Analysis of the infrastructure network in Slovenia and report on SWOT analysis

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LUKA KOPER

Port of Koper

Port of Koper

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1. Executive Summary

The logistics network in Slovenia is based on a motorways and expressways system, and on a railway network.

Highways which were built in the last 15 years form the backbone of the road network and enable efficient connections within the country and to international road connections (the network of E-roads, Pan-European corridors V and X). The public railway network consists of main lines which represent a part of several international railway connections (Pan-European corridors V and X, and E-railways for example), and regional lines.

In the last decade, from 2000 to 2009, the traffic (passenger and freight) in Slovenia increased in all modes of transport. In freight transport the volume of freight transported and ton-km performed increased in all modes of transport.

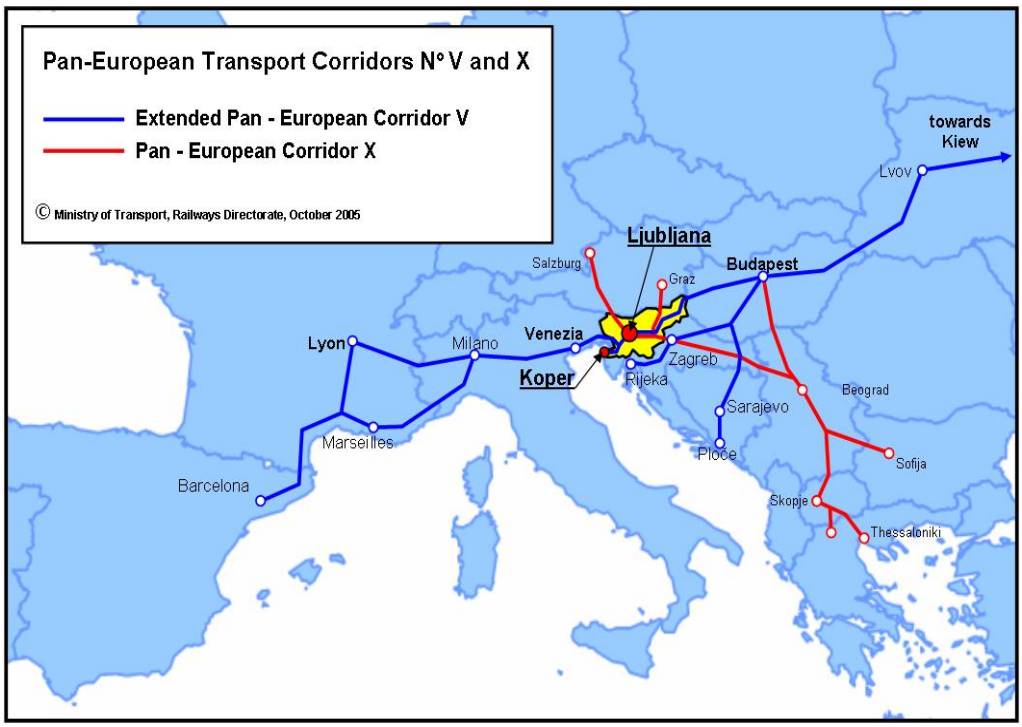


Figure 1: Location of the study area (Slovenia at the crossing of Pan – European Corridors V and X)

Compared to the year 2000 the transport of freight by road was higher by 30 % and by sea by 85 % in the year 2009. The rail freight transport had decreased by 4 % expressed in tons and increased by 2 % expressed in ton-km. Airport traffic (loading and unloading of freight to/from aircraft) had decreased by 9 %.

After Slovenia has entered the EU in 2004 an increase in the volume of land freight transport was recorded and especially in 2006 – 2008 period. In the period from 2001 to 2008, the freight loaded on railways in Slovenia and transported to other European countries recorded positive growth. Unfortunately the growth was not as high as in the road transport.

The port freight traffic in Slovenian ports increased substantially in the last 15 years, where the Port of Koper is the only and the busiest port with more than 99 % share of total port throughput. Roughly one third of the freight in the Port of Koper is handled for the Slovenian market, while most is headed for transit to foreign countries, located in the ports' catchment (hinterland) area.

The public railway infrastructure is getting worse every year. This is mainly due to insufficient financial assets required for its development, maintenance and modernization. Because of that bottlenecks are becoming an important issue - permanent bottlenecks which are linked to required infrastructure modernization and are present on routes with prevailing long-term guaranteed freight potential, and temporary bottlenecks which are connected with current freight potential and linked to operational solutions.

Bottlenecks identified in relation to the port of Koper are of two types: the utilization of handling facilities and storage areas which are close to the capacity limits, and the port connection to inland infrastructure network (direct highway connection to the port entrance is missing, while the existing single track line between Koper and Divača is inadequate).

2. Introduction

In the last 15 years the volume of transport on Slovenian transport network increased considerably in passenger as well as freight transport. In passenger transport particularly national road transport involving cars increased, followed by the air passenger traffic. In freight transport road traffic has increased the most, mainly due to increased international freight flows in directions of the Corridor V and Corridor X (which happened following the accession of several eastern European countries to EU and an increase in international trade exchange).

The actual development of infrastructure was rather uneven, as in the last 15 years most of activities were realized in the area of road (highway) infrastructure, which was to provide an effective integration of Slovenia in international (road) transport infrastructure connections; there was

actually no development and construction of rail infrastructure as the activities were limited only to minimum maintenance work.

These two modes of transport – their efficiency directly depends on the extent and condition of built infrastructure, are of crucial importance for the efficiency of national freight and passenger transport as well as international transport, freight transit in particular.

Slovenia is geographically located on the crossing of natural routes connecting west with east as well as north and northeast with southeast areas of Europe; and north Adriatic with central Europe.

The significance and prospective of the location are further emphasized by placing several important transport connections over the Slovenian territory. The most important one are **corridor V and corridor X,** which actually cross in the city of Ljubljana. Such a transport location requires establishment of an efficient transport network, while on the other hand provides conditions for further increase of (particularly transit) freight traffic.

Objective development of transport infrastructure is of crucial importance for planning and realization of traffic, on a national as well as on international level, and particularly in transit. These activities should be consistent with the principles of sustainable development and transport.

3. The Slovenian Logistics Network and its Utilization

3.1 Road Infrastructure Characteristics

The total length of the Slovenian road network was 38,900 km. In table 1 are the actual lengths of road network in Slovenia.

Table 1: Characteristics of Slovenian road network in 2009

Road category	Length in km
Highways	657
Express ways	105
Main roads	819
Regional roads	5,120
Local roads	13,837
Public roads	18.383

Source: Direkcija Republike Slovenije za ceste

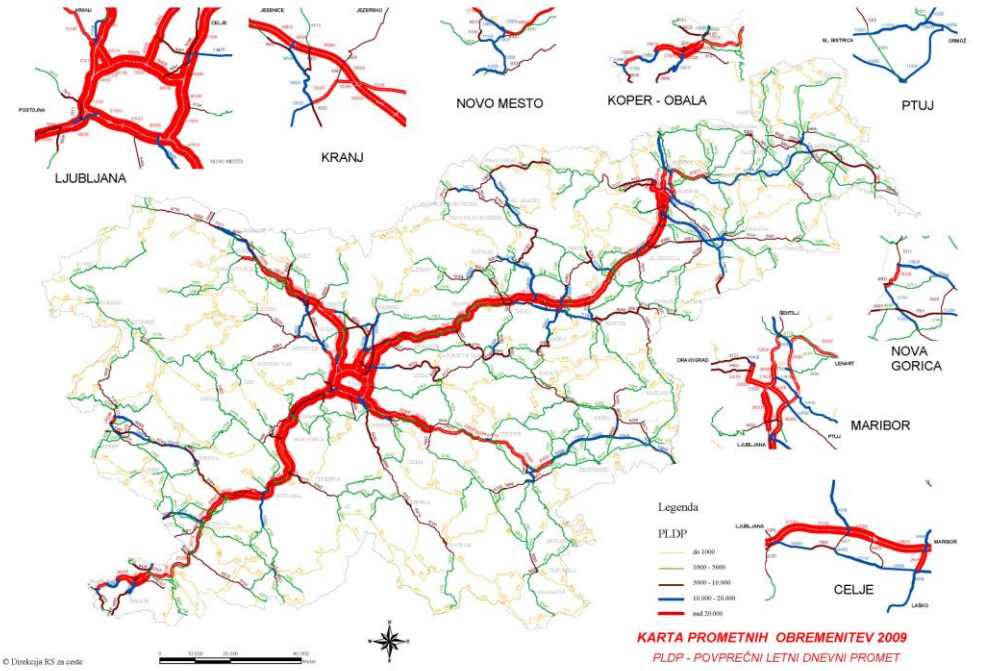
Motorways and expressways are the main traffic lines of the Slovenian road network.
They enable efficient connections on the national and international level such as the network of E-roads, road connections within **Pan-European corridors V and X** and the rest of EU networks.

The current status of the motorway system in Slovenia is presented in Figure on the next page.

Source: DARS

Figure 2: Slovenian motorway system in 2009

The volumes of traffic and traffic loads are shown in figure 3.



Source: Direkcija Republike Slovenije za ceste

Figure 2: Volume of traffic on Slovenian road network

From the year 2006 the share of passenger cars in total kilometers driven has been constantly decreasing (from 81 % in 2006 to 78.3 % in 2007 and 77.3 % in 2008), due to the higher rate of increase of goods vehicle traffic (heavy goods vehicles as well as trucks and trailers), which reached a share of 21.8 % of total highway and expressway traffic in Slovenia in 2008.

3.2 Characteristics of Rail Infrastructure and its Utilization

In 2009, there was 1,228 km of railway tracks on the public railway infrastructure network in Slovenia of which approx. 898 km is single track and approx. 331 km double track lines.

The Slovenian public railway network consists of main lines and regional lines. Main lines represent a part or parts of several international railway connections (PEN Corridor V and X, and E-railways for example).

Source: Slovenska železnice

Figure 3: Railway network in Slovenia

The maximum allowed vehicle and load dimensions, on all railway lines enable rail transport in line with the international loading (clearance) gauge, loading gauge SŽ1 and loading gauge for combined transport GA and GB (lines suitable for combined transport are also properly coded).

Most of the railway lines in Slovenia open for transit traffic, fulfill the criteria of the D3 line category (axle load – 22.5 t/axle; longitudinal load – 7.2 t/m), which is also declared to be the normal category for public network lines in Slovenia.

Note: Red line – double track; Black line – single track

Source: Slovenske železnice

Figure 4: Number of tracks on the Slovenian railway network

Note: Red line (22,5 t/axle); Yellow line (20,0 t/axle) Blue line (18 t/axle); Grey line (16 t/axle)

Figure 5: Axle load limitations on Slovenian railway network

According to the speed railway lines can be classified as lines for high speed or conventional lines. All railway lines in Slovenia are classified as conventional lines.

The electrification system of the Slovenian railway lines is 3 kV DC, except at the junction points with railway infrastructure of foreign countries:

- 25 kV AC, frequency 50 Hz (Croatia),
- 15 kV AC, frequency 16 2/3 Hz (Austria).

Note: Grey line (diesel traction); Red line (3 kV); Blue line (15kV); Yellow line (25 kV)

Figure 6: Electrification of the Slovenian railway network

Technical characteristics of the main lines are presented in the Table 2 below.

No.	Railway route/section	Line code	No. of tracks	Section length	Traction system	Max. axle load	Line capacity	
							Capacity (train paths/24 hours)	Capacity employment rate (%)
1.	Dobova-Ljubljana							
	Dobova d.m.-Dobova	E70; Corridor X	2	2.3	25 kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
	Dobova-Zagorje	E70; Corridor X	2	65.6	3kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
	Zagorje-Ljubljana	E69, E70; Corridor X	2	46.6	3kV	D3 (225 kN; 72 kN/m)	Ljubljana-Dobova=292; Lj-Zidani most=300	Lj-Dobova=27; Lj-Zidani most=51
2.	Ljubljana izklj.-Jesenice d.m.							
	Ljubljana-Lj. Šiška	E65; Corridor X	1	1.6	3kV	D3 (225 kN; 72 kN/m)	76	81
	Ljubljana šiška-Lj. Vižmarje	E65; Corridor X	1	4.8	3kV	D3 (225 kN; 72 kN/m)	76	81
	Ljubljana šiška-Jesenice	E65; Corridor X	1	58.1	3kV	D3 (225 kN; 72 kN/m)	76	81
	Jesenice-Jesenice d.m.	E65; Corridor X	2	7.1	15 kV	D3 (225 kN; 72 kN/m)	76	81
3.	Zidani most izklj.-Šentilj d.m.							
	Zidani most-Šentjur	E67, E 69; Corridor X	2	3.,6	3 kV	C3 (200 kN; 72 kN/m)	Maribor-Šentilj=62; Zidani most-Maribor=185	Maribor-Šentilj=69; Zidani most=65
	Šentjur-Maribor	E67, E 69;	2	53.2	3 kV	D4 (225	Maribor-Šentilj=62;	Maribor-Šentilj=69;

	Tezno	Corridor X				kN; 80 kN/m)	Zidani most-Maribor=185	Zidani most=65
	Maribor Tezno-Šentilj	E67; Corridor X	1	19.6	3 kV	C3 (200 kN; 72 kN/m)	Maribor-Šentilj=62; Zidani most-Maribor=185	Maribor-Šentilj=69; Zidani most=65
4.	Pragersko izklj.-Središče d.m.							
	Pragersko-Središče d.m.	E69; Corridor V	1	51.9	diesel	C3 (200 kN; 72 kN/m)	55	89
5.	Ormož izklj.-Hodoš d.m.							
	Ormož-Murska Sobota	Corridor V	1	38.5	diesel	C3 (200 kN; 72 kN/m)	34	88
	Murska Sobota-Hodoš d.m.	Corridor V	1	30.7	diesel	D4 (225 kN; 80 kN/m)	34	88
6.	Ljubljana izklj.-Sežana d.m.							
	Murska Sobota-Hodoš d.m.	E 65, E 69,E 70;Corridor V	2	116.8	3 kV	D3 (225 kN; 72 kN/m)	135	62
7.	Pivka izklj.-Ilirska Bistrica d.m.							
	Pivka-Ilirska Bistrica d.m.	E 65	1	24.5	3 kV	C2 (200 kN; 64 kN/m)	63	54
8.	Divača izklj.-Koper							
	Divača-Prešnica cep.	E 69, Corridor V	1	16.5	3 kV	D3 (225 kN; 72 kN/m)	66	88
	Prešnica cep-Koper	E 69,Corridor V	1	31.5	3 kV	D3 (225 kN; 72 kN/m)	66	88

Table 2: Characteristics of the Slovenian railway network – main lines

Source: Slovenske železnice

Table 2 shows the employment rate of singular lines, therefore bottlenecks can be derived from it.

Important shunting stations which must be mentioned are:

- Shunting stations: Ljubljana Zalog, Maribor Tezno, Celje tovorna and Koper tovorna.
- Stations where container terminals are located: Celje tovorna, Luka Koper, Ljubljana Container terminal and Maribor Tezno (tracks at these stations are not part of the public railway infrastructure).
- Stations suitable for loading and unloading of cars: Koper, Jesenice, Maribor, Most na Soči, Podbrdo, Bohinjska Bistrica.
- Stations opened for combined transport ("piggy-back"): Ljubljana Moste and Maribor Tezno (tracks at these stations are not part of the public railway infrastructure).

Source: Slovenske Železnice d.o.o.

Figure 8: Utilization of railway lines in 2009

3.3 Intermodal Infrastructure Characteristics

Intermodal infrastructure in Slovenia consists of a network of intermodal terminals specialized for a certain type of intermodal transport, regarding the handling techniques and the intermodal loading units handled.

For the combined transport of road vehicles (accompanied and unaccompanied) two terminals are available – in Ljubljana (Moste) and Maribor (Tezno). Both terminals are owned and operated by Slovenian Railways.

Intermodal (container) terminals are located in Ljubljana, Maribor, Celje and in the Port of Koper. Container terminal in the Port of Koper is the biggest intermodal terminal in Slovenia.

3.4 Analysis of Road Transport and National Freight Flows

Freight traffic represents an important share (from the point of view of the effect on the total traffic flow) of the total road traffic. The volume of freight traffic has increased considerably since Slovenia's accession to the EU. The biggest increase has been recorded in the direction of two important international connections crossing Slovenian territory, Corridor X and Corridor V. The following figure , n.9, represent the share of freight traffic among total traffic on Slovenian roads in 2009.

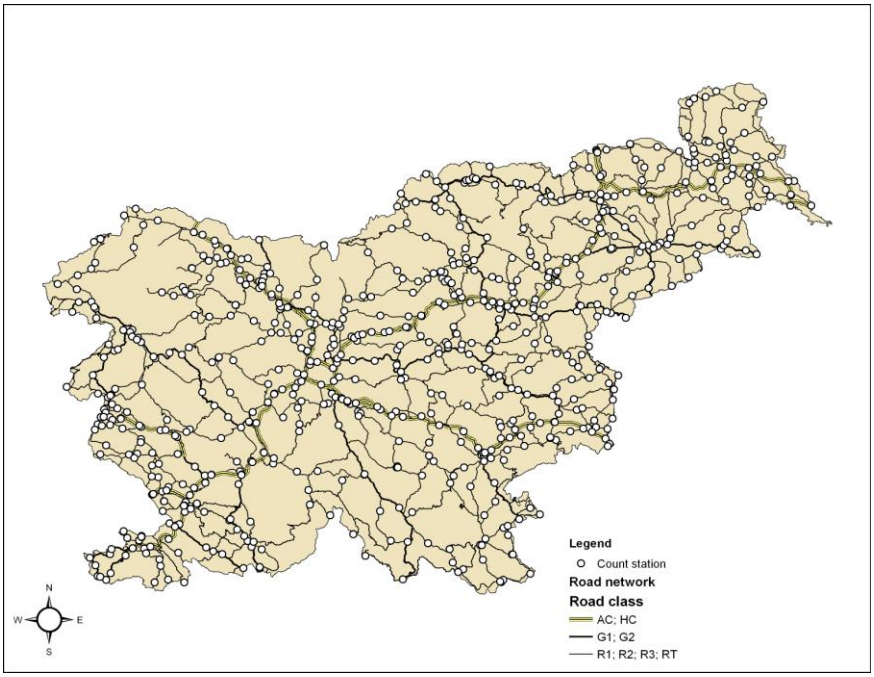


Figure 9: Spatial distribution of traffic count location on the road network in 2009

In the figure can be seen that most of the traffic is carried by motorways, highways and major roads. Those roads together represent 21 % of the total length of the network, yet carry more than 64 % of the total traffic (2009). Highways and motorways together represent 8.7 % of the total road network, while taking 44 % of the total traffic (2009).

The traffic of HGV on Slovenian roads in 2009 is presented in the following Figure below; from the map it is evident that most of the goods vehicles traffic is on the course of the two Pan-European corridors, V and X.

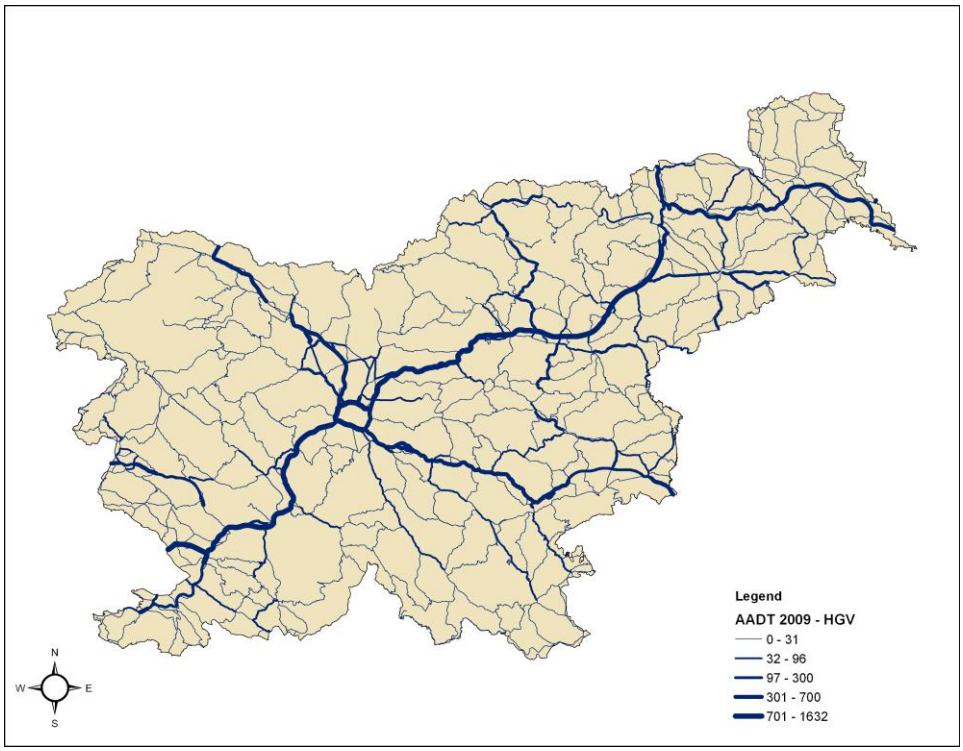


Figure 10: Traffic (AADT) of heavy goods vehicles (HGV) in 2009

4. Analysis of International Freight Flows

The analysis of the freight flows in road transport gives an overview of the transport carried out by all goods road vehicles of at least 2 tons of load capacity, and registered in the Republic of Slovenia (national carriers). The analysis covers road freight flows in transport of freight from Slovenia to other countries as well as from other countries to Slovenia, from 2001 to 2009.

Year / To countries	2001	2002	2003	2004	2005	2006	2007	2008	2009	Change in 2001-2008	Change in 2008-2009
Foreign countries - TOTAL	3,218	3,221	3,408	3,909	4,883	5,719	6,316	7,004	5,939	11.8%	-15.2%
Austria	276	276	320	570	517	673	860	1,000	899	20.2%	-10.1%
Belgium	23	25	27	41	50	78	56	72	48	17.7%	-33.3%
Bosnia and Herzegovina	44	63	68	58	72	43	24	88	-	10.4%	-
Croatia	511	663	607	457	595	497	668	541	436	0.8%	-19.4%
Czech Republic	58	26	25	58	44	37	53	80	50	4.7%	-37.5%
France	137	155	173	249	299	328	244	323	297	13.0%	-8.0%
Germany	663	627	664	664	816	907	964	1,112	894	7.7%	-19.6%
Hungary	182	69	238	186	157	210	147	245	207	4.3%	-15.5%
Italy	850	858	817	1,006	1,487	2,115	2,202	2,332	1,978	15.5%	-15.2%
Netherlands	39	26	37	59	60	75	102	136	160	19.5%	17.6%
Poland	51	50	57	84	80	79	97	141	101	15.6%	-28.4%
Romania	-	-	-	39	75	34	66	96	56	25.3%	-41.7%
Russian Federation*	43	28	46	47	61	55	92	82	-	9.7%	-
Serbia	-	-	-	-	-	-	194	248	211	27.8%	-14.9%
Serbia and Montenegro	99	130	142	146	207	167	-	-	-	11.0%	-
Slovakia*	-	-	14	-	57	-	87	72	110	38.8%	52.8%
Spain	44	61	28	68	81	100	94	84	113	9.7%	34.5%
United Kingdom	104	55	53	76	93	160	158	162	98	6.5%	-39.5%
Other EU Member States	27	45	50	47	78	84	123	79	81	16.6%	2.5%
Other countries	41	35	-	45	53	59	86	106	138	14.5%	30.2%

* annual average change is calculated according to data availability and not for the period from 2001-2008

Table 2: Road freight transport - loaded in Slovenia by country of unloading (in 1000 tons)

In years from 2001 to 2008 the amount of freight loaded in Slovenia and carried abroad **by road** vehicles was growing on a regular basis. The majority of freight transported was destined to hinterland countries, Italy, Austria, Germany and Croatia.

In * annual average change is calculated according to data availability and not for the period from 2001-2008

Table 2 it can be seen that the average annual growth was around 12 %, with the highest share of transport recorded by Slovakia and western Balkan countries. These countries represent markets that are below European average development rate in comparison to most other EU countries, and further growth of freight transport in these directions is expected in the future.

Year 2009 shows negative growth numbers, which are the result of the financial crises in the last period.

Almost 6 million tons of freight, in 2009, was carried by national carriers from Slovenia to other European countries.

Around one third of all goods carried by road were unloaded in Italy, 15 % in Germany and Austria, 7 % in Croatia and France with 5%.

The railway sector recorded growth was considerably lower compared to road transport.

In 2009, there was a considerable decrease recorded in cargo loaded (26 %), almost twice as much as in the road sector (15 %).

Historically the most important markets in out band rail freight transport are those of the neighboring or hinterland countries of Austria, Hungary and Italy, followed by Slovakia, Croatia, Germany, France, Serbia and Poland.

In inbound rail freight traffic there are also some traditional markets identified, represented by Austria and Hungary, followed by Czech Republic, Germany, Slovakia, Croatia and Italy. The Balkan countries also represent an important market share, especially countries from the territory of the former Yugoslavia (Croatia, Bosnia and Herzegovina, Serbia).

Comparing numbers of freight volumes transported by rail and by road a certain unsteadiness can be identified. There was a constant growth from years 2001 and 2008 in the road transport.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2008	2008-2009
Countries of loading - TOTAL	4,113	4,786	5,167	4,742	4,825	5,230	4,648	4,349	3,298	0.8%	-24.2%
Austria	1,505	1,828	1,860	1,849	2,036	2,272	2,065	2,097	1,295	4.9%	-38.2%
Belgium	34	29	34	24	21	17	22	30	41	-1.8%	36.7%
Bosnia and Herzegovina	27	97	118	104	95	139	99	54	39	10.4%	-27.8%
Bulgaria	0	-	2	1	8	25	31	15	1	-	-93.3%
Croatia	258	244	224	282	296	365	252	191	170	-4.2%	-11.0%
Czech Republic	547	598	854	549	493	388	489	476	395	-2.0%	-17.0%
France	136	127	117	127	74	22	25	19	5	-24.5%	-73.7%
Germany	264	281	319	331	384	426	329	364	291	4.7%	-20.1%
Greece	0	-	-	3	1	3	2	2	0	-9.6%	-100.0%
Hungary	802	667	687	804	888	898	561	492	531	-6.7%	7.9%
Italy	296	322	275	183	107	131	135	113	65	-12.9%	-42.5%
Luxembourg	1	1	1	0	1	1	2	3	1	17.0%	-66.7%
Macedonia	1	-	0	5	5	10	26	4	0	21.9%	-100.0%
Montenegro	-	-	-	-	-	-	0	1	4		300.0%
Netherlands	2	5	4	2	5	2	2	1	1	-9.4%	0.0%
Norway	-	-	-	-	-	-	-	-	0		
Poland	32	41	51	115	91	70	56	42	17	4.0%	-59.5%
Romania	10	16	14	10	4	4	2	3	0	-15.8%	-100.0%
Serbia	-	-	-	-	-	-	148	115	39	-22.3%	-66.1%
Serbia and Montenegro	26	140	96	106	53	107	-	-	-	-	-
Slovakia	164	369	483	228	245	334	380	278	363	7.8%	30.6%
Spain	6	6	8	6	2	0	0	0	0	-100.0%	-
Sweden	0	5	4	6	5	8	14	14	9	18.7%	-35.7%
Switzerland	4	12	16	2	9	1	8	28	20	32.0%	-28.6%
Turkey	-	-	-	0	3	4	0	8	12		50.0%
Turkey	48	48	60	32	17	20	32	42		-1.9%	
Ukraine	-	-	-	0	-	1	20	3	-	-	-100.0%

Source : Statistični urad Republike Slovenije

Table 6: Railway freight transport – freight unloaded in Slovenia by country of loading (in 1000 tons)

Types of goods are defined by the *Goods Nomenclature for Transport Statistics (NST/R)* till 2008. In 2008 this classification was replaced by a new goods classification NST, 2007. The following 10 groups of goods are defined for the purpose of analyses:

	International transport - goods loaded in Slovenia			International transport - goods unloaded in Slovenia			Transit		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Type of goods - TOTAL	5,029	4,892	5,558	4,825	5,230	4,648	3,110	3,311	3,750
Cereals	7	6	1	145	287	130	92	136	333
Potatoes, other fresh or frozen vegetables and fresh fruit	0	0	0	0	0	0	0	0	0
Live animals, sugar beet	0	0	0	69	36	0	0	0	0
Wood and cork	110	124	202	685	808	697	562	614	935
Textiles and waste, other raw animal and vegetable materials	0	0	0	0	0	0	3	2	2
Foodstuffs and animal fodder	31	48	34	81	46	30	214	233	190
Oil seeds and oleaginous fruits and fats	2	1	0	21	14	10	4	4	7
Solid mineral fuels	383	268	429	68	63	114	17	17	21
Crude petroleum	0	0	0	0	0	1	0	0	0
Petroleum products	**108**	**113**	**188**	**177**	**184**	**88**	**157**	**184**	**192**
Iron ore, iron and steel waste and blast furnace dust	2,166	1,968	2,078	369	399	342	614	558	451
Non-ferrous ores and waste	32	37	27	0	0	0	0	1	0
Metal products	57	27	140	623	774	820	490	466	430
Cement, lime, manufactured building materials	15	19	16	34	32	65	53	51	50
Crude and manufactured minerals	203	174	160	305	306	323	33	27	28
Natural and chemical fertilisers	**0**	**0**	**1**	**81**	**98**	**68**	**97**	**124**	**119**
Coal, chemicals, tar	0	0	0	1	0	0	0	2	30
Elementary chemicals, chemical products	**370**	**368**	**371**	**139**	**88**	**81**	**170**	**158**	**70**
Paper pulp and waste paper	25	16	11	217	187	179	52	24	26
Vehicles and transport equipment, machinery, apparatus, engines or not assembled, and parts	181	186	230	196	209	183	88	78	107

thereof									
Manufactures of metal	0	0	0	0	0	0	2	1	0
Glass, glassware, ceramic products	33	36	40	17	6	8	44	50	43
Leather, textiles, clothing, other manufactured articles	74	75	98	142	152	129	78	130	158
Other non-mentioned product	1,232	1,425	1,534	1,455	1,540	1,379	339	452	558

Source: SURS

Table 7: Railway goods transport by type of goods (NST/R) and type of transport (in 1000 tons)In table 7 are highlighted in bold chemical products.

Slovenian Railways own and operate three combined transport terminals in Slovenia: in Ljubljana, Maribor and Celje.

Combined/intermodal transport today represents more than 20 % of the freight (more than 3.8 mil. tons per year) transported by the Slovenian Railways (Slovenske Železnice). Roughly two thirds of freight is transported in containers, while the rest is transported by other means of intermodal transport.

Most of the freight is handled by the Slovenian Railways at the Ljubljana Container terminal. Much less freight is handled at the terminals in Maribor and Celje. In recent years the Ljubljana terminal recorded a throughput of more than 90,000 TEU per year, which is actually a small volume compared to the throughput of the container terminal in the Port of Koper, that's was more than 470.000 TEU in 2010.

The recorded throughputs of the three combined transport terminals in the last years are as follows (see also Figure below):

a) 2007: CT Ljubljana: 64,427 TEU, CT Maribor: 7,587 TEU, CT Celje: 4,994 TEU,
b) 2008: CT Ljubljana: 97,639 TEU, CT Maribor: 9,632 TEU, CT Celje: 6,290 TEU,
c) 2009: CT Ljubljana: 80,337 TEU, CT Maribor: 12,163 TEU, CT Celje: 8,174 TEU.

5. Traffic in the Port of Koper

5.1 Freight Flows and its characteristics

The Port of Koper is operated by the company Luka Koper d.d. It operates 11 specialized terminals which are equipped for almost all type of goods.

The freight handled can be classified into five groups, characterized by cargo characteristics (way of manipulation and transportation) as follows: dry bulk cargo, general cargo, liquid cargo, cars and containers.

Traffic throughput grew in the port at a yearly rate of 5.9 % until 2009, where the growth was 8%. The highest growing rates had cargos like containers and cars, while other cargos grew at a smaller rate.

In the years 2008 and 2009 approximately two thirds of cargo handled in the Port of Koper was transit cargo. However the structure of cargo flows changed somewhat during these two years. Containers and liquid cargos increased their share; cars maintained the same share, while dry bulk and general cargos dropped their shares in 2008. In 2009 the share of cars dropped, together with dry bulk cargos, and, on account of this, liquid and general cargos as well as containers increased their share.

Cargo group \ Period		1996-2009
Containers (TEU)	Loaded	13.7%
	Unloaded	14.8%
	Total	14.2%
Cars (piece)	Loaded	41.8%
	Unloaded	11.3%
	Total	14.2%
Containers (t)	Loaded	11.4%
	Unloaded	14.0%
	Total	12.4%
Cars (t)	Loaded	12.7%
	Unloaded	10.7%
	Total	10.5%
Other general cargoes (t)	Loaded	7.8%
	Unloaded	13.3%
	Total	7.5%
Dry bulk cargoes (t)	Loaded	11.8%
	Unloaded	4.5%
	Total	4.9%
Liquid cargoes (t)	Loaded	-
	Unloaded	5.3%
	Total	5.1%
TOTAL (t)	Loaded	7.9%
	Unloaded	5.6%
	Total	5.9%

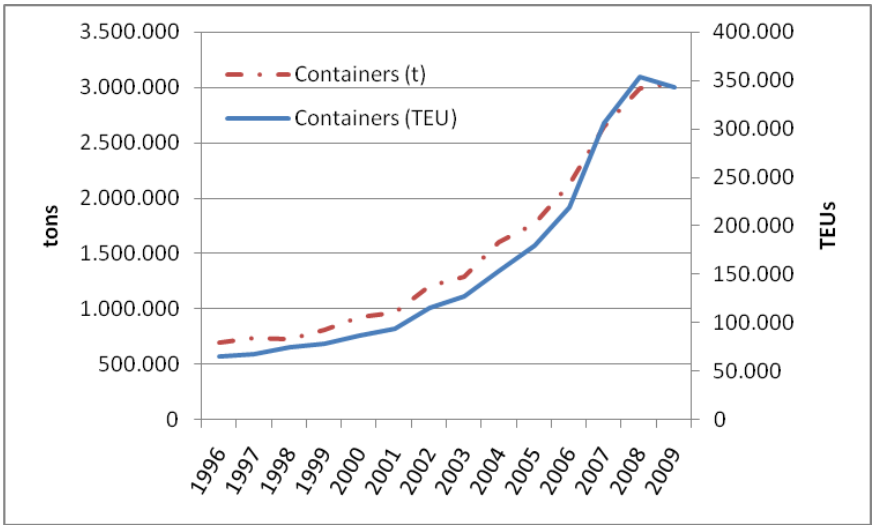
Table 8: traffic throughput growing rates from 1996 to 2009

Till the year 2008, container transshipment achieved record values, as the highest number of container units (TEU) was transshipped as many as 353,880. The annual growth of container transshipment amounted to 16 %, and the port thus kept its leading position in comparison to the neighboring northern Adriatic ports, which was especially positive given the fact that containers represent a very desirable type of freight in ports.

In 2009, container transshipment decreased somewhat, to 343,165 container units (TEU). In view of the economic crisis, the 3 % decrease in the container transshipment scope was a good and encouraging result both in comparison with other ports in the northern Adriatic as well as with the northern European ports.

The minimum decrease of the container transshipment scope was definitely influenced by the construction of the **new operative shore** with hinterland surfaces and the acquisition of four new post-panamax container cranes, which provided the conditions necessary to establish the new direct shipping link to the Far East. The new railway connections of the port with the hinterland markets and the new shipping links with the eastern Mediterranean were also of significance.

The growth rate for containers was quite higher compared to other cargo groups (general cargoes, liquid cargoes, cars), which recorded modest growing rates. In 2000 containerized cargo represented about 10 % of total throughput in terms of volume, while in 2010 this cargo group recorded 23 % share of the throughput - around 3 million tons of cargo. The container traffic registered a positive growth rate even in 2009, although less than previous years, while all other cargo groups registered negative growth.



Source: Luka Koper

Figure 11: Port of Koper Container traffic in years 1996 - 2009 (tons, TEU)

6. Analysis of Slovenian Transport Network Bottlenecks

From 1991 only reconstructions and modernization of tracks were carried out on the Slovenian public railway infrastructure, which mostly maintained the status quo and transportability, while there were no major updates and new constructions (the only exception was the building of a new rail link between Slovenia and Hungary).

A presentation and assessment of the situation in the Slovenian transport infrastructure is given within the Operational Program of Environmental and Transport Infrastructure Development for the 2007-2013 Period[1], a 2008 document, the aim of which was to ensure conditions for growth by providing sustainable mobility, for improvement of quality of the environment and for the construction of adequate infrastructure.

6.1 Public railway infrastructure situation

Due to insufficient funding the railway network is in its worst condition ever. Until now only 25% of the National Program of the Slovenian railway Infrastructure Development was adopted

The railway tracks in Slovenia suffer from evident:

- damages and defects on tracks, catenaries, signaling and safety devices, points and
- which results in the introduction of lower speeds.

Such a condition of the railway infrastructure has resulted in:

- **Axle and speed load restrictions:** Inadequate maintenance and slow modernization of the railway infrastructure, with increased route loads due to the extending scope of transport

[1] The Operational Programme of the Environmental and Transport Infrastructure Development for the 2007-2013 Period is an implementation document of the Republic of Slovenia for the period extending from 2007 to 2013, which determines legal obligations and the rights to implement the EU's cohesion policy in Slovenia. It is Slovenia's and the EU's joint programme document adopted after harmonisation with the European Commission, with the partners implementing and financing it together.

- **Decrease of the railway transport scope:** Due to the poor infrastructure condition, the
- already less competitive railway transport services are moving even further away from the requirements and needs of their users;
- **By-passing Slovenian lines:** Due to the inadequate allowed axle loads certain freights are already being directed to transport routes passing Slovenia (which, of course, means losing freight) or box cars in certain directions of main routes are loaded by 15 % less than admissible in view of their load capacity (e.g., Zidani Most-Šentilj and Pragersko-Murska Sobota);
- **Speed constraints:** With the existing condition of the infrastructure, transport safety can only be ensured by restricting speed which results in increased railway transport delays and lower average commercial speeds
- **Influence on the intermodal transport:** Poor condition of the public railway infrastructure also influences the running of intermodal transport the freights transported are also restricted by admissible axle load.
- **Increased train delays:** Within the public railway infrastructure network in Slovenia, the situation in freight transport presents the greatest problem.

A first analysis of the Slovenian public railway network is showing that the infrastructure have to be modernized as soon as possible to ensure safe, reliable and modern transport conditions to all users.

6.2 Identified Infrastructural Bottlenecks

The Network Statement of the Republic of Slovenia for 2010 issued by the Slovenske železnice company distinguishes between **permanent and temporary bottlenecks**. Permanent bottlenecks are present on routes with prevailing long-term guaranteed freight potential and linked to infrastructure modernization. Temporary bottlenecks are connected with current freight potential and linked to operational solutions.

Bottlenecks have been located on the following track sections:

- Ljubljana – Jesenice;
- Pragersko – Ormož;
- Maribor – Prevalje;

- Ljubljana – Kamnik;
- Jesenice – Nova Gorica;
- Divača – Koper;
- Novo mesto – Metlika;
- Ljutomer – Hodoš.

Permanent bottlenecks are mostly present on the following track sections:

– Divača – Koper,

– Ljubljana – Jesenice and

– Pragersko – Ormož – Ljutomer – Hodoš.

From the aspect of international railway links, especially in the direction northern Adriatic –Baltic, important bottlenecks appear on the following routes (key characteristics are presented in the Table below):

- Koper – Ljubljana – Slovenian/Austrian border (Villach),
- (Zagreb/HR) – Zidani Most - Maribor – Slovenian/Austrian border (Graz),
- Zidani Most – Ljubljana.

Section	Bottlenecks	Negative Consequences
Ljubljana – Divača	passenger train max speed = 100 km/h	lower train speed
		expected year of saturation = 2012
Divača – Koper	single track	lower train speed
	max gradient 25 ‰	expected year of saturation = 2012
	min radius 250 m	
A/SLO border – Zidani Most	max axle load = 20 tons	train load capacity underutilization
	single track between A/SLO border – Maribor (16 km)	
Zidani Most – Ljubljana	max speed on Ljubljana – Zidani Most section = 120 km/h	lower train speed
		expected year of saturation = 2012

Source: Updated data from AB Landbridge Project

Table 9: Railway bottlenecks and negative consequences on major international connections

The improvements planned for the technical characteristics of the railway infrastructure are:

- provision of admissible axle load of the minimum D3 category (225 kN/axle and 72 kN/m) across the entire network of the main routes in Slovenia,
- construction of the new Divača – Koper railway link,
- increase of the highest allowed route speed along main routes coinciding with corridors V and X to 160 km/h, with admissible and substantiated deviations,

- further modernization of the signaling-safety and telecommunications devices along corridor V.

With the above mentioned steps the modernization should bring:

- increase in route transport electricity,
- increased level of transport safety,
- more effective transport management,
- lowered operating expenses,
- introduction of interoperability.

6.3 Road Network Bottlenecks situation

In previous years, the Republic of Slovenia mostly made investments in the construction of a motorway network, while investments in the national road network were practically non-existent or were implemented in a substantially lesser volume. Based on this, bottlenecks related to the road infrastructure can be divided into two groups:

From the year 1998 traffic by road increased substantially which caused various problems on the network and as a consequence bottlenecks were forming.

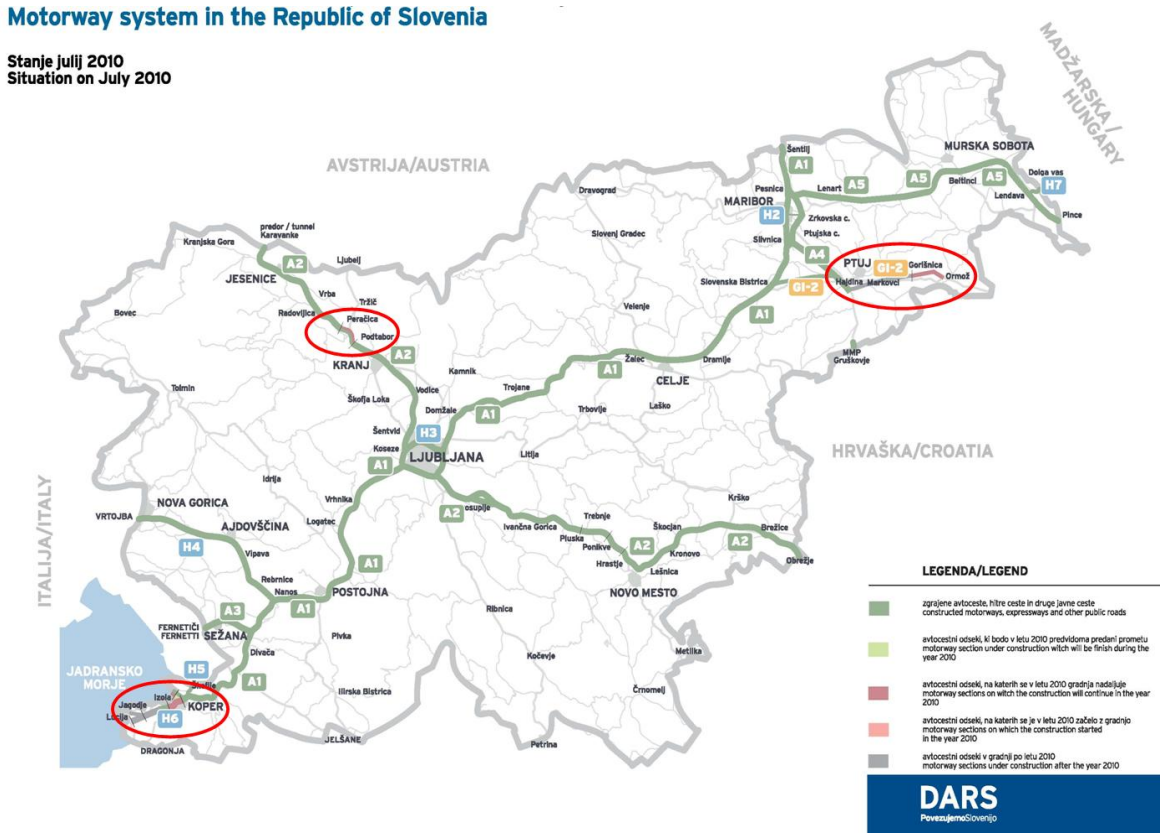
Despite the motorway network being extended for the most part, we are still facing bottlenecks due to constant and high levels of traffic growth.

The main and regional roads have not been dimensioned and constructed for the current traffic volume that is persistently increasing, so that traffic density as well as traffic loads are rising (both resulting in road surface damage).

There are still motorway sections in construction in 2010 and present bottlenecks due to missing sections of the motorway network are shown in Table and Figure below.

Table 10: Motorway sections in construction – bottlenecks in 2010

Name of the motorway leg	*Name of the section*	*Length in km*	*Opened for traffic*
Podravje leg	Gorišnica – Ormož section	10.4	After 2013
Primorska leg	Connection to the Port of Koper, phase 1, Ankaran access road	1.5	End of 2010
	Koper – Izola	5.2	Beginning of 2013
	Connection to the Port of Koper, phase 2	1.4	2012
Gorenjska leg	Peračica – Podtabor section	2.4	2011



Source: DARS

Figure 12: Motorway sections under construction (bottlenecks) in 2010

With the already poor condition of the roads, the key problems of the road network are :

- insufficient capacity of existing roads in the direction of future/new motorways:
- expected increase of international (transit) transport towards the southeast upon further expansion of the EU to the east and further into the Balkans or after the restoration of economic flows,

- reduced connections capacities to peripheral regions with central Slovenia and poor links between these areas and international highways (to the TEN network).
- expected increase of international (transit) transport in the direction southwest – northeast,
- bottlenecks on roads leading through urban centers – this is related to poor safety conditions.

The elimination of bottlenecks by constructing and modernizing road links on development axes will result in:

- improved capacity on these axes as well as direct economic effects among users (lower transport costs),
- indirectly enabled improvement of economic competitiveness in these areas and consequent favorable influence on regional development,
- enabled utilization of potentials offered by the area in terms of settlement, infrastructure, manufacturing and supply activities.

Construction of the new transverse development transport axis and modernization of the existing ones also means connecting regional centers in Austria, Italy, Slovenia and Croatia, and enables establishment of links of the freight and passenger road transport in all regions on this axis to the main European transport directions.

6. Pipeline network in Slovenia

Slovenia, being a small country does not have a widespread network of pipelines. In the figures below are shown the Slovenian pipelines.

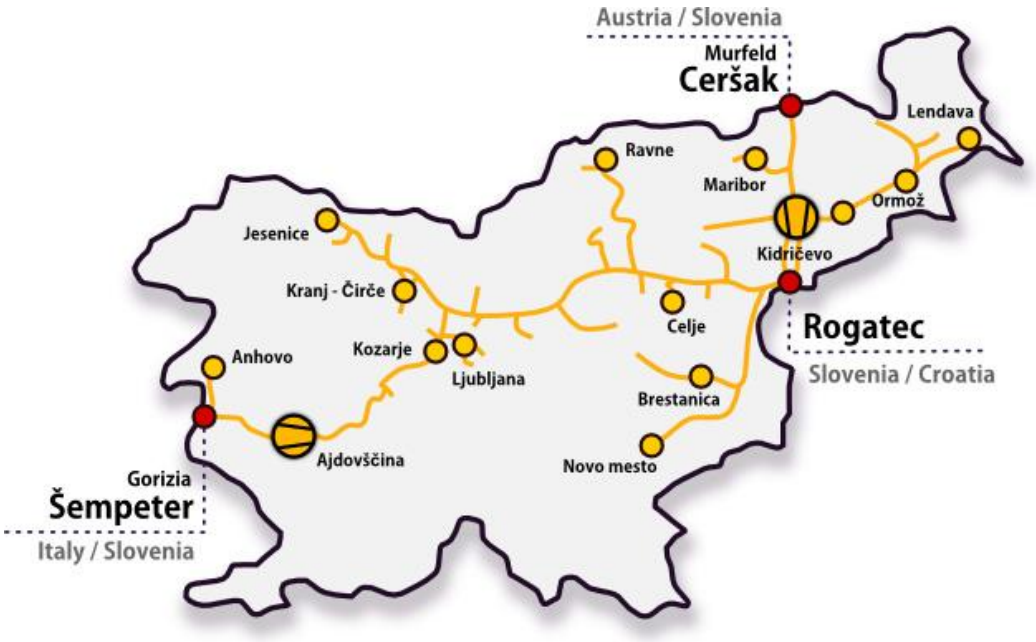


Figure 13: Gas pipeline of company Geoplin (source: www.geoplin.si)

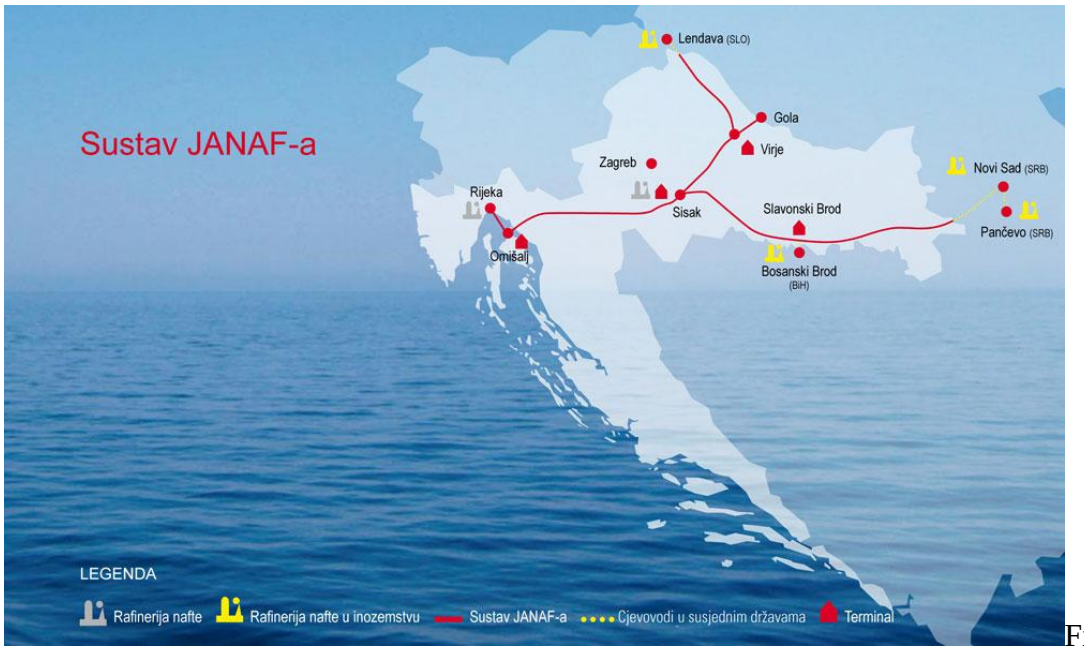


Figure 14: Oil pipeline (source: http://www.janaf.hr)

The oil pipeline is only reaching the city of Lendava where is located the only Slovenian refinery.