

講師のプロフィール

Prof. Antonio MUSSO

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ローマ大学教授

1946年 生まれ

1972年 ローマ大学交通土木工学科卒業

1974年 ローマ空港公団技師

1975年 ローマ大学研究員

• 1975年 マサチューセッツ工科大学研究員

1987年 サレルノ大学教授

1998年 現職

[経 験]

- 交通経済及び都市計画分野での数多くの研究とコンサルティング
- EUの各種鉄道計画に参画
- イタリア国内外の交通計画に参画
- 交通計画に関する論文多数

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Overview

- The freight transport sector in Europe and the Italian situation
- The European Policies and a new approach towards an integrated planning framework
- A new scheme for the Italian multimodal Network
- Conclusions

EU Freight Transport: performance by mode

(1000 mio tkm)

	1970	%	1980	%	1990	%	1999	%	Var. 90-99
Road	412	30.8	626	33.1	933	40.7	1318	44.5	41 %
Rail	283	21.1	287	15.2	255	11.1	238	8.0	-7 %
Inland Waterways	103	7.7	107	5.7	108	4.7	120	4.1	12 %
Pipelines	68	5.1	92	4.9	76	3.3	89	3.0	18 %
Sea (UE)	472	35.3	780	41.2	922	40.2	1195	40.4	30 %
Total	1338	100	1892	100	2294	100	2960	100	29 %

Italian Freight Transport: performance by mode

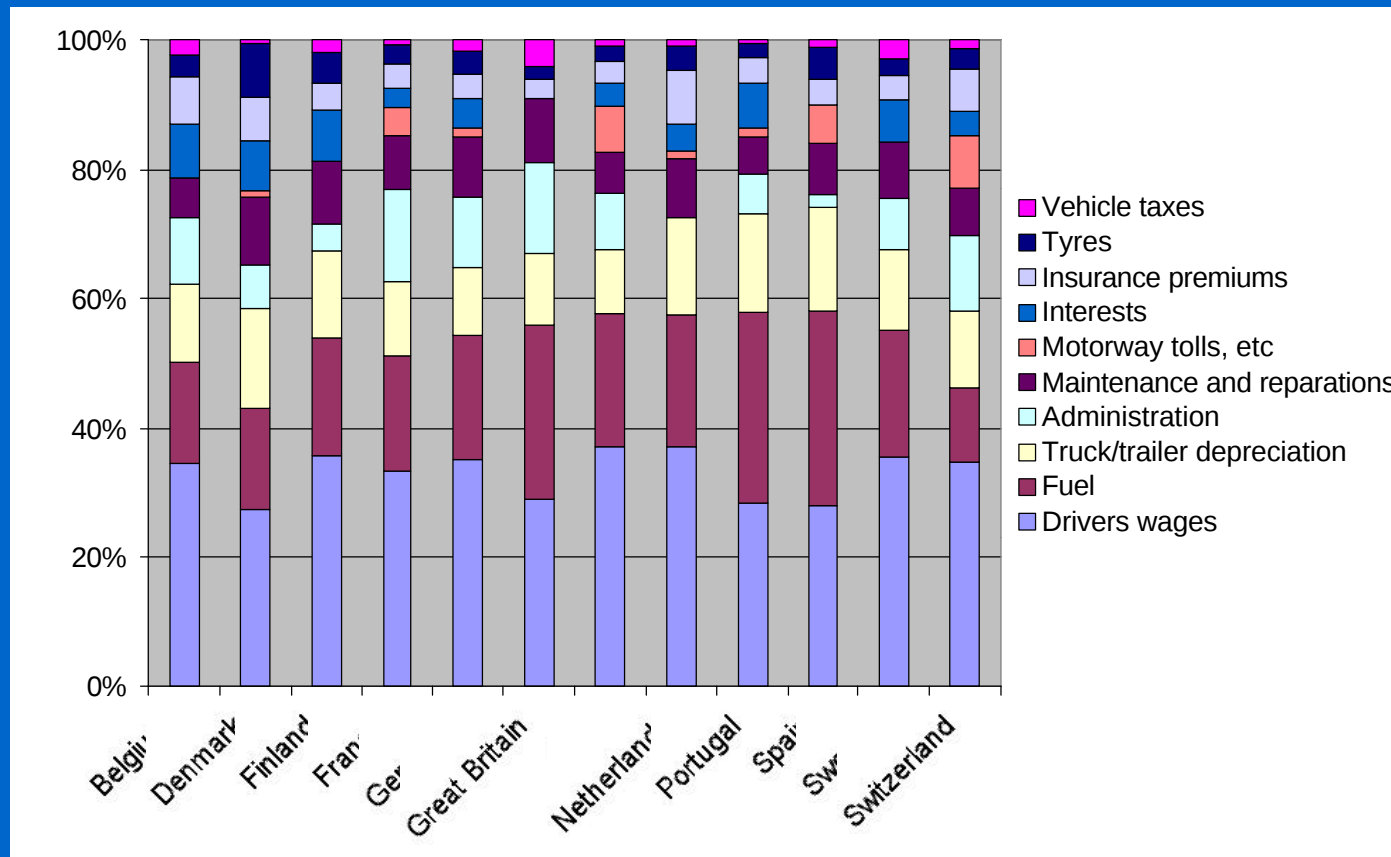
(1000 mio tkm)

MODE	1970		1980		1990		1999		var. 90-99
	tkm	%	tkm	%	tkm	%	tkm	%	%
Road	58,7	52%	119,6	66%	177,9	72%	232,8	74%	31%
Rail	18,9	17%	19	10%	21,8	9%	24,4	8%	12%
Pipelines	8,8	8%	11,3	6%	11,1	5%	14,1	5%	27%
Sea	26,2	23%	31,1	17%	35,7	14%	41,4	13%	16%
Total	112,6	100%	181	100%	246,5	100%	312,7	100%	27%

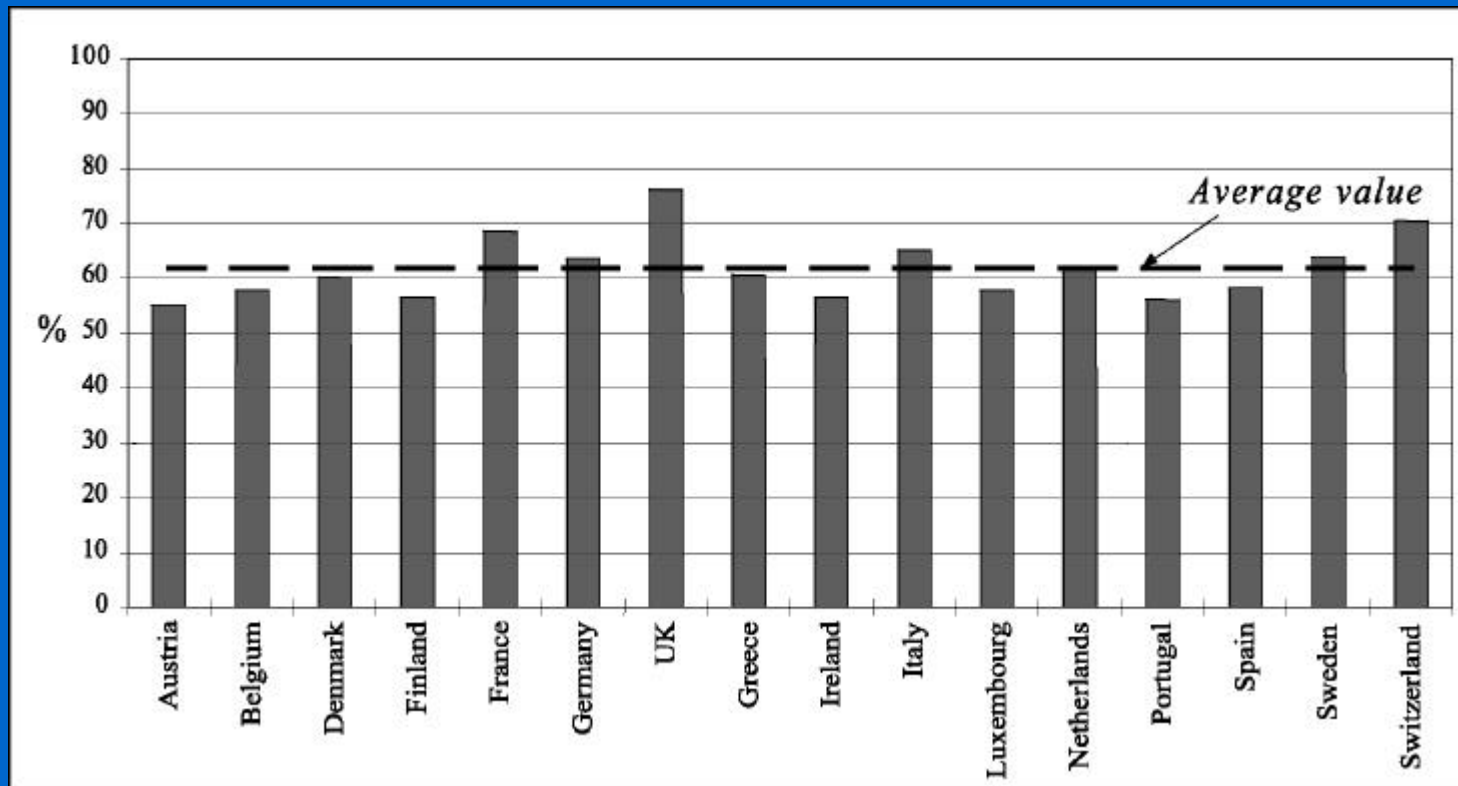
EU average unit shipment cost per country



EU Road Freight Cost breakdown



EU Fuel excises



Results of a Shippers Survey on Costs (The different stimuli)

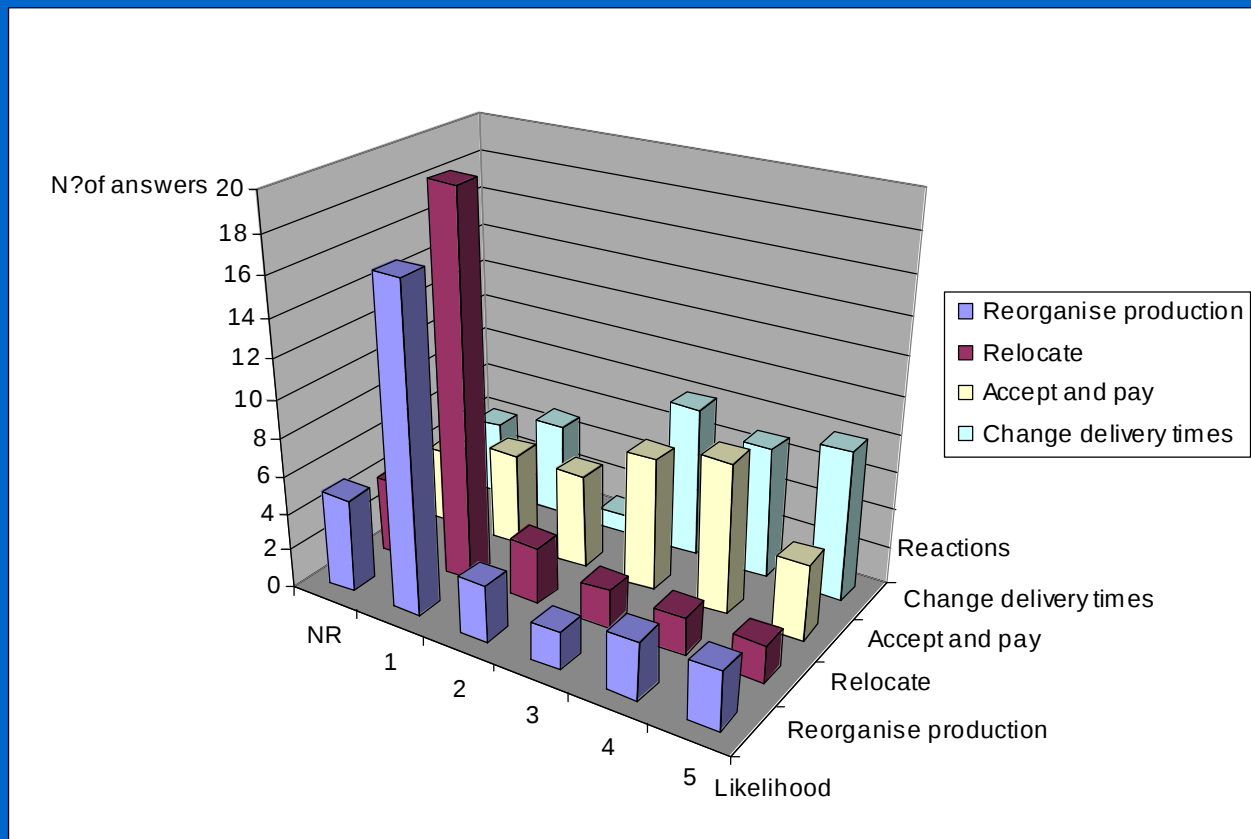
- Local restrictions
- Troubles in the supply transport services
- Pricing
- Troubles in the production

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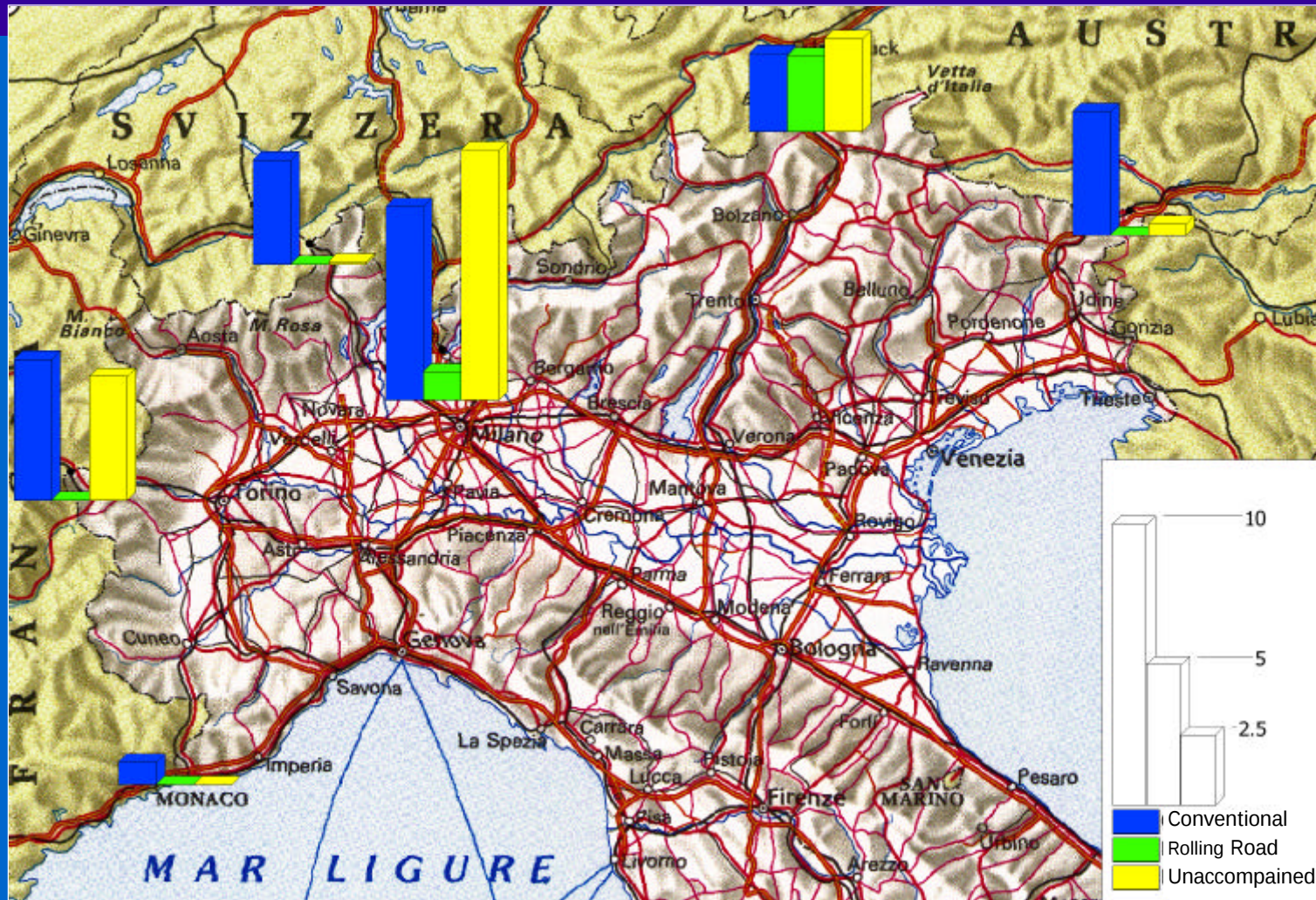
Results of a Shippers Survey on Costs (The possible reactions)

- Change delivery times
- Relocate
- Reduce frequency of dispatches
- No change
- Accept and pay
- Reorganize production
- Change haulier
- Modal shift

Results of a Shippers Survey on Costs Harmonisation (Level of interest of each reaction)

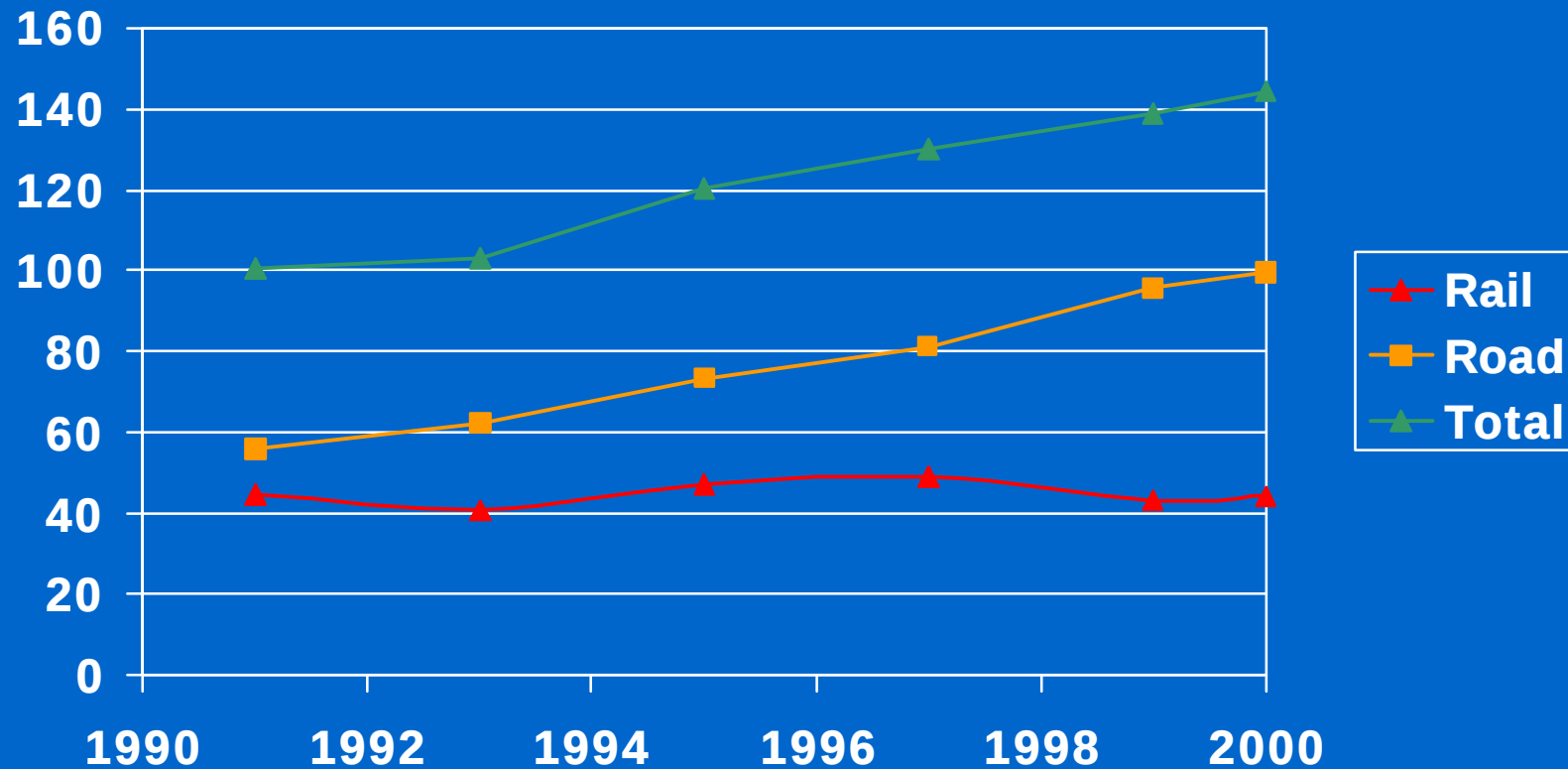


Freight traffic through the Alps

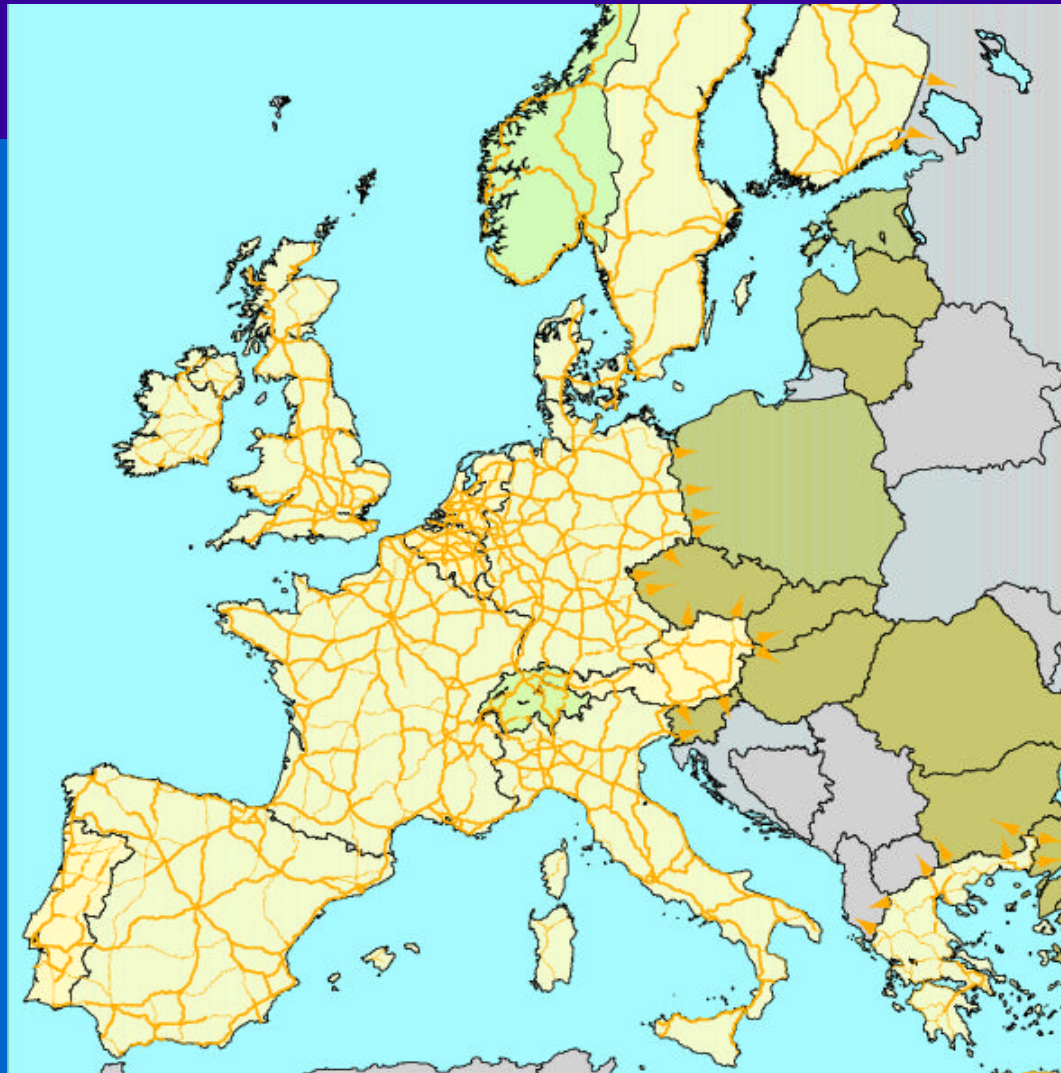


Freight Traffic through the Alps

[tonne x 10⁶]



Outline of Trans European Networks (TEN) for year 2010: road



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Outline of Trans European Networks (TEN) for year 2010: rail and high speed rail

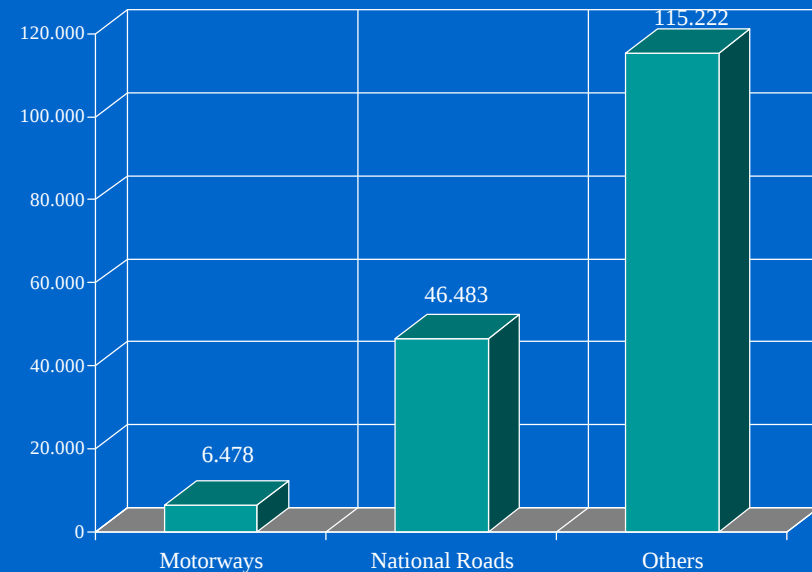


The Italian motorway network



The Italian road network

- 6478 Kms of Motorways (5380 Kms under concession)
- 46483 Kms of National Roads
- 115222 Kms of other roads

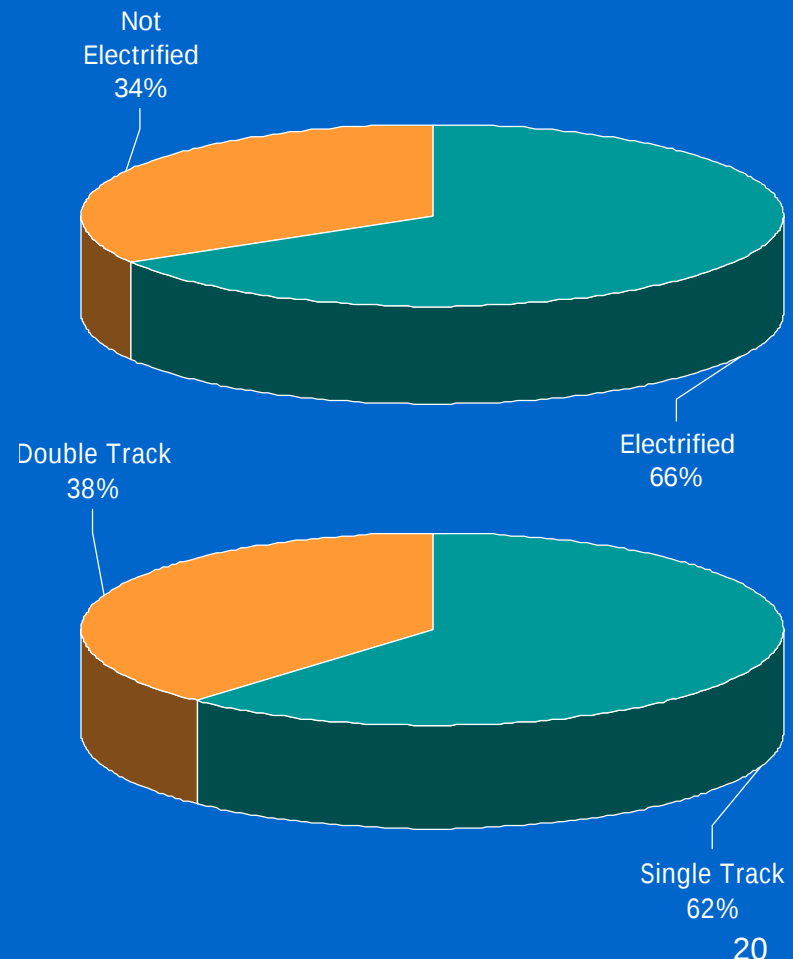


The Italian railroad network

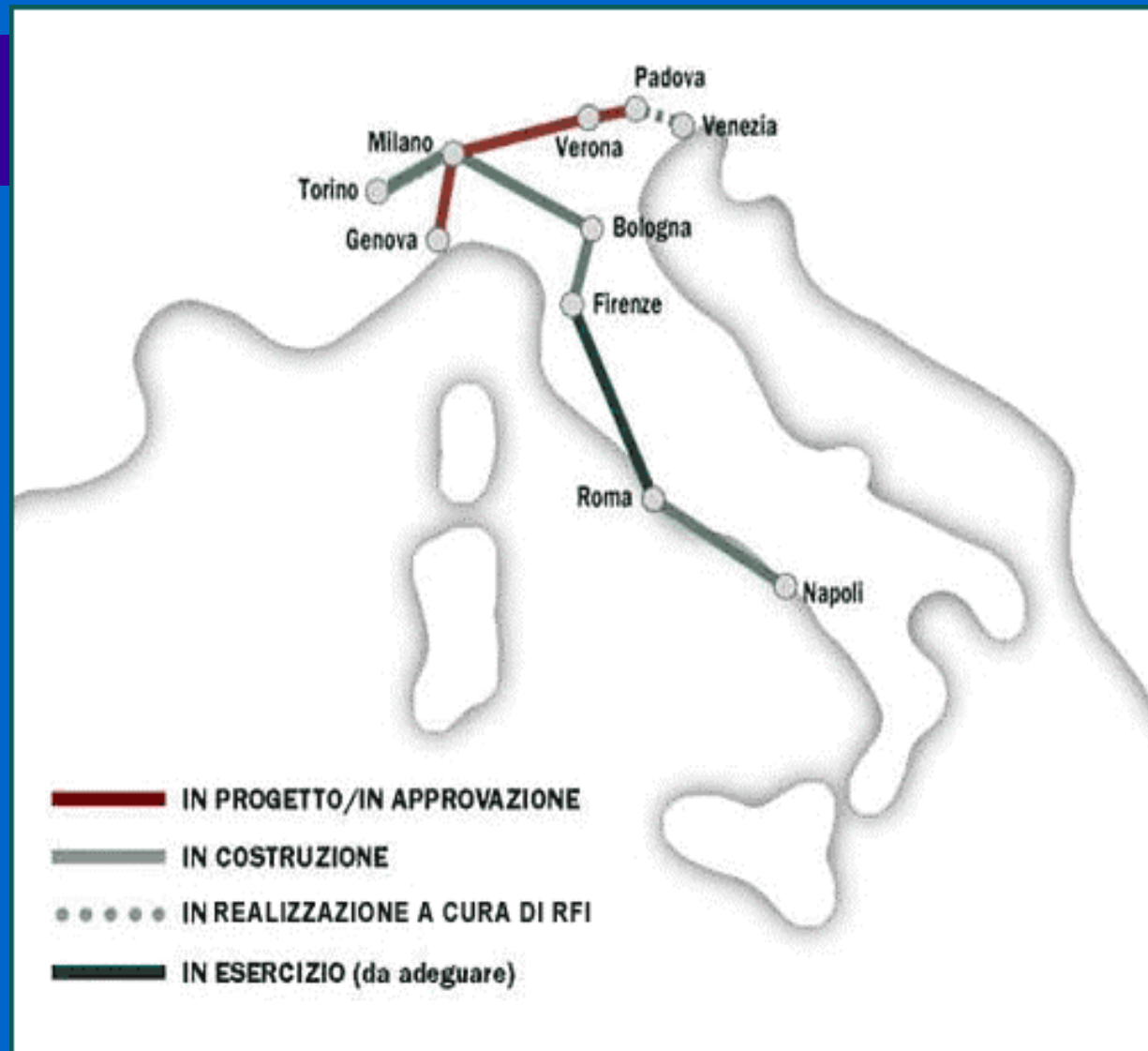


The Italian railroad network

- 16108 Kms of railways under the administration of RFI:
 - *Electrified: 10688 Kms*
 - *Not Electrified: 5420 Kms*
- *Single Track: 9935 Kms*
- *Double Track: 6173 Kms*



The Italian high speed rail network



The Italian high speed network

	<i>Lenght (Kms)</i>	<i>Present status</i>
Turin - Milan	125	under construction
Milan - Bologna	182	under construction
Bologna - Florence	79	under construction
Rome - Florence	254	in operation since 1978
Rome - Naples	205	under construction
Milan - Verona	108	pending approval
Verona - Venice	about 88	under design
Milan - Genoa	about 40	under design
TOTAL	1081	

The main italian harbours



Throughput in the main italian harbours

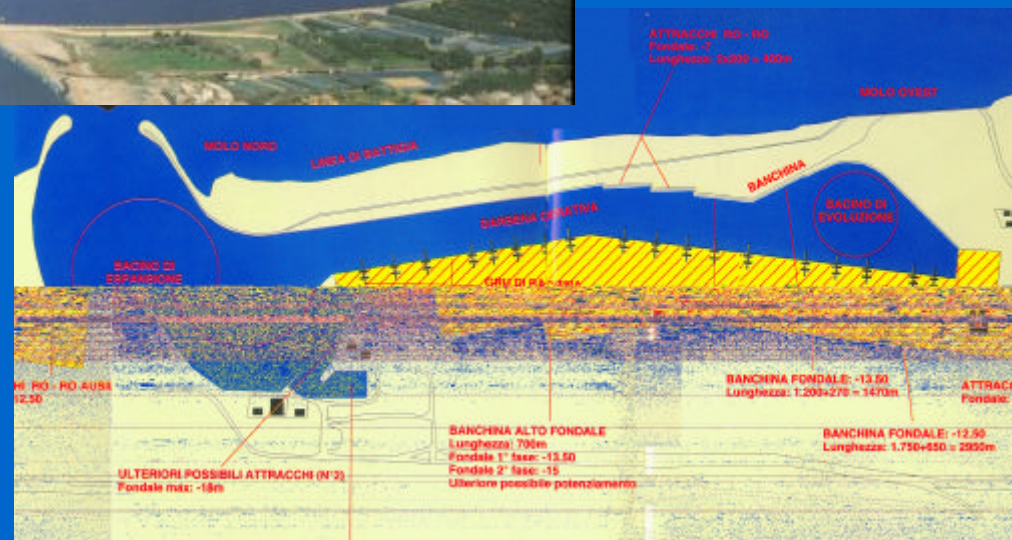
Year 1998 (in tonnes)

PORT	LIQUID BULK x 1000	DRY BULK x 1000	GENERAL CARGO x 1000	TOTAL tonnes x 1000	VAR 1997-'98 (%)	TEUs N.	PASS N.
Savona	7.609	3.266	1.868	12.273	+ 8.8	14.495	459.908
Genoa	18.012	9.108	18.640	45.761	+ 4.8	1.265.593	2.210.769
La Spezia	3.465	2.068	8.351	13.884	+ 7.9	731.882	40.000
Livorno	10.010	784	11.445	22.240	+ 5.5	535.490	1.481.061
Civitavecchia	5.200	1.487	3.992	10.679	- 6.0	8.831	2.030.529
Naples	6.334	3.910	13.962	13.926	+ 2.5	319.686	6.934.835
Gioia Tauro	-	-	16.200	16.200	+ 30.6	2.125.000	-
Taranto	6.425	30.408	-	36.834	+ 0.3	1.297	-
Ancona	5.067	2.088	2.680	9.834	+ 49.4	75.066	991.416
Ravenna	8.840	7.273	5.821	21.934	+ 11.7	172.524	3.523
Venice	13.672	7.455	5.349	26.476	+ 11.9	206.369	759.204
Trieste	36.942	4.474	5.801	47.217	+ 1.2	174.080	179.079

Containers handled in the main Mediterranean ports (teus)

PORT	1995 x 1000	1996 x 1000	1997 x 1000	1998 x 1000	1999 x 1000	2000 x 1000	VARIATION 1999 – '00 (%)
Algeciras	1.154	1.307	1.537	1.826	1.833	2.009	9,60
Barcelona	689	767	950	1.095	1.250	1.360	8,80
Valencia	672	710	790	1.006	1.153	1.308	13,44
Marseilles	499	548	620	660	695	726	4,46
Piraeus	600	575	684	900	984	1.150	16,87
Genoa	615	826	1.180	1.266	1.234	1.501	21,64
La Spezia	965	871	616	732	843	910	7,95
Naples	235	246	299	320	334	397	18,86
Livorno	424	417	501	535	458	501	9,39
Gioia Tauro	16	572	1.449	2.125	2.203	2.653	20,43
Malta	514	595	662	900	1.200	1.033	-13,92
Haifa	524	548	669	834	725	871	20,14
Hashod	344	393	400	364	441	479	8,62

The harbour of Gioia Tauro



Mediterranean feeder connections from Gioia Tauro



The Sea Motorways



The Sea Motorways

Ro – Ro traffic 1997

Line	Company	N° freight vehicles	Goods [tonnes]	t/vehicles	Length per vehicle [m]
Tyrrhenian Sea					
Genoa – Palermo	Grandi Traghetti	357	8.000	22,4	8,9
Voltri – Termini I.	Tirrenia	33.242	639.268	19,2	10,1
Naples – Palermo	Tirrenia	15.199	156.237	10,3	15,4
Naples – Palermo	Tirrenia (cargo)	64.403	1.026.795	15,9	9,1
Leghorn – Catania	Tirreno	9.252	192.984	20,9	10,4
Leghorn – Palermo	Grandi Traghetti	10.161	232.687	22,9	13,1
Total		132.614	2.255.971	-	-
Adriatic Sea					
Ravenna – Catania	Adriatica	31.533	734.719	23,3	12
Venice – Catania	Adriatica	6.962	93.084	13,4	9,1
Venice – Bari	Adriatica	502	15.050	30	9,3
Bari – Catania	Adriatica	16	400	25	8,6
Total		39.013	843.253	-	-

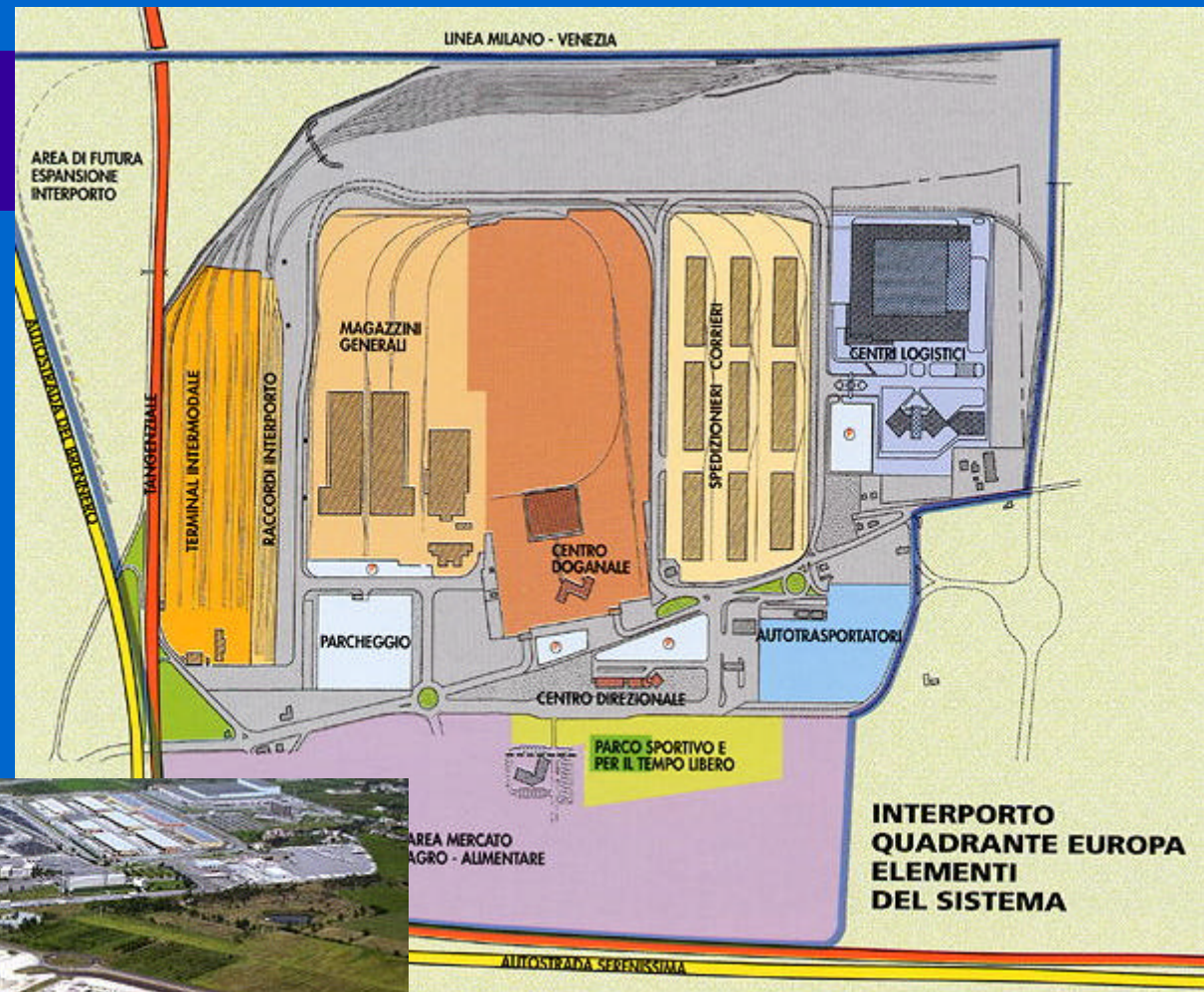
Potential sea freight corridors

<i>TYRRHENIAN LINES</i>	
Liguria – Campania	600.000 tonnes/year
Liguria – Sicily	300.000 tonnes/year
Tuscany – Campania	400.000 tonnes/year
Tuscany – Sicily	450.000 tonnes/year
Latium – Sicily	300.000 tonnes year
Campania – Sicily	550.000 tonnes/year
<i>ADRIATIC LINES</i>	
Veneto/Emilia Romagna – Apulia	900.000 tonnes/year
Veneto/Emilia Romagna – Sicily	300.000 tonnes/year
<i>TOTAL: 3.800.000 tonnes/year</i>	

The main Italian intermodal platforms (Interporti)



Verona Quadrante Europa



The main Italian airports

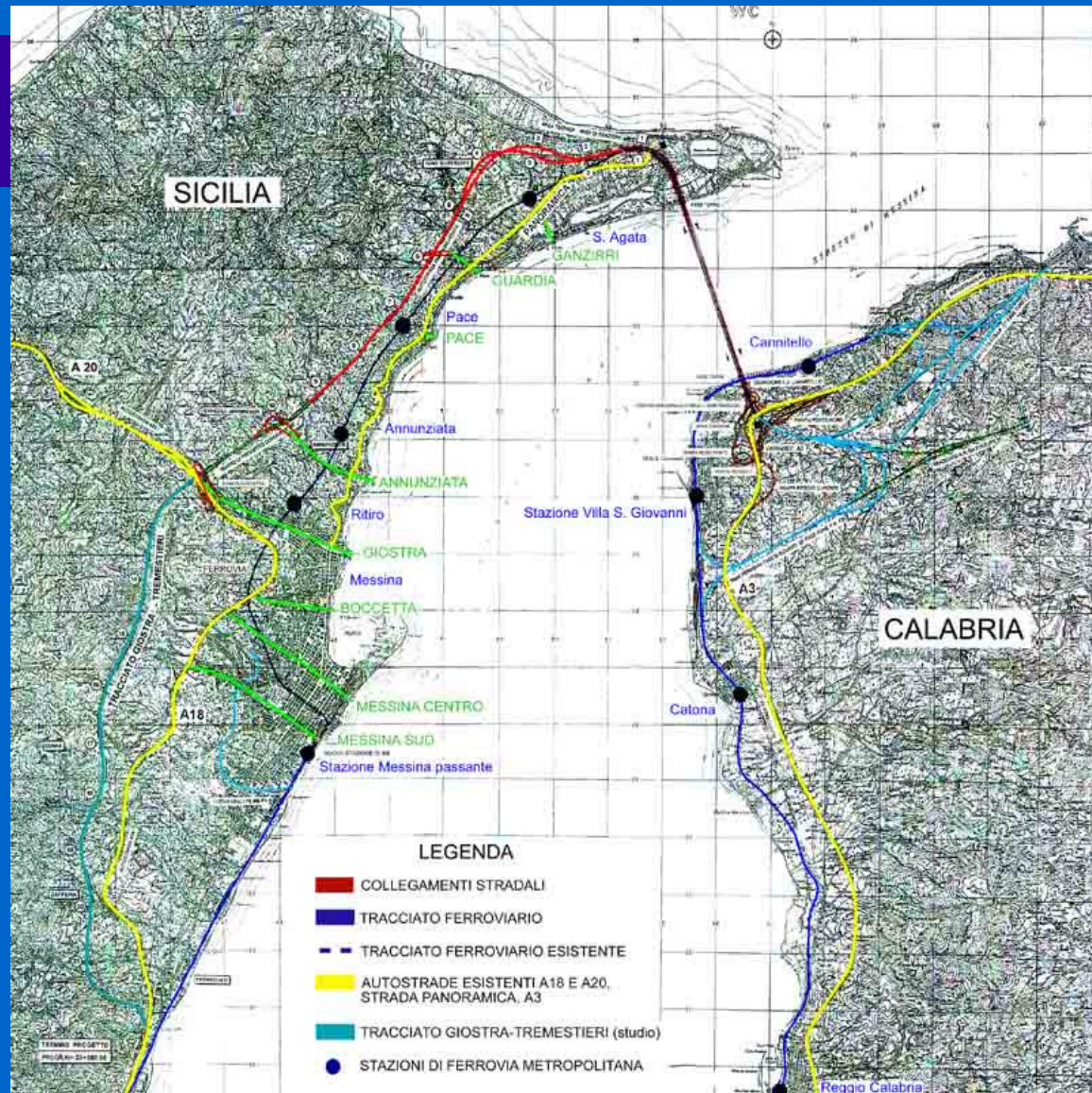


Throughput in the main italian airports

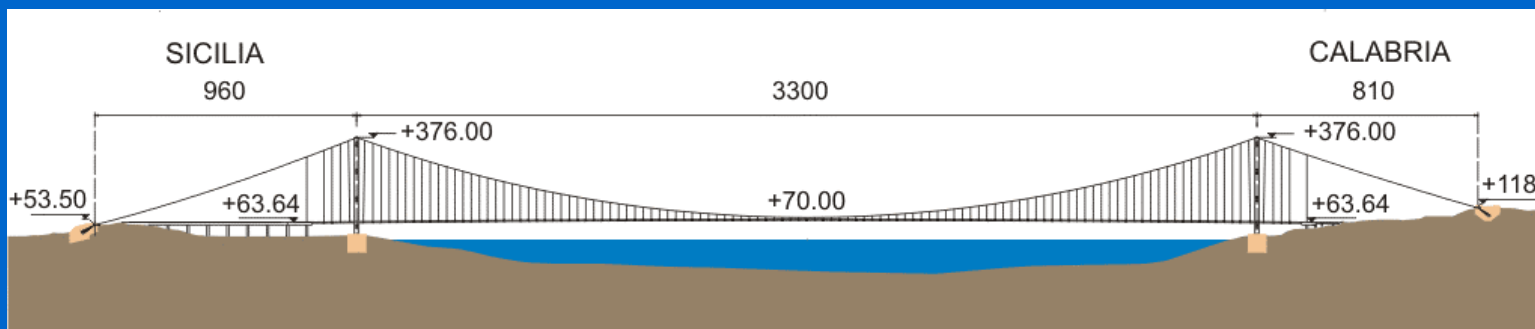
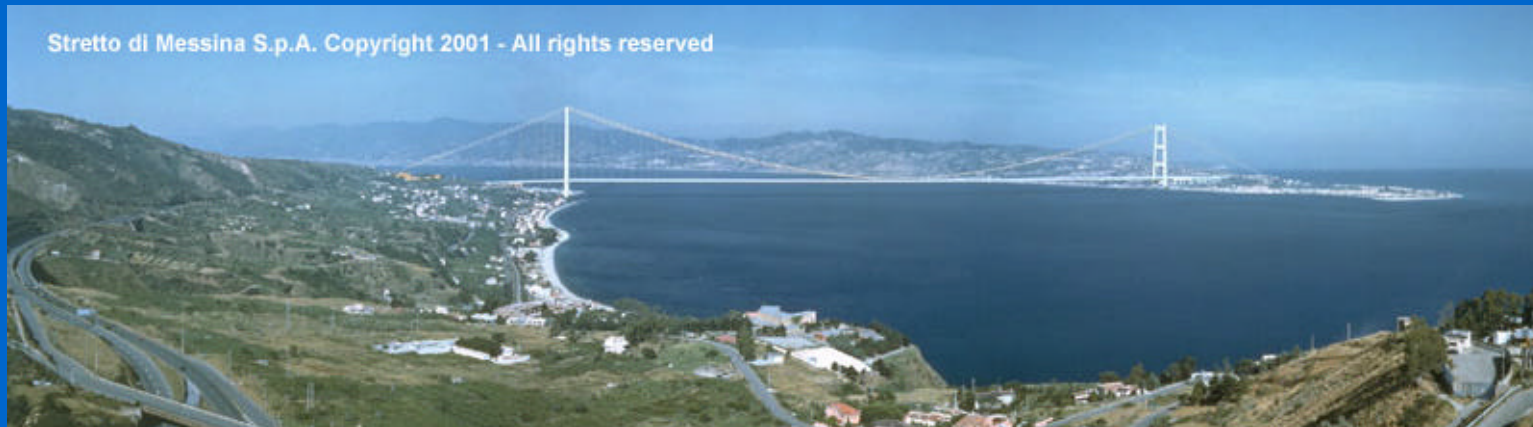
Years 2000 and 2001

AIRPORT	year 2001			year 2000		
	Movements	Passengers	Cargo [tonnes]	Movements	Passengers	Cargo [tonnes]
Rome FCO	283.748	25.565.727	186.038	283.444	26.288.181	202.378
Milan MXP	236.409	18.570.494	323.707	249.107	20.716.815	301.045
Milan LIN	110.566	7.136.337	29.153	78.077	6.026.342	22.145
Turin	64.855	2.820.762	17.220	61.971	2.814.850	20.623
Venice	63.067	4.178.285	16.287	36.328	2.293.799	9.055
Naples	60.916	4.003.001	9.470	62.494	4.136.508	7.440
Bologna	56.746	3.440.051	26.197	61.909	3.524.789	25.034
Catania	47.749	3.925.289	13.133	47.910	3.970.754	12.102
Palermo	41.777	3.213.389	6.012	43.508	3.231.267	6.219
Verona	37.513	2.188.068	9.694	36.328	2.293.799	9.055
Bergamo	36.586	1.061.397	96.253	40.944	1.241.138	100.494
Florence	35.370	1.487.326	489	35.699	1.521.272	601
Cagliari	29.676	1.936.237	5.862	30.579	2.067.116	5.499
Genova	26.756	1.001.494	6.050	29.574	1.063.146	6.253
Pisa	26.717	1.378.322	11.414	24.116	1.246.807	10.210
Rome CIA	26.114	718.562	17.602	28.471	829.511	16.875

The bridge over the Strait of Messina



The bridge over the Strait of Messina



The bridge over the Strait of Messina

Technical data

GENERAL DATA

Length of the central span:	3,300 m
Length of side spans:	180 m
Sag / span ratio:	1/11
Road sections:	2 x (high speed traffic + normal speed traffic + slow speed traffic + emergency)
Railway sections:	2 x (track + lane for tired vehicles)
Service sections:	2 independent lanes for service vehicles and pedestrians
Height above sea:	64.35 , 70 m
Maximum theoretical traffic capacity:	4,500 vehicles/h for each direction; more than 200 trains/day

DECK

Length of the suspended deck:	3,360 m
Total width:	60 m
Structural weight per metre:	15 t
Total weight per metre:	23.4 t
Total weight of steelworks:	70,500 t (Fe 510 D steel, S420 for limited parts)
Aeroelastic stability:	up to more than 270 Km/h
Max. lateral deflection of the middle span at lev. 1:	9.9 m (for 170 Km/h lateral wind)
Expansion joint allowance:	+/- 3.4 m

The bridge over the Strait of Messina

Technical data (cont.)

TOWERS

Height of towers:	370 m (+376 m above sea level)
Shape of the section (in plan):	lozenge 16 x 12 m
Total weight of steelworks:	54,100 t each
Type of foundation (Sicily):	two round plinths diam. 55 m, with cross beam
Type of foundation (Calabria):	two round plinths diam. 48 m, with cross beam
Volume of foundation (Sicily):	86,400 m ³ , 11,200 of which above ground
Volume of foundation (Calabria):	72,400 m ³ , 11,200 of which above ground

SUSPENSION SYSTEM

Total length between anchorages:	5,300 m
Number and dimension of cables:	2 pairs with a diam. of 1.24 m (cross area = 1 m ² each)
Cable formation (central span):	88 wires made of 504 elem. wires 5.38 mm diam.
Amount of elem. wires per cable (central span):	44,352 wires
Type of steel:	high-tensile strength galvanised steel (1,770 MPa)
Total amount of steel wires:	166,600 t
Pull force of each cable pair:	139,000 t (at anchorages)
Volume of the anchorage (Sicily):	328,000 m ³ , 94,000 of which above ground
Volume of the anchorage (Calabria):	237,000 m ³ , 4,000 of which above ground

Main Conclusions

- Stricter regulations on working hours in the road haulage industry must not be seen as an effective instrument towards modal shifts. If indeed they are to be enforced, that should be mainly on account of workers' well being
- Transport costs for the shippers represent very often a small part of the total production cost. As long as transport cost increases are introduced in an equitable way, they will be probably partly compensated by a higher efficiency on the hauliers' side and partly accepted by the shippers

Main Recommendations

- Pricing: progressive introduction of new principles, giving time to all operators to prepare their strategy for adaptation
- Harmonisation of conditions of production on the road transport sector is an important tool also for its effect in road safety. Strict enforcement of driving hours, speed limits and maximum loadings may give a decisive help in this direction
- Creations of conditions that will force railways towards a more commercial behaviour

Useful links on the Internet (draft list)

- <http://www.infrastrutturetrasporti.it/>
- <http://www.trenitalia.it/>
- <http://www.rfi.it/>
- <http://www.autostrade.it/>
- <http://www.enteanas.it/>
- <http://www.informare.it/>
- <http://www.assaeroporti.it/>
- <http://www.interporto.it/>
- <http://www.strettodimessina.it/>