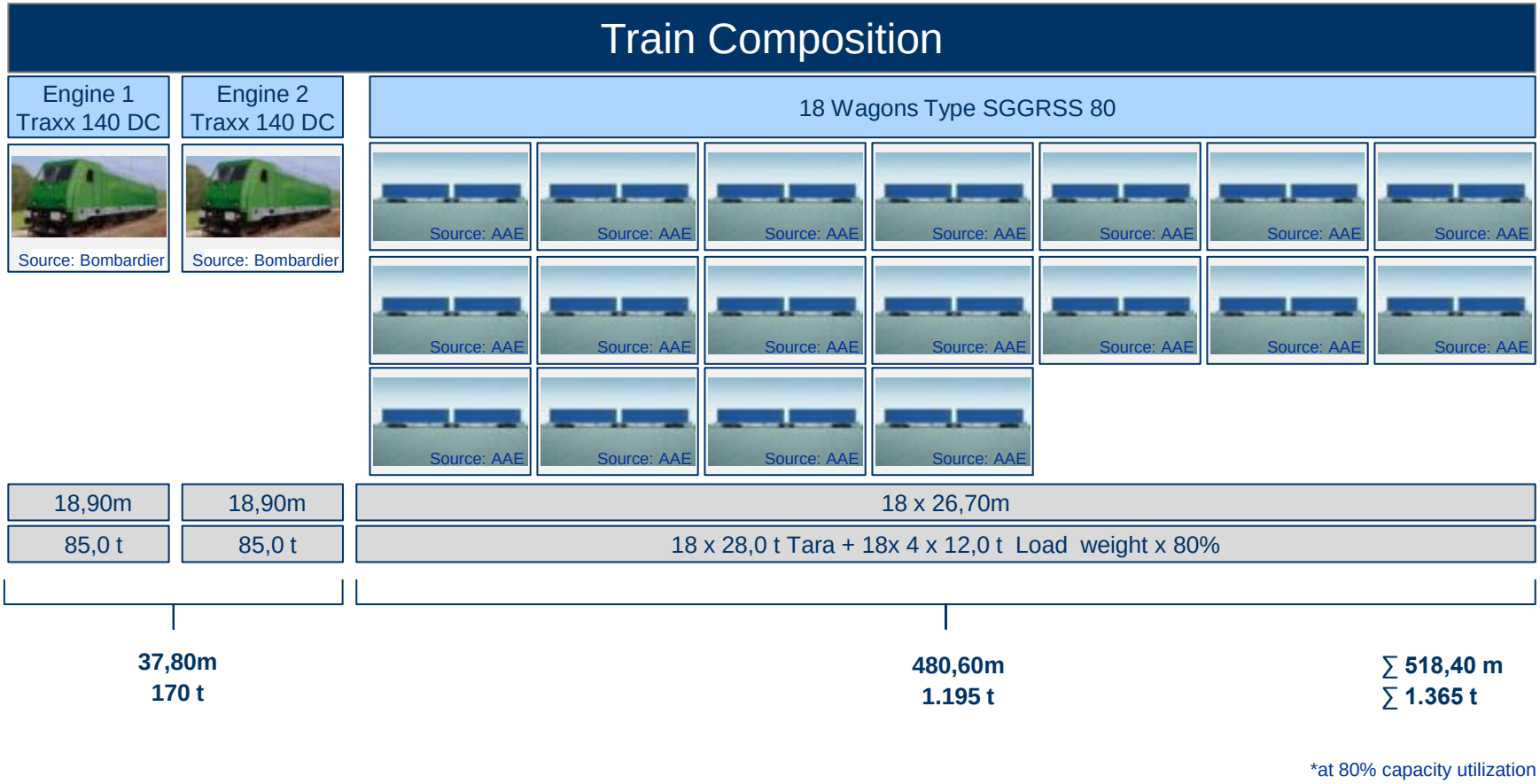
The model train is equipped with two locomotives to ensure that gradients are not an obstacle



*at 80% capacity utilization

5 Operational Costs

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Personnel costs for the locomotive driver are calculated based on labour costs per hour and the time needed for each trip

Calculation of personnel costs (single trip)

	Distance	Net travel time per trip at average speed of 60 km/h	Extra time before the trip (coupling)	Extra time after the trip (un-coupling)	Total time per trip	Single trip driver costs (42 EUR per h)	Single trip inspector costs (1 h at 35 EUR per h)	**Total single trip personnel costs**
Vado L. - Ferrania - Busto A.	241 km	4 h 2 min	30 min	30 min	5 h 2 min	211 EUR	35 EUR	**246 EUR**
Vado L. - Genoa – Busto A.	218 km	3 h 39 min	30 min	30 min	4 h 39 min	195 EUR	35 EUR	**230 EUR**
Genoa - Pavia – Busto A.	185 km	3 h 6 min	30 min	30 min	4 h 6 min	172 EUR	35 EUR	**207 EUR**
La Spezia - Genoa – Busto A.	258 km	4 h 19 min	30 min	30 min	5 h 19 min	223 EUR	35 EUR	**258 EUR**
La Spezia- Piacenza- Busto A.	260 km	4 h 21 min	30 min	30 min	5 h 21 min	225 EUR	35 EUR	**260 EUR**

5 Operational Costs

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Trip distance, terrain gradient, train weight and speed are considered in the calculation of energy costs

Calculation of energy costs (single trip)	Distance	Maximum gradient	Energy (train weight 1.365 t; max. speed: 100 km/h)*	**Total single trip energy costs at 0,15 EUR/kWh**
Vado L. – Ferrania - Busto A.	241 km	25‰	8.836 kWh	**1.325 EUR**
Vado L. - Genoa - Busto A.	218 km	16‰	5.875 kWh	**881 EUR**
Genoa - Pavia - Busto A.	185 km	16‰	5.069 kWh	**760 EUR**
La Spezia - Genoa - Busto A.	258 km	16‰	7.127 kWh	**1.069 EUR**
La Spezia- Piacenza- Busto A.	260 km	25‰	9.468 kWh	**1.420 EUR**

*at 80% capacity utilization

5 Operational Costs

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The shuttle variant between Genoa and Busto Arsizio offers the lowest operational costs (short route/flat terrain)

Calculation of round trip costs before overhead and margin

	Personnel	Loco-motive (costs per operation day for 2 loco-motives)	Energy	Infra-structure (slot)	Wagon rental	Shunting etc. (2x 500 EUR)	**Total round trip costs before overhead + margin**
Vado L.- Ferrania - Busto A. (241 km / max. 25‰)	493 EUR	2.418 EUR	2.651 EUR	950 EUR	1.109 EUR	1.000 EUR	**8.621 EUR**
Vado L. - Genoa - Busto A. (218 km / max. 16‰)	461 EUR	2.358 EUR	1.763 EUR	1.201 EUR	1.109 EUR	1.000 EUR	**7.891 EUR**
Genoa - Pavia - Busto A. (185 km / max. 16‰)	414 EUR	2.274 EUR	1.521 EUR	918 EUR	1.109 EUR	1.000 EUR	**7.236 EUR**
La Spezia - Genoa - Busto A. (258 km / max. 16‰)	517 EUR	2.462 EUR	2.138 EUR	1.348 EUR	1.109 EUR	1.000 EUR	**8.574 EUR**
La Spezia- Piacenza- Busto A. (260 km / max. 25‰)	520 EUR	2.468 EUR	2.840 EUR	1.178 EUR	1.109 EUR	1.000 EUR	**9.115 EUR**

5 Operational Costs

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The shuttle variant between Genoa and Busto Arsizio offers the lowest operational costs (short route/flat terrain)

Calculation of round trip/single trip costs including overhead and margin

	Costs before overhead + margin	20% overhead	**Total round trip costs including overhead**	5% margin	**Total round trip costs including overhead + margin**	**Total single trip costs including overhead + margin**
Vado L. - Ferrania - Busto A. (241 km / max. 25‰)	8.621 EUR	1.724 EUR	**10.345 EUR**	517 EUR	**10.862 EUR**	**5.431 EUR**
Vado L. - Genoa - Busto A. (218 km / max. 16‰)	7.891 EUR	1.578 EUR	**9.469 EUR**	473 EUR	**9.943 EUR**	**4.971 EUR**
Genoa - Pavia - Busto A. (185 km / max. 16‰)	7.236 EUR	1.447 EUR	**8.683 EUR**	434 EUR	**9.117 EUR**	**4.559 EUR**
La Spezia - Genoa - Busto A. (258 km / max. 16‰)	8.574 EUR	1.715 EUR	**10.289 EUR**	514 EUR	**10.804 EUR**	**5.402 EUR**
La Spezia- Piacenza- Busto A. (260 km / max. 25‰)	9.115 EUR	1.823 EUR	**10.938 EUR**	547 EUR	**11.485 EUR**	**5.743 EUR**

5 Operational Costs

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Operational costs per container between the Ligurian ports and Busto Arsizio amount to about 200 EUR

Single trip costs including overhead and margin

	Costs per train*	Costs per 40' container			
Capacity utilization		100%	90%	80%	70%
Units per train (40')	36	36	32,4	28,8	25,2
Vado L. - Ferrania - Busto A. (241 km / max. 25‰)	5.431 EUR	151 EUR	168 EUR	189 EUR	216 EUR
Vado L. - Genoa - Busto A. (218 km / max. 16‰)	4.971 EUR	138 EUR	153 EUR	173 EUR	197 EUR
Genoa - Pavia - Busto A. (185 km / max. 16‰)	4.559 EUR	127 EUR	141 EUR	158 EUR	181 EUR
La Spezia - Genoa - Busto A. (258 km / max. 16‰)	5.402 EUR	150 EUR	167 EUR	188 EUR	214 EUR
La Spezia- Piacenza- Busto A. (260 km / max. 25‰)	5.743 EUR	160 EUR	177 EUR	199 EUR	228 EUR

*at 80% capacity utilization (differences in energy costs depending on different utilization rates are not considered for simplicity)

5 Operational Costs

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The shuttle train can offer connections from the Ligurian ports to Busto Arsizio at a cheaper rate than the road

Cost comparison for a 40' container from the Ligurian ports to Busto Arsizio (single trip)

	Train costs (at 80% capacity utilization)			Truck costs from Ligurian ports to Busto Arsizio (1,80 EUR per km)	
	Transport	**Terminal handling**	**Total**		
Vado L.- Ferrania - Busto A. (241 km / max. 25‰)	**189 EUR**	**20 EUR**	**209 EUR**	**196 km**	**353 EUR**
Vado L. - Genoa - Busto A. (218 km / max. 16‰)	**173 EUR**	**20 EUR**	**193 EUR**	**196 km**	**353 EUR**
Genoa - Pavia - Busto A. (185 km / max. 16‰)	**158 EUR**	**20 EUR**	**178 EUR**	**172 km**	**310 EUR**
La Spezia - Genoa - Busto A. (258 km / max. 16‰)	**188 EUR**	**20 EUR**	**208 EUR**	**253 km**	**455 EUR**
La Spezia- Piacenza- Busto A. (260 km / max. 25‰)	**199 EUR**	**20 EUR**	**219 EUR**	**253 km**	**455 EUR**

5 Operational Costs

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When the aim is to deliver containers in Milan area, it is more difficult for a shuttle train to compete with the road

Cost comparison for a 40' container from the Ligurian ports to Milan area (single trip)

	Intermodal transport costs (shuttle train to Busto Arsizio and last mile truck delivery to Milan area)				Truck costs from Ligurian ports to Milan area (1,80 EUR per km)	
	Rail leg*	Terminal handling	Truck leg**	Total		
Vado L. - Ferrania - Busto A. (241 km / max. 25‰)	189 EUR	20 EUR	125 EUR	334 EUR	178 km	320 EUR
Vado L. - Genoa - Busto A. (218 km / max. 16‰)	173 EUR	20 EUR	125 EUR	318 EUR	178 km	320 EUR
Genoa - Pavia - Busto A. (185 km / max. 16‰)	158 EUR	20 EUR	125 EUR	303 EUR	143 km	257 EUR
La Spezia - Genoa - Busto A. (258 km / max. 16‰)	188 EUR	20 EUR	125 EUR	333 EUR	226 km	406 EUR
La Spezia- Piacenza- Busto A. (260 km / max. 25‰)	199 EUR	20 EUR	125 EUR	344 EUR	226 km	406 EUR

*at 80% capacity utilization
**assuming short distance delivery in Milan area at approx. 250 EUR per round trip, single trip assumed

Agenda

6 Key Findings

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A recommendation for a shuttle train can only be given for the section Ligurian ports – Milano region and in co-operation with a shipper

- Today the major cargo flows on the corridor are southbound, so considerable northbound capacites are available
- Due to their geographical location, transport chains via Ligurian ports have time, flexibility and climate advantages compared to other transport chains
- An intermodal shuttle train between the ports and a terminal in the Milan region, e.g. Busto Arsizio, could be an attractive solution, but...
  - ...set up of the train should be planned in co-operation with a shipping company in order to have attractive prices and to attract sufficient volumes
  - ...Italian railway infrastructure should be upgraded for longer, heavier and higher trains

6 Key Findings

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Shuttle train from Genoa to Milan: the benefits at a European level

- There is still substantial room for increasing the modal share of rail (the traffic today is largely long-distance, over 300 km)
- Better opportunities to cope with the growing road traffic through the Swiss Alps (from Southern to Northern Europe)
- Shorter transport distances and a high degree of reliability and punctuality
- Better use of route and terminal capacities
- Positive effects on the environment (reduction of emissions)
- The potential modal shift from road to rail will significantly reduce the external costs (accidents, congestion, noise, ...) due to lower external costs of rail transport
- Increasing efficiency and effectiveness of rail freight transport and transferring large shares of road transport to the railway will bring significant improvements that will also be beneficial for passenger transport on road and rail due to reduced congestion

Contact

ROTTERDAM CODE24 CORRIDOR DEVELOPMENT GENOA

Uniontrasporti
Trasporti Logistica Infrastrutture

Uniontrasporti
Via E. Oldofredi, 23
20124 Milano
ITALY

Tel: +39 02 607 9601
Email: fontanili@uniontrasporti.it

www.uniontrasporti.it

TransCare
We change logistics

TransCare AG
Danziger Str. 14
65191 Wiesbaden
GERMANY

Tel: +49 (0)611 76 34 185
Email: j.kohlschuetter@transcare.de

www.transcare.de