



Chemical Logistics Cooperation in Central and Eastern Europe

Feasibility Study

**COMBINED TRANSPORT IN CENTRAL AND EASTERN
EUROPE**

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Partner: Association of Chemical Industry of the Czech Republic

Author: VUOS Pardubice

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FEASIBILITY STUDY

COMBINED TRANSPORT IN CENTRAL AND EASTERN EUROPE

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Dělnická 12

Prague 7, 170 00

Author: Výzkumný ústav organických syntéz a.s.

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Rybitví, 533 54

Composite authors: VUOS: Dipl. Eng. Josef Havranek

Dipl. Eng. Viktor Mejstrik, PhD.

Dipl. Eng. Michal Bartos

ChemLog project partners:

- Saxony-Anhalt Ministry of Economics and Labour (LP – project head) (DE)
- Institut isw Halle (DE)
- Ministry of Regional Development and Transportation (DE)
- Polish Chemical Industry Federation (PL)
- **SCHP CR - Association of Chemical Industry of the Czech Republic**
- **Usti region**
- FH OO Research and development, GmbH / Logistics (AT)
- SR Chemical and Pharmaceutical Industry Federation
- Province of Novara (I)
- Regional Development Holding, j.s.c. (HU)

List of used abbreviations	
ADR	The European Agreement concerning the International Carriage of Dangerous Goods
AGN	The European Agreement on main inland waterways of international importance
CACS	The Czech Association of Cleaning Stations
CEFIC	The European Chemical Industry Council
C.R.	The Czech Republic
EFTCO	The European Federation of Tank Cleaning Organizations
EIA	The Environmental Investigation Agency
EIRAC	The European Intermodal Research Advisory Council
ERS	The European Railway Shuttle
GNP	Gross National Product
HHLA	Hamburger Hafen und Logistik AG
HZS	Joint Rescue Services
FRC	Fire Rescue Commission
IBC	Intermediate Bulk Container
ICE	Intervention in Chemical Emergencies
ISO	International Organization for Standardization
JRS	Joint Rescue Services
CT	Combined Transport
CC	Combined Carriage
MEGC	Multiple-Element Gas Container
MT	Ministry of Transport of the Czech Republic
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SAR	Search and Rescue of the German Army
SCHP ČR	The Association of Chemical Industry of the Czech Republic
SQAS	Safety and Quality Assessment Systems
TEU	Twenty foot equivalent unit
TUIS	Transportation emergency and information system, FRG
tkm	tonne-kilometer
TRINS	Transportation information and emergency system (C.R.)
UIRR	The International Union of Combined Road-Rail Transport Companies
ITS	Intelligent Transport Systems and Services

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1 CHARACTERIZING THE AIM OF THE FEASIBILITY STUDY AND USED REFERENCES

1.1 Focus of the feasibility study

The ChemLog project was initiated in 2008 and is a European Cooperation project among federations, associating chemical firms, regional bodies, and scientific institutions from Germany, Austria, Poland, Czech Republic (partners are the Association of Chemical Industry of the Czech Republic and Usti Region), Slovakia, Hungary, and Italy. The main goal of the project is to enhance chemical industry competitiveness. Crucial changes in the structure are occurring in the chemical industry, especially in former Eastern bloc countries; the industry is progressively transforming itself from an independent one to a global one. In line with these trends, key manufacturers are focusing on principle production, and greater emphasis is placed on the exchange of goods, especially as it concerns intermediates and raw materials. The E.U. chemical industry is also searching for additional trading outlets for its products. A similar statement applies as well to markets that are east of the E.U. It is, therefore, necessary to secure safe, reliably, and affordable transport for the bilateral exchange of chemical goods. It is for this reason that the ChemLog project is currently implemented. It progressively defines key challenges in the field of chemical substance logistics in Central and Eastern Europe; it attempts to progressively find solutions and to assess their feasibility.

From the perspective of chemical logistics, the Central and Eastern European regions are facing many challenges. The Czech side has been aware of these challenges prior to the execution of the first part of the ChemLog project, the SWOT analysis. This specifically concerned the excessive concentration of transport on road corridors (e.g. D1 highway) resulting from the marginal use of alternative transport modes (rail, river transport), dedicated network of trans-ship centres, insufficient corridor facilities for the transport of chemicals, etc. Only after the SWOT analysis was produced and numerous discussions at national conferences and peer negotiations took place, were these challenges identified more specifically. Three key challenges were identified that were further elaborated.

The SWOT analysis revealed these pivotal areas, which continue to be developed:

1. Necessity of completing construction of modern rail and road corridors with corresponding facilities for the transport of chemical substances. Emphasis is placed on the maximal use of existing corridors. Modern rail and road corridors from a chemical viewpoint should meet the following conditions:
 - To have a sufficient technical background available for the carriage of chemical goods (e.g. rest areas with separate parking for vehicles carrying dangerous chemical goods, an appropriate number of fire extinguishers, construction solutions in rest areas in the event of chemical substance spillage – cisterns, sewage systems, etc., trained personnel)
 - The availability of sufficient interconnection to the integrated rescue system in the event of an emergency

- Means of monitoring the carriage of dangerous goods, especially recurrent carriage (e.g. shipping from production plants/receipt of raw materials to production plants) including preventative preparations and training of all transport network agents.
2. Necessity of developing combined transport. Negative specifics of individual transportation modes may, in the frame of combined transport, be successfully eliminated, thus achieving improved safety and environmental friendliness of carriages and cost savings over greater distances.
 3. Necessity of securing full-year navigability on the Labe. The improvement of nautical conditions is a crucial condition of increasing carriage volumes by the reverse transfer of suitable chemicals by water freight. Remaining associated goals specifically include:
 - The improvement of water freight services and their targeted cohesion with other types of transport (creating multimodal nodes that are superior from a technical, logistical, as well as personnel aspect)
 - Interconnecting special-interest subjects – carriers with potential transport providers, designation of additional measures including long-term investment goals of the chemical industry (naturally also in additional fields of the industry)
 - The systematic training of responsible employees and the clear designation of requirements placed on firms that operate their business in the field of water freight.

These critical points of chemical logistics in Central and Eastern Europe were further elaborated within the context of best practices. Best practice outlined how the specified challenges should be ideally resolved; nevertheless, emphasis has not yet been placed on the feasibility of these solutions.

All of the challenges outlined, resolved in the context of the ChemLog project, are closely related. Completed, top-rate, and well-equipped rail and road corridors are a fundamental prerequisite of well functioning combined transport. The same may also be stated about terminals, through which these corridors shall be mutually interconnected and, in so doing, to establish assumptions of goods transfer between both transportation modes. Since the majority of chemical works, just as their customers and suppliers, are not located directly on the Labe, it is necessary to establish an origination and termination segment by rail or possibly by road transport. The development of transportation corridors to/from harbours on the Labe is thus a prerequisite for the further development of combined transport and the increase of volumes of chemical substances transported over the Labe.

As was already mentioned, in part, the E.U. chemical industry is searching for additional suppliers or clients, as necessary, of raw materials, intermediates, and trade outlets for final products. The close interrelatedness of the chemical industry and perspective combined transport is available. Obviously, challenges relating to the combined transport of chemical substances in Western, Central, and Eastern Europe must be defined and analyzed in detail, their solutions outlined, and the feasibility of such solutions assessed. *The combined transport of chemical goods in Central and Eastern Europe* feasibility study is a fundamental output of the ChemLog project and should specifically provide solutions to specified challenges and their feasibility. The general goal of this feasibility study is to enhance the competitiveness of the combined transport of chemical substances in the target area when compared to other modes of transport.

1.2 Territorial region of the feasibility study

As already stated at the outset, the target area of this feasibility study is Central and Eastern Europe. This region is also secondarily designated by the ChemLog project partners, which are Germany, Austria, Poland, Czech Republic, Slovakia, Hungary, and Italy. All of the countries in Central and Eastern Europe, thus, have their own representatives within the ChemLog project. Since the ChemLog project is equally focused on transit to/from the former Soviet Federation nation-states, partners from the Russian Federation were also invited to the negotiations.

Specified above were the territorial delimitations of the ChemLog project. It is, however, necessary to mention the political classification. Political borders of nation-states in present-day Europe (with the exception of several states) are irrelevant. They were progressively erased, first by the break-up of the Eastern bloc, and gradually by the entry of many post-communist nation-states into the E.U. and by the establishment of the Schengen Area. Even though the political borders are gradually disappearing, the differences among the former Eastern and Western block countries are still apparent. Areas, in which these differences are apparent, are many, including infrastructure and, along with it, the possibilities of logistical solutions. Infrastructure and related services are at a high level in the majority of Western European countries. In contrast, infrastructure is still unfinished in Eastern Europe, and insufficient attention is placed on the transport of chemical substances. The differences in both fields also result in specific problems that need to be resolved in these fields.

1.3 References used for the production of the feasibility study

Pivotal background materials for producing this feasibility study are the SWOT analysis and BEST PRACTICE. The SWOT analysis defined both weaknesses and strengths in chemical substance logistics in the C.R. from the perspective of chemical firms, combined transport operators, and other specific-interest agents. As was already mentioned, the SWOT analysis defined three key areas – The necessity of developing rail and road corridors, the Necessity of developing combined transport of chemical substances, and the Necessity of year-round navigability on the Labe.

BEST PRACTICE then illustrated the optimal solution of chemical logistics in these key areas.

Regular, publicized statistical data from the Czech Statistical Bureau, Eurostat, and specifically interested Ministries, namely the C.R. Ministry of Transport, were further applied to gather information on the flow of chemical goods. Detailed information on combined transport networks, terminals, and subsequent carriages were acquired through a detailed study of internet websites of specifically interested subjects, especially terminals, combined transport operators, carriers, union federations, certification offices, etc. Much of the pivotal information, as well as feedback on the emerging feasibility study, were acquired during personal meetings with the representatives of concerned institutions, meetings with chemical firm logisticians, and also during multiple peer discussions. National conferences were thus considered a crucial aspect in the emerging feasibility study. The most recent findings were similarly acquired from the Logistics Committee of the Association of Chemical Industry.

It must, however, be noted that the international conferences also outlined many solutions. It was pointed out that the carriage of chemical substances in the ChemLog project, in Central and Eastern

Europe, have their similarities as well as differences, which is also evident from the produced feasibility studies. The C.R. Association of Chemical Industry deals with the combined carriage of chemical substances in Central and Eastern Europe. Many overlapping areas are specifically provided by the project performed in Slovakia, which targets rail and combined transport development opportunities directed from Slovakia to Central Europe. Certain common characteristics may be also observed in the Hungarian-Italian project, in the implementation of corridor 5, heading in the East-West direction. The attachment of this corridor to Central and Eastern Europe, i.e. the ChemLog project area, is secured secondarily, specifically by means of corridors heading North-South, which intersect corridor 5. A pivotal revelation of this project is the fact that road transport along corridor 5 is given preferential treatment at the expense of rail transport. Authors of the study are attempting to find the reasons for this and to enhance the competitiveness of rail transport along the specified corridor. The German side is concerned with transit carriages to/from former Soviet Federation countries.

Austria and the Usti Region are focusing, in their feasibility study, on river transport. The Usti region assesses the benefits of year-round navigability on the Labe, assuming that critical navigation levels are completed on the Czech side. The Austrian side is analyzing narrow areas on the Danube; it proposes solutions and evaluates their feasibility such that the transport of chemical substances is intensified on this water route.

The Polish associate, in contrast, is focusing on the feasibility assessment of constructing a network of oil pipelines, gas pipelines, and other product pipelines in the region of Central and Eastern Europe, such that the dependency on Russian raw materials is decreased.

The fact that the *Combined transport of chemical substances in Central and Eastern Europe* feasibility study arrives at the right time is also underlined by the Joint Appeal of C.R. road and rail carriers, which expresses the support of combined continental transport in the road-rail arrangement. Road and rail carrier representatives, particularly desire development of technical and technological conditions of combined transport that would lead to their increased mass use. According to the appeal, combined road-rail transportation stands and falls on the following three fundamental pillars ²¹:

1. The existence of regular, continental, public, combined transport, long-distance routes.
2. Road carrier equipped with transportation units applicable on both road and rail.
3. Transitional infrastructure between road and rail – terminals with free and un-discriminated access for road carriers

2 DESCRIPTION OF THE CURRENT STATE

In the context of describing the current state, attention is paid to the trade of chemical goods, followed by the import-export balance of chemical goods. The studied field in this case shall be both the entire E.U., as well as the C.R. itself. Individual representatives of the chemical industry and their manufactured products, relating to the Czech Republic, which can potentially contribute to increasing the volume of combined transport, shall be specified in detail. Carriage specifics of chemical substances shall be discussed further in the classification of mandatory and voluntary systems for the transportation of chemical goods. A description of the state of combined transport in Central and Eastern Europe (C.R. is addressed separately) follows the specifics of transport of chemical substances, arranged in the network of combined transport – terminals – subsequent transport.

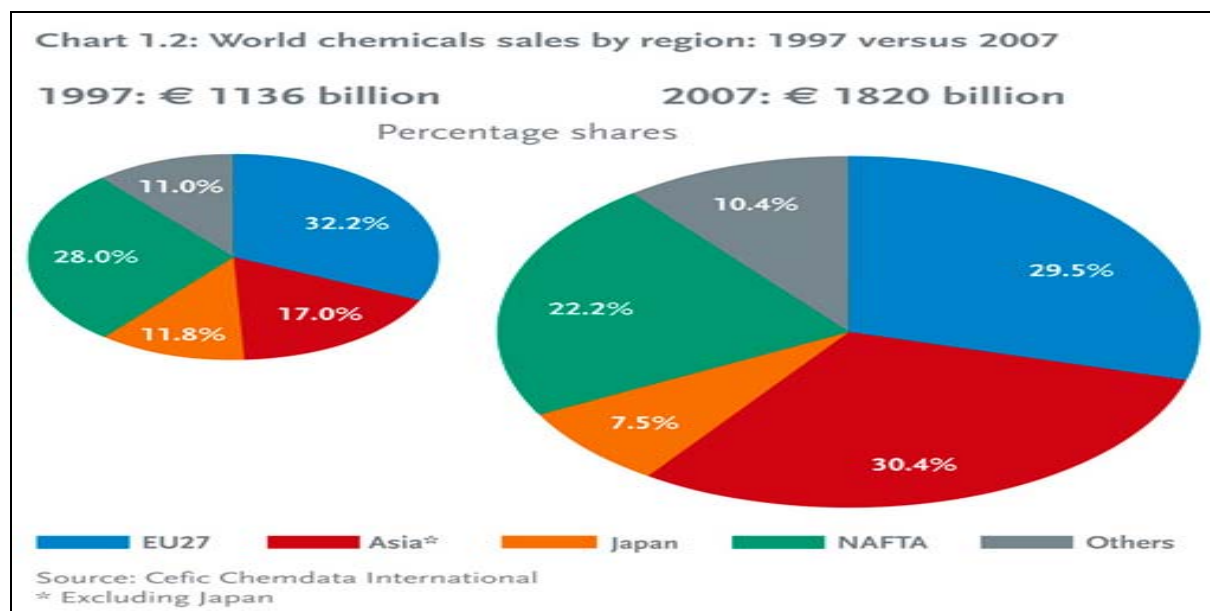
2.1 Production of chemical substances

2.1.1 Production of chemical substances in the E.U.

The European chemical industry represents a significant source of GDP. As one of the largest industrial sectors, the chemical industry has a significant influence on prosperity and employment. Western Europe is one of the largest manufacturers of chemical products; it produces approximately 1/3 of global production in the chemical industry. It employs roughly 1.3 million employees in approx. 27,000 firms. The chemical industry provides jobs in firms in associated branches. A strong, prosperous industry is the foundation of sustainable development. The profits of chemical firms contribute to national economies and subsidize research and development funds that focus on the innovation of new technologies and enhancement of environmental protection.¹⁵

The principle organization representing the E.U. chemical industry interests is the CEFIC organization, located in Brussels. Since its inception in 1972, CEFIC has become one of the largest and most effective specific-interest organizations not only in Europe, but globally as well. The CEFIC organization regularly publicizes statistics relating to the European chemical industry. One of the publicized statistics includes the development of the European chemical industry over time in comparison to other global chemical fields.

Graph 1: Chemical industry in individual global regions based on net sales (1997 and 2007)



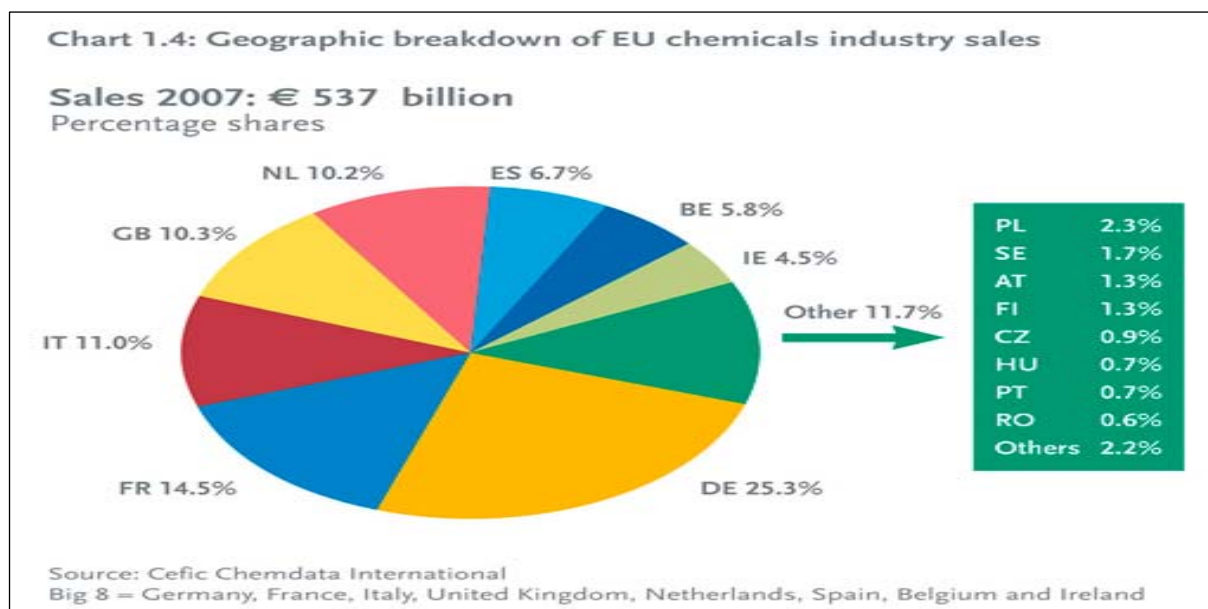
Source: www.cefic.org

In the above graph, we see that the E.U. has lost its leading position over the past decade among the leading producers of chemical substances. If we compare the E.U. result from 1997 and 2007, we see a decline of 2.7%. In actual fact, the sales of chemical substances in the E.U. grew continually, but the

global sales grew even faster. The value of global sales revenues of chemicals increased during the 1997 – 2007 decade by 60%.

All dominant regions on the chemical substances market lost a share to the Asian competition. The Asian competition gains an edge mainly due to the absence of strict environmental regulations and cheaper labour. The competitiveness of the European chemical industry is, on the other hand, influenced by E.U. legislation, legal acts and regulations. Most recently, to cite an example, it concerns REACH regulations, which relate to compounds manufactured in the E.U. or those imported in a quantity greater than 1ton annually. These substances must be progressively registered over the next few years. The costs for such registrations are large and are the responsibility of the manufacturers or importers of these substances, as applicable.

Graph 2: Chemical industry of individual E.U. nation-states based on overall revenues



Source: www.cefic.org

As mentioned above, Western Europe has a dominant position in the chemical industry from an E.U. aspect. Among the most significant producers of chemicals in Europe are Germany, followed by France, Italy, and Great Britain. Together, these countries comprise nearly two thirds of overall chemical revenues in the E.U., i.e. 329 billion EUR. After including the Netherlands, Spain, Belgium, and Ireland, the overall market share of chemicals is 88%. With a 2.3% share on overall revenues for chemicals, Poland is the largest producer of chemicals from the new EU nation-state members. The Czech Republic represents 0.9% of overall revenues, i.e. about 4.8 billion EUR.

The European Statistical Office, EUROSTAT, also publicizes foreign revenue statistics. It is possible to assess the overall trade balance of foreign revenues, since both import and export data are publicized. Additionally, these statistics are classified according to the product. This makes it possible to assess the revenue balance of chemical products.

The export of chemicals and related chemical products monitored by EUROSTAT is mentioned in the Table 1. Export of chemical products from the EU 27 continuously grows in the monitored 2000 – 2008

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period. The value of exported chemical products in 2000 was 129.6 billion EUR, in 2008 it was as much as 224.3 billion EUR. The dominant E.U. 27 exporter of chemical products is Germany. The rank in other areas was constantly changing since the year 2000. Currently, the largest exporters are Belgium, France, Netherlands, Great Britain, and Switzerland. Czech Republic export in 2008 was 5.98 billion EUR.

Tab. 1: Foreign revenues of chemical products – export (SITC5 – chemicals and related products)¹

EXPORTS IN 1000 MILLION OF ECU/EURO									
	2000	2001	2002	2003	2004	2005	2006	2007	2008
European Union (27 countries)	118.91	130.19	141.13	141.1	152.62	164.85	184.57	197.9	198.82
European Union (25 countries)	119.73	131.32	142.57	142.56	154.35	166.87	187.51	201.48	203.04
European Union (15 countries)	129.61	142.44	154.64	154.85	166.92	181.22	204.74	221.27	224.32
Belgium	41.35	44.71	61.71	61.86	68.6	77.15	83.04	91.02	90.22
Bulgaria	0.53	0.52	0.47	0.5	0.52	0.72	0.76	1.03	1.21
Czech Republic	2.24	2.4	2.42	2.53	3.1	3.77	4.38	4.98	5.98
Denmark	6.05	6.77	7.35	7.73	8.14	9.21	9.14	9.9	10.27
Germany (including ex-GDR from 1991)	75.28	81.68	79.31	84.8	96.78	105.43	121.38	134.8	140.85
Estonia	0.14	0.17	0.18	0.22	0.26	0.32	0.39	0.45	0.53
Ireland	27.46	32.4	39.14	35.79	37.5	40.36	39.77	43.18	44.1
Greece	1.03	1.15	1.08	1.47	1.64	2.03	2.18	2.36	2.28
Spain	11.88	13.15	14.39	15.2	16.02	18.57	20.38	23.14	24.66
France	49.01	51.69	53.31	53.62	56.78	60.42	66.09	69.71	73.37
Italy	24.56	26.44	27.86	27.13	29.03	32.18	34.98	37.24	36.81
Cyprus	0.07	0.09	0.1	0.09	0.11	0.13	0.14	0.16	0.19
Latvia	0.13	0.14	0.14	0.16	0.2	0.26	0.39	0.51	0.63
Lithuania	0.35	0.34	0.4	0.46	0.6	0.82	1.03	1.68	2.2
Luxembourg (Grand-Duché)	0.56	0.58	0.63	0.67	0.75	0.69	0.75	0.87	0.8
Hungary	1.99	2.21	2.42	2.64	3.34	3.69	4.9	5.58	6.12
Malta	0.04	0.05	0.04	0.04	0.05	0.1	0.14	0.2	0.21
Netherlands	33.88	35.22	38.08	38.97	45.27	49.92	55.7	62.34	60.46
Austria	6.65	7.36	8.15	8.22	8.36	9.54	11.26	12.33	13.12
Poland	2.34	2.54	2.76	3.1	3.89	4.88	6.31	7.51	9.11
Portugal	1.49	1.47	1.6	1.73	1.94	2.11	2.34	2.71	2.73
Romania	0.66	0.66	0.69	0.74	1.04	1.28	1.47	1.7	2.04
Slovenia	1.05	1.18	1.34	1.53	1.72	1.92	2.37	2.79	3.12
Slovakia	0.98	0.99	1.01	1	1.18	1.47	1.82	2.09	2.3
Finland	2.95	3.05	3.31	3.33	2.27	3	3.55	3.76	4.01
Sweden	8.48	8.87	9.2	10.35	11.03	11.76	13.53	13.63	13.62
United Kingdom	40.91	43.94	45.02	45.26	47.22	48.82	54.88	56.92	54.88
Iceland	0.03	0.06	0.09	0.08	0.12	0.09	0.08	0.08	0.08
Norway	1.69	1.82	1.94	1.87	2	2.23	2.32	2.87	3
Switzerland	24.13	28.58	31.48	30.62	33.1	36.47	41.27	43.3	46.85

Source: Eurostat 2010

Tab. 2: Foreign trade of chemical products – export (SITC5 – chemicals and related products): EU27 vs. main partners outside of the EU27 (in millions of EURO)

partner/year	2002	2003	2004	2005	2006	2007	2008	2009
Extra EU-27	141135	141103	152621	164852	184570	197917	198793	195514
United States of America	46468	46306	46716	48597	54939	55809	53455	53804
China	3308	3760	4447	5180	6095	7409	8507	10132
Russian Federation	4700	5170	6403	8222	10932	12394	13812	11333
Japan	8413	7787	8801	8960	9171	8789	8755	9546
Norway	2830	2878	2987	3322	3496	3772	3859	3677

The EUROSTAT statistics were accepted in unmodified form. The first line in the table has most likely been swapped with the third line of the table. The EU 15 import volume cannot be larger than that of the EU27 or EU25.

ChemLog – Chemical Logistics Cooperation in Central and Eastern Europe

Switzerland	13824	13496	14887	16406	18238	19957	18078	17614
Turkey	5043	5638	6998	7861	8704	9152	9256	8495
Canada	3537	3872	3915	4307	4968	5188	4939	4876
Brazil	3002	2791	3195	3226	3671	4324	5176	5060
Singapore	1905	1821	2260	2474	2606	2528	2557	2526

Source: Eurostat 2010

Export to countries outside of the EU 27 grows constantly since 2002. The only exception is the year 2009, when the economic crisis was fully manifested. From an export aspect, the largest partners of the E.U. are namely the United States of America, with China and the Russian Federation far behind. The development of combined transport heading eastward is merited, considering the constantly increasing export to the Russian Federation and China.

Tab. 3: Foreign revenues of chemical products – imports (SITC5 – chemicals and related products)²

IMPORTS IN 1000 MILLION OF ECU/EURO									
	2000	2001	2002	2003	2004	2005	2006	2007	2008
European Union (27 countries)	70.5	76.9	80.76	80.51	88.53	96.44	109.22	120.63	124.35
European Union (25 countries)	70.58	76.89	80.65	80.37	88.26	96.03	108.68	120.1	123.7
European Union (15 countries)	71.37	77.54	81.16	80.76	89	98.3	112.01	124.34	128.19
Belgium	31.4	35.59	50.08	49.63	55.23	64.46	68.45	72.7	71.53
Bulgaria	0.66	0.82	0.86	0.96	1.2	1.39	1.63	1.92	2.2
Czech Republic	3.9	4.43	4.82	5.21	6.06	6.69	7.69	8.89	9.92
Denmark	4.87	5.18	5.66	5.61	6.06	6.71	7.47	7.79	8.28
Germany (including ex-GDR from 1991)	51.64	57.69	57.72	58.79	66.41	75.97	88.34	98.73	102.62
Estonia	0.4	0.43	0.49	0.54	0.64	0.76	0.97	1.06	1.13
Ireland	6.09	6.35	7	6.89	7.07	7.38	7.94	8.09	8.28
Greece	4.21	4.55	3.65	5.02	5.72	6.36	6.92	7.75	8.26
Spain	18.03	19.8	22	23.38	24.89	26.9	29	31.65	34.15
France	40.87	42.15	42.44	44.12	46.8	51.16	53.99	59.63	61.64
Italy	31.48	32.39	33.73	34.37	38.06	40.82	45	48	46.95
Cyprus	0.34	0.38	0.41	0.41	0.44	0.46	0.51	0.57	0.64
Latvia	0.43	0.49	0.54	0.57	0.65	0.75	0.98	1.14	1.3
Lithuania	0.67	0.81	0.92	0.98	1.16	1.41	1.79	2.28	2.43
Luxembourg (Grand-Duché)	1.12	1.25	1.19	1.22	1.32	1.42	1.53	1.68	1.69
Hungary	3.08	3.38	3.69	4.09	4.63	4.99	5.89	6.44	7.29
Malta	0.23	0.22	0.23	0.24	0.26	0.27	0.29	0.33	0.32
Netherlands	25.04	26.09	28.06	27.67	31.14	35.15	38.85	44.48	44.7
Austria	7.8	8.52	8.92	9.28	9.59	10.8	12.14	13.04	13.65
Poland	7.46	8.18	8.69	8.91	10.2	11.64	13.64	15.7	18.51
Portugal	4.07	4.39	4.64	4.75	5.05	5.39	5.96	6.35	6.66
Romania	1.42	1.72	2.03	2.18	2.72	3.31	4.3	5.26	6.15
Slovenia	1.36	1.44	1.55	1.63	1.85	2.04	2.25	2.64	2.79
Slovakia	1.51	1.7	1.87	1.95	2.33	2.7	3.19	3.87	4.33
Finland	3.88	3.96	4.18	4.34	4.55	5.13	5.84	5.82	6.13
Sweden	7.15	7.32	7.34	7.87	8.67	9.59	10.61	11.92	12.73
United Kingdom	34.74	37.24	39.13	38.73	42.26	43.94	47.77	51.97	48.58
Iceland	0.2	0.24	0.25	0.26	0.28	0.31	0.33	0.36	
Norway	3.24	3.4	3.5	3.44	3.62	4.18	4.66	5.03	5.69
Switzerland	14.86	18.06	19.36	18.81	20.01	22.11	23.83	26.33	25.46

Source: Eurostat 2010

The situation in imports of chemical substances is similar to their exports. Since year 2000, imports of chemical substances into the EU 27 is constantly growing. The largest importer is Germany, followed by Belgium, France, Great Britain, and Italy. Imports of chemical products into the C.R. account for roughly 8% of the EU 27.

² The EUROSTAT statistics were accepted in unmodified form. The first line in the table has most likely been swapped with the third line of the table. The EU 15 import volume cannot be larger than that of the EU27 or EU25.

The growth of global trade, which is not limited solely to exports and imports of chemicals, is closely associated with increasing sea freight especially to/from Asia and related subsequent shipping of containers to/from seaports (especially Hamburg, Bremerhaven, and Rotterdam). That obviously leads to an increase in direct integrated trains on route to seaports and to the introduction of new consecutive routes as well as the growth of transit over inland nation-states like the C.R. Volumes of unaccompanied continental transport (from inland terminal to inland terminal) are very small. The very growth of this transport presents large potential in the future.

Chemical substances do not have to be transported to the specified ports only by means of containers. The majority of liquid chemical substances today are transported to ports, to Rotterdam specifically, in freely-laid in tankers, subsequently stored in underground tanks, and distributed across the entire traditional continent. The same applies in the opposite direction.

Tab. 4: Foreign trade of chemical products – imports (SITC5 – chemicals and related products): EU27 vs. main partners outside of the EU27 (in millions of EURO)

partner/year	2002	2003	2004	2005	2006	2007	2008	2009
Extra EU-27	80757	80506	88529	96443	109218	120699	124294	112402
United States of America	31040	28945	31423	31231	34821	35879	35872	33872
China	3340	3830	4072	5178	6267	7536	9294	7934
Russian Federation	2398	2686	3149	3702	4038	4505	5321	3322
Japan	5561	5452	5709	6034	6157	6531	6067	5551
Norway	2355	2425	2441	2583	3030	3317	3526	2545
Switzerland	18468	17596	19825	21332	24208	25309	26038	27118
Turkey	628	671	801	907	1189	1355	1592	1318
Canada	949	1314	1376	1610	2242	3398	2284	2406
Brazil	735	808	809	1049	1319	1763	2177	1860
Singapore	2171	3476	4448	5857	6140	7469	5612	5054

Source: Eurostat 2010

Among key importers to EU 27 countries are the United States of America, with China and the Russian Federation far behind. Imports from China from 2002 to 2009 have more than doubled. Imports from the Russian Federation since 2002 have also grown, but not as significantly as in the case of China.

2.1.2 *Production of chemical substances in the C.R.*

The chemical industry in the C.R. has a long tradition and represents a significant source of GDP. According to the data provided by the Ministry of Industry and Trade, the contribution to the gross value³ added in 2009 was approximately 3.6%. The chemical industry supplies all sectors of the manufacturing industry, services, and households with its products. The contribution to revenues of the manufacturing industry is 15.5 % (2009); the ratio of workers in the chemical industry to the

³ The gross value added (GVA) is the difference between the overall production of goods and services measured on the one side and between marginal consumption (value of goods and services consumed during production) on the other side. Source: Wikipedia; http://cs.wikipedia.org/wiki/Ekonomick%C3%A1_p%C5%99idan%C3%A1_hodnota; updated on 8/7/2010

manufacturing industry as a whole is then 11.4 %. Average revenues per firm were 400 million CZK. This includes all firms with over 20 employees.

The below specified table summarizes the situation of the Czech chemical industry in years 2008 and 2009. In 2009, the chemical industry registered a downturn in revenues of 16.1 %. A downturn, in fact larger than the chemical industry by a full 13.9%, was also registered across the entire manufacturing industry. The contribution of the chemical industry on the manufacturing industry in the C.R. in 2009 thus increased. In the context of streamlining expenses, the chemical as well as manufacturing industry experienced layoffs during the crisis; the chemical industry recorded a 10% fall in the number of employees, the manufacturing industry 11.5% decrease.

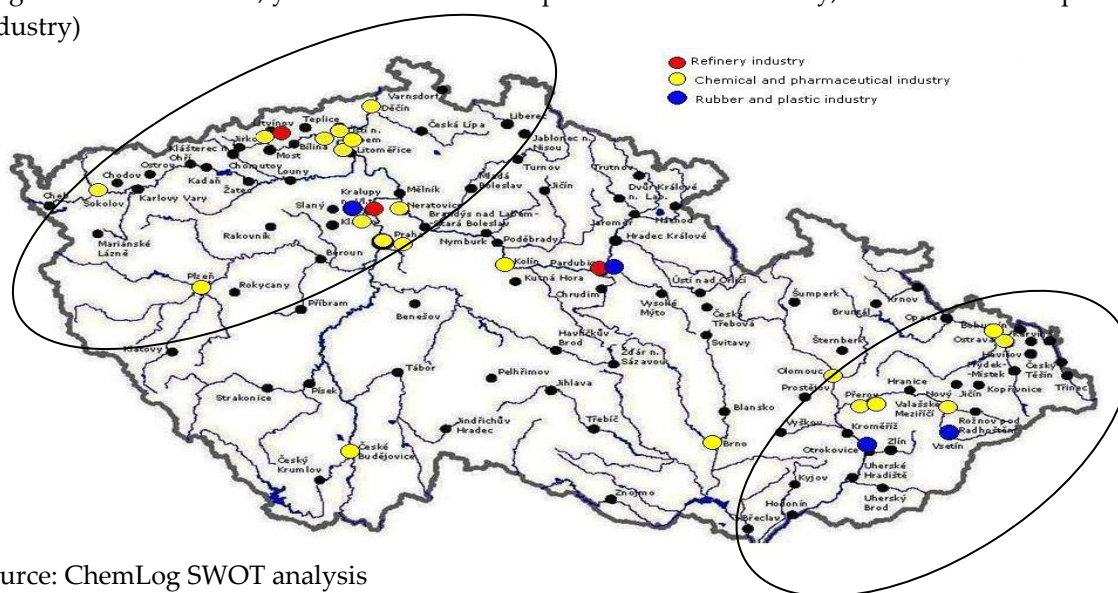
Tab. 5: Principle indicators of the chemical industry in the C.R. in 2009

Indicator	Year 2008	Year 2009	Index 09/08 (%)	
			Chemical industry	Manufacturing industry
Revenues at current prices (bill. CZK)	445,6	373,7	83,9	86,1
Direct export revenues (bill. CZK)	183,2	168,7	92,1	84,1
Number of employees (thousand persons)	116,6	104,9	90,0	88,5
Exports (bill. CZK)	278,5	247,0	88,7	85,0
Imports (bill. CZK)	396,0	340,3	85,9	82,9
Value added (bill. CZK)	97,2	91,6	94,2	94,6

Source: SCHP CR 2009 Annual report

Picture 1: Location of the chemical industry in the C.R.

(Legend: red – refineries, yellow – chemical and pharmaceutical industry, blue – rubber and plastics industry)



Source: ChemLog SWOT analysis

Distribution of individual chemical plants in line with the CZ-NACE classification of economical activities is specified below. The picture indicates that the C.R. chemical industry is concentrated in the North-East and North-West region. The transitional region then specifically comprises the Central and Eastern Bohemia region (Prague, Kolín, and Pardubice). Among the key players in the C.R. chemical industry are the following firms and products:

- **North-West region:**

Hexion – specialties, acrylic acids, esters, acrylic polymers <http://www.hexion.com/>

Unipetrol RPA – plastic materials, agro-urea, monomers, alcohols, <http://www.unipetrolrpa.cz/>

Česká rafinérská – Shell, ENI, PKN – production of petroleum, diesel, avgas, heating oils, LPG, asphalt, etc. <http://www.ceskarafinerska.cz/cz/index.aspx>

Spolchemie – synthetic resins (basic as well as modified, low as well as high molecular), basic inorganic compounds (sodium and potassium hydroxide, hydrochloric acid), and specialties, etc. <http://www.spolchemie.cz/>

Setuza – bio-fuel, cosmetics <http://www.setuza.cz/>

Lovochemie – inorganic products, fertilizers (ammonium sulphate, ammonium nitrate, calcium nitrate, urea-based fertilizers) <http://www.lovochemie.cz/>

Synthos – plastic materials, rubbers (styrene-butadiene rubbers, monomers, <http://www.kaucuk.cz/html/intro.html>

Spolana – PVC (Neralit), inorganic compounds (Sodium hydroxide, Sulphuric acid, Hydrochloric acid, ammonium sulphate-based industrial fertilizers, specialties, <http://www.spolana.cz/html/>

Chemotex – textile industry chemicals, detergents, tensides, concentrated extracts for the cosmetics industry, etc. <http://www.chemotex.cz/>

SIAD, Air Products – technical and special gases (acetylene, oxygen, mixtures), liquefied gases (oxygen, nitrogen, argon, carbon dioxide, helium) <http://www.airpower.com.sg/>

Dekonta – dangerous waste materials, <http://www.dekonta.cz/>

- **North-East region:**

Barum Continental – production of rubber compounds, <http://www.contitrade.cz>

Biochemie – retail cleaning agents, disinfecting agents, wood treatment preparations, metal treatment preparations, etc. <http://www.bochemie.cz>

BorshodChem – basic chemicals, amines (aniline, cyclohexylamine, special amines), inorganic compounds, <http://www.bc-mchz.cz/>

Deza – aromatic compounds (benzene, phenols), organic specialties, tar products,

<http://www.deza.cz/vgs/deza/d.htm>

Fatra – PVC (floor coverings, water-resistant membranes, granulated PVC), PET for insulation, laminates, etc. <http://www.fatra.cz/>

Fosfa – phosphoric acid, phosphates for use as food additives, fertilizers, detergents (washing detergents, powder detergents) <http://web.fosfa.cz/>

Gumotex - rubbers, <http://www.gumotex.cz/>

Precheza – inorganic pigments, titanium white, <http://www.precheza.cz/www/index.htm>

CS Cabot – carbon black, <http://www.cabot.cz/>

- **Others:**

Cepro – small petrol retailer, pipeline routes, terminals, national reserves, <http://www.ceproas.cz/>

Silon – polymer bases (PP, PE, PP/PE, PP/EPDM, PP/PE + EPDM), polyester fibres, additives (heat retarder, dyes) <http://www.silon.cz/>

Synthesia – organic pigments and dyes, pharmaceutical specialties <http://www.synthesia.eu/>

Explosia – explosives and smokeless powders, <http://www.explosia.cz/>

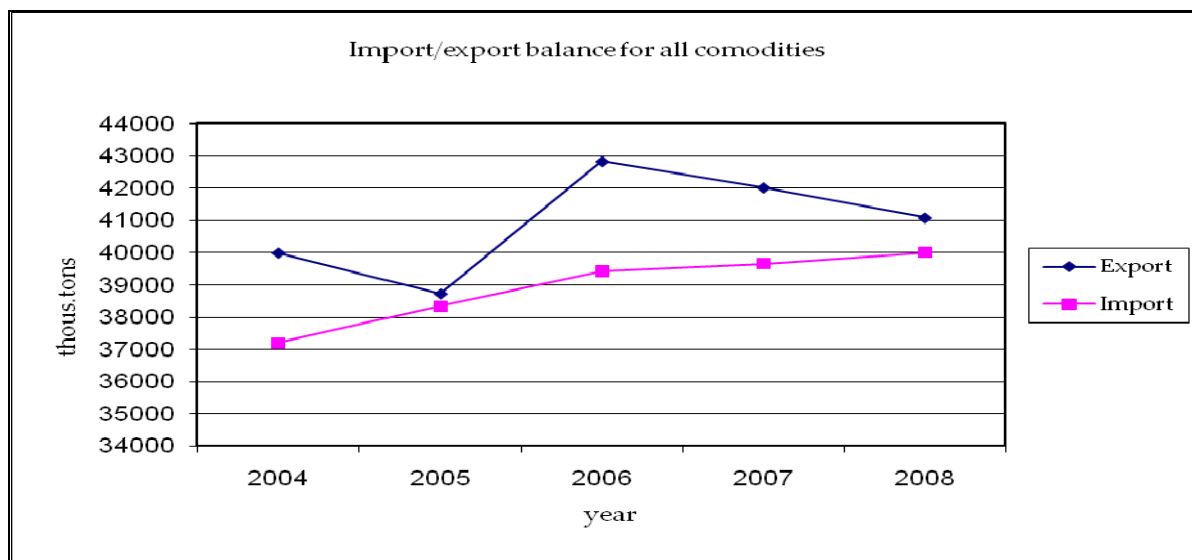
Zentiva – pharmaceuticals, <http://www.zentiva.cz/>

Paramo – oils, lubricants, paraffin, <http://www.paramo.cz/cs/index.html>

Linde Gas – technical, special, and medicinal gases, www.linde-gas.cz

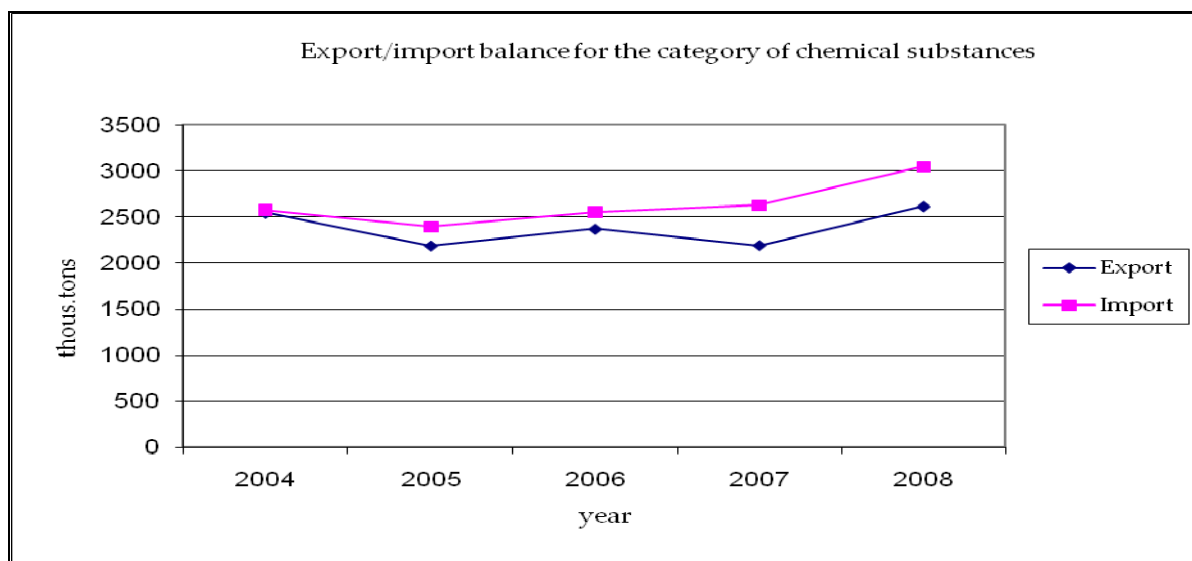
The European statistical office also acquires import and export data from national statistical authorities of member countries according to individual commodities. One of these categories also includes chemical substance preparations, products and synthetic fibres, rubber and plastic products, and nuclear fuel. The following graphs describe the import/export balance for all commodities and the import/export balance only for the category of chemical substances specified above.

Graph 3: Import/export balance for all commodities for the Czech Republic



Source: Eurostat 2010

Graph 4: Import/export balance for the category of chemical substances in the C.R.



Source: Eurostat 2010

Black and brown coal comprise the largest export item from the Czech Republic, metal ores, mining products, and general metals, in contrast, comprise the largest import item.

Raw materials for chemical production, intermediates as well as final products that are the subject of our interest, comprises roughly 6% of the overall exports of all commodities and 7.8% of the overall imports of all commodities.

From the specified amount it is evident that basic infrastructure cannot be completed only because of the chemical industry. Transported amounts of chemical substances are, in comparison with other commodities, small; consequently, only the addition of chemical cargo to other non-chemical goods may be considered.

It is evident from the information provided above that the chemical industry constitutes an important contribution to the gross domestic product, both in the E.U., then so too in the Czech Republic. In order to execute business transactions, raw materials, intermediates, as well as final products must be transported. Based on our findings, combined transport appears to us to be the most promising. The reason, in particular, is:

1. Environmental friendliness – combined transport in its most common arrangement (road-rail), combines long-distance transport using quick, reliable, and environmentally friendly railways and flexible road transport in initial and terminal segments. If the advantages of individual transportation modes are sufficiently applied in the frame of combined transport, the environmental impact is significantly reduced. Demonstrably small impact on the environment compared with road transport also underscores the study performed by the UIRR (International Union of combined Road-Rail transport companies). According to this study, associated combined transport represents 11% energy savings compared to pure road transport, un-associated combined transport then as much as 29% energy savings. If CO₂ emissions are compared, associated combined transport represents 18% savings, un-associated transport up to 55% savings compared to pure road transport.
2. Safety
3. Demonstrable reduction in operating expenses during sufficiently long rail transport.
4. Reloading of goods between transportation instruments is unnecessary when changing the mode of transportation.

2.2 *Specifics of combined transport of chemical goods*

2.2.1 Essential instruments/requirements for transporting dangerous goods

Before the specifics of chemical substance logistics is discussed in detail, we deem it appropriate to define two basic legislative terms that we encounter in the frame of chemical logistics.

Dangerous chemical substance: The definition of a dangerous chemical substance can be found in directive 67/548/EHS, which the European Parliament decree as well as Council (ES) no. 1907/2006 (REACH) appeal to, during the classification. Dangerous substances, in the context of this directive, are considered to be

- | | |
|---|--|
| a) <i>explosive substances and preparations</i> | i) <i>harmful substances and preparations</i> |
| b) <i>oxidizing agents and preparations</i> | j) <i>caustic (corrosive) substances and preparations (corrosives)</i> |
| c) <i>extremely flammable substances and preparations</i> | k) <i>irritants</i> |

- | | |
|---|---|
| d) <i>highly flammable substances and preparations:</i> | l) <i>sensitizing agents and preparations</i> |
| e) <i>flammable substances and preparations</i> | m) <i>carcinogenic substances and preparations</i> |
| f) <i>highly poisonous substances and preparations</i> | n) <i>mutagenic substances and preparations</i> |
| g) <i>poisonous substances and preparations</i> | o) <i>substances and preparations that are toxic for reproduction</i> |
| h) <i>substances and preparations that are harmful to the environment</i> | |

Dangerous goods: The definition of dangerous goods is entrenched in the ADR agreement. Dangerous goods are those that specified namely in Table A of the ADR decree in part 3: Identifying dangerous goods, special provisions, and valid exceptions for limited amounts. According to the ADR agreement, dangerous goods, whose transport is forbidden in Table A, must not be accepted for international transport, whereas the international transport of other dangerous goods is permitted, should the following be met:²⁸

- Conditions concerning packaging and labelling (designated in Table A); and
- Conditions concerning the construction, equipment, and operation of vehicles transporting the given articles (designated in Table B)²⁸

Safety requirements for the transport of dangerous articles over road and rail are thus embodied in international agreements, which the C.R. endorsed – this relates to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) and the International Rule for Transport of Dangerous substances by Railway (RID). ADR and RID contain both general requirements for the transport of dangerous articles, as well as the classification and listing of dangerous articles, provisions for the use of packages and cisterns, labelling, construction requirements and testing of packages, cisterns, and cistern containers as well as service personnel requirements. The AGN and ADN agreements are pivot for river transport. We shall not deal with sea transport of dangerous goods (addressed by the IMDG regulation) and air transport of dangerous goods (IATA Dangerous Goods Declaration) in this project.

The above specified agreements cover all transportation modes that can be applied in the frame of combined transport. It generally then applies, that what can be transported by road transport, can usually be transported also by means of combined transport. Goods that are forbidden to be transported by combined transport are then designated in table A of the ADR/DIR document by the English expression “prohibited.” This particularly concerns certain explosive substances, spontaneously reacting substances, organic peroxides requiring a controlled environment, and sulphur trioxide in a specific level of purity.⁽⁴⁾

2.2.1.1 Road transport of chemical substances

Road transport of dangerous chemical substances is regulated by the European Agreement concerning the International Carriage of Dangerous Goods by Road, known commonly under the abbreviation ADR (Accord Dangereuses Route). Integral components of this agreement are its annexes (A and B)

and their supplements. The ADR agreement was established in year 1957 Geneva and ČSSR adopted it in 1987. All Central and Eastern European nation-states also adopted the ADR Agreement⁴.

Each country that signed the ADR agreement had to implement it into its legislation. The decree in the C.R. was implemented into Act no. 150/2000 Coll., which amends Act no. 111/1994 Coll., on road transport, as further amended. This Act defines dangerous goods as substances and articles, for which their nature, characteristics or condition may, in relation to their transport, present a safety threat to persons, animals, and goods, or which pose a threat to the environment. The legislation states that the road transport is permitted only for the transport of dangerous goods delineated by the ADR agreement. The transport of nuclear materials and radionuclide emitters is meanwhile governed by special legal regulations.

The Road Transportation Act also precisely outlines the basic obligations of dispatchers and carriers, national professional oversight for the fulfilment of these obligations and sanctions, which may be rendered upon dispatchers and carriers alike, for failing to meet these obligations. Carrier and dispatcher obligations are delineated as follows:

A subject accepting a dangerous good for transport. According to the ADR Agreement, the dispatcher is specifically obligated to:

- a) classify, package, and label the dangerous good,
- b) to adhere to the provision(s) prohibiting joint loading, if so performed,
- c) to refrain from delivering dangerous goods for transport, whose transport is prohibited,
- d) to review, prior to loading, the originating documentation and to perform a visual inspection to determine if the vehicle and its equipment meet the prescribed provisions,
- e) to deliver to the carrier, in written form, instructions for the driver,
- f) to enter accurate and complete information in the bill of lading, inclusive the declaration,
- g) to deliver to the driver a copy of the authorization according to special regulations,
- h) to label the containers,
- i) to secure the prescribed training of additional persons, participating in the transport,
- j) to appoint a safety consultant. ⁽⁵⁾

The carrier is obligated, under the ADR Agreement, during the transport of dangerous goods, specifically:

- a) to use vehicles that are roadworthy for such use,

⁴ **States, which adopted the ADR agreement:** Albania, Andorra, Azerbaijan, Belgium, Belarus, Bosnia and Herzegovina, Bulgaria, Czech Republic, Montenegro, Denmark, Estonia, Finland, France, Croatia, Ireland, Italy, Kazakhstan, Cyprus, Lichtenstein, Lithuanian, Latvia, Luxembourg, Hungary, Malta, Macedonia, Morocco, Moldavia, Germany, Netherlands, Norway, Poland, Portugal, Austria, Romania, Russia, Greece, Slovakia, Slovenia, United Kingdom of Great Britain and Northern Ireland, Serbia, Spain, Sweden, Switzerland, Tunis, and Ukraine.

- b) to secure that the driver has obligatory equipment, including orange hazard plates, or safety signs, if necessary,
- c) to secure the presence of an assistant driver in the vehicle, if so prescribed,
- d) to ensure that the transport is performed solely by drivers that are so trained,
- e) to secure the training of additional persons, participating in the transport,
- f) to ensure that the driver:
 - has, during transport, with him/her and presents upon request for inspection to authorized persons, originating documents, functioning fire extinguishers, mandatory vehicle equipment,
 - does not accept for transport, nor transports an item, whose packaging is damaged or leaking,
 - performs, in the event of an emergency or unexpected event, measures specified in the written instructions for the driver,
 - adheres to the regulations concerning loading, unloading, and handling, if he/she performs it personally, including the prohibition of joint loading, operation of the vehicle, and oversight of vehicles, ⁽⁵⁾

2.2.1.2 Railway transport of chemical substances

Transport of dangerous chemical goods by railway is modified by the International Rule for Transport of Dangerous Substances by Railway, commonly abbreviated as RID (Règlement international concernant le transport des marchandises dangereuses par chemins de fer). RID, in terms of its structure, is very similar to the European Agreement concerning the International Carriage of Dangerous Goods, ADR. RID defines the obligations of the principle participants of railway transport – dispatcher, carrier, and consignee. All of these participants must, according to the RID agreement, undertake reasonable measures, based on the nature and extent of foreseeable events, such that damages or bodily harm are avoided, or their impacts are minimized, as necessary. Should the public be directly at risk, these participants must notify emergency response units, without delay, and convey all information necessary for their activity. ¹⁷

Specific obligations of individual railway transport participants are as follows: ¹⁷

Dispatcher

- a) To make certain that dangerous goods are classified and admitted for shipping according to the RID
- b) To deliver information and data to the carrier, or transportation and origination documentation (authorizations, approvals, notifications, etc.), as necessary.
- c) To use only packaging, large packaging, IBC, and cisterns approved and suitable for the transport of the corresponding substances and labelled according to the RID
- d) To fulfil the obligations concerning the method of shipping and transport limitations
- e) To make certain that even emptied, contaminated, and un-aerated cisterns are respectively labelled and equipped with safety markings

Carrier

- a) To verify that the dangerous goods for transport, are permitted for transport according to the RID
- b) To verify that the prescribed documents are attached to transportation documentation
- c) To visually inspect that the vehicle and the cargo are absent of noticeable defects, leaks or cracks, and that no equipment is missing
- d) To make certain that the next test date in storage-tank trucks, battery vehicles, removable tanks, transferable tanks, tank containers, and MEGC has not elapsed.
- e) To inspect that the vehicle is not over-loaded
- f) To make certain that the vehicles are equipped with the prescribed symbols and labels

Consignee

- a) To perform, where so prescribed by the RID, the cleaning and decontamination of vehicles and containers
- b) To ensure that that after the containers are completely unloaded, cleaned, and decontaminated, that the orange labels and safety markings are removed from vehicles and containers.

Further, in the context of the RID, detailed obligations of other participants are defined during the process of loading, packaging, or filling, as applicable. These operations shall not be discussed further.

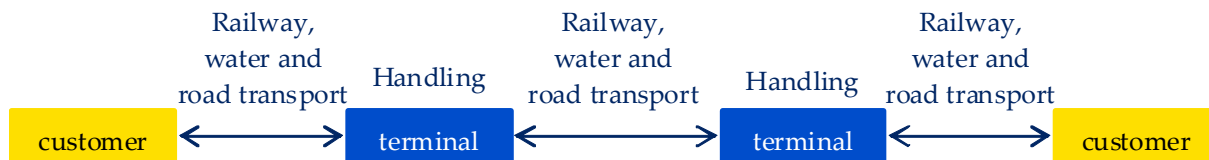
2.2.1.3 River transport of chemical substances

River transport of chemical substances is modified by the European Agreement on main inland waterways of international importance (AGN) and Regulation for the Carriage of Dangerous Substances on the Rhine (ADNR). The AGN Agreement was negotiated in Geneva in 1996. The Czech Republic signed the agreement in Helsinki in 1997 and it was eventually publicized in the Collection of Acts as Ministry of External Affairs' announcement no. 163/1999 Coll. ⁽⁶⁾ The European Agreement concerning the international transport of dangerous substances on the Rhine) and corresponding regulations were also applied to transport over the Elbe an Germany channels. ⁽⁷⁾

2.2.1.4 Technical equipment of terminals for the transport of chemicals

Combined transport comprises several, mutually coherent parts. It concerns the initial transport from the customer to the terminal, where the goods are transferred to a different mode of transportation and transported to the next terminal. The goods are eventually shipped from this terminal to the end customer. The transportation costs must be calculated for the entire transportation chain (all-inclusive rate), and terminal services, thus comprise its significant part. The price, extent, and quality of offered services in terminals are key factors, according to which the customer decides on the execution of transport. The quality of offered services, especially considering the treatment of dangerous chemical parcels from the series of chemical companies, is of pivotal importance for the customer.

Picture 2: Diagram of the combined transportation chain



Terminals are usually extensive areas, which must be properly tailored for the transportation of goods, and not only chemical. We can essentially divide the operating-technical equipment of loading stations into constructional, technological, and other equipment. Only some of this equipment, however, is actually relevant for the transport of chemical substances.

The constructional parts include:

- Railway siding and its track
- Internal communication, handling, and storage areas
- Administration (operations) building
- Entry gate
- Service centre
- Storage areas
- Other terminal facilities

The constructional areas that are specifically relevant to handling of chemical substances are the handling and storage areas. In terms of handling chemical substances, the constructional areas of the terminal of significance are specifically the constructional components, i.e.

- Specially treated flooring, which is impermeable to chemical substances and preparations
- Storage area facilities for flammable substances equipped with an endorheic sump, into which the entire room is grouted. The size of the sump must be sufficient to hold the full volume of the largest stored container
- Appropriate fire prevention equipment including electronic fire alarms
- Temperate conditions in the winter
- Recuperation when re-pumping chemical substances

The technological part includes:

- Transferring mechanisms
- Special equipment for containers and detachable extensions

From a chemical substance transport viewpoint, special container equipment is predominantly important. This particularly relates to the heating of containers and leakage sumps.

Others

- Fencing and other safeguards and ensuring the guarding of the loading station
- Night-time lighting

It must be noted that the operation of terminals, especially the treatment of chemical goods in the frame of the terminal, is not modified by legislation.

2.2.2 Compulsory instruments for the transport of chemical substances

2.2.2.1 *Responsible Care*

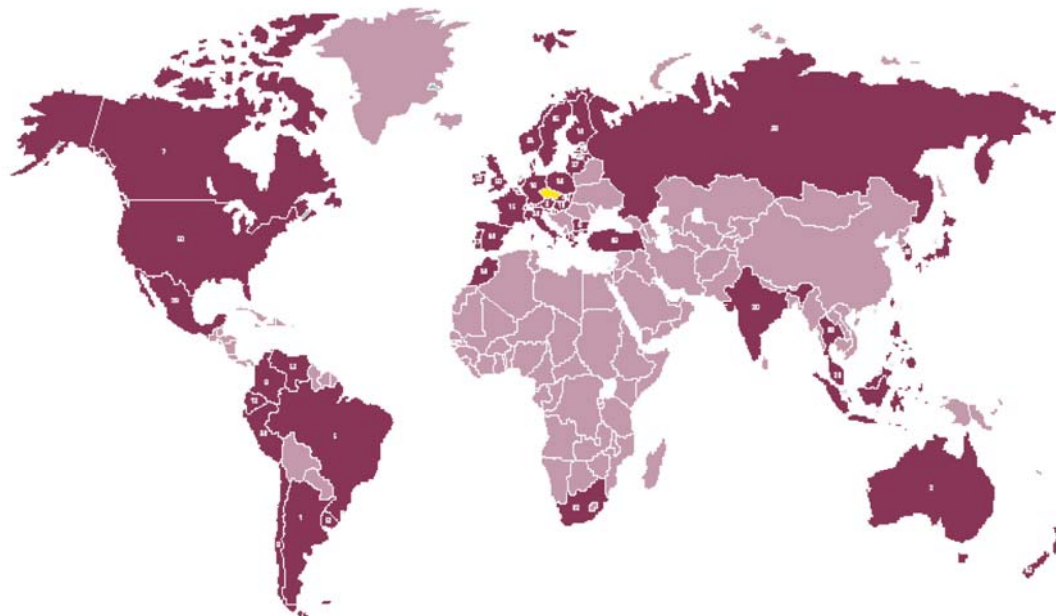
The chemical industry is a relatively new, modern field, which we could presently only scarcely do without. Manufacturing of chemical products and treatment during their lifecycle is associated with a certain measure of risk. Company patience was abound in 1984, when the fire erupted in a chemical production plant in Indian Bhopal, which had immense impacts on the health of regional inhabitants, their lives, and their environment.

Responsible Care[®], as a global chemical industry initiative, was directly connected to these events, and was first established under the initiative of the Canadian Chemical Producers Association in 1985.

Responsible Care is a unique, voluntary, ethical initiative that emphasizes the continuous improvement of work safety, health and environmental protection (HSE). It gradually resulted in the chemical industry's contribution to sustainable company development. Responsible Care is currently an obligation for establishing trust towards the industry, which is essential in improving the standard and quality of life. It requires that companies are open and transparent in relation to third parties ranging from local communities to broad public authorities.

Openness and accommodation in resolving potential problems is currently focused, not only on the manufacture of chemical products, per se, but also on communication with their users during the course of the entire lifecycle. Notable elements include activities in the field of preparing chemical substances, since in the eyes of the public, the responsibility for transport falls not only on the carrier, but also the manufacturer of a given product, or chemistry as such.

In 2008, the Responsible Care program was already adopted by 53 national chemical associations across the globe, which is illustrated on the following picture.



The Association of Chemical Industry of the Czech Republic joined the implementation of the program already in 1994, as one of the first national associations in Central and Eastern Europe.

Voluntary initiatives have an irreplaceable role in the effort to gain public trust. This fully applies also to initiatives in the transportation sector of chemical substances, which should be an integral component in broadening European standards when preparing chemical substances. These activities specifically include assistance during traffic emergencies with a risk of chemical substance spillage – ICE (Intervention in Chemical Emergencies) and in the field of prevention – SQAS (Safety and Quality Assessment Systems).

2.2.2.2 Assistance during traffic accidents with a risk of chemical substance spillage

The chemical industry must safeguard the transport of its products and raw materials in full accordance with legislation, other agreements, and best practice. In the event of an emergency, the chemical industry may assist in advising, practically assisting, and if absolutely necessary, even by using its own technical facilities to assist responsible authorities in minimizing undesirable effects.

ICE (Intervention in Chemical Emergencies) systems are constructed at the national level and based on the principle of voluntary participation. There are currently 17 such national systems in operation in Europe, which cooperate with each other. The systems are functional also in all countries of the Central European Region, the representatives of which are participating in the execution of the ChemLog project. The presence of such elaborate systems east of Poland, Slovakia, and Hungary is practically non-existent.

The system in the C.R. is secured under the name TRINS (Transport Information and Emergency System) established by an agreement between the CR Chemical Industry Federation and the Ministry of the Interior – Fire Rescue Brigade Headquarters since 1996. The system includes, along with assistance at the emergency site, also preventative measures that are intended to prevent the

ChemLog – Chemical Logistics Cooperation in Central and Eastern Europe

occurrence of disasters or to maximally eliminate the potential impacts during emergencies themselves.

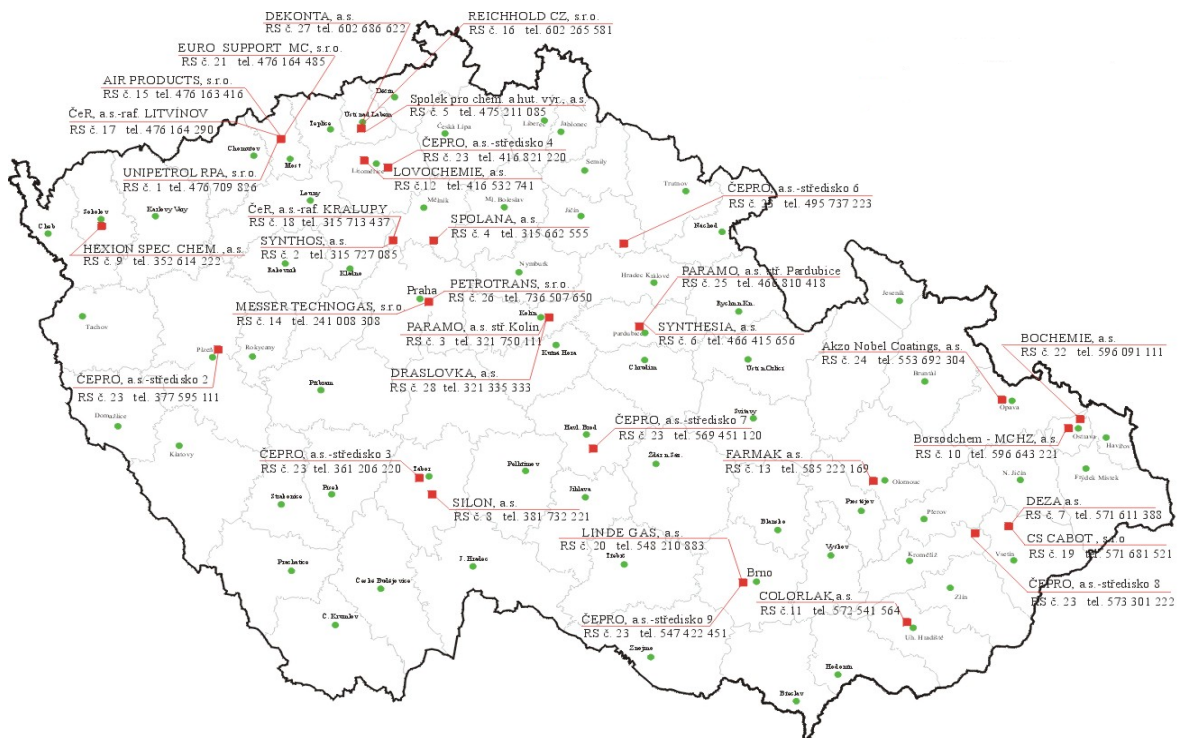
28 SCHP CR companies are currently involved in the TRINS system, while one company (ČEPRO, j.s.c. Prague) has another 7 centres scattered along various parts of the Republic (HZS ČEPRO, j.s.c. units). It provides overall assistance in the TRINS system framework across the entire territory of the Czech Republic through 35 centres.

The use of the transport and information system is of great benefit, when:

- the manufacturer or tradesperson, as applicable, cannot be contacted quickly;
- the manufacturer involves one of the companies in the TRINS activity, but due to the distance or other risk of delay, it is preferable to use a different company;
- dangerous cargo is imported or only transported, and contact abroad is difficult or the risk of delay is again present;
- documents, markings, and other information at the emergency site are unavailable, destroyed, or illegible.

Picture 3: Map of TRINS centres in the C.R.

(■ - regional TRINS centres; ● regional cities of the C.R.)



Source: <http://www.unipetrolrpa.cz/cs/sluzby-areal/trins/mapa-trins/>, as of 26/4/2010

TRINS centres provide, upon the request of the Fire Rescue Brigade assistance at several levels with a consideration to the nature of the emergency. These levels are as follows:

1st level – Consultation on the phone

Providing information, consultation advice by a professional – specialist on the phone.

It involves the delivery of specific information about companies, which are TRINS components and it offers necessary knowledge about the given dangerous substance. This information is transferred to the response unit chief. Advice and recommendations are provided until such time as the respective manufacturer, tradesperson, or consignee is contacted.

2nd level – Consultation at the emergency (accident) site

Sending of the professional to the place of accident – specialist to the response (accident) site in the shortest possible time from the request.

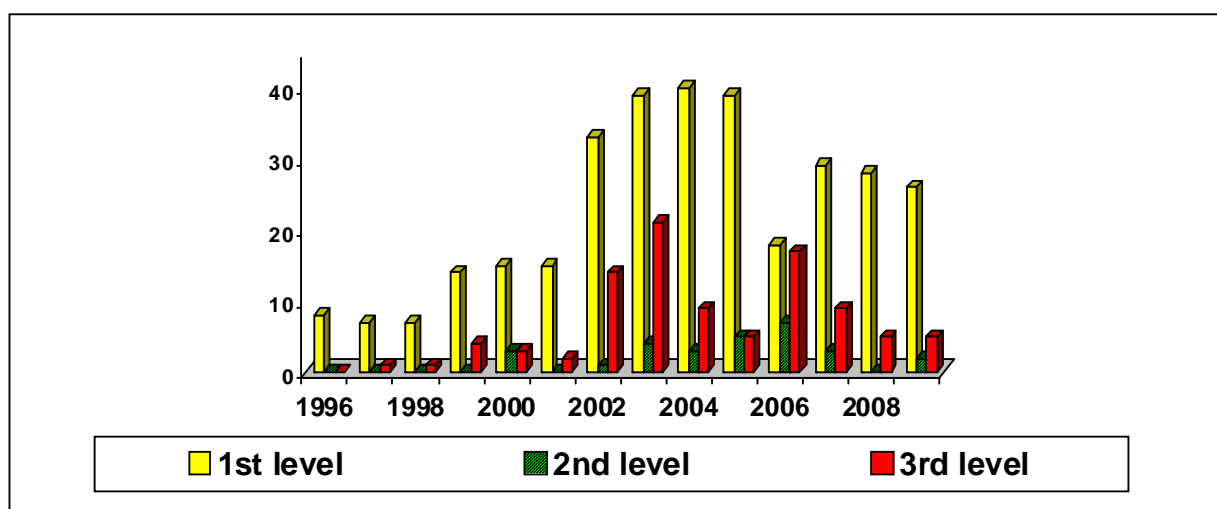
The method of transport to the response site must be negotiated based on the specific situation, due to the risk of delay, and resolved either by JRS means, or by the respective TRINS company.

3rd level – Practical assistance at the response (accident) site

Sending of the forces and instruments to the response site in the shortest period possible from the request in order to provide practical assistance during the liquidation of an exceptional event.

Practical assistance through forces and means incorporated within TRINS is provided solely upon the request by means of JRS operational and informational centres. It is provided by specific TRINS centres for a delineated number of dangerous substances. TRINS centres are entitled to deny such a request for practical assistance in the event that an exceptional event is already being resolved on the premises of the company itself, a response force and facilities have been already been dispatched outside of the company’s premises, or if the provision of forces or facilities at the given moment would present a serious safety risk of their own operations.

Picture 4: Assessment of TRINS activities from 1996 to 2009



Source: SCHP ČR

2.2.2.3 SQAS (*Safety and Quality Assessment System*)

The SQAS (Safety and Quality Assessment System) has been successfully used to assess the quality and safety, including the assessment of health and environmental impacts. It was established by the European Group of large-scale chemical plants and logistic service providers under the management of the European Chemical Industry Council (CEFIC). The system is designated primarily for carriers, conveyers, and partially for chemical product storage facilities.

The SQAS is a system of assessing providers of logistical services (not only carriers). The system has an organizational structure and also requires financial resources, acquired through user company fees, for the uninterrupted operation of the system. The SQAS system is organizationally secured by the CEFIC. Membership is open to all chemical company, which are offered the following services:

- Database of assessment reports
- Network of accredited inspectors (assessors)
- Training on the use of the SQAS system

The SQAS is a system of assessment aimed at securing quality in accordance with Quality Management Systems, safety systems, health and environmental protection systems. The SQAS exceeds, in its catalogue, the requirements of ISO 9001 and covers the issues of valid regulations and management principles for transportation services.

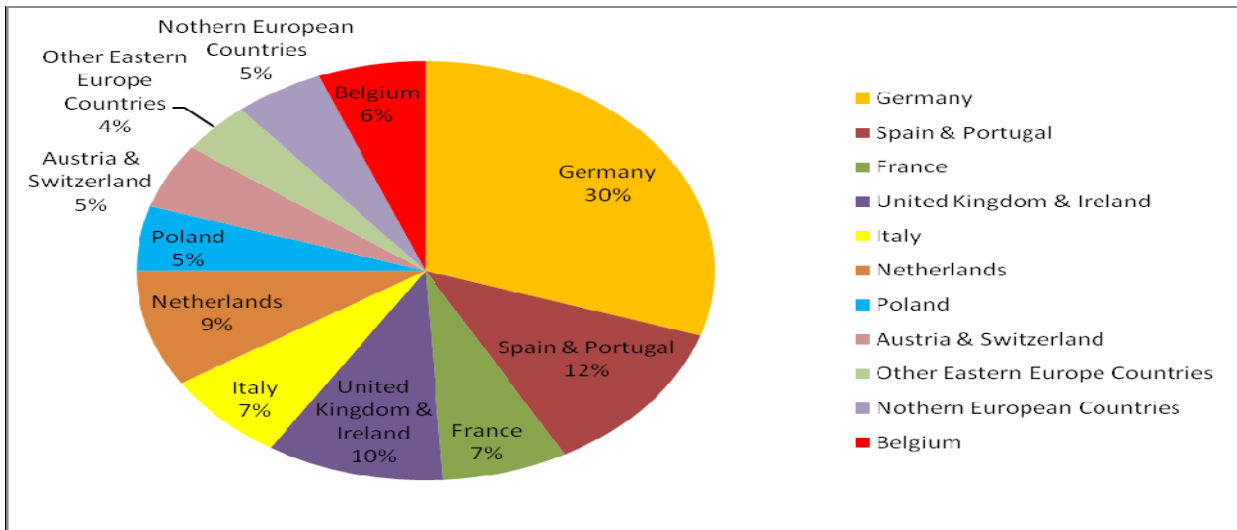
Consignees of chemical commodities use SQAS more frequently as an admission ticket for carriers/service providers for chemical industry activities. The assessment takes at least two days and roughly 500 questions must be answered. A system of standards and assessors exists that verifies, in detail, the set partners. This takes place in regular three-year intervals.

Nine types of SQAS expertise-based assessments currently exist. SQAS Road transport, SQAS Railway transport, SQAS Tank cleaning stations, SQAS Integrators of Goods, SQAS Distributors of Goods, SQAS Sea-Packaging Operations, SQAS Sea ships for bulk goods, SQAS Tank storage terminals, SQAS of River vessels.

All SQAS modes are constantly re-evaluated and perfected. In road transport, since January 1st, 2010, for example, companies are controlled to make certain that their drivers are trained according to the BSS system – “Behaviour Based Safety”, which is interactive training, during which the instructor monitors professional drivers while driving and manoeuvring with the aim of assessing individual strengths and weaknesses and to offer improvements of driving abilities. We must keep in mind that this is a driver that has dozens of tonnes of dangerous chemicals behind his back. This type of training is also secured in the Czech Republic.

The graph below shows that the number of SQAS system assessments is directly proportional to the size and development of the chemical industry of individual nation-states and their expanse. The largest number of SQAS system assessments, without a doubt, is performed in Germany.

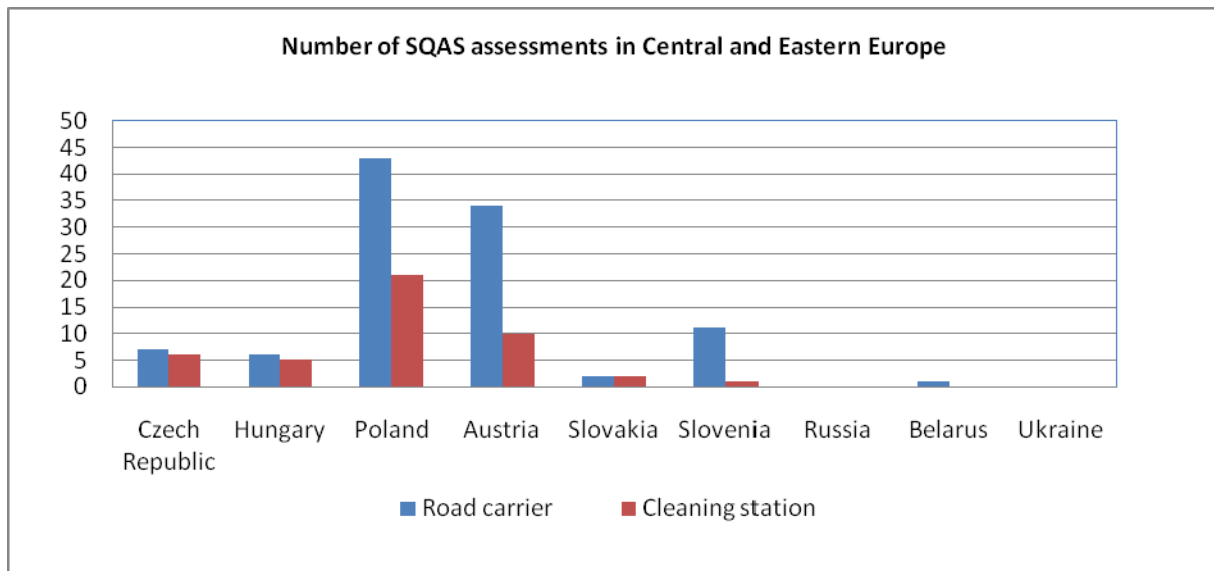
Picture 5: Number of SQAS assessments according to individual countries, expressed in per cent



Source: Annual SQAS Report – 2009

An overview of the use of SQAS assessments in Central and Eastern Europe for road carriers and cleaning stations is expressed in the following table. The SQAS system is used the most in Poland, followed by Austria. 7 assessments of road carriers and 6 assessments of cleaning stations were performed in the Czech Republic.

Picture 6: Number of SQAS assessments according to individual countries, expressed in per cent



The expanded use of the SQAS assessment in this region occurred mainly in recent years. We discuss the use of the SQAS system in the Czech Republic as an example of good practice in the next chapter.

2.2.2.4 Example of good practice – application of the SQAS system in the C.R.

Transportation unit cleaning stations have been assessed under SQAS on the basis of the Agreement for the assessment of cleaning stations using the SQAS system, endorsed in October, 2003, following negotiations of the European Federation of Tank Cleaning Organizations (EFTCO) and the European Chemical Transport Association (ECTA). A positive SQAS assessment is currently one of the prerequisites for issuing an ECD (European Cleaning Document), the unified European cleaning attest. The second condition for issuing an ECD is membership in the EFTCO national association.

Various activities in the field of SQAS advertisement took place in the Czech Republic at the beginning of the new millennium. The results, however, were not apparent. A breakthrough occurred in 2006, when an SCHP CR and associated organizations' initiative led to the establishment of the Czech Association of Cleaning Stations (CACS).

We recall selected milestones in the brief history of the CACS:

- Preliminary committee established on 6. 6. 2006
- First SQAS assessment in May 2007 and first ECD issued 6. 6. 2007
- In 2008, the ECD issues ECDs to all 6 (tank) cleaning stations in associated CACS
- Continuous effort to expand the activity to Slovakia – first member from the Slovak Republic in November, 2009
- Spring 2010 – three additional organizations became members – 2 in the C.R. and 1 in Slovakia
- August 2010 – two organizations operating cleaning stations in Slovakia passed the SQAS assessment, and contemporaneously acquired the right to issue an ECD
- The CACS affiliates 10 cleaning station operators in the Czech Republic and in Slovakia, 8 of which have the authority to issue an ECD

The Czech Association of Cleaning Stations, under the EFTCO framework, first applied the model in which a national association affiliates companies from two countries and is responsible for issuing two national ECD series.

The current distribution of cleaning stations on the territories of the Czech and Slovak Republic is illustrated on the following picture.

Picture 7: Cleaning stations operated in the C.R. and in Slovakia

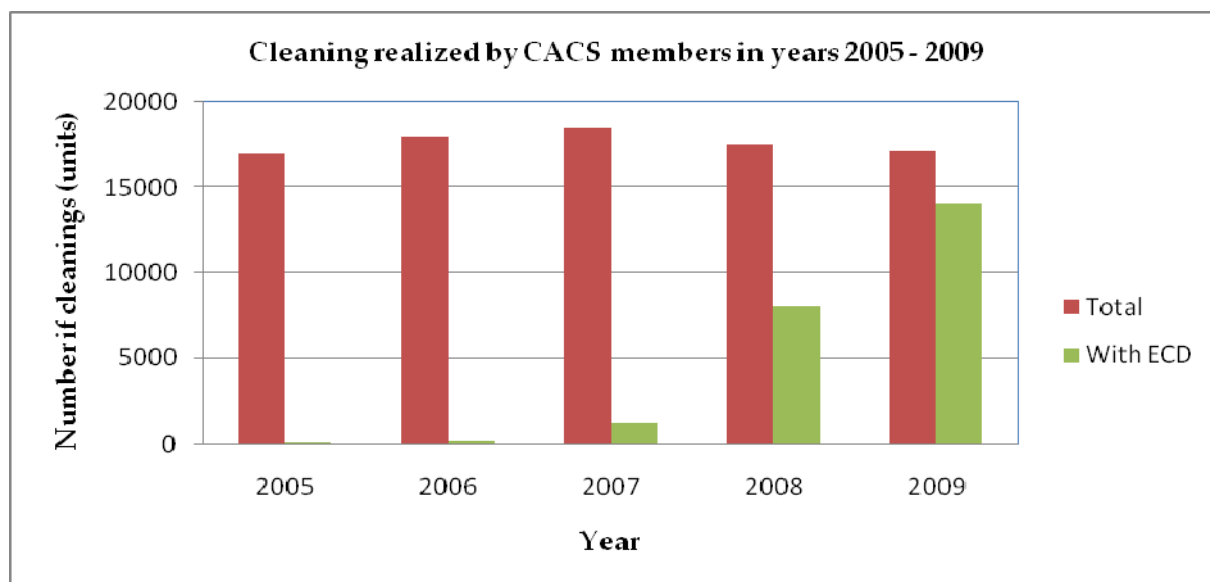


Source: <http://www.cacs.cz/clenove.htm>, up to date 4/5/2010

Preparation for the SQAS assessment, its successful completion, and underpinning of additional cleaning stations has been favourably reflected in the offer of services, which contributed not only to maintaining the quality of transported chemicals, but also to environmental protection. A current offer of available services may be found at www.cacs.cz.

Advances in the cleaning number and the developments of issued ECD certificates may be found in the following graph. Significant growth in the cleaning number is expected to occur in 2010, in which the CACS acquired three new members; 2 organizations underwent an SQAS assessment and an additional 2 are preparing for this assessment.

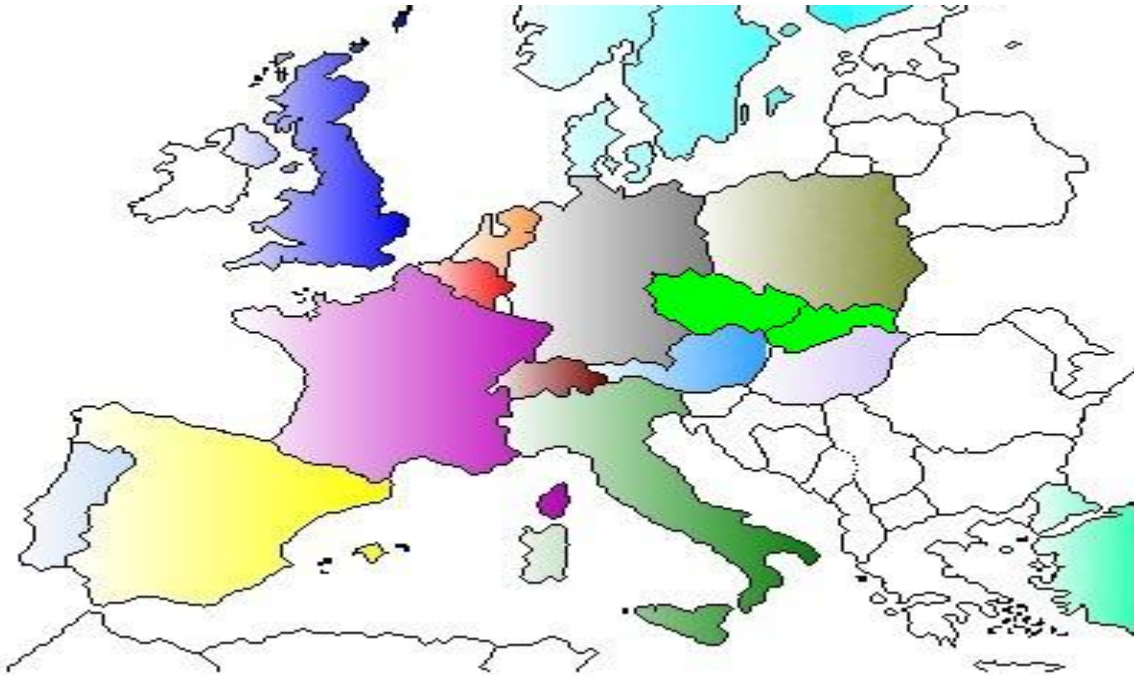
Picture 8: Progress of performed cleanings by CACS members in years 2005 - 2009



Source: CACS materials

The EFTCO (European Federation of Tank Cleaning Organizations) currently has 16 orderly members. It is of note that national associations operate in all countries in which ChemLog project associates work. The primary task of this organization is to examine, defend, and develop professional interests of its members, to develop and externally advertise the organization, to support the cohesion of relationships with other organizations, regulatory bodies, both at a national and international level. In the map below, we can see that East of the Slovak Republic (excluding Romania and Turkey), there is no other EFTCO organization member. A guarantee of quality tank cleaning of transporting units, thus, does not exist here.

Picture 9: Members of the European Association of Tank Cleaning Stations – Slovakia is administered under the CACS



Source: <http://www.eftco.org/>, updated on 6/5/2010

We did not cite the CACS example by chance; practical experience with an SQAS assessment and the application of its benefits also attracted other providers of logistical services to this system that elicited an interest in the SQAS assessment and collectively contributed to the advancement of standardized European services in the transport of chemical products. The practical example may serve as an inspiration for further development in the provision of these services.

2.2.2.5 Remaining optional instruments

The ISO 9001 system is currently among the most extensive ISO series standards in the world, and it may be applied to nearly all types of firms, irrespective of their size or field of business. The ISO system was, therefore, also collectively introduced in firms providing logistical services. The system originates from procedural management and the PDCA model (plan-do-check-act). Introducing this system, in reality, means continuously improving, documenting, maintaining, and expanding business processes and understand the customer principle, which emphasizes customer satisfaction. ⁽⁸⁾

2.2.3 Professional qualification of transportation chain personnel

Dangerous goods, which in many cases may cause serious environmental damages, notwithstanding the harm to human health, require special treatment. Individuals that come into contact with these substances must, therefore, be specially trained. The professional qualification of transportation chain personnel is thus a fundamental prerequisite of safe transport of dangerous chemical substances.

Training of individuals, participating in the transport of dangerous substances, is thus embedded in ADR ordinances, and is mandatory for all member states. As mentioned earlier, the transportation of dangerous substances begins in the chemical processing plant. Here, an employee responsible for the transport of dangerous substances must be assigned, i.e. a safety advisor.

A safety advisor must be appointed in each firm that dispatches, transports, or receives dangerous goods. The duties of a safety advisor within a firm lie primarily in analyzing the current state of transport of dangerous goods, if necessary, proposing remedial measures, preparing requisite documentation (transportation documents, written instructions for the driver, etc.), producing mandatory annual reports, information and consultation service, performing a control audit, producing reports on exceptional events, applying safety schemes (anti-terrorist measure), regular training of employees from the field of ADR/RID and corresponding regulations, etc. ⁽⁹⁾

ADR ordinances further demand that the employee completes

1. General safety training focused on general regulatory provisions on the transport of dangerous articles.
2. Specific training, corresponding to his/her work tasks and responsibilities from a regulatory aspect, relating to the transport of dangerous articles.
3. Safety training focused on risks and dangers associated with the transport of chemical substances

A detailed list of performed examinations must be kept by either the employee or employer. ⁽¹⁰⁾

The issue of educating employees in the combined transport chain shall be resolved in detail in the following chapters. A crucial point appears to be the safeguarding of a systematic, permanent, superior, and pan-European comparative training framework in the logistics of chemical substances, in the context of the Central European region. Training in the field of mandatory legislation (ADR, RID) occurs regularly in all target region nation-states. What seems to be more challenging is rather the adherence and enforcement of the legislation in practice.

The education should not mimic the current systems, but supplement them with systems of grammar school and University education, and real information from people with experience. Logisticians of chemical companies, logisticians in the field of conveyance and transportation, and grammar school and University students, in particular, should be trained.

2.3 Combined transport in Central and Eastern Europe

Central and Eastern Europe is a region with a long-standing industrial tradition, and not only chemical. A large quantity of chemical firms with rich portfolios of chemical products is located here. Among the leading firms, from a global perspective are, e.g. the firms BASF, Shell, Ineos, Total, Bayer, Akzo Nobel, Evonik, Linde, PKN Orlen. Among 30 of the largest chemical firms in 2007, 12 firms come from the European Union, with a 10% share of overall revenues in the chemical industry. ⁽³⁾ In the region of Central and Eastern Europe, then, large volumes of chemical, but not only chemical goods, are transported. For the purposes of the feasibility study, then, an analysis of these flows of goods was performed, which can gradually be used for the feasibility assessment of solutions outlined for the combined transport of chemical substances in the target region.

2.3.1 Territorial composition of combined transport lines in the E.U.

The territorial composition includes the geographical arrangement of combined transport lines, their mutual cohesion in terminals, and density. Operators of the combined transport lines are affiliated in the International Union of combined road/rail companies (UIRR). Their Central European members are specified in table 7. We see, from the table, that the largest combined transport operators in Europe are the firms Kombiverkehr, HUPAC, Polzug, ICA, and Okombi. The territorial composition of integrated train lines, operated by these operators shall be discussed in this chapter, to gain an overview of the situation in Central and Eastern Europe. We shall also discuss the largest combined transport operators on the Czech territory and corresponding territorial compositions of these lines.

Tab. 6: UIRR members in Central Europe and their preparations for the year 2009 ⁵

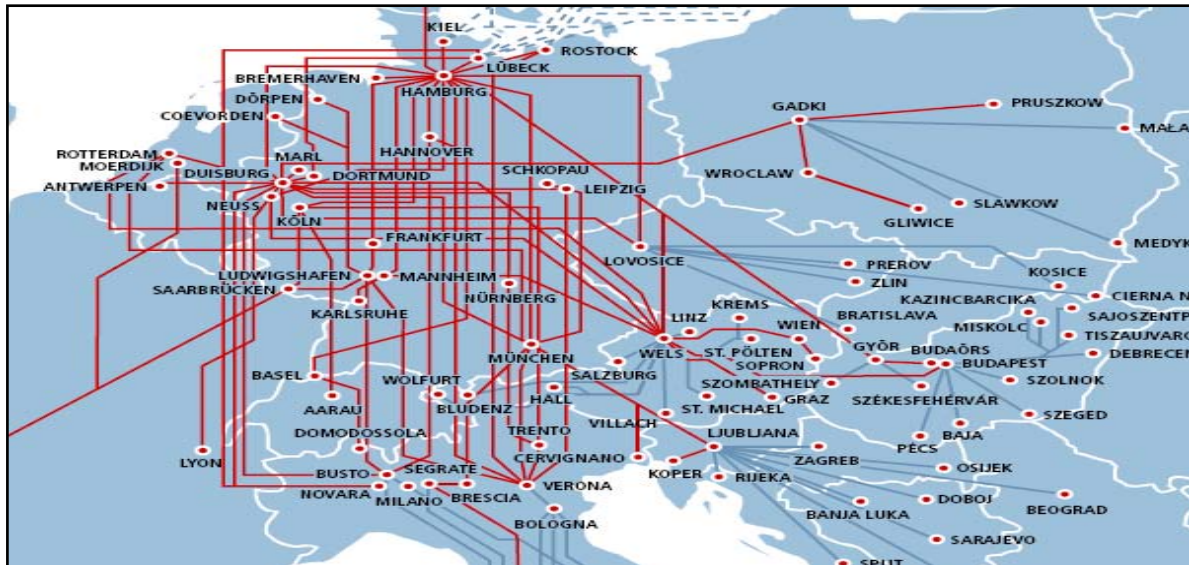
UIRR members – preparations for year 2009				
Operator	Country	International carriages (number of parcels)	Domestic carriages (number of parcels)	Turnover (thousand EUR)
Adria Kombi	Slovenia	45402	36040	39000
Bohemiakombi	Czech Republic	6401	-	1747
Crokombi	Croatia	1090	-	1500
Hungarokombi	Hungary	13216	-	20000
Hupac	Switzerland	333026	53583	318600
ICA	Austria	135371	36136	86282
Kombiverkehr	Germany	355001	244003	347000
Okombi	Austria	97170	176076	94336
Polzug	Germany	55708	11553	-
ICA	Austria	135371	36136	86282

Source: <http://www.uirr.com/?action=page&page=21&title=Our+Members>, data up to the year 2009

⁵ The firms Alpe Adria (Italy), Cemat (Italy), Combiberia (Spain), HUPAC NV (Netherlands), IFB (Belgium), Naviland Cargo (France), Novatrans (France) are also UIRR members, but due to the delineated region, they will not be discussed in the introduction.

2.3.1.1 Kombiverkehr

Picture 10: Lines operated by the firm Kombiverkehr in Europe



(—integrated trains; --- aerials, train ferries)

Source: www.kombiverkehr.de

The firm Kombiverkehr is, from a European perspective, the largest operator. It currently secures train connections of Northern German ports with terminals in Western, Central, and Eastern Europe by means of integrated as well as aerial trains. These lines are connected to the European network of combined transport, in which approximately 170 trains are dispatched daily. Two lines heading into the C.R. and operated by the Bohemiakombi Company also connect to this network. Combined transport services in the firm Kombiverkehr may be divided into two groups, namely domestic and international transport. In domestic transport, it relates to the Kombi-Netz (combined network) 2000+ service, established in cooperation with another German carrier, DB Mobility Logistics AG, thereafter DB Cargo. The Kombi-Netz service is an economical system of combined transport that offers a large number of direct and integrated trains, a large operating capacity (over one thousand parcels per night), optimal connection to the European transportation network of integrated trains in the Gateway system, competitive, quick dispatch times at terminals. ⁽⁷⁾

The Gateway system is an optimal combination of transport connections between domestic and international combined transport. The Gateway system makes it possible to reach a large number of target terminals. Combining routes, however, cannot always be achieved by only direct connections, and therefore several principle Germany transit nodes are used. Hamburg-Billwerder, Duisburg Ruhrort Hafen, Efelort Köln am Rhein, Ludwigshafen, Nuremburg and Munich-Riem, and the Baltic ports of Lübeck, Kiel, and Rostock. Thanks to these nodes, Kombiverkehr offers over 15 000 connections across Europe each day in the frame of this system. The Gateway system includes four basic areas of transportation, being: Northern Europe and Baltic ports, Eastern and South-Eastern Europe, Southern Europe, and Western Europe. Transport across the countries of Europe is based on the cooperation of Kombiverkehr and affiliated companies, where e.g. during carriage to the Czech

Republic, it cooperates with the Bohemiakombi company, where two main lines heading to the Czech Republic from Duisburg and Hamburg to the terminal in Lovosice. ⁽⁷⁾

2.3.1.2 HUPAC

Picture 11: Lines operated by the firm HUPAC in Europe



Source: http://www.hupac.com/en/index.php?p=prod_shuttlenet&mt=2, updated on 18/6/2010

HUPAC is one of the key players on the European market of intermodal transport. The company aim is to transfer the increasing volume of goods, in large part, to railways instead of roadways. It thus supports the transition to a different mode of transportation, which has a significant environmental impact, considering the over-burdening of European road corridors.

The HUPAC firm operates a network with over 110 trains that connect the main European economical regions every day with ports. HUPAC comprises ten companies that reside in Switzerland, Germany, Italy, Netherlands, and Belgium. The system of container transport is based on shuttles with a network spanning all of Europe (see Picture 10). Due to the branched networks, HUPAC is capable of achieving quick, direct connections from terminal to terminal; hundreds of shuttle trains can be dispatched daily, and it has stable, fixed time schedules. HUPAC also has IT systems available for easy handling, monitoring, and tracking of parcels. HUPAC is capable of transporting all common transporting units – containers, tank containers, detachable extensions, special trailers equipped for intermodal transport.

The transport of containers in Germany is directed from the Hamburg port or Rotterdam port to the Duisburg terminal. The firm HUPAC and Kombiverkehr jointly operate Hamburg Shuttle trains from the Hamburg port to the Busto Arsizio terminal in Milan. This service is capable of being provided thanks to its attractive transit times by the strong road transportation competitor in this region. Aside from this, it is possible to deliver packages via the Busto Arsizio terminal further to Central and Southern Italy. The Rotterdam-Duisburg service, including both sea as well as continental transport, is secured by trains, travelling 6times per day in each direction.

The HUPAC firm also offers combined connections to Eastern Europe. Parcels from Antwerp, Rotterdam, Duisburg, Ludwigshafen, the Busto Arsizio terminal, and Zeebrugge are completed in Schwarzheide and transported daily to Warsaw, Kobylnice, and Slawkowa in Poland. Transport from Slawkowa to Moscow and other Russian destinations is then secured in cooperation with the Russian partner Russkaya Troyka.

2.3.1.3 Polzug

Polzug Company is one of the leading companies on the European market of multimodal transport. In 2005⁶, the company transported over 100 000 TEU. Polzug Intermodal is a railway operator offering container transport services between Northern European ports (Hamburg, Bremerhaven, and Rotterdam) and terminals in Poland and Eastern Europe. The Polzug network, with its terminals, branches, subsidiary companies and agencies, breaks up in Poland, Russian, Ukraine, Georgia, and Azerbaijan; it further extends outside of Europe as far as Mongolia and Afghanistan. It also has representation in South Korea, the United States, and South America.

Picture 12: Main connections operated by the firm POLZUG



Source: www.polzug.de

In Poland, a key market region, the company is expanded into 8 terminals, 4 of which the company administers personally. These terminals are located in the prime economic centres of Poland. The company uses FCL (Full Container Load) containers and removable and swappable extensions of the following type:

2.3.1.4 ICA

The firm Intercontainer Austria operates integrated trains, as well as individual wagons, business trains, and further secures services in terminals, monitoring of shipments, as well as providing

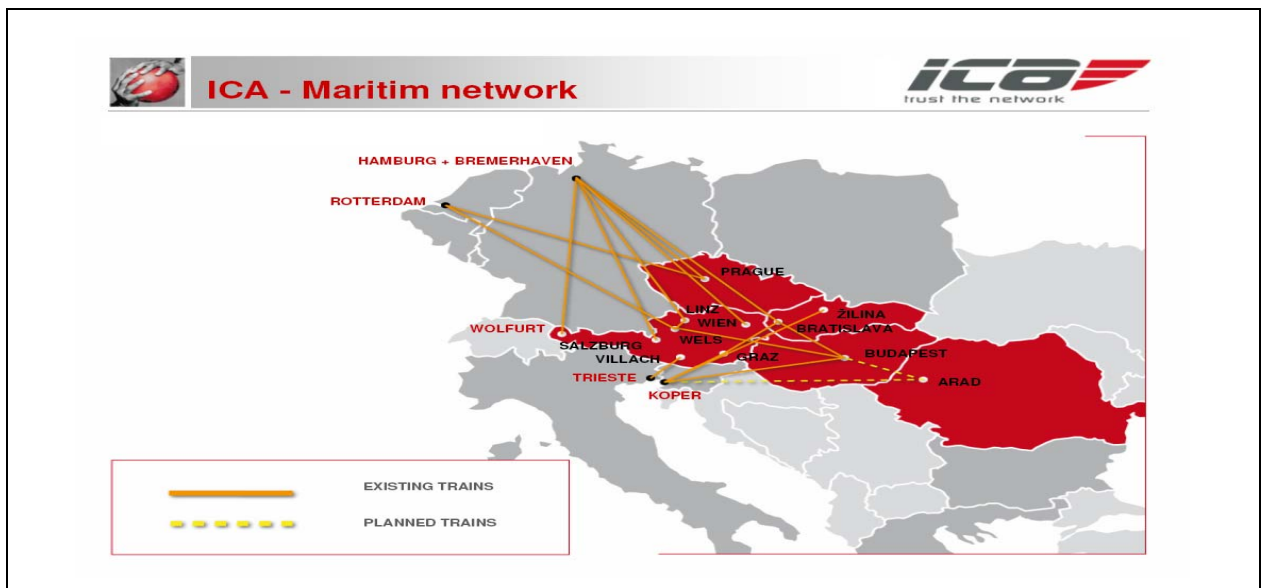
⁶ Latest data available in UIRR statistics

customs services. The firm Intercontainer dominates the Central European market with the assistance of the firms Bohemiakombi, CSKD Intrans Czech Republic, SKD Intrans Slovakia, Hungaria Intermodal Hungary, and ICA Romania. Individual branches are equally scattered across all of Central Europe.

The company activity may be divided into two pivotal areas

1. Transportation from sea ports, namely Bremerhaven, Hamburg, Rotterdam, and Terst.
2. Inland transport

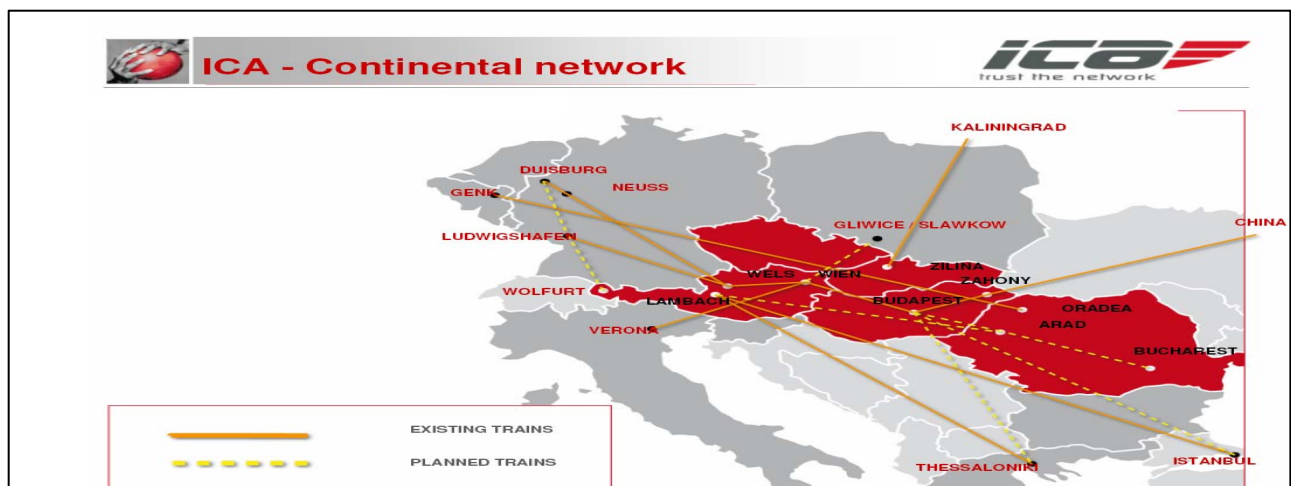
Picture 13: Intercontainer Austria lines from European sea ports



Source: <http://www.intercontainer.at/content/deutsch>, updated on 16/7/2010

Transport from European sea ports to major European cities, is specifically provided to Prague, Vienna, Budapest, Bratislava, Žilina, Linz, etc. The trans-alpine line from Villach to Terst is accomplished similarly.

Picture 14: Inland line of the firm Intercontainer Austria



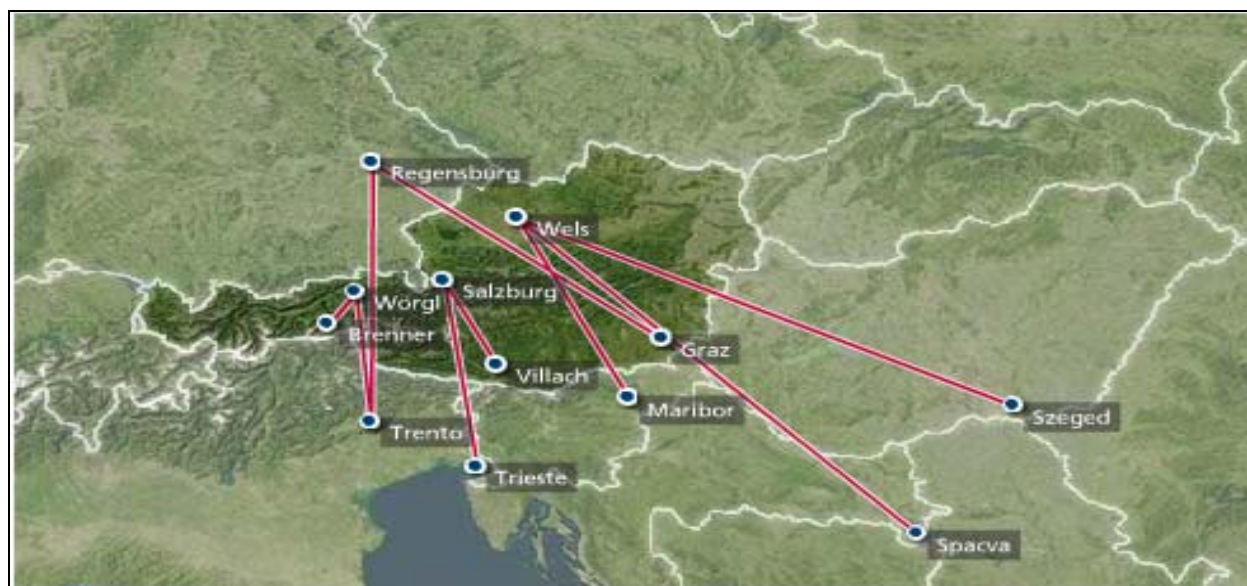
Source: <http://www.intercontainer.at/content/deutsch>, updated on 16/7/2010

Inland transport is implemented not only in the frame of Central Europe, but also to Russia (Kaliningrad), China, Greece, and Turkey.

2.3.1.5 Ökombi

Ökombi is a firm established in 1983 by a single founder. It is both a national as well as international operator, who provides associated combined transport, specifically across the Alps. The firm Ökombi secures not only the transport of loading vehicles to/from Austrian, but also transit across the territory of Austria.

Picture 15: RO-LA lines operated by the firm Ökombi



<http://www.oekombi.at/>, updated on 16/7/2010

Transports are executed to/from surrounding countries, namely Italy, Germany, Hungary, and Croatia.

Ro-La systems in the Czech Republic were operated in the 90's of the past century. It dealt with two routes: one was directed to Austria, the other to Germany. The systems did not purposefully transfer transport from roads to railways, but rather resolved transportation problems in surrounding states and the deficiency of entry permits for Czech road carriers and state border crossings. Both lines of associated combined transport were progressively cancelled, because absent targeted subsidies, they were unable to compete with road transport.

When we closely examine the lines of combined transport of individual operators, we discover that the density of lines is rapidly decreasing towards the East. As mentioned in the introduction, it is mainly caused by the different territorial needs in formed states of the Eastern and Western block and the constantly remaining disproportion between these regions. These differences shall be reconciled in the future to the benefit of the industry, and not only chemical.

The information specified above was continuously acquired from websites of combined transport operators. The structure and scope of information presented on this websites differs from one operator to the next. This is also the reason why this information is presented heterogeneously in this feasibility study.

2.3.2 Combined transport volumes in the E.U.

In order to assess the feasibility of certain proposed solutions, one must have an idea of what the volumes of transported chemical as well as non-chemical goods are in the target region. The quantity of parcels delivered from terminal to terminal by combined transport operators affiliated in the UIRR is introduced in the following table. The origination and target destination, the number of consignments between the specified destinations, average distance that the consignment travelled, and the number of tonne-kilometres is always specified. The below specified tables only mentions the consignments transported by UIRR affiliated operators. The Czech Republic here has a single representative, which is the firm Bohemiakombi. Due to the fact that other operators exist, who are not UIRR members, however, the below specified information must only be taken as an example.

Tab. 7: Combined transports from terminal to terminal between the states of Central Europe according to UIRR for 2009 (only UIRR affiliated operators)

Transport from terminal to terminal from	to	Number of consignment ⁷	Average distance (km)	1000*tkm
Austria	Switzerland	17	120	17
Switzerland	Austria	15	120	14
Switzerland	Czech Republic	273	250	328
Czech Republic	Switzerland	559	499	1 594
Austria	Germany	65 217	1 000	1 217 340
Germany	Austria	43 417	924	854 265
Austria	Hungary	13 814	630	255 717
Hungary	Austria	15 675	624	258 060
Austria	Poland	13	950	25
Poland	Austria	20	950	551
Austria	Slovenia	19 570	345	198 027
Slovenia	Austria	19 022	352	218 787
Austria	Slovakia	16	200	68
Slovakia	Austria	1 111	200	556
Switzerland	Germany	23 526	651	244 582
Germany	Switzerland	32 593	646	525 925

⁷ Consignment, according to the UIRR, corresponds with a transport capacity of one lorry on the road (equivalent 2.0 TEU), which means:

- one semi-trailer
- two detachable extensions smaller than 8.30 m and under 16t
- one detachable extension larger than 8.30 m or over 16t
- one vehicle on the ROLA system

ChemLog – Chemical Logistics Cooperation in Central and Eastern Europe

Czech Republic	Germany	6 056	939	87 719
Germany	Czech Republic	6 470	937	136 586
Czech Republic	Poland	61	800	966
Germany	Croatia	77	1 200	2 178
Germany	Hungary	4 758	1 126	104 591
Hungary	Germany	4 567	1 022	69 690
Germany	Poland	46 414	974	564 657
Poland	Germany	21 315	929	205 109
Germany	Slovenia	3 710	1 352	148 440
Slovenia	Germany	4 887	1 100	37 630
Germany	Slovakia	201	1 011	5 925
Croatia	Austria	43	516	176
Croatia	Hungary	685	571	2 160
Croatia	Slovenia	374	207	835
Slovenia	Croatia	437	350	2 753
Hungary	Slovenia	2 094	750	18 846
Slovenia	Hungary	2 267	750	25 504
Poland	Slovenia	147	1 200	4 234
Slovenia	Poland	174	1 200	835
Slovenia	Czech Republic	2 596	900	32 710
Slovenia	Slovakia	6 717	800	75 230
Slovakia	Slovenia	5 403	800	17 290

Source: UIRR statistics 2009

Tab. 8 is UIRR statistic. Therefore, only UIRR members, i.e. the largest combined transport operators in Europe, are mentioned in the table. For our purposes, only states falling into the geographic region of Central and Eastern Europe were selected.

According to the UIRR data for 2009, combined transport was used the most often for the transport of parcels from Austria to Germany and vice-versa, thereafter from Germany to Poland. The flow of consignments in the opposite direction, i.e. from Poland to Germany is only half compared to the opposite direction. Germany dominates from the perspective of the flow of goods directed to/from its territory. This also relates to combined transport performed with the Czech Republic – the greatest numbers of parcels were transported from the C.R. to Germany, and the greatest numbers of consignments directed to the C.R. again originate from Germany. The reason for the large volumes of goods across the German territory from the C.R. or Poland, or in the opposite direction, as applicable, is namely transit to/from ports in Hamburg or Bremerhaven.

Tab. 8: Combined transports from terminal to terminal between the states of Central and Eastern Europe according to UIRR for 2009 (only UIRR affiliated operators)

Transport from terminal to terminal		Number of parcels	Average distance (km)	1000*tkm
from	to			
Germany	Russia	95	2250	5230
Russia	Germany	157	2790	1484
Poland	Russia	68	1550	2960
Russia	Poland	11	1550	105

Source: UIRR statistics 2009

The number of consignments transported from Central to Eastern Europe is negligible compared to the number of consignments transported in the frame of Central Europe. Combined transport, based on the number of parcels, is used most often between Russia and Germany. The reason for the negligible number of consignments is obvious. It is primarily due to the insufficient density of associated train networks in Eastern Europe, insufficient terminal facilities, and overall lower quality of provided services. This is exactly why this region is one of the target regions of the ChemLog project. The ChemLog project should define the prerequisites for safe, economically acceptable transport of chemical substances to the region of Eastern Europe.

Information specified on operator websites, from a structural aspect, was not unified, and there was often no mention at all of transporting chemical substances. Information on combined transport operators, presented in the feasibility study, is thus considerably non-uniform.

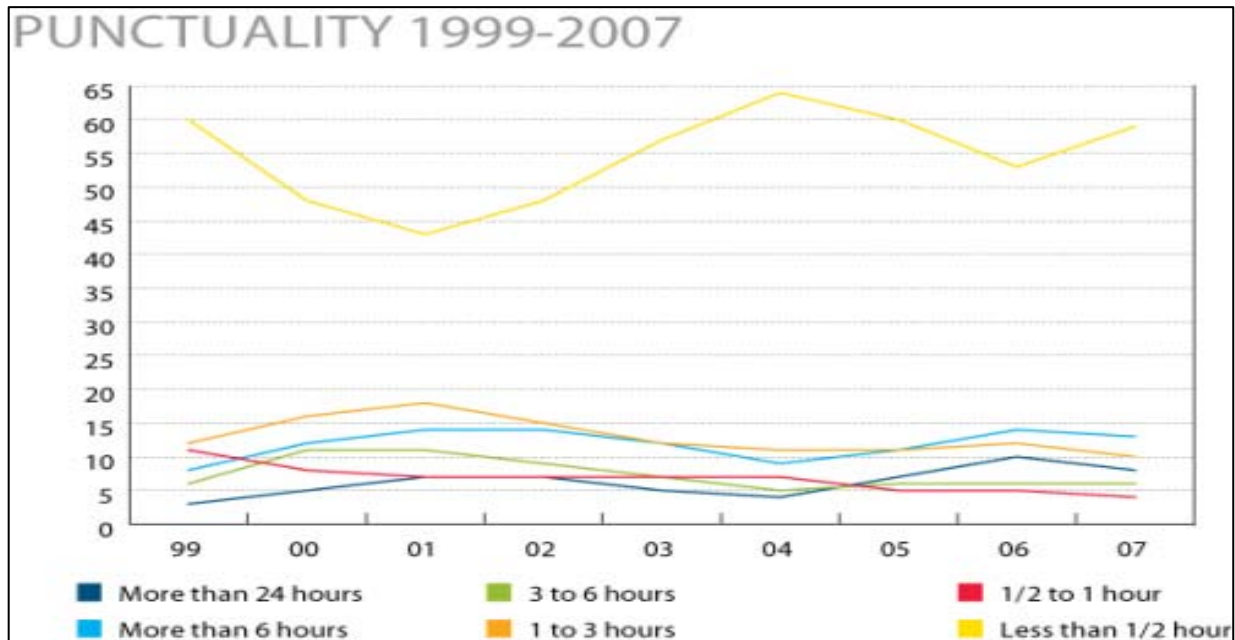
2.3.3 *Speed and timeliness of transports in Central and Eastern Europe*

Presently, “just in time” deliveries are successfully used in the chemical industry, which enable firms to minimize stock stores, or financial bound instruments, as applicable. In the “just in time” approach, large emphasis is placed on term reliability of deliveries and close cooperation between the customer and supplier. The International Union of Combined Road-Rail transport companies (UIRR) regularly assess the timeliness of integrated trains on selected corridors. In the event of delay, it defines the cause and adopts remedial measures for the future. The UIRR currently focuses on the following corridors:

- Transports directed across the Alps (across France, Switzerland, and Austria)
- Transports to/from the Pyrenean peninsula
- Transports to and from newly ascending EU countries
- Other transports (e.g. Belgium – Switzerland)

A total of 21 000 integrated trains on 10 transport corridors were mapped in this manner in 2006.

Picture 16: Timeliness of combined transport trains



Source: <http://www.uirr.com/>

Picture 15 is divided according to various delays, achieved by associated combined transport trains from 1999 to 2007. A positive fact is that 60% of trains reach a delay of within half an hour. The remaining 40% of trains currently achieve a greater delay; nevertheless, the situation is monitored and remedial measures are adopted.

2.3.4 Combined transport terminals in Central and Eastern Europe

2.3.4.1 *Network of terminals in Central and Eastern Europe*

Combined transport lines originate and end in terminals. Since the largest combined transport operators on the European market were presented and discussed, it is no longer necessary to repeat this for combined transport terminals. The picture provided below serves an illustration of the combined transport terminals used by the firm Kombiverkehr.

Picture 17: Container terminals of the firm Kombiverkehr



<http://www.kombiverkehr.de/web>, updated on 20/7/2010

The Kombiverkehr firm has a dense network of container terminals at its disposal. The greatest number of terminals is likely concentrated in Germany. As already stated, the firm Kombiverkehr focuses primarily on inland transport, but also on sea freight, e.g. from Dutch Rotterdam or from Belgian Antwerp. Their integrated trains subsequently transport goods to all of Europe. In the C.R., it makes use of terminals in Lovosice, Přerov, and Ostrava – Paskov.

Obviously, the distribution of terminals in the region of Central and Eastern Europe correspond to the density of combined transport lines. For this reason also, it may be stated that the number of combined transport terminals decreases eastward. Their facilities and services therein provided shall be described in the following chapters. Services and terminal facilities shall first be discussed on a general level, and gradually in detail in light of transport of dangerous chemical substances.

2.3.4.2 Terminal standards in Central and Eastern Europe

Terminals vary in their facilities and services provided, from one terminal to another. The quality of provided services and corresponding facilities play a crucial role in the transport of chemical goods. Certain standards are present from the facility and service perspective, which should already be considered when planning the combined transport terminal. Standards differ in countries of the Eastern and Western block. For former Eastern bloc countries, a specific standard, for example, could be the Žilina terminal.

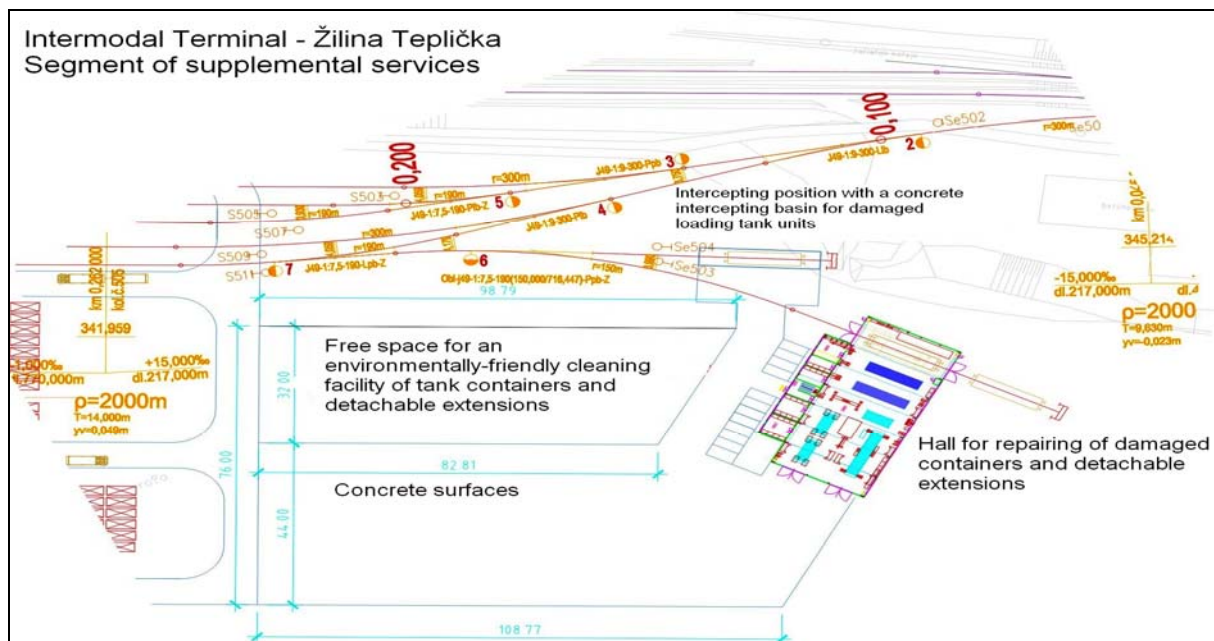
The proprietor of the Žilina terminal is the SKD Intrans Company. The firm SKD Intrans is a subsidiary company of the firm CSKD Intrans. The Žilina terminal has an excellent location and is found between the railway station Žilina – Vrútky, the Žilina waterworks, and switchyard Teplička nad Váhom. Modernization of this terminal began in 2007.²³ Modernization lies primarily in:

1. Expanding paved areas for storing and handling containers up to approx. 16 000 m²

2. New terminal facilities and technologies – purchase of two new portal rail cranes, and a mobile front-end loader.

There is thus the opportunity for vertical (large lorries, detachable extensions and trailers) as well as horizontal transfers (transportation equipment in the ROLA system). The terminal also offers supplementary services, including customs processing, repairs and modifications of large lorries and detachable extensions, social facilities and catering services, logistical services, consultation and information services, and tank cleaning of intermodal transport units.²²

Picture 18: Map of the terminal in Žilina



Source: <http://www.asb.sk/inzinierske-stavby/dopravne-stavby/>

The picture number 17 describes the arrangement of the Žilina terminal in detail. The terminal is operated as bimodal, and serves for the transfer between road and rail transport, and vice-versa. The terminal is equipped with a total of five tracks, four of which are services by two gantry cranes. As seen in the above specified visualization, the transfer may occur in the train-train, train-cargo truck arrangement, and vice-versa, or transportation means – storage area and vice-versa. One of the tracks is dedicated to the ROLA system.

The daily capacity of the terminal are two integrated trains; during night operations, up to 3 trains in both directions. The increase in container trans-shipments in the Žilina terminal is associated with:²³

1. The construction of the KIA Motors Slovakia production plant – in the context of the needs of this plant, a regular link was also established from the Koper port and back²³
2. The expansion onto the Russian market – disassembled automobiles are delivered to the assembly plant in Kaliningrad in 40' containers – establishment of the regular line Žilina – Čadca – Český Těšín – Kozse - Żelznodorożnyj²³

The development of the terminal in Žilina was 85% financed from EU resources. EU resources were used exclusively for the construction of the combined transport terminal; the associated logistics park was already financed from private resources. ⁽²⁴⁾

2.3.4.3 Range of services provided in the terminals

Combined transport terminals offer and secure a range of services that correspond to their possibilities. Loading stations in the extent of provided services depend on the position, surface sizes, technical equipment, and availability of providing services on part of the state administration (customs, veterinary, and phyto control). The terminal operator and his/her business activities also play a major role. Provided services differ from terminal to terminal, however, the most important include:

Basic:

- Transfer of transportation units between individual transport media
- Submitting a parcel for transport with the carrier (rail, road, as well as inland waterway) according to customer demands in domestic and international transport
- Transfer of goods from one transportation unit to another or to a road vehicle or rail vehicle, and vice-versa
- Storage (depositing) of individual transportation units in the loading centre at the customer's request
- Transferring transportation units in the loading centre as well as in the customer's facilities
- Securing the comprehensive customs dispatching of parcels, including a customs fee guarantee (specifically, the fulfilment of customs regulations and securing overall parcel clearance)

Supplementary:

- Palletization of goods
- Storing goods in public storage facilities (including customs) in the loading centre site or externally with an emphasis of providing services in the frame of operating public customs storage and offering sheltered, temperate public storage areas
- Securing the collection (completion) of goods including necessary handling using corresponding equipment (e.g. forklifts)
- Renting transportation units – universal as well as special ISO series 1 containers
- Recharging aggregates of isothermal transportation units
- Permitted modifications of transportation units, or delivery and installation of special transportation unit equipment, resp. (e.g. container inlets, container insulation, etc.)
- Securing veterinary and phyto inspections for customs processing based on customer demands

- Repairs and adjustments of transportation units
- Providing reports on parcel movements
- Sale of ISO class 1 containers
- Inspection activity for lifting equipment (loading mechanisms)
- Securing a prescribed temperature within the transportation unit (cooling or heating of the transportation unit)
- Providing a container for the re-loading of goods during a customs inspection
- Providing bonds (seals or a container lock) including hinges
- Issuing necessary documents in the field of road transport subsequent to international rail transport
- Services and operations relating to shipping activity (carriage)
- Consultation and other logistical services in the field of CC

2.3.5 Initial/final phase of combined transport in Central and Eastern Europe

The initial and final phase of transport is an integral component of combined transport. The initial segment of combined transport is understood to mean transport from the manufacturer. Subsequent transport is usually understood to mean the final segment of combined transport directed toward the target customer. This most often relates to road or railway siding transport, as applicable. Water transport, with the exception of extraordinary events, is not used at all in the initial/final segment. In the most common arrangement of combined rail – road transport, this exclusively concerns road transport.

Road transport of chemical substances has its specific traits. During the transport of dangerous chemical substances, it is foremost necessary to strictly adhere to regulations stipulated in international accords (ADR). Due to the transport of dangerous chemical substances, certain optional systems were also implemented – these include, for example, ICE systems (Intervention in Chemical Emergencies), or the optional SQAS assessment system, as necessary. Then there is the optional Responsible Card initiative, which deals with responsible business practices in the chemical industry. Optional and mandatory systems were discussed in previous chapters.

Furthermore, in the frame of the initial and final phase of combined transport, we shall only consider road transport and we shall define the demands placed on the transport of chemical substances. It specifically concerns the following requirements:

1. Suitable transportation unit for chemical substances – chemical substances are, in the frame of combined transport, specifically transported in tank containers and silo containers.

- a. Tank container



Source: <http://www.rmi.nl/>

- b. Silo container



Source: <http://www.combipass.com/>

The same principles essential apply for the transportation of tanks and silos over roadways as for road tanker carriages. The requirements are given foremost by the ADR ordinances and are discussed further in the chapter dedicated to specifics of transporting chemical substances – this primarily deals with

1. The necessity of systematic training of personnel, whose works relates to the transport of chemical substances
2. Inspection activities that precede the transport of dangerous goods over roadways
3. Documents that the driver of the vehicle, transporting the chemical substance must have on his/her person
4. Marking the road vehicle that transports the dangerous chemical substance, etc.

2.4 Combined Carriage in the C.R.

The beginning of combined transport in Czechoslovakia date back to the mid 60's of the previous century in the direction of the CSSR/USSR and vice versa (CSKD Intrans). From the outset, combined transport on our territory is developing primarily in the arrangement overseas shipping/railways/roadway; river transport is seldom used, often in the form of transportation trials.

The current period in this respect is no different. The C.R. most often uses combined transport for transporting to and from Germany, then specifically to the Northern German sea ports of Hamburg, Bremerhaven, and Porúří – Duisburg. Combined transport is also used for transporting to/from the Rotterdam port. Volumes of un-associated international combined carriages are increasing every year. This increase may be seen in the rising demands on C.R. integrated train lines – Northern German ports (Hamburg, Bremerhaven) and Rotterdam, in the implementation of additional connecting international associated train lines for loading “from” or “to” the above specified ports and also in transit lines. Considering the gradually increasing volumes of CT also in additional states of Central and Eastern Europe, a mild increase in CT over the C.R. should be expected. Domestic un-associated CT, in contrast, is stagnating or mildly increasing, resp., but in actual fact, it usually concerns the continuation of transports “to” or “from” sea ports.

CT volumes across water (inland water routes – over the Labe and Vltava) are very small. One of the reasons for this is the small competitiveness caused by the imperfect navigability of the Elbe water routes and loss of access to the Danube. Among the major drawbacks of inland water transport is the significantly longer period of transport compared to rail transport and the irregularity of transport resulting from unsuitable water conditions (low or high levels).

Relative volumes of goods transported by combined carriage in the Czech Republic are constantly lagging behind nation-states of Western Europe. The relatively lower proportion of combined transport (CT) on overall transport capacities and volumes of railway freight transport in the C.R., compared with a series of Western European states, corresponds particularly with the technical-operational and technological facilities of the current loading centres. In contrast to European standards, loading centres in the C.R. exhibit insufficient parameters, especially as they concern their location and connection to road and railway networks, the number of usable lengths of tracks, and the location of storage areas for transportation units. Equally lacking is the park of CT special railway cars. For the application of CT in road transport as well as other segments of the market, or in different directions, respectively – i.e. in inland transports, it is necessary, among others, to perfect its technologies such that the critical transporting distance is significantly reduced, based on which CT

becomes competitive towards road transport. Solutions that could shorten the critical transporting distance, from which CT is competitive compared to road transport, is discussed in the study in the following chapters.

2.4.1 *Volumes of combined transports in the C.R.*

To assess the feasibility of solutions that will be proposed in the conclusion of the feasibility study, it is unconditionally necessary to assess the volumes of existing combined transports and to adopt a specific vision into the future. The below specified tables describe the volumes of combined transports in the C.R. from 2000 to 2008.

Tab. 9: Transport of large containers over railways

	2000	2004	2005	2006	2007	2008
<i>Number of transported bulk containers in total</i>	175 882	253 643	300 527	342 530	422 757	471 464
domestic	40 329	42 825	54 222	71 406	84 168	88 101
international in total	135 553	210 818	246 305	271 124	338 589	383 363
of those: exports	51 390	85 771	101 814	112 176	130 647	188 029
imports	52 494	102 034	119 291	135 124	170 419	145 978
transit across the C.R.	31 669	23 013	25 200	23 824	37 523	49 356

Source: Ministry of Transportation annual publication 2008

The total number of transported large bulk railway containers is progressively increasing since the year 2000. The total number of such recorded containers has nearly tripled since 2000 to the latest monitored period in 2008. Inland transport of large containers increased over the observed period somewhat slower than international transport. From the perspective of international transports and the export – import – transit balance summary, exports (2008) of large containers via rail dominated, followed by imports and transit.

Tab. 10: Transport of detachable extensions via rail

	2000	2004	2005	2006	2007	2008
<i>Number of transported bulk detachable extensions in total</i>	22 996	13 480	13 024	10 726	12 289	8 968
domestic	19	19	39	3	1	5
international in total	22 977	13 461	12 985	10 723	12 288	8 963
of those: exports	14 559	91	88	1 064	1 668	3 515
imports	38	276	2 304	1 525	3 789	3 515
transit across the C.R.	8 380	13 094	10 593	8 134	6 831	1 933

Source: Ministry of Transportation annual publication 2008

The net transport of bulk detachable extensions via rail since 2009 markedly decreased. The main reason is the fact that detachable extensions were in many cases replaced by containers. Domestic transports of detachable extensions were already negligent in the year 2000. When the latest statistical assessment was produced in 2008, the overall transports of bulk detachable extensions were less than 40% the value of the year 2000.

Tab. 11: Un-associated transport of road semi-trailers and tractor trailers via rail

	2000	2004	2005	2006	2007	2008
<i>Number of transported bulk road semi-trailers and tractor trailers, in total</i>	0	12	65	1 822	1 505	1 428
domestic	0	0	0	6	0	0
international in total	0	12	65	1 816	1 505	1 428
of those: exports	0	0	0	970	756	702
imports	0	0	0	763	749	726
transit across the C.R.	0	12	65	83	0	0

Source: Ministry of Transportation annual publication 2008

Un-associated transport of road semi-trailers and tractor-trailers compared to transport of containers is negligible. Domestic transport is minimal, and international transports have not significantly increased since the year 2000. The best year from the view of these transports was in the year 2006, with 1816 transported road semi-trailers and tractor-trailers.

Tab. 12: Associated transport of road vehicles via rail

	2000	2004*	2005	2006	2007	2008
<i>Number of transported bulk road tandem sets and cargo vehicles in total</i>	*	26 162	0	0	0	0
domestic	*	0	0	0	0	0
international in total	*	26 162	0	0	0	0
of those: exports	*	12 350	0	0	0	0
imports	*	13 812	0	0	0	0
transit across the C.R.	*	0	0	0	0	0

Source: Ministry of Transportation annual publication 2008

Systems of associated combined transport (Ro-La) operated in Bohemia in the 90's of the last century. It dealt with two routes: one was directed to Austria, the other to Germany. These Ro-La lines were terminated and are no longer operated on the Czech territory.

2.4.2 *Territorial composition of combined transport lines in the C.R.*

As already mentioned, combined transport in the C.R. was established in the mid 60's. During this period, only the firm Intrans dealt with combined transported. After the year 1989, the number of combined transport operators significantly grew. Currently, four main combined transport operators function on the Czech market – CSKD Intrans, Maersk Czech Republic, L.L.C., Metrans, and Bohemiakombi. Aside from these firms, additional firms significantly contribute to combined transport operations in the C.R., especially as proprietors of loading centres (e.g. České přístavy a.s., Česko-saské přístavy s.r.o, Advanced World Transport a.s., ČD Duss, ČSKD Intrans) and carriers in the frame of combined transports (e.g. ČD Cargo, A.W.T and ERS). The following text will discuss only combined transport operators and the territorial composition of their lines.

2.4.2.1 ČSKD INTRANS

ČSKD INTRANS s.r.o. is one of the prominent actors on the Czech market. Today, the company operates its own rail connection to/from European ports; so-called Container shuttle trains (see Table 14). ČSKD INTRANS s.r.o has its own network of container terminals both in the C.R., then so too in Slovakia (Prague Žižkov, Přerov, Brno, Košice, Žilina). Linking to the ICA, ICF, Adriakombi, and other companies is possible through company terminals, enabling connections to Koper, Trieste, Rijeka, inland EU destinations, Eastern Europe, CIS, Baltic region, and Asia.

CSKD Intrans provides integrated logistical services, from rental and depositing of containers, customs declaration services, consultation activity up to the installation of special equipment into containers (freezing aggregates, installation of locking and security devices).

Tab. 13: Direct train connections (shuttles) of the firm, ČSKD Intrans

Shuttle	Frequency
Hamburg – Prague Container shuttle train service	7 bidirectional trips / week
Rotterdam – Prague Container shuttle train service	4 bidirectional trips / week
Prague – Přerov Over night transfer	daily
Prague – Bratislava Container shuttle train service	2 bidirectional trips / week
Koper – Žilina Container shuttle train service	5 bidirectional trips / week
Koper – Bratislava Container shuttle train service	2 bidirectional trips / week
Koper – Paskov Container shuttle train service	2 bidirectional trips / week

2.4.2.2 ERS RAILWAYS

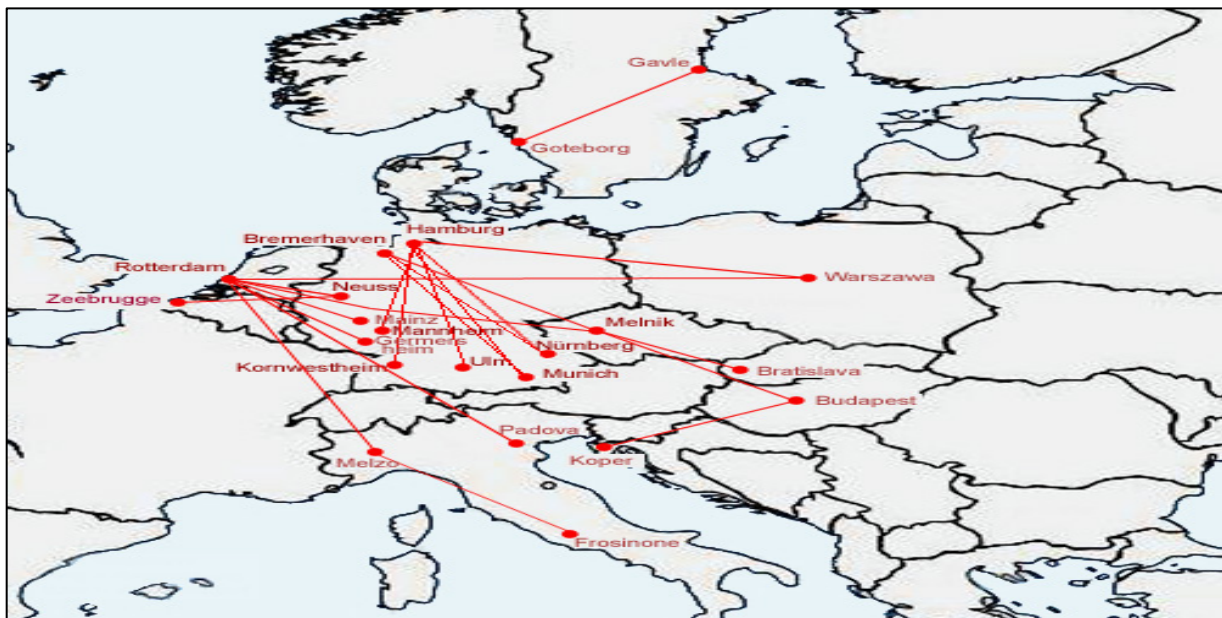
The activity of ERS Railways Company is affiliated with the firm, MAERSK CZECH REPUBLIC s.r.o. that operates on the Czech market since 2003. The MAERSK firm operates shuttles through the ERS Railways firm (neutral combined transport operator – shuttles see Picture 18).

The firm MAERSK further operates loading centres in Mělník using the internal division of Container Terminal MIT (Maersk Intermodal Terminal). Aside from the operation of shuttles, the company's principle line of business includes storage and handling services in this site and mediation activity in water transport. The Container Terminal MIT is a significant storage area for empty ISO class 1 containers.

Tab. 14: Shuttles operated by the ERS Railways Company from the terminal in Mělník

Main corridors	Frequency
Mělník – Rotterdam	9 bidirectional trips / week
Mělník – Bremerhaven	10 bidirectional trips / week
Remaining corridors	
Mělník - Bratislava	2 bidirectional trips / week
Mělník – Budapest	2 bidirectional trips / week

Picture 19: Shuttles operated by the firm, ERS Railways across Europe



Source: <http://www.ersrail.com/>

2.4.2.3 METRANS

The METRANS Company was founded as early as 1948; in the year 1991, it was transformed to a joint stock company with the primary goal of doing business in the field of combined transport. The Metrans Company has the largest proportion of combined transport on the C.R. market. Among the leading activities of the METRANS Company is the operation of combined transport, especially in arranging road – rail transport, even though the company also has branches in major ports. Further services of the firm include trucking, operations within terminals including storage, repairs, and handling work. The company operates the largest loading centre in the C.R. (even in Central Europe) in Prague Uhřetěves, followed by a loading centre in Pilsen, in Lípa nad Dřevnicí (near Zlín), and Dunajska Streda in Slovakia. Since the end of the 2007, the firm operates loading centres in Nýřany and Otrokovice (in the BARUM CONTINENTAL Company) and in Slovakia in Veľka Ida (near

Košice). Operated loading centres are connected by means of shuttles (integrated container trains) with North German ports (Hamburg, Bremerhaven).

Tab. 15: Transports accomplished by the firm, METTRANS

Shuttle links	Number of trains per week		
	2006	2007/4	2008/6
Hamburg - Prague	52	63	78
Bremerhaven - Prague	12	20	28
Koper – Dunajska Streda	0	4-8	12
Local trains (aerial)			
Dunajska Streda - Prague	8	12	14
Zlín - Prague	12	18	23
Nýřany - Prague	0	0	6

2.4.2.4 BOHEMIAKOMBI

The company was founded in 1992. In the past, the firm focused on associated combined transport (Ro-La trains); today, it exclusively operates non-associated combined transport. The company's main goal is to operate on the Czech and Slovak market as a neutral rail operator of combined road-rail transport. Direct lines of the BOHEMIAKOMBI firm are directed to the continental terminal of Hamburg Billwerder, Duisburg, and Terst. Hamburg and Duisburg make use of successive links to Denmark, Scandinavia, Rotterdam, Antwerp, Lyons, and Basle. The vast majority of transports (approx. 97%), which the operator organizes, are continental transports, and only a small share comprise transports of containers to sea ports.

Tab. 16: Frequency of BOHEMIA EXPRESS train departures produced by the BOHEMIAKOMBI Company

From Lovosice to:	Transporting distance (km)	Transport time incl. transfer	Frequency of departures weekly
Direct connections			
Hamburg-Billwerder	573	12 hrs.	3x
Duisburg	704	17 hrs.	5x
Variable successive connections			
Rotterdam	852	33 hrs.	5x

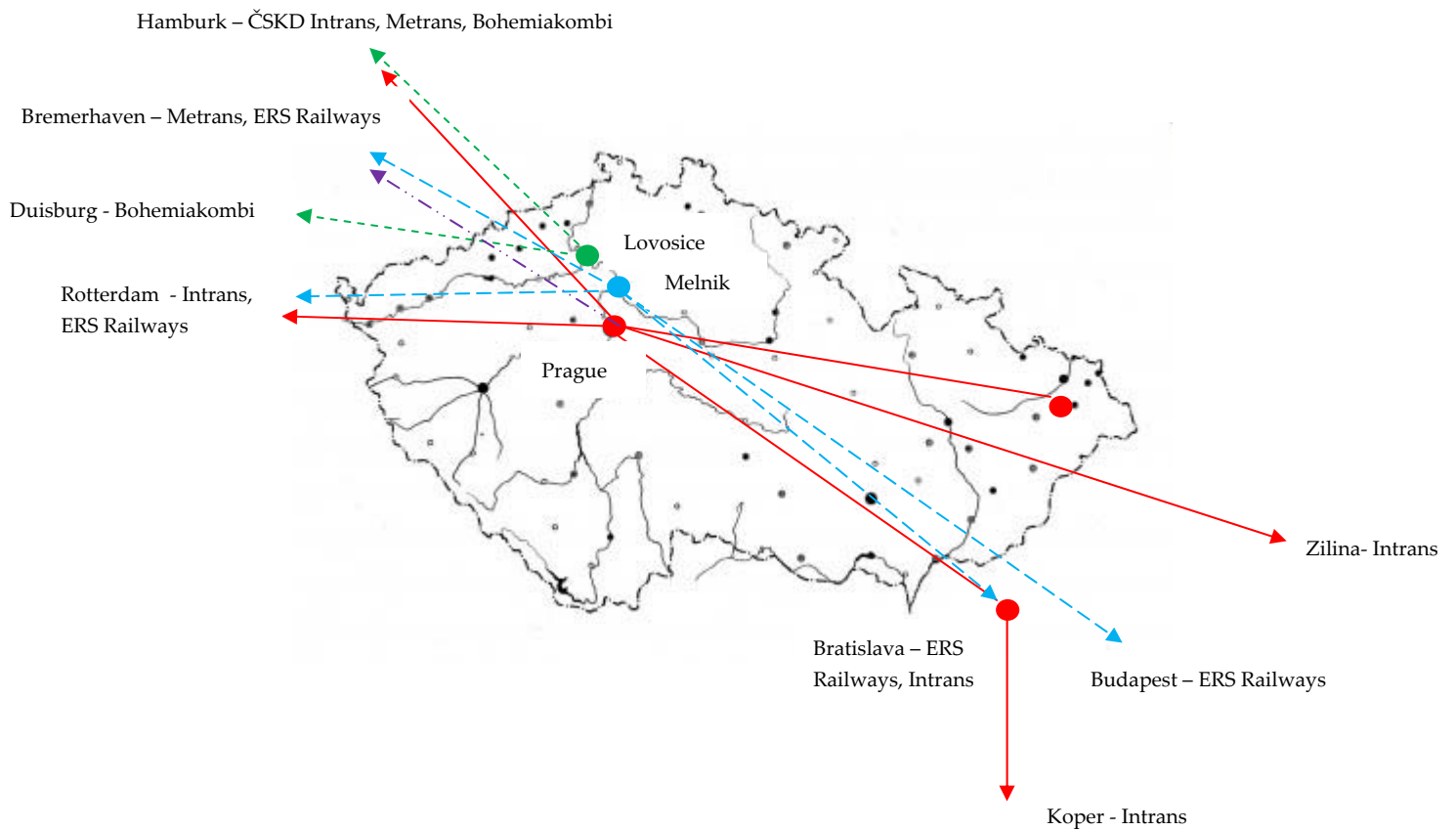
ChemLog – Chemical Logistics Cooperation in Central and Eastern Europe

Ludwigshafen	730	1 day 18 hrs.	5x
Trelleborg	724	1 day 15 hrs.	3x
Antwerp	831	2 days 8 hrs.	5x

Source: <http://www.bohemiakombi.cz/>

Information specified on operator websites, from a structural aspect, was not unified, and there was often no mention at all of transporting chemical substances. Information on combined transport operators, presented in the feasibility study, are thus considerably non-uniform.

Picture 19: Shuttle operators of combined transports – ČSKD Intrans, ERS Railways, Bohemiakombi, Metrans



Source: Webpages of interested subjects

2.4.3 Combined transport terminals in the C.R.

There are currently ten private combined transport loading centres in operation in the Czech Republic with public access in the rail – road combination. The loading centres are Prague-Žižkov, Přerov, Prague-Uhřetěves, Zlín (Lípa nad Dřevnicí), Pilsen - Nýřany, Vratimov (Paskov) and Lovosice operated by the firm TRANS-SPED-CONSULT s.r.o and ČD DUSS, terminal Kopřivnice, Uherský Brod, and port Mělník (MAERSK Logistics).

Only the Lovosice terminal (51% ČD) is under national ownership, and Brno (Intrans – currently out of operation).

Other loading centres are operated in the arrangement road – rail – water transport. This specifically refers to the port in Ústí nad Labem, Mělník (České přístavy, a.s.), Děčín – Loubí, and Lovosice (Česko-saské přístavy ports).

Loading centres with decisive volumes of trans-shipments are thus Lípa nad Dřevnicí, Prague-Uhřetěves and Prague-Žižkov, Mělník, and Lovosice. All loading centres are based on a vertical method of transfer.

They also function as business loading centres with public restricted access that secures services for personal needs or a limited number of customers, respectively. This relates, e.g. to the loading centres of SKODA AUTO, a.s. Mladá Boleslav, FOXCONN CZ s.r.o. Pardubice, PASO a.s. Brno-Modřice, Mondi Packaging and Paper in Štětí and Biocel, a.s. Paskov. In the premises of the firm, Mondi Packaging and Paper Štětí, inland containers with wooden chips for paper production are emptied and handled.

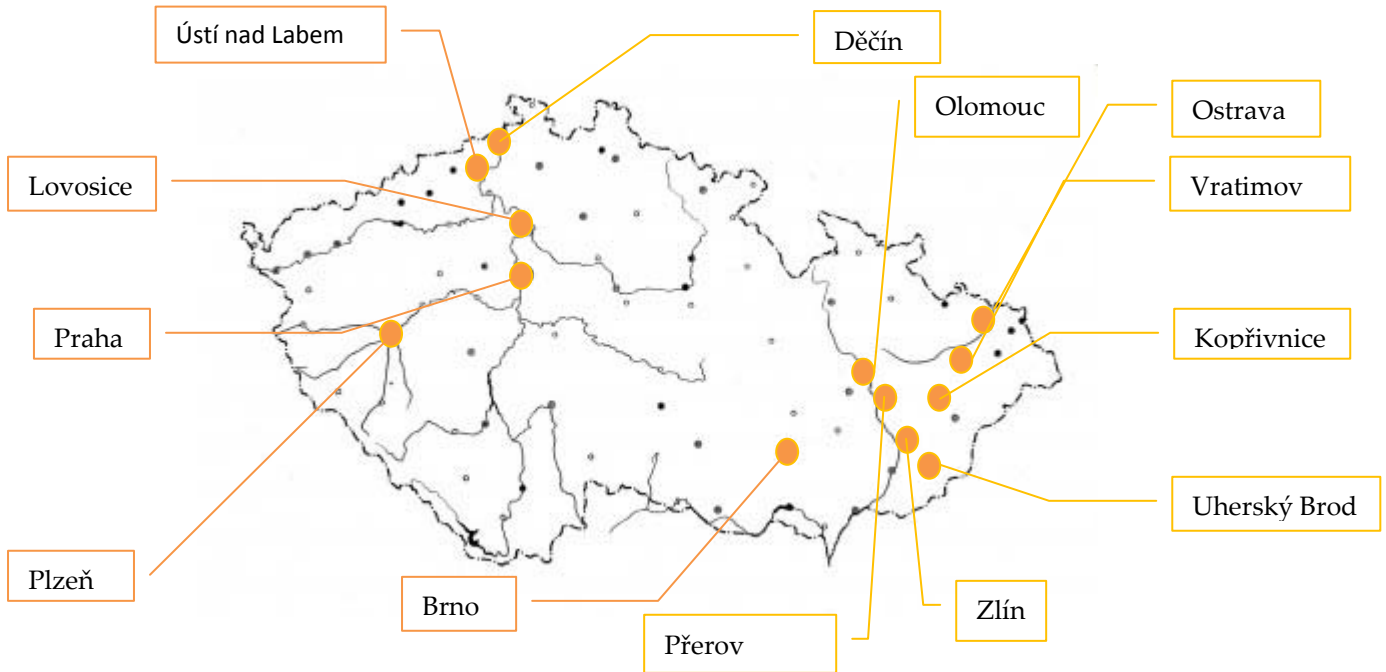
Aside from the terminal in Lovosice (ČD-DUSS), all specified loading centres are owned by private subjects, and thus are not a component of public transport infrastructure. Their establishment or perhaps termination, as well as conditions for their use, depend entirely on the decisions of their owner. Loading centre manner of use is not legislatively modified.

Tab. 17: Currently operated loading centres

Operator	Terminal	Terminal type	Use
Metrans, a.s.	Prague Uhřetěves	Container terminal	Rd-Rail
	Zlín (Lípa nad Dřevnicí)	Container terminal	Rd-Rail
	Pilsen - Nýřany	Container terminal	Rd-Rail
ČSKD INTRANS, s.r.o.	Prague Žižkov	Container terminal	Rd-Rail
	Přerov	Container terminal	Rd-Rail
Advanced World Transport a.s. (formerly OKD- Doprava, a.s. Ostrava)	Vratimov (Paskov)	Container terminal	Rd-Rail
ČD DUSS, a.s.	Lovosice, ČD- DUSS Terminal	Container terminal	Rd-Rail
TRANS - SPED - CONSULT, s.r.o.	Lovosice, TRANS - SPED - CONSULT, s.r.o. (Leased from ČSKD INTRANS, s.r.o.)	Container terminal	Rd-Rail
České přístavy, a.s., Prague	Mělník port	Port	Rd-RI-W
	Ústí nad Labem port	Port	Rd-RI-W
Maersk Logistics C.R.	Mělník terminal port (lease Maersk Logistics)	Container terminal	Rd-RI-W
Česko-saské přístavy, s.r.o., Děčín	Děčín – Loubí port	Port	Rd-RI-W
	Lovosice port	Port	Rd-RI-W
Talosa s.r.o.	Kopřivnice terminal (component of Skoda Tatra Forwarding)	Container terminal	Rd-Rail
	Uherský Brod terminal (component of Škoda Tatra Forwarding)	Container terminal	Rd-Rail

Source: Ministry of Transportation annual summary 2008, complemented by latest findings

Picture 20: Combined transport terminals, Czech Republic, 2010



Source: Webpages of involved subjects

2.4.4 *Telematics in logistics chains*

The expression telematics in logistics chains is understood to mean all use of information technologies for the purpose of enhancing planning, management, and control of transport processes. The term transportation telematics is essentially an equivalent term for Intelligent Transportation Systems (ITS). Telematics has recently been the focus of much attention in the E.U., and under the patronage of the European Commission, a large series of projects was initiated. Telematics finds broad application in all types of transport, not excluding combined transport. The following projects, for example, deserve to be mentioned:

ECALL – concerns itself with the improved ability to reach an emergency site by integrated rescue system units (JRS). The e-call system enables the automatic identification and localization of emergencies by means of an automatic emergency call system from a crashed vehicle. All new vehicles should already be equipped with this technology, so that help can automatically be called. ⁽¹³⁾

Another field, where telematics in the combined transport of chemical substances can be applied, are navigation systems. Currently, the GALILEO system, developed by the European Union in cooperation with the European Space Agency, is probably the most renowned. It is currently not under operation yet, but in the future, it should represent a full-fledged GPS alternative. ⁽¹⁴⁾

2.4.5 *Perspective from the aspect of infrastructure*

Superior transport infrastructure is the fundamental pillar of a functioning economy. Infrastructure in the C.R. has far to be developed – new railway and roadway corridors must be built with adequate facilities, and the navigability of important European water flows must be secured. Since, in the majority of cases, this relates to long-term and financially cumbersome projects, one must have a specific plan.

In the E.U., such a plan exists under the label TEN-T (Trans-European Transport Network). It is a trans-European transport network program. The principle goal is cohesion, interconnectedness, and interoperability on the trans-European transport network. Finances from this program may be drawn on by all EU member states.²⁶

An analogous strategic design exists in the C.R., which in many respects follows up on the TEN-T. This relates to the C.R. Transport Policy for 2005 – 2013. The Transport policy declares what a state and its executive body must do in the area of transport, based on international obligations, of what it wishes to accomplish from a social needs viewpoint, and can accomplish from a financial aspect.¹⁸

The aim of the Transport policy is to unify conditions for the transport market and to create conditions of assuring superior transport in the frame of sustainable development. The principle priorities of the Transport policy are to secure:¹⁸

- equal conditions for access to a transport market,
- superior transport infrastructure, enabling economic growth,
- financing in the transportation sector,
- support of regional transportation development.

Financial support from the E.U. for supporting the transportation sector shall be drawn upon in the years 2007 – 2013, especially by means of the Transportation Operating program. The Transportation OP is focused on achieving the priorities and goals, given by the Transport policy of the Czech Republic for years 2005 – 2013 and other strategic documents.²⁵

The Transportation OP contains 7 priority axes, dividing the operating program into logical entities, and those are further detailed by means of, so-called regions of support, which delineate, what types of projects may be supported in the frame of the respective priority axis.²⁵

Priority axis 1 – Modernization of the TEN-T²⁵ rail network

The following regions of support correspond to the proposed specific aims of priority axis 1:

- Modernization and development of TEN-T railway networks, including rail nodes
- Securing the interoperability on existing railways, ensuring the accordance with technical specifications for the interoperability (TSI) and development of telematic systems

Priority axis 2 – Construction and modernization of TEN-T²⁵ highway and road networks

The following regions of support correspond to the proposed specific aims of priority axis 2:

- Modernization and development of TEN-T highways and road networks
- Development of intelligent transport systems in road transport and systems to improve safety and fluency of road transport

Priority axis 3 – Modernization of the rail network outside of the TEN-T²⁵ network

The following region of support corresponds to the proposed specific goal of priority axis 3:

- Modernization and development of railway networks outside the TEN-T network

Priority axis 4 – Modernization of Class I roads outside of TEN-T²⁵

The following region of support corresponds to the proposed specific goal of priority axis 4:

- Reconstruction and modernization of Class I roads outside of TEN-T

Priority axis 5 – Modernization and development of the Prague metro and systems of managing road transport in the capital city Prague²⁵

The following regions of support correspond to the proposed specific goals:

- Development of the metro network in Prague
- Introducing systems of management and regulation of traffic in Prague

Priority axis 6 – Support of multimodal freight transport and development of inland water transport²⁵

The following regions of support correspond to the proposed specific goals:

- Support of multimodal freight transport, purchase of transport media for CT and transport units for CT, modernization of CT loading centres (within this region of support, only the subarea of Support of revitalization of railway sidings is current)
- Development and modernization of TEN-T network inland waterways and those outside of the TEN-T
- Supporting modernization of river vessels, which shall lead to diminished negative impacts of water transport on the environment, or the support of multimodality in freight transport

Priority axis 7 – Technical assistance²⁵

Financing of activities associated with program management, e.g. securing of super personnel capacities at all levels of the implementation structure, support during the selection of projects, monitoring support of programs and projects, securing the publicity of a program and projects, supporting abilities of potential recipients to draw on financial instruments from the program, etc.

Individual priority axes are obviously awarded various budgets. The amount of the budget for individual priority axes is specified below:

Tab. 18: Budgets of individual priority axes of the Transport Operating program

Priority axis	bill. EUR	% total allocation TOP
1	2.196	38.0
2	1.614	28.0
3	0.393	6.8
4	1.051	18.2
5	0.330	5.7
6	0.119	2.1
7	0.069	1.2
total	5.774	100

Source: <http://www.opd.cz/cz/Zakladni-informace>

We can see from the specified tables that 119 million EUR are awarded to priority axis 6, which is concerned with multimodal freight transport; it represents 2.1% of the overall instruments provided to the C.R. in the frame of the Transport Operating program.

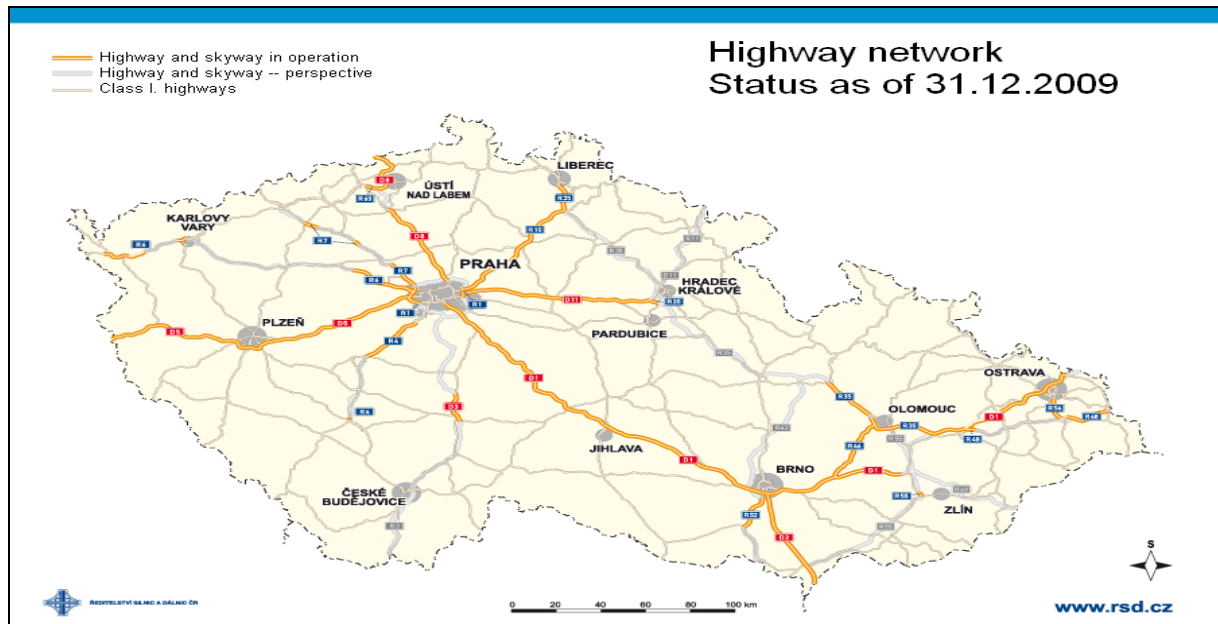
E.U. projects always require a certain measure of co-payments. In the TEN-T program, the co-payment is as follows:

- Producing the study – min. 50%
- Implementation of construction work – 90% in the event of single-state participation
- Implementation of construction work – 80% in the event of trans-border cooperation

Despite the large EU subsidies, joint financing (up to 90%) of projects, especially considering the global economic crisis, are considerably challenging. The financing of transport constructions has presently, principally due to cost-cutting needs resulting from the global economic crisis, become a political theme in great measure. Due to the lack of revenues of the State fund of transport infrastructure (2.6 billion CZK), governmental cost-cutting measures (1.2 bill. CZK) and the decline in surcharge revenues for track operation (1 bill. CZK), many transport projects must be suspended and preserved this year (4 constructions under full realization and 11 constructions in preparation phase or at a minimally developed level) as well as all rail developments.

From the perspective of road freight transport, highway corridors are the most important. The condition of the highway networks as of 31.12.2009 and the forward-looking state is clear from the two following pictures. The savings mentioned above will not affect highways as greatly. In the event of the emerging D47 highway (Lipník nad Bečvou – state borders of C.R./Poland) and in the case of the D8 highway (Lovosice - Řehlovice), financing shall be distributed over a longer time period. In addition, two highway supply conduits to D47 will not be built for now – highway I/67 and I/56.

Picture 21: Highway network in the C.R. – status as of 31. 12. 2009



Source: <http://www.mdcz.cz/>

Picture 22: Highway network in the C.R. – planned state



Source: <http://www.mdcz.cz/>

Rail corridors are equally modernized. The main principles of modernizing and streamlining selected railway networks in the C.R. are:¹⁹

- introducing higher track speeds on sufficiently long segments to make it possible to effectively make use of the increased speed
- achieving a D4 UIC track loading class for the track speed level of 120 km/h inclusively
- introducing area passage for bulk measure UIC GC and wider vehicles according to CSN 73 6320
- securing the demanded capacity of the track while currently determining the optimized scope of railway infrastructure
- equipping of tracks with such technological facilities that ensure full safety of operation at track speeds up to 160 km/h
- improving the state of track level crossings with land communications

Due to the above reasons, the investment program shall be suppressed in 2010 without limiting instruments for repairs and maintenance of tracks and elimination of flood damages. This investment program suppression is expected to bring savings of roughly 2.1 billion CZK.²⁰

3 CONCLUSIONS - COMBINED TRANSPORT IN CENTRAL AND EASTERN EUROPE

3.1 Conclusion 1: Significant potential for increasing the volumes of combined transports exists in the frame of the chemical industry

From the acquired statistical data it can be seen that permanent growth of the chemical industry and volumes of important and exports of chemical substances is occurring in the region of Central and Eastern Europe. These findings follow from the following statistics:

- CEFIC professional organization data on the permanent growth of the E.U. chemical industry.
- Constantly increasing volumes of exported and imported chemical substances from/to the E.U.
- Constantly increasing volumes of exported and imported chemical substances from/to the C.R.

The specified data is always available up to 2008. In the year 2009, the global economic crisis began to fully manifest itself. We, therefore, anticipate that there will be a marked downturn in more recent statistics for year 2009 and 2010 in export and import volumes. An illustrative example of the impact of the crisis may, for example, be the plummeting revenues in the Czech chemical industry across all key sectors – in refinery processing of crude (-33.2%), in the production of chemical substances and preparations (-19.5%), as well as in the rubber and plastics industry (-6.3%). Only the pharmaceutical industry recorded a negligible year-over-year increase of approx. 2%.

Even though the chemical industry and import and export volumes of chemical substances are experiencing constant growth, it is still considered, in light of the overall transports, to be a relatively small amount. Transports of chemical substances must thus be realized jointly with other commodities.

Combined transport volumes of chemical substances will continue to grow also due to the targeted effort to eliminate risk associated with the transport of dangerous associated articles. This particularly relates to the effort to divert transport from road to rail.

The combined transport of chemical substances shall increase also due to newly applied markets. Each firm, not only in the undergoing economic crisis, tries to find new trade outlets for its products and new, more affordable suppliers, comparable quality raw materials, so that it could at least partially lower its costs. These outlets are more frequently sought in Eastern Europe and further East, in Asia. Cheaper suppliers of raw materials more frequently originate from the Asian market, namely in China and India. These suppliers are capable of providing the raw materials somewhat cheaper (the quality is questionable), primarily due to the mentioned absence of strict environmental ordinances and the presence of a cheaper labour force.

Considering the given statistics and the outlined economical trends, it is clear that the demand for superior, reliable, and affordable transport from/to Eastern Europe and the rapidly growing Asian market will continue to increase.

AD 1/1: The systemic completion of transport infrastructure – rail and road corridors

As already stated in the feasibility study, the number of direct combined transport connections decreases eastward. Combined transports are, in their essence, linked to both road and rail corridors. The deficiency of rail and road corridors and **adequate facilities for the transport of chemical substances** is the main barrier in the development of combined transports in Central and Eastern Europe. Completion of the network lies in:

1. Modernizing existing corridors
2. Developing new corridors
3. Linking road and rail corridors through an infrastructure of terminals of combined transport

Both the modernization of existing corridors and the construction of new corridors must be performed with a consideration to the transport of chemical substances. Requirements placed on corridors from the transport aspect of chemical substances are as follows:

1. Emergency plans for transporting chemical substances, especially dangerous ones, including evacuation plans of inhabitants along corridors in the event of spillage of dangerous substances
2. Connecting to the Integrated Rescue Systems (JRS) and optional ICE systems (Intervention in Chemical Emergencies)
3. Construction – constructional elements: e.g. separate parking spots at resting areas for road vehicles transporting dangerous chemical substances, intercepting basins in the event of chemical substance spillage, the availability of access by special rescue facilities to the site of the emergency

AD 1/2 : Further development of combined transport infrastructure – integrated train networks and associated aerial connections and network of terminals, including comprehensive services and subsequent carriage, with a consideration to the subsequent carriages of chemical substances

Combined transport in the region of Central and Eastern Europe was studied in the following arrangement: network of combined transport lines → combined transport terminals → transport of chemical substances to/from the terminal. It seems that the following is pivotal:

1. Completing combined transport lines in Central and Eastern Europe and connecting these networks for continental as well as trans-oceanic transport.
2. Guaranteeing the full systemic equipment of terminals for the transport of chemical substances
3. **Guaranteeing superior equipment and preparation of carriers for the transport of chemical substances to/from terminals**

Good territorial coverage of the studied region through regular integrated train lines is the fundamental prerequisite for timely and reliable deliveries of essential raw materials for the chemical industry. The other side of the transport chain then deals with the quick and reliable shipment of

manufactured products to the target customers. In the frame of the examined region of Central and Eastern Europe, the five largest combined transport operators were specifically discussed according to the production statistics publicized by the UIRR organization. The firms Kombiverkehr, HUPAC, Polzug, ICA, Ökombi are the primary key actors on the European market. Similarly, attention was focused on the five largest actors in the C.R.

Operators, with the exception of Ökombi, mainly concern themselves with un-associated combined transport. These transports may, in fact, be divided into two basic segments:

1. Overseas transports to/from large European sea ports, such as Hamburg, Bremerhaven and Rotterdam, Terst, Koper
2. Continental transports, which utilize
 - full or partial lines of integrated trains heading to/from major European ports
 - links between continental terminals

Transports from sea ports through direct combined transport lines unquestionably dominate. Continental transports in European combined transport, especially in Central and Eastern Europe, still play a secondary role. It is necessary to see the potential for the further development of combined transport in target areas, when considering continental carriages.

The density of combined transportation lines decreases in the West-East direction. German coverage is exemplary. In the event of Germany, the construction of lines is supported by the interest of economic subjects, especially large, supra-national firms, including chemical and the presence of a rising, strongly pro-export economy. Economies of remaining Central and Eastern European countries are not as strong as the German economy; economic subjects in the field of chemical production and consumption are unable to create strong coalitions for promoting their logistical interests. Only supra-national manufacturers of automobiles and electronics are more successful. Austria or Italy may also be cited as a role-model. In the remaining countries of Central Europe, then, it must be contemplated, who should initiate the connection of small economic subjects within the chemical industry into larger entities that could better promote their interests in the field of combined transport and to create, e.g. direct links to perspective markets. The role of the initiator, in this respect, could be played by the state or professional unions, perhaps, who understand the issue somewhat better.

The state plays a decisive role in all of these countries during the creation of infrastructure terminals. In Germany, it is e.g. through means of the companies DUSS, that owns 75% of DB Netz (with additional 12.5% shares in each DB Intermodal and Kombiverkehr). Austrian terminals are held by Austrian national railways, in Italy it is also the state (by means of RFI) and the operator CEMAT holds only a 7% stake in the terminals. Such proprietary structures of terminal operators guarantee the free and un-discriminated approach for all CT participants: rail carriers, operators, as well as road carriers and dispatchers. In countries, where the approach to infrastructure of loading centres is free and un-discriminated, the preparations naturally concentrate into these terminals, wherein various rail carriers, in cooperating with various operators, organize integrated trains. This principle – of free access and non-discrimination is underestimated in the C.R. and is only partially applied so far in Lovosice.

Terminals form the remained together with combined transport lines/networks. Analogously, as in combined transport lines, even the number of terminals decrease eastwards. A fundamental deficiency is the facilities and services provided during the transport of chemical substances. From the perspective of combined transport of containers, in particularly relates to the following facilities and services:

1. Intervention basins in the event of a chemical substance leak
2. The ability to clean empty containers
3. Recovery facilities, when re-pumping chemical substances, as necessary
4. Facilities for heating of containers
5. Ability to lease special transport units (tank and silos)
6. Principle – handling must always be performed by trained personnel

In the event that it concerns the storage of packaged chemical substances, the following building – constructional elements must be available:

1. Specially treated flooring or basins, which are impermeable to chemical substances and preparations
2. Storage area facilities for flammable substances equipped with an endorheic sump, into which the entire room is grouted. The size of the sump must be sufficient to hold the full volume of the largest stored container
3. Appropriate fire prevention equipment including electronic fire alarms
4. Temperance of storage areas in the winter season
5. Recuperation of storage areas in the event of chemical substance re-pumping

AD 1/3: Defining and subsequently implementing European standards

Transports of dangerous chemical substances are potentially hazardous. In the event of an emergency, environmental damage may occur during their course or property damage or bodily harm may possibly result. From the perspective of securing safety, there are two fundamentals approaches

- prevention, i.e. the attempt to eliminate the risks an emergency occurring during transport and handling as best as possible
- guaranteeing systemic measures in the event of a chemical emergency (leakage of chemical substance, fire, explosion)

Gradually, in accordance with the development of transports, systems modifying the transport, storage, and handling of chemical substances were gradually implemented in Central and Western Europe, both in terms of mandatory systems (ADR), as well as optional ones. Among the generally

binding systems for the transport of chemical substances are ADR or RID; optional systems are, e.g. TRINS and the SQAS quality assessment. The Responsible Care initiative modifies responsible business practices in the chemical industry.

Know-how is also bound to the above mentioned systems and follows from practice during their implementation in the entire transport chain, including combined transports. It is partially codified in internal regulations of individual carriers, conveyors, integrated train operators, terminal operators, chemical manufacturers, and consumer organizations, or also as Good practice of professional associations – SCHP C.R.

Considering the progressive implementation of these generally binding regulations as well as systems in countries of Eastern Europe, the corresponding know-how must also be transferred in as short a time as possible. The aim is to achieve an identical procedure on both ends of the transport chains.

1. Phase – establishing systemic cooperation with Eastern Europe states in the area of chemical substance transport
 - a. Mapping the current legislation of states in Central and Eastern Europe, with a view on the transport of chemical substances, especially dangerous ones
 - b. Mapping the current state of development of optional systems (TRINS, SQAS, Responsible Care initiative) in Central and Eastern European states, with a consideration of the transport of chemical substances, especially those that are dangerous
 - c. Mapping the current utilization of know-how and the status of its codification on national, company levels of ChemLog Project participants and its generalization into subsequent standards for the transport chain of combined transports

2. Phase – implementation of know-how in the form of a standard for the combined transport of chemical substances into existing systems, or legislation of interested subjects in Eastern Europe, as applicable.

3.2 Conclusion 2: Training of employees in the field of logistics of chemical substances

The 2nd conclusion of this feasibility study originated from hitherto analyses as well as business meetings – the necessity of systemic, permanent, high-quality, and pan-European comparable education of all individuals that participate in the transport of chemical substances in the frame of the entire Central European region.

The necessity of this education is directly founded in the system of personnel training in legislation (e.g. ADR, RID) and its non-compliance is sanctioned by state administrative authorities of the respective state. Training occurs in this field; the challenge rather seems to be the implementation in practice and subsequent enforcement and control. Training, therefore, should not primarily be focused

on legislative aspects of combined transports (this training is undergoing), but rather on broadened chemical logistics standards reaching as far as the business level (see division below).

1. Consignees / consignors – employees in the chemical industry, especially logisticians of chemical firms, trade, storage, and distribution firms,
2. Carriers / conveyors – including training of drivers for the transport of dangerous chemical materials

Basic logistical top-quality education should be provided at colleges and Universities, including a system of lifetime learning in the field.

Professional unions must also be included in the education and they must be connected with the economic subject of the given field.

Special emphasis should be placed on cooperation during education in the E.U. region and the countries of Eastern Europe, the establishment of a unified system of a level of information, and their continuous updates

Formulated basic know-how principles of the logistics of chemical substances, including updates, should be incorporated in the regular life-long professional education, as an optimal solution by means of professional unions under the assistance of EU projects.

Make use of the availability of co-ops and personal contacts, achieved by means of professional associations under the assistance of E.U. projects

4 FEASIBILITY OF OUTLINED SOLUTIONS

Pivotal conclusions were formulated in the previous chapter on the *Combined transport of chemical goods in Central and Eastern Europe* feasibility study. This section will again summarize the conclusions, as well as solutions, and the feasibility of outlined solutions shall also be partially assessed. For easy viewing, this shall be performed in table form.

Problem	Signature	Solution/Feasibility
4.1 Conclusion 1: Significant potential for increasing the volumes of combined transports exists in the frame of the chemical industry		
AD 1/1: THE SYSTEMIC COMPLETION OF TRANSPORT INFRASTRUCTURE – RAIL (AND ROAD) CORRIDORS		
<p>The current state of road (rail) corridors in Central and Eastern Europe (their completion)</p>	<p>The infrastructure must be completed, especially in Central and Eastern Europe. During the development of new/modernizations of old corridors, the infrastructure must be adjusted to the requirements following from the transport of dangerous chemical substances.</p>	<p>Solution:</p> <ul style="list-style-type: none"> • Enforcing that infrastructure becomes an EU priority as well as for the future planning period • Enforcing that infrastructure of terminals in the C.R. also are legislatively considered an component of the public transport infrastructure with a guaranteed, non-discriminatory approach <p>Feasibility:</p> <ul style="list-style-type: none"> • Financing the construction of new and modernization of old, from the perspective of

		chemical transports of unsatisfactory road (rail) corridors, is possible from state funds (SFDI) and EU funds
<p>AD 1/2: FURTHER DEVELOPMENT OF COMBINED TRANSPORT INFRASTRUCTURE – INTEGRATED TRAIN NETWORKS AND ASSOCIATED AERIAL CONNECTIONS AND NETWORK OF TERMINALS, INCLUDING COMPREHENSIVE SERVICES AND SUBSEQUENT CARRIAGE, WITH A CONSIDERATION TO THE SUBSEQUENT CARRIAGES OF CHEMICAL SUBSTANCES</p>		
<p>Network of combined transport lines</p> <p>Deficiency of direct lines of combined transports (shuttles) in Central and Eastern Europe</p>	<p>In the region of Central and Eastern Europe, the network of combined transport lines is essentially less dense than in Western Europe, to it does not allow the transition to the transport of chemical goods via rail in necessary measure</p>	<p>Solution:</p> <ul style="list-style-type: none"> • Completing construction of combined transport line networks such that a network is established in Western Europe – connected West – East as well as North – South and connect this created network to the network in Western Europe • Enforcing that infrastructure becomes an EU priority as well as for the future planning period (after the year 2013). <p>Feasibility:</p> <ul style="list-style-type: none"> • Financing of new lines of combined transport must be supported by initial short-term support from state funds (SFDI) and EU funds
<p>Combined transport terminals</p>	<p>The equipment (facilities) for the transport of chemical substances in Central and Eastern</p>	<p>Solution:</p>

ChemLog – Chemical Logistics Cooperation in Central and Eastern Europe

<p>Combined transport terminal facilities for the transport of chemical substances</p>	<p>Europe for the transport of chemical substances is insufficient</p>	<ul style="list-style-type: none"> • Invest in the terminal facilities (equipment) of combined transport, especially equipment for chemical substances (heating containers, catch basins, special constructional modifications) • Delegate the role of the state in construction of currently unsatisfactory infrastructure of terminals to rail infrastructure administrators (SŽDC) <p>Feasibility:</p> <ul style="list-style-type: none"> • Financing – terminal owners of combined transports, or possibly EU funds, state funds – only after a certain bridging period when purchasing the special equipment
<p>Transport from/to the terminal</p> <p>Quality of transports corresponding to other segments of the transport chain of combined transport</p>	<p>In Central and especially the Eastern portion of Europe, carriers do not have sufficiently appropriate transport instruments available for the transport of chemical substances by combined transport.</p> <p>Corresponding infrastructure of these transports are not built (neither loading centres, nor lines)</p> <p>The implementing subjects do not possess sufficient know-how</p>	<p>Solution:</p> <ul style="list-style-type: none"> • Motivation and support during procurement of acceptable transport instruments for the transport of dangerous chemical substances in combined transport • Systemic construction of corresponding infrastructure, loading centres, and lines • Implementation of standards and know-how (see Conclusion 2, below) <p>Feasibility:</p>

		<ul style="list-style-type: none"> • It is feasible at the level of carriers, should certain bridging financial support be provided for the purchase of these special transport units. • Financing – private carriers, EU funds, and state funds
<p>AD 1/3: DEFINING AND SUBSEQUENTLY ADOPTING EUROPEAN STANDARDS</p>		
<p>Defining and subsequent adoption of European standards</p> <p>Broader logistics standards of chemical substances, especially on business levels of the transport chain.</p>	<p>Mandatory, legislatively embedded systems for the transport of chemical substances were adopted in the majority of Central and Eastern European states. Their adherence and exact fulfilment, however, significantly differ, if we compare Central and Eastern Europe.</p> <p>Transports of dangerous chemical substances are potentially hazardous. In the event of an emergency, environmental damage may occur during their course or property damage or bodily harm may possibly result.</p> <p>Know-how is also bound to the above mentioned systems and follows from practice during their implementation in the entire transport chain, including combined transports. It is partially codified in internal</p>	<p>Solution:</p> <ul style="list-style-type: none"> • Mapping the current legislation of states in Central and Eastern Europe, with a view on the transport of chemical substances, especially dangerous ones • Mapping the current state of development of optional systems (TRINS, SQAS, Responsible Care initiative) in states of Central and Eastern Europe. • Mapping the current utilization of know-how and the status of its codification on national, company levels of ChemLog Project participants and its generalization into subsequent standards for the transport chain of combined transport of chemical substances • Implementation of know-how in the form

	<p>regulations of subjects of the transport chain</p>	<p>of a standard for the combined transport of chemical substances into existing systems, or legislation of interested subjects in Easter Europe, as applicable.</p> <ul style="list-style-type: none"> • Continue in the set trend of close-knit cooperation with HZS CR Headquarters, participate in introducing the ecall system into practice, and in so doing, increase the safety of transports <p>Feasibility:</p> <ul style="list-style-type: none"> • <u>by means of professional associations under the assistance of EU projects</u>
<p>4.2 Conclusion 2: Training of employees in the field of logistics of chemical substances</p>		
<p>Level of education of works in the field of chemical logistics</p> <p>Cooperation during education in the E.U. region and the countries of Eastern Europe, the establishment of a unified system of a level of information, and their continuous updates</p>	<p>The logistics of chemical substances requires well-educated, thoroughly trained, and professionally experienced workers to reduce the risk in a significant manner, with the transport of associated chemical substances</p> <p>Basic logistical top-quality education should be provided at colleges and Universities, including a system of lifetime learning in the</p>	<p>Solution:</p> <ul style="list-style-type: none"> • Regularly train logisticians of chemical companies, logisticians in the field of conveyance and transportation, and grammar school and University students. • Training, specifically in the following areas must be secured:

	<p>field. The education project must also include professional associations.</p> <p>Incorporate formulated basic know-how principles of logistics of chemical substances including updates in the regular life-long professional education. Make use of co-op opportunities and personal contacts,</p>	<ul style="list-style-type: none"> - Legislation associated with logistics of chemical substances (ADR, RID) in connection with optional systems association with the logistics of chemical substances (ICE, SQAS) - Formulated basic know-how principles of logistics of chemical substances including updates - Co-ops and personal contacts, achieved by means of professional associations under the assistance of E.U. projects <p>Feasibility:</p> <ul style="list-style-type: none"> • <u>By means of professional associations under the assistance of EU projects and in cooperation with</u> - grammar schools and Universities - economic subjects of the given region <p>life-long education of works in the field of chemical logistics</p>
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