TransBaltic

Towards an integrated transport system in the Baltic Sea Region

Feasibility study of launching regular intermodal traffic between Poland and Scandinavia

TransBaltic
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SKANE

Contents

List of Figures

List of Tables

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Executive summary

The study is focused on feasibility of launching regular intermodal traffic between Poland and Scandinavia being a contribution to a wider elaboration made by the WP5.5. Task Leader – East Norway County Network analysing possibilities to increase railway traffic between the Nordic Triangle and the other parts of the Baltic Sea Region including the South Baltic coast.

The following routes were selected to analyse these opportunities:

- Western route leading from Oslo, Stockholm and Göteborg to the western part of Poland and specifically to Poznan and Wroclaw with the use of ferry line Ystad -Swinoujscie.
- Central route leading from Oslo, Stockholm and Göteborg to Katowice in the central south part of Poland with the use of Karlskrona – Gdynia ferries

Fig. 0-1 Selected routes between business centres in Poland , Sweden and Norway

Source : ILiM own study

We are starting with the statement that nowadays there is no intermodal transport service between Scandinavia and Poland in a form of regular container trains. The dominant mode of transporting goods between the both regions is “truck on ferry” effectively suppressing the other transport solutions.

There are however regular conventional train connections operated by PKP Cargo SA linking Poznan and Wroclaw with Malmö which can be base for deliveries of containers. Trains operators use 3 car-rail ferries between Ystad and Świnoujście equipped with 600m of rail track each. The ferry connection between Karlskrona and Gdynia base entirely on car-ferries so far. Launching of rail ferries is under investigation and will be implemented after completing container terminal in Karlskrona scheduled for mid 2013.

In this study we would like to assess flows of goods being potentially subject of containerised transports between Poland and Scandinavia. It refers to the flows resulting not only from the foreign trade of Sweden and Norway with Poland but also from trade with neighbouring countries as Czech Republic, Slovakia, Hungary and Ukraine.

In the further part of the study the bottleneck analysis was made to highlight the factors that inhibit development of intermodality in the North-South traffic. The elaboration than delivers the comparative study of timewise and price wise aspects of modal competition to demonstrate the opportunities facing intermodal solutions. The study ends with the conclusions and recommendations.

1. Characteristics of the transport system of the Baltic Sea Region

The transport system of the Baltic Sea region is determined by the presence of the sea posing a need of taking use of ferries between the Central Europe and Scandinavian Peninsula.

This is a reason for domination of road transport carried on ro-ro ferries. Rail transport encounters bigger technological barriers.

However passenger traffic is the core business for ferry operators nonetheless each ferry is adjusted to carry trucks, semi trailers or swap bodies and some of them may transport rail stock onboard.

1.1. Ferry connections linking Central Europe with Scandinavian Peninsula

The region of Baltic Sea is considered as providing remarkable density of ferry connections. Currently, the following RO-PAX ferry connections may be used by transport companies carrying goods between the Central Europe and Scandinavia. (In this study we will focus on the connections between Poland and Germany with Denmark, Sweden and Norway where regular intermodal services are the most likely to be launched)

Denmark - Sweden:

• Helsingør (DK)	- Helsingborg (SE)	SCANDLINES
• Frederikshaven (DK)	- Göteborg (SE)	STENA LINE
• Grenaa (DK)	- Varberg (SE)	STENA LINE

Denmark – Norway:

• Frederikshaven (DK)	- Oslo (NO)	STENA LINE
• Hirtshals (DK)	- Kristiansand (NO)	COLOR LINE / FJORD LINE
• Hirtshals (DK)	- Stavanger/Bergen (NO	FJORD LINE
• Hirtshals (DK)	- Larvik (NO)	COLOR LINE
• Kopenhaga (DK)	- Oslo (NO)	DFDS Tor Line

Germany - Sweden:

• Kiel (DE)	- Göteborg (SE)	STENA LINE
• Rostock (DE)	- Trelleborg (SE)	SCANDLINES/TT LINE
• Sassnitz (DE)	- Trelleborg (SE)	SCANDLINES
• Travemünde (DE)	- Trelleborg (SE)	TT LINE

Germany – Denmark:

• Rostock (DE)	- Gedser (DK)	SCANDLINES

Germany – Norway:

• Kiel (DE)	- Oslo (NO)	COLOR LINE

Poland – Sweden

• Świnoujście (PL)	- Ystad (SE)	UNITY LINE
• Świnoujście (PL)	- Trelleborg (SE)	

The figure below presents estimated maximal yearly transport potential of ferry connections between the Central Europe and the Scandinavian Peninsula being measured in number of trucks taking into account maximal loading capacities of ferries and its sailing frequencies.

The most occupied are ferry links between Sweden and Denmark mainly due to very narrow crossing of Helsingborg –Helsingør.

The alternative ferry route links Danish islands with Germany represent also significant volumes however they have been already visibly reduced as result of opening of the Øresund Bridge and will probably disappear after building of tunnel under Fehmarn Belt

For Poland ferry connection with Sweden will keep its importance for possible intermodal connections of Norway and Sweden with Poland and neighbouring countries as Ukraine, Belarus, Slovakia, Hungary or Czech Republic.

Fig. 1-1 Transport capacity of ferry lines connecting countries of the BSR (in thousand trucks)

Source: ILiM own study based on ferry operators' websites

Some of enlisted ferries possessing at least 600 meters long track are adapted to carry rail wagons.

Germany - Sweden:

- Rostock (DE) - Trelleborg (SE)
- Sassnitz (DE) - Trelleborg (SE)

Denmark – Sweden:

- Frederikshaven (DK) - Göteborg (SE)

Poland - Sweden:

- Świnoujście (PL) - Ystad (SE)

1.2. Fixed transport connections

1.2.1. Existing fixed transport connections

During 1998 -2000 significant infrastructural investments took place in the region.Two transport corridors between Germany – Denmark and Sweden were established enabling fixed land rail connection without need of using ferries.

- In 1998 road-rail bridge over Great Belt strait linking Danish islands of Fionia and Zeeland was opened. This 16 km long bridge allowed to connect whole national rail network. (The toll for crossing the bridge is DKK 737,00 per waggon).

- In 2000 another fixed connection between Kopenhagen and Malmö in Sweden was opened. It consists of 7,8 km long bridge, artificial island and tunnel under the sea bottom . It is the longest combined connection in Europe offering dual road carriagewaynand twin track railway. The electrified railroad line is equipped with the point of change of voltage due to different voltage standards in Denmark (25kV, 50HZ) and Sweden (15kV,16,7HZ) . The Øresund bridge allowed international direct rail traffic between Sweden and Norway with continental Europe. The level of tolls is 138-210 EUR / truck depending on tonnage and ca. 2080 DKK per freight train.

  Øresund bridge has definitely changed the rail traffic between Europe and Scandinavia. All the rail traffic coming from Germany to Sweden and Norway is directed through the Øresund Bridge. The busy ferry connection between Copenhagen and Malmö was closed.

  The Øresund Bridge allows also for transport of containers coming through the North Range European Ports to Scandinavia without use of ferries what makes it much cheaper. The new rail connection is also extremely competitive to all other nearby rail connections which still have to use ferries as e.g. Rostock-Trelleborg, Sassnitz-Trelleborg or Frederikshaven- Göteborg. Railways tend to take roundabout way to avoid ferries.

1.2.2. Planned fixed transport connections

A few other regional investments enabling unstopped truck and train traffic is planned in the nearest future.

- Building of bridge linking Helsingør (DK) with Helsinborg (SE). Expected time of investment fulfilment is scheduled on 2018. The new bridge may finally eliminate ferries in freight traffic between Sweden and Denmark.

- Building of tunnel under Fehmarn Belt connecting German Puttgarden with Danish island Lolland Rodby. It will be 16 km long and is scheduled to be performed between 2014 – 2020.

It is strategic investment joining German and Scandinavian railway networks which allows for significant reduction of transit time. Project assumes taking over the whole traffic on the line Puttgarden –Rodby realised today with the use of ferries.

The investment may result in consolidation of majority of traffic between Germany and Denmark and taking over loads from ferries circulating between Germany and Sweden as Travemünde – Trelleborg, Travemünde – Malmö, Rostock – Trelleborg or Sassnitz - Trelleborg especially in freight railway carriages Completing of these two investments of fixed land connections eliminating expensive and time consuming reloads of wagons brings very deep changes in transport profiles on continental Europe – Scandinavia route. Only long ferry connections (300-400 km) offering savings on drivers' working time may stay interesting to road hauliers.

Fig. 1-2 Strategic role of Fehmarn Tunnel for logistics in Scandinavia

Source : Presentation of Region Sjaelland " DRY PORT CASE REGION SJAELLAND" – TransBaltic Dry Port Seminar, Copenhagen March'2012

Implementation of the fixed links significantly changes the picture of the transport system in the south part of the BSR.

Transport of containers carried by road or rail from the North Range ports is quicker and simpler. It became very competitive with port of Gothenburg in his role as the gateway port for trans ocean containerised deliveries especially in case of shipments addressed to the south of Sweden. Block container trains crossing the sea through a tunnel or bridge gain big competitive advantage towards intermodal operators forced to use a ferry.

This situation affects also Poland. All the potential North – South intermodal transport solutions through Polish territory being alternative to similar connections through the east part Germany will suffer due to necessity of taking ferry. The remaining possible North – South train connections through the Polish ports heading for Poland, Slovakia or Ukraine are expected to be attractive.

1.3. Railroad transport corridors in carriages between Continental Europe and Scandinavia

Main railroad corridors linking Scandinavia with the continental part of Europe - according to the Royal Institute of Technology KHT Railway Group - Center for research and education in railway technology

- Hamburg / Berlin – Copenhagen – Malmö (Öresund bridge) – Göteborg – Oslo
- Hamburg / Berlin – Copenhagen – Malmö (Öresund bridge) – Stockholm – Helsinki
- Hamburg / Berlin – Copenhagen – Malmö (Öresund bridge) - Orebro – Falun / Ange
- Berlin – Rostock – Malmö (ferry: Rostock – Trelleborg) – Stockholm – Helsinki / Tampere
- Berlin – Rostock – Malmö (ferry: Rostock – Trelleborg) – Orebro – Falun/ Ange
- Berlin – Rostock – Malmö (ferry: Rostock – Trelleborg) – Göteborg - Oslo
- Berlin – Sassnitz – Malmö (ferry: Sassnitz – Trelleborg) – Stockholm – Helsinki / Tampere
- Berlin –Sassnitz – Malmö (ferry: Rostock – Trelleborg) – Orebro – Falun/ Ange
- Berlin – Sassnitz – Malmö (ferry: Rostock – Trelleborg) – Göteborg - Oslo

The scale of volumes transported on rails on the main the main routes may be illustrated by the statistics of Sweden being the central part of the BSR transport network (in 2007 in thousands tonnes)

Relation : Sweden – Germany
- with the use of ferries 2.500
- through the Oresund bridge 2.300

Relation : Sweden – Norway
- overland transport 1.600

Relation : Sweden- Finland

- with the use of ferries 400

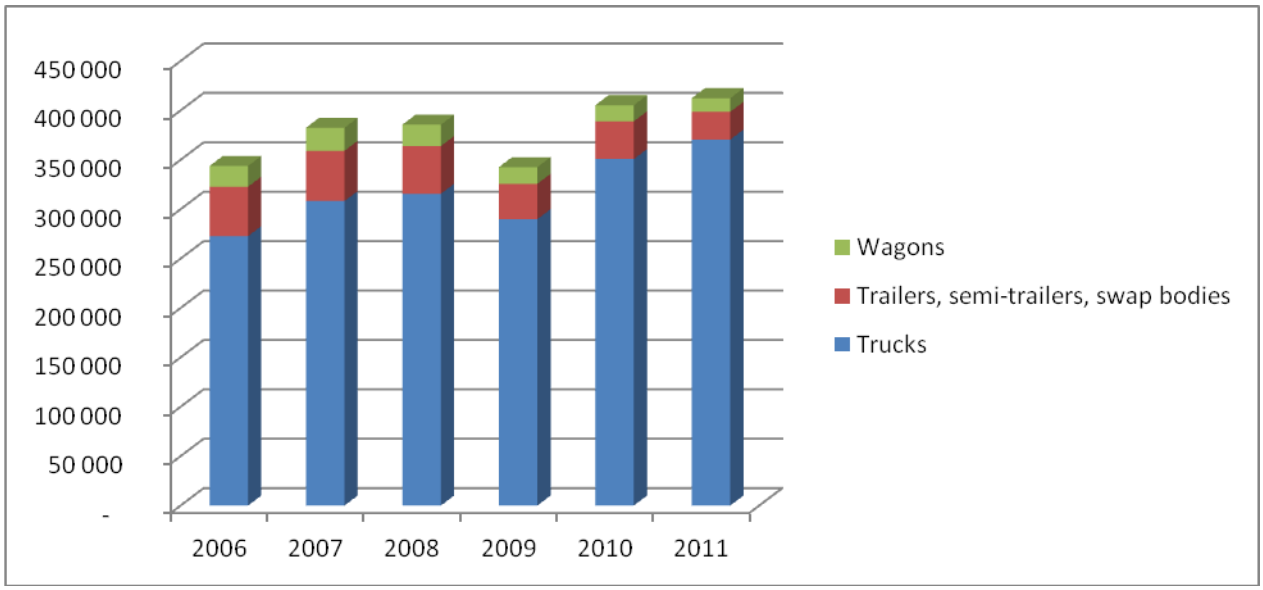
Relation : Sweden - Poland

- with the use of ferries 600

2. Present railway transport statistics

Ro-ro traffic between Poland and Scandinavia is dominated by truck transport which represents 80% of the transport units. Trailers represent ca 7% and rail wagons ca. 3% only. Transports executed in trailers and rail wagons are not stabilized, the volumes are changeable from year to year being both in downtrend since crisis of 2008-2009.

Fig. 2-1 Cargo ro-ro traffic of trucks, trailers and wagons at Polish seaports (vehicle units)



Source: GUS Transport Activity Results in 2011

Truck transport is relatively well balanced in terms of export and import traffics. There is export excess amounting to ca 10-15%. In case of trailers export volumes are bigger by 10-30%. Rail transports are much more unbalanced – Polish imports amount to 40%-50% of export volumes.

Tab.2-1 Balance of export and import ro-ro traffic between Poland and Scandinavia

Year		2006	2007	2008	2009	2010	2011
Trucks	Export	134 871	153 297	151 572	142 423	174 176	184 568
	Import	120 537	134 763	130 045	122 935	149 555	156 226
	Balance	14 334	18 534	21 527	19 488	24 621	28 342
	%	10,6%	12,1%	14,2%	13,7%	14,1%	15,4%
Trailers	Export	15 965	17 000	15 970	11 689	10 428	17 453
	Import	14 726	14 386	12 958	8 512	9 544	12 374
	Balance	1 239	2 614	3 012	3 177	884	5 079
	%	7,8%	15,4%	18,9%	27,2%	8,5%	29,1%
Wagons	Export	9 994	11 131	11 131	10 295	7 622	7 233
	Import	5 023	5 429	4 859	3 933	3 898	3 356
	Balance	4 971	5 702	6 272	6 362	3 724	3 877
	%	49,7%	51,2%	56,3%	61,8%	48,9%	53,6%

Source: GUS Transport Activity Results in 2011

Transports carried by trucks are more efficient in terms of backloads. Empty trucks represent ca.6-10% of vehicles being carried by ferries. This coefficient in case of trailers is bigger – reaching 15% in average while rail transport suffer co. 30% share of empty vehicles.

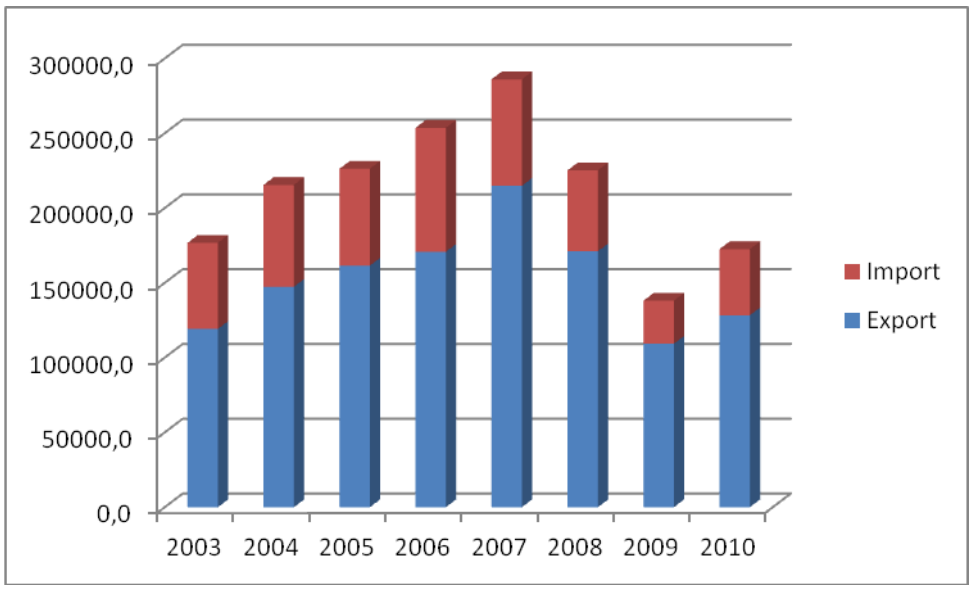
Tab.2-2 Transport of of empty vehicles in ro-ro traffic between Poland and Scandinavia

Year		2006	2007	2008	2009	2010	2011
Trucks	Loaded	255 408	288 060	281 617	265 358	323 731	340 794
	Empty	17 392	20 211	30 473	24 586	27 036	29 680
	Total	272 800	308 271	312 090	289 944	350 767	370 474
	Empties share	6,4%	6,6%	9,8%	8,5%	7,7%	8,0%
Trailers	Loaded	30 691	31 386	28 928	20 201	19 972	29 827
	Empty	3 482	3 415	4 070	4 439	5 380	6 698
	Total	34 173	34 801	32 998	24 640	25 352	36 525
	Empties share	10,2%	9,8%	12,3%	18,0%	21,2%	18,3%
Wagons	Loaded	15 017	16 560	15 990	14 228	11 520	10 589
	Empty	5 938	6 777	6 505	5 295	5 025	3 276
	Total	20 955	23 337	22 495	19 523	16 545	13 865
	Empties share	28,3%	29,0%	28,9%	27,1%	30,4%	23,6%

Source: GUS Transport Activity Results in 2011

Analysis of rail transport between Poland and Sweden expressed in thousand tonnes show dynamic development of transports until 2007, deep decline as result of worldwide financial crisis in 2008-2009 and not full recovery afterwards. It shows also significant imbalance in favour of Polish exports (representing 72% of total volume)

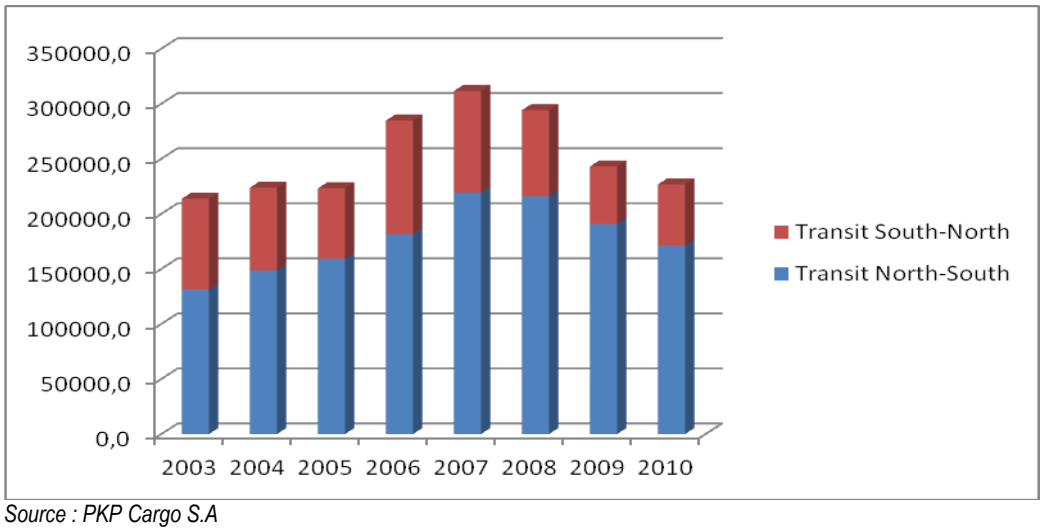
Fig. 2-2 Railway traffic between Poland and Sweden in thousand tonnes (Polish exports and imports)



Source : PKP Cargo S.A.

The rail traffic between Poland and Sweden is significantly fed by transit going through the Polish territory linking Scandinavia with their trading partners in the Central Europe – mainly in Austria and Czech Republic. Majority of volumes (70%) goes in the North-South direction. The development tendencies are similar to traffic resulted from the Polish foreign trade – uptrend until 2007 and downtrend afterwards.

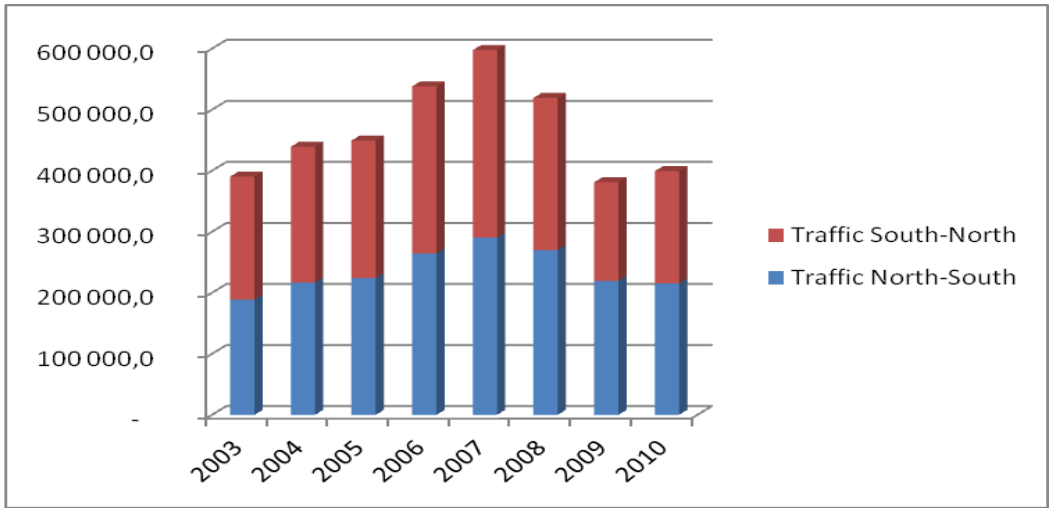
Fig. 2-3 Railway traffic between Poland and Sweden in thousand tonnes (transit through Poland)



Source : PKP Cargo S.A

These two streams of loads overlap. The total volumes being transferred from the North to the South are more or less equal to the volumes transported in the opposite direction.

Fig. 2-4 Total railway traffic between Poland and Sweden in thousand tonnes



Source : PKP Cargo S.A

Presented volumes refer entirely to rail transports executed in conventional wagons.

3. Available intermodal services in Poland and Scandinavia

3.1. Intermodal transport system in Sweden and Norway.

The Swedish and Norwegian rail freight market is deregulated. The old state owned monopolies are still the dominating companies operating, but there are smaller operators mainly offering hauling services and system trains linking more specific flows for companies or container shuttles such as the ones going to the port of Gothenburg.

The overall Swedish rail freight market is heavily dominated by iron ore, paper and forest industry products. It is therefore less interesting to focus on the overall rail freight industry and instead focus on the intermodal part of the sector.

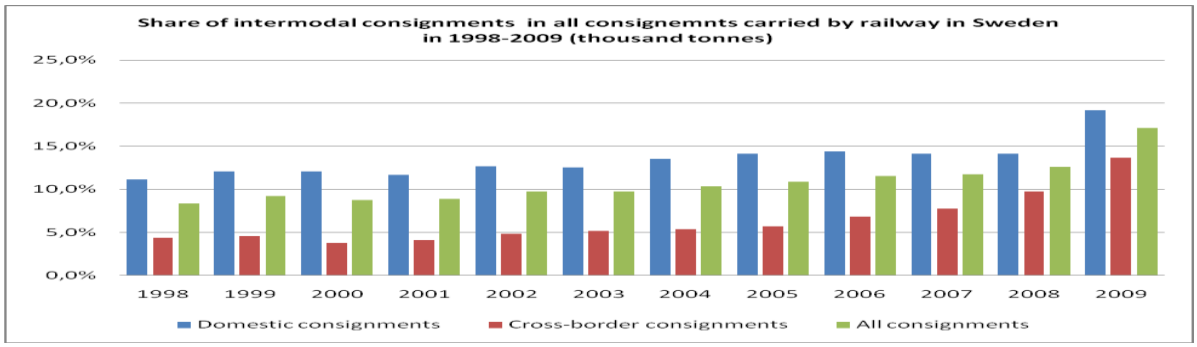
In Sweden increasing share of intermodal transports in total railway freight traffic is to be noted. The process is much stronger in domestic carriages reaching 20% of tonnage and nearly 30% of transport efforts measured in tonno-km. In cross-border traffic in turn intermodality ratio is lower but but it's growth is more dynamic. Nevertheless it is one of the highest share of intermodality in railway traffic in Europe.

Tab.3-1 Share of intermodal consignments in all loads carried by railways in Sweden in 1998-2009 (thousand tonnes)

Thousand tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Domestic consignments												
Overall consignments	33 127	33 149	34 340	34 795	34 211	35 827	36 553	38 740	40 575	42 847	42 388	34 651
Intermodal consignments	3 693	4 004	4 139	4 065	4 325	4 488	4 949	5 477	5 843	6 047	5 998	6 647
Share pf intermodal c-ments	*11,1%*	*12,1%*	*12,1%*	*11,7%*	*12,6%*	*12,5%*	*13,5%*	*14,1%*	*14,4%*	*14,1%*	*14,2%*	*19,2%*
Cross - border consignments												
Overall consignments	22 937	20 451	22 923	20 411	20 569	22 047	23 604	24 458	24 369	24 962	23 244	20 785
Intermodal consignments	1 006	937	857	838	998	1 139	1 261	1 395	1 657	1 930	2 263	2 839
Share pf intermodal c-ments	*4,4%*	*4,6%*	*3,7%*	*4,1%*	*4,9%*	*5,2%*	*5,3%*	*5,7%*	*6,8%*	*7,7%*	*9,7%*	*13,7%*
All consignments												
Overall consignments	56 064	53 600	57 263	55 206	54 780	57 874	60 157	63 198	64 944	67 809	65 632	55 436
Intermodal consignments	4 699	4 941	4 996	4 903	5 323	5 627	6 210	6 872	7 500	7 977	8 261	9 486
Share pf intermodal c-ments	*8,4%*	*9,2%*	*8,7%*	*8,9%*	*9,7%*	*9,7%*	*10,3%*	*10,9%*	*11,5%*	*11,8%*	*12,6%*	*17,1%*

Source: Ramboll Sverige AB Report based on Trafikverket.

Fig. 3-1 Share of intermodal consignments in all loads carried by railways in Sweden in 1998-2009 (thousand tonnes)



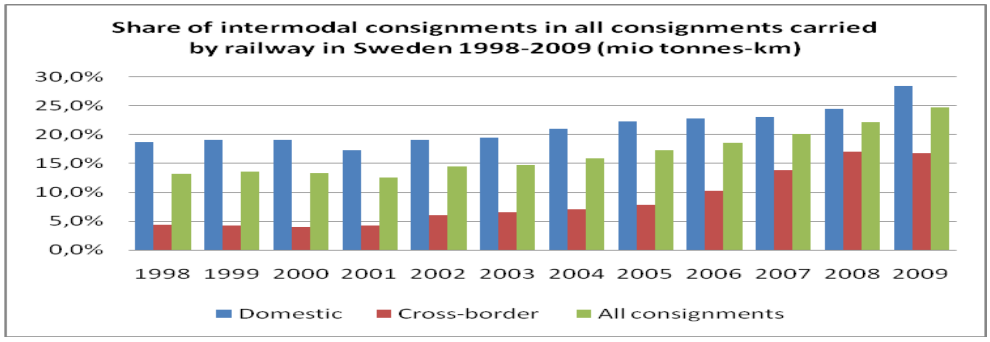
Source: Ramboll Sverige AB Report based on Trafikverket.

Tab.3-2 Share of intermodal consignments in all loads carried by railways in Sweden in 1998-2009 (million tonne-km)

Transport performance (million tonne-kilometres)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Domestic consignments												
Overall consignments	11 901	12 036	12 420	12 501	12 404	12 856	13 190	14 125	14 894	15 681	15 782	13 288
Intermodal consignments	2 221	2 296	2 377	2 160	2 368	2 497	2 774	3 153	3 391	3 619	3 871	3 771
Share pf intermodal c-ments	*18,7%*	*19,1%*	*19,1%*	*17,3%*	*19,1%*	*19,4%*	*21,0%*	*22,3%*	*22,8%*	*23,1%*	*24,5%*	*28,4%*
Cross - border consignments												
Overall consignments	7 261	7 054	7 668	7 047	6 793	7 314	7 666	7 550	7 377	7 569	7 141	6 117
Intermodal consignments	317	301	305	298	413	477	546	594	754	1 051	1 218	1 026
Share pf intermodal c-ments	*4,4%*	*4,3%*	*4,0%*	*4,2%*	*6,1%*	*6,5%*	*7,1%*	*7,9%*	*10,2%*	*13,9%*	*17,1%*	*16,8%*
All consignments												
Overall consignments	19 162	19 090	20 088	19 548	19 197	20 170	20 856	21 675	22 271	23 250	22 923	19 405
Intermodal consignments	2 538	2 597	2 682	2 458	2 781	2 974	3 319	3 747	4 145	4 670	5 089	4 797
Share pf intermodal c-ments	*13,2%*	*13,6%*	*13,4%*	*12,6%*	*14,5%*	*14,7%*	*15,9%*	*17,3%*	*18,6%*	*20,1%*	*22,2%*	*24,7%*

Source: Ramboll Sverige AB Report based on Trafikverket.

Fig. 3-2 Share of intermodal consignments in all loads carried by railways in Sweden in 1998-2009 (million tonne-km)



Source: Ramboll Sverige AB Report based on Trafikverket.

There are two main reasons for the Swedish intermodal rail freight increase. Both took place about ten years ago.

The first was that the opening of the Öresund bridge between Sweden and Denmark. This made it possible to reach Sweden/the continent (also using the Stora Baelt bridge in Denmark) without needing to go on a ferry. This made lead time and costs for rail transports more interesting and more competetive. The bridge has continued to increase its rail freight (and passenger) transport, and we are getting close to the maximum capacity. The Fehmarn Belt tunnel will decrease costs and lead time between Denmark and Germany when it is finished 2019, which will make freight transports even more competetive. There are also studies being made to build another connection between Sweden and Denmark, this will most likely be located between Helsingborg and Helsingor and it would increase the freight capacity for international trains even more.

The second reason is the block trains going to the port of Gothenburg. The line leading out to the port was electrified 2004, which made it possible to reach the harbour area without using hauling services (most of the Swedish rail network is electrified, and therefore almost all passenger trains and locomotors drive using electricity). Cost decreased and lead times became better to reach the harbour. At the same time new terminals were established and the rail freight market was deregulated which altogether made it possible to start a number of block trains between the port of Gothenburg and these inland terminals. The inland terminals are so called dry ports, meaning that customers can check in their container shipment from the port of Gothenburg already at the inland terminal. Altogether this decreased costs and increased competiveness of these block trains. It has also meant that municipalities are nowadays keen to establish terminals, to try to attract companies finding it more attractive to establish close to one of these dry port terminals. From the beginning there were just a few container shuttles, but it has steadily increased and the latest figure I heard is that they now have 26 different shuttles (a couple of them are competing for the same route and terminal but operated by two different companies

When the concept was first launched the port of Gothenburg hoped that it would take 50% of the increase in container traffic to the port. The outcome was much better and they surpassed so that 50% of

the total container traffic used rail by 2009. Interesting was that the rail transports held their market share during the downturn in the economy, wheras the truck transports decreased sharply. Maybe this was because of lowered prices of the block train operators, so that they still could fill their trains.

Fig. 3-3 Intermodal trains serving different dry port destinations from the Port of Gothenburg

Source : Ramboll Sverige AB Report

I also heard that they are about to start a shuttle to Karlshamn, which might decrease lead times for that alternative.

The port of Helsingborg, the second largest container port in Sweden, have also established a couple routes now.

In Sweden and Norway there are two main intermodal operators that may participate in launching intermodal transports between Scandinavia and Poland.

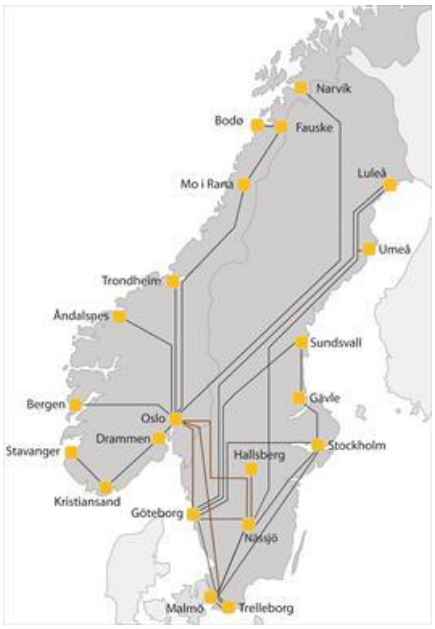
Fig. 3-4 Green Cargo terminals network in Sweden

First one – it is **Green Cargo** (formally part of the Swedish state railway, SJ) that is still 100% owned by the Swedish state. Green Cargo used to own 45% of CargoNet, but its share has recently been sold to NSB. Green Cargo has a large terminal network

and operates both block trains, wagon load and combi trains. New combi transport setups are under development since Green Cargo sold its share of CargoNet. A large portion of Green Cargo rail network is based on sorted setups using the big marshalling yards.

Source : Ramboll Sverige AB Report

Second one is CargoNet is 100% owned by NSB (Norwegian state railway). The company operates on a number of terminals around Sweden and Norway with a fixed timetable between the destinations, mainly operated using block train setups.



3.2. Intermodal transport system in Poland

There are two developed intermodal transport systems in Poland.

- The first one secures international long distance hinterland deliveries of containers addressed to the Polish market carried through the gateway European ports.
- Within the second transport system containers are unloaded in the Polish seaport container terminals and transported on rails to the central and southern parts of the country.

Tab.3-3 Transport of goods in containers by standard gauge railway (thousand tonnes)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic	47	40	167	80	193	578	671	419	752	1223
International	1 766	1 819	1 973	2 175	2 735	2 939	3 490	2 416	3 117	3 856
Total	**1 813**	**1 859**	**2 140**	**2 255**	**2 928**	**3 517**	**4 161**	**2 835**	**3 869**	**5 079**

Source : GUS (Main Statistical Office) TRANSPORT – Results of activity 2002-2010

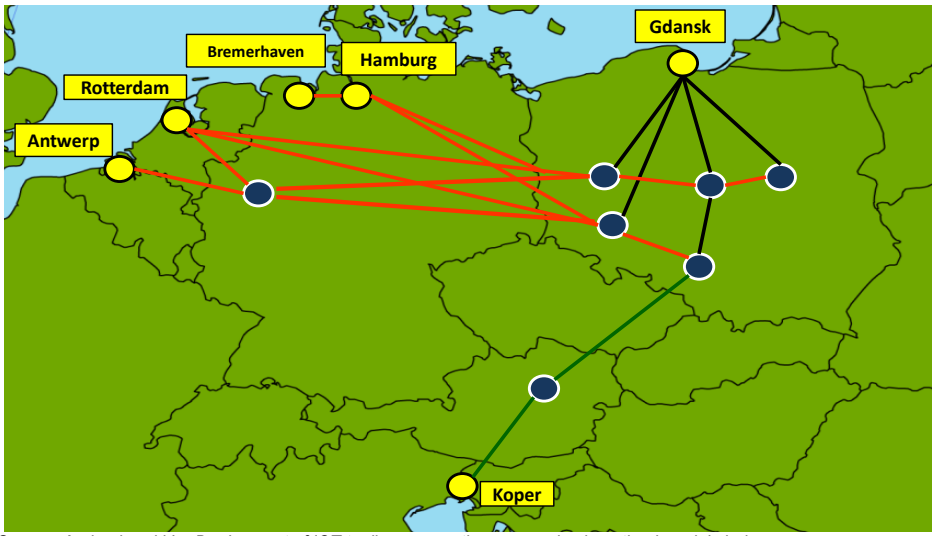
Tab.3-4 Yearly scale of development of railroad transport of containers in Poland

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	Yearly average
Domestic	-14,9%	317,5%	-52,1%	141,3%	199,5%	16,1%	-37,6%	79,5%	62,6%	79,1%
International	3,0%	8,5%	10,2%	25,7%	7,5%	18,7%	-30,8%	29,0%	23,7%	10,6%
Total	**2,5%**	**15,1%**	**5,4%**	**29,8%**	**20,1%**	**18,3%**	**-31,9%**	**36,5%**	**31,3%**	**14,1%**

Source : GUS (Main Statistical Office) TRANSPORT – Results of activity 2002-2010

Container traffic statistics show intensive development of international flows ranging to 10% p.a. and much more dynamic domestic containerised rail transport.

Fig. 3-5 Intermodal rail connections between gateway European seaports and Poland



Source: Andrzejewski L.. Deployment of ICT toolbox supporting companies in optimal modal choice

3.2.1. Hinterland intermodal services offered from the gateway European seaports

Just a few years ago all the containers being sent from the other continents and heading for Poland were transferred through one from the North Range Europeaan ports as Hamburg, Bremerhaven, Rotterdam or Antwerp. From here they can be alternatively sent on feeders or by land.

Intermodal hinterland connections from these seaports may be considered as significant alternative for deliveries on road chassis. There are many regular block trains connections provided by the intermodal operators.The most important amog them are: Polzug Intermodal GmbH, PCC Intermodal , Hupac or CTL Logistics.

Tab.3-5 The most important international intermodal connections of Poland

Operator	International routes	Departure ferquency per week
POLZUG INTERMODAL POLSKA Sp. z o.o	Hamburg - Warszawa Praga	5
POLZUG INTERMODAL POLSKA Sp. z o.o	Hamburg – via hub in Poznań to terminals in: Gdańsk - Gliwice - Łódź - Małaszewicze - Pruszków - Sławków – Wrocław	5
POLZUG INTERMODAL POLSKA Sp. z o.o	Rotterdam – via hub in Poznań to terminals in: Gdańsk - Gliwice - Łódź - Małaszewicze - Pruszków - Sławków - Wrocław	5
POLZUG INTERMODAL POLSKA Sp. z o.o	Bremerhaven – via hub in Poznań to terminals in Gdańsk - Gliwice - Łódź - Małaszewicze - Pruszków - Sławków - Wrocław	5
PCC Intermodal S.A	Sławków - Hamburg	2
PCC Intermodal S.A	Sławków - Bremerhaven	2
PCC Intermodal S.A	Sławków - Frankfurt	2
PCC Intermodal S.A	Brzeg Dolny - Frankfurt	2
PCC Intermodal S.A	Krzewie - Bremerhaven	2
PCC Intermodal S.A	Krzewie - Frankfurt	2
PCC Intermodal S.A	Krzewie - Hamburg	2/
PCC Intermodal S.A	Frankfurt - Hamburg	2
PCC Intermodal S.A	Franfurt - Bremerhaven	2
PCC Intermodal S.A	Brzeg Dolny - Rotterdam	2
PCC Intermodal S.A	Sławków - Rotterdam	2
PCC Intermodal S.A	Krzewie - Rotterdam	2
PCC Intermodal S.A	Frankfurt - Rotterdam	2
CARGOSPED Sp. z o.o.	Rotterdam - Warszawa - Rotterdam	-
CTL Logistics Sp. z o. o.	Germany - Poland	-
CTL Logistics Sp. z o. o.	Hungary - Poland	-
Hupac Intermodal	Schwarzheide BASF - Kobylnica	5
Hupac Intermodal	Schwarzheide BASF - Sławków	5
Hupac Intermodal	Schwarzheide BASF - Warszawa Praga	5

Source: ILiM study based on information gathered from intermodal operators.

Recently two more initiatives were launched.

- In October 2011 the new intermodal connection was launched linking the Slovenian port of Koper to Dabrowa Gornicza in the south of Poland via terminals in Graz and Vienna. Thus the long lasting idea of the Adriatic – Baltic transport corridor equipped with intermodal solutions becomes real. The connection offers 1 departure per week. According to the operators (Baltic Rail AS) the connection will be enlarges to the port of Gdansk and to Lithuania (Šeštokai) expected to be a dry port for further deliveries to Moscow, St. Petersburg and Tallinn.
- In May 2012 the new intermodal weekly connection was opened between Rotterdam and Poznan (Terminal CLIP) by ERS Railways and PKP Cargo SA.

3.2.2. Hinterland intermodal services offered from the Polish sea ports

Domestic intermodal services became more and more important. these days. Intermodal operators after nearly two decades of activity in Poland gained confidence to the market what resulted in their investments in container terminals :

- Dąbrowa Górnicza, Poznan (Polzug Intermodal) and
- Kutno (PCC Intermodal) and
- planned dry port in Tczew (PCC Intermodal) for consolidation of loads from the container terminals in the ports of Gdansk and Gdynia

Tab.3-6 The most important domestic intermodal connections in Poland

Operator	Domestic routes	Departure ferquency per week
PCC Intermodal S.A	Gdańsk/Gdynia - Sławków	5
PCC Intermodal S.A	Gdynia/Gdańsk - Brzeg Dolny	2
PKP Cargo S.A.	Polish ports – main industrial and trading centres in Poland	-

Source: ILiM study based on information gathered from intermodal operators.

Besides the intermodal services rendered by PKP Cargo and PCC Intermodal. there are new initiatives of Maersk launching two new block container trains:

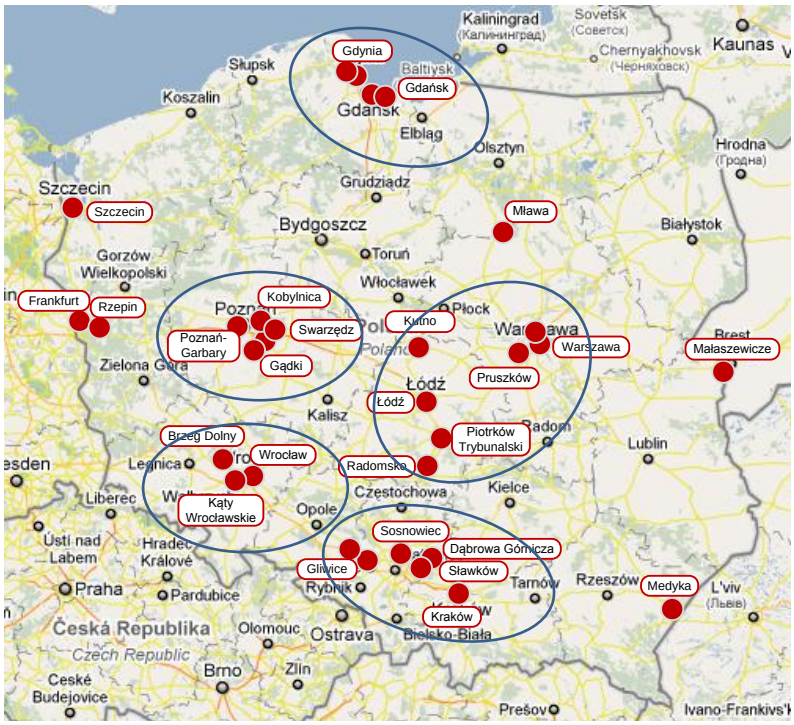
- Amber Express – from Gdansk to Wroclaw
- Baltic Express – from Gdansk to Slawków.

In Poland there is a network of ca. 40 container terminals concentrated mainly along two TINA transport corridors :

- Corridor II : Berlin – Poznan – Warsaw – Minsk – Moscow
- Corridor III : Berlin - Dresden – Wroclaw – Katowice - Lvov - Kiev

as well as in the Polish ports.

Fig. 3-6 Concentration of container rail terminals in Poland



Source: IliM own study

3.2.3. Present railway connections between Poland and Scandinavia

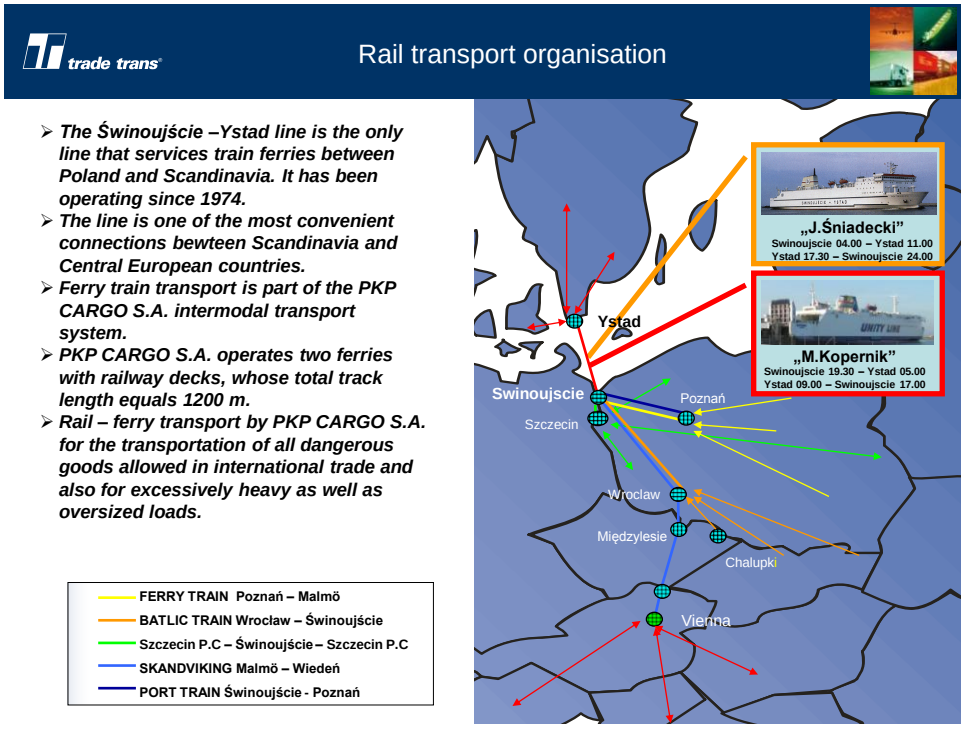
Presently there are regular railway connections between Poland and Scandinavia established by PKP Cargo S.A.

- **TEA 79921/46796 „SKANDVIKING" train (Malmö - Świnoujście – Chałupki – Vienna route) –** transports shipments from Scandinavia to the south of Europe. The train covers the route from Świnoujście to Vienna in 33 hours.

- **TNG 8780 PORT TRAIN (the Świnoujście – Poznań Franowo route) –** has been running since March 1st, 2010, introduced to streamline both freight transport from Scandinavia and delivery tothe consignee. The train is also used to transport the largest number of empty back-haul cars from Sweden.

- **TLJ 55174/5 train (Świnoujście – Szczecin Central Port route) –**transports Scandinavian cargoes to consignees in Poland as well as transit shipments to the Czech Republic, Slovakia and Eastern European countries.

Fig. 3-7 Present railway transport connections between Poland and Scandinavia



- **TEA 7861 „FERRYTRAIN" – international train connecting Poznań Franowo – Świnoujście – Malmö.** This train has been launched by PKP CARGO S.A. to service Polish exports to Sweden. The train which runs directly to Świnoujście was introduced in May 2002 to reduce the number of marshalling yards on the freight transport route and to shorten transportation time.

- **„BALTIC TRAIN" TXA 6862/3 (the Wrocław Brochów – Świnoujście route) –** an **express train** launched on December 15th, 2002. It handles cargo flows within transit transport from the south of Europe and to transport exports from the south of Poland.

- **TLG 11572/3 train (the Szczecin Central Port – Świnoujście route)** – handles local traffic between Świnoujście and Szczecin. Apart from transporting cargoes to the Trade Port (*Port Handlowy*) and consignees in Świnoujście, it also transports cargoes from dispatchers in the West and Central Pomerania regions, later forwarded to consignees in Scandinavia via ferry

The trains listed above are directly connected to all the stations in the PKP network from which shipments for Scandinavia, transported via Świnoujście – Ystad ferry line are dispatched. All these trains are conventional but can be adapted to handle intermodal transport units.

4. Potential volumes

Estimation of volumes that potentially may be transported within intermodal connections will be based on analysis of susceptibility of loads to be containerised and transported on rails.

Transport susceptibility of cargoes – the range of physical-chemical features, physical state, and other characteristics defining the resistance of the load to the conditions and results of transport. It might be divided as followed1:

- **Natural** – susceptibility resulting from physical, chemical and biological features of the load. In particular, these are: damages resulting from mechanical energy, resistance to the weather conditions during transport, such as temperature, moisture, insolation, harm to human health, damaging other loads, absorption of other smells or giving off own smell, vulnerability to evaporation, spilling and to ignition or explosion;
- **Technical** – resulting from the weigh, volume, shape, physical state, etc.;
- **Economic** – resulting from the value of the load and the quality requirements;
- **Loading** – resulting from resistance to piling up, which is crucial in intermodal transport

There are special classifications for each above mentioned kind of susceptibility.

For the purpose of this analysis the loads are classified according to the popular classification SITC revision - 4 (Standard International Trade Classification) maintained by the United Nations and widely used in statistics of foreign trade .

On the other hand basing on the classification of Fraunhofer ATL each article category was attributed with the degree of susceptibility towards being containerized and transported on rails. Three degrees are applied (see Tab.4-1):

- 1 – low degree of susceptibility
- 2 – average degree of susceptibility
- 3 – high degree of susceptibility

Transport susceptibility was evaluated based on the following set of criteria:

- traffic volumes,
- variety of products,
- requirements for reliability and punctuality of delivery,
- variety of suppliers and customers markets,
- seasonality of production,

[1] H. Mokrzyszczak, Ładunoznawstwo, WKiŁ, Warszawa 1977

- size of the delivery lots,
- requirements for equipment,
- logistics structure,
- the number of destination points,
- speed.

Susceptibility analysis has been made in two dimensions North – South and South - North, with reference to the commercial exchange between

- Sweden / Norway and Poland as basic volume for intermodal connections
- Sweden / Norway with Czech Republic, Slovakia, Hungary and Ukraine.- as suplementary volumes able to be consolidated with basic cargo flows

Tab. 4-1 Classification of loads susceptibility to be containerised and transported on rails according to SITC

Code number	Standard International Trade Classification - SITC	Commodity susceptibility for:	
		Railroad transport	Containerisation
0	Food and live animals		
00	Live animals	1	1
01	Meat and meat preparations	2	2
02	Dairy products and birds' eggs	2	2
03	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof	2	3
04	Cereals and cereal preparations	3	3
05	Vegetables and fruit	2	2
06	Sugars, sugar preparations and honey	3	3
07	Coffee, tea, cocoa, spices, and manufactures thereof	3	3
08	Feeding stuff for animals (not including unmilled cereals)	3	3
09	Miscellaneous edible products and preparations	1	1
1	Beverages and tobacco		
11	Beverages	2	2
12	Tobacco and tobacco manufactures	2	3
2	Crude materials, inedible, except fuels		
21	Hides, skins and furskins, raw	2	2
22	Oil-seeds and oleaginous fruits	2	2
23	Crude rubber (including synthetic and reclaimed)	2	2
24	Cork and wood	3	3
25	Pulp and waste paper	3	2
26	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)	3	3
27	Crude fertilizers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)	2	2
28	Metalliferous ores and metal scrap	3	3
29	Crude animal and vegetable materials, n.e.s.	2	2
3	Mineral fuels, lubricants and related materials		
32	Coal, coke and briquettes	3	3
33	Petroleum, petroleum products and related materials	2	2
34	Gas, natural and manufactured	1	1
35	Electric current	1	1

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Code number	Standard International Trade Classification - SITC	Commodity susceptibility for:	
		Railroad transport	Containerisation
4	Animal and vegetable oils, fats and waxes		
41	Animal oils and fats	1	1
42	Fixed vegetable fats and oils, crude, refined or fractionated	1	1
43	Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n	1	1
5	Chemicals and related products, n.e.s.		
51	Organic chemicals	2	2
52	Inorganic chemicals	2	2
53	Dyeing, tanning and colouring materials	3	3
54	Medicinal and pharmaceutical products	1	1
55	Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations	1	1
56	Fertilizers (other than those of group 272)	3	3
57	Plastics in primary forms	2	2
58	Plastics in non-primary forms	3	3
59	Chemical materials and products, n.e.s.	1	1
6	Manufactured goods classified chiefly by material		
61	Leather, leather manufactures, n.e.s., and dressed furskins	2	2
62	Rubber manufactures, n.e.s.	1	1
63	Cork and wood manufactures (excluding furniture)	2	2
64	Paper, paperboard and articles of paper pulp, of paper or of paperboard	1	1
65	Textile yarn, fabrics, made-up articles, n.e.s., and related products	2	3
66	Non-metallic mineral manufactures, n.e.s.	1	1
67	Iron and steel	3	3
68	Non-ferrous metals	2	3
69	Manufactures of metals, n.e.s.	2	2

Code number	Standard International Trade Classification - SITC	Commodity susceptibility for:	
		Railroad transport	Containerisation
7	Machinery and transport equipment		
71	Power-generating machinery and equipment	2	2
72	Machinery specialized for particular industries	2	2
73	Metalworking machinery	2	2
74	General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.	2	2
75	Office machines and automatic data-processing machines	1	3
76	Telecommunications and sound-recording and reproducing apparatus and equipment	1	3
77	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type e	1	3
78	Road vehicles (including air-cushion vehicles)	2	2
79	Other transport equipment	1	1
8	Miscellaneous manufactured articles		
81	Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.	2	2
82	Furniture, and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings	2	2
83	Travel goods, handbags and similar containers	2	3
84	Articles of apparel and clothing accessories	1	3
85	Footwear	1	3
87	Professional, scientific and controlling instruments and apparatus, n.e.s.	1	1
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks	1	2
89	Miscellaneous manufactured articles, n.e.s.	1	1

Source: ILiM study based on Fraunhofer ATL classification of susceptibility of loads to be containerized and transported on rails.

Basing on foreign trade statistics of Sweden and Norway with the Central Europe showing scale of yearly flows across types of commodities and their susceptibility to be containerised and transported on rails two scenarios of potential volumes that may be transferred from road to railroads may be presented.:

- moderate scenario assuming 10% shifting potential in high level susceptibility commodity groups and 2% in average level ones (Variant 1),
- optimistic scenario assuming 15% and 5% respectively (Variant 2).

These both scenarios will be considered taking into account:

- volumes resulted from the Polish foreign trade with Sweden and Norway,
- additional volumes resulted from the foreign trade of Sweden and Norway with the central European countries as Czech Republic, Slovakia, Hungary and Ukraine.

4.1. Cargo flows resulted from the foreign trade between Poland and Sweden and Norway

Taking into account only loads which have its source in the commerce between Poland, Sweden and Norway, it can be expected that some 30.000-54.000 loaded TEU may be transported in the North-South direction and ca. 13.000-23.000 TEU in the opposite direction. This containerised flow will generate also movements of empty containers that may be estimated to ca. 50% of loaded containers flows.
All together it is assumed that some 37.000-65.000 TEU may flow from North to South and some 28.000-50.000 TEU back. in potential intermodal connections linking Poland with the Scandinavian Peninsula.
(i.e. there is 30% surplus of loads imported to Poland over exported flows)

Tab. 4-2 Estimated flows of cargo between Poland and Scandinavia

Scenario	Shifting potential			No of TEU								
	Susceptibility for containerisation and transport on rails			Loaded			Empty			TOTAL		
	High level	Average level	Low level	North-South	South-North	TOTAL	North-South	South-North	TOTAL	North-South	South-North	TOTAL
Variant 1	10%	2%	0%	30 300	13 500	43 800	6 750	15 150	21 900	37 050	28 650	65 700
Variant 2	15%	5%	0%	53 800	23 100	76 900	11 550	26 900	38 450	65 350	50 000	115 350

Source: ILIM own study based on Yearbook of Foreign Trade Statistics of Poland, GUS 2011

4.2. Cargo flows resulted from the foreign trade between Sweden and Norway and the Central European countries

The loads coming between Poland and Scandinavia may be combined with the tranzit cargo from Scandinavia to such trading partners as Czech Republic, Slovakia, Hungary and Ukraine. These additional flows in terms of volumes being transferred from road to rails may be estimated as 27.000-47.000 TEU in the North – South direction and 20.000-35.000 TEU backwards.Also here there is 35% large surplus of cargo going from the North to the South.

Tab. 4-3 Estimated flows of cargo between Scandinavia and Czech Rep., Slovakia, Hungary and Ukraine

Scenario	Shifting potential			No of TEU								
	Susceptibility for containerisation and transport on rails			Loaded			Empty			TOTAL		
	High level	Average level	Low level	North-South	South-North	TOTAL	North-South	South-North	TOTAL	North-South	South-North	TOTAL
Variant 1	10%	2%	0%	22 300	9 300	31 600	4 650	11 150	15 800	26 950	20 450	47 400
Variant 2	15%	5%	0%	38 600	16 200	54 800	8 100	19 300	27 400	46 700	35 500	82 200

Source: ILIM own study based on the OECD international trade statistics.

In the next few tables more detailed impact of particular markets is shown accross traffic directions and scvenarios of anticipated shift potencial.

Tab. 4-4 Estimated flows of cargo between Scandinavia and Central Europe (North-South) Variant 1

North - South		Total tonnage (thous.tonnes)	Susceptibility for containerisation and transport on rails			Expected intermodal volumes	
			High level	Average level	Low level	th. tonnes	Equivalent in TEU
Sweden	Poland	3 537	1 278	1 667	592	161	16 100
Sweden	Czech Republic	1 059	415	405	238	50	5 000
Sweden	Slovakia	727	67	589	72	18	1 800
Sweden	Hungary	2 462	1 157	1 098	207	138	13 800
Sweden	Ukraine	235	30	85	120	5	500
Norway	Poland	3 774	918	2 504	353	142	14 200
Norway	Czech Republic	2 996	18	148	2 830	5	500
Norway	Slovakia	23	7	8	8	1	100
Norway	Hungary	62	15	36	12	2	200
Norway	Ukraine	208	3	203	2	4	400
Polish foreign trade		7 312	2 196	4 171	944	303	30 300
Polish tranzit		7 772	1 713	2 571	3 489	223	22 300
TOTAL flows		**15 084**	**3 909**	**6 742**	**4 433**	**526**	**52 600**

Source :ILIM study based on GUS and OECD Foreign Trade Statistics 2010

Tab. 4-5 Estimated flows of cargo between Scandinavia and Central Europe (South-North) Variant 1

South - North		Total tonnage (thous.tonnes)	Susceptibility for containerisation and transport on rails			Expected intermodal volumes	
			High level	Average level	Low level	th. tonnes	Equivalent in TEU
Poland	Sweden	2 447	800	1 013	634	100	10 000
Czech Republic	Sweden	922	207	462	254	30	3 000
Slovakia	Sweden	357	89	131	137	12	1 200
Hungary	Sweden	423	58	211	154	10	1 000
Ukraine	Sweden	214	161	43	10	17	1 700
Poland	Norway	910	273	378	259	35	3 500
Czech Republic	Norway	368	70	174	123	11	1 100
Slovakia	Norway	200	73	60	67	8	800
Hungary	Norway	151	11	66	74	2	200
Ukraine	Norway	71	24	30	17	3	300
Polish foreign trade		3 358	1 073	1 391	893	135	13 500
Polish tranzit		2 707	693	1 178	836	93	9 300
TOTAL flows		**6 065**	**1 766**	**2 569**	**1 730**	**228**	**22 800**

Source :ILIM study based on GUS and OECD Foreign Trade Statistics 2010

Tab. 4-6 Estimated flows of cargo between Scandinavia and Central Europe (North-South) Variant 2

North - South		Total tonnage (thous.tonnes)	Susceptibility for containerisation and transport on rails			Expected intermodal volumes	
			High level	Average level	Low level	th. tonnes	Equivalent in TEU
Sweden	Poland	3 537	1 278	1 667	592	275	27 500
Sweden	Czech Republic	1 059	415	405	238	83	8 300
Sweden	Slovakia	727	67	589	72	39	3 900
Sweden	Hungary	2 462	1 157	1 098	207	229	22 900
Sweden	Ukraine	235	30	85	120	9	900
Norway	Poland	3 774	918	2 504	353	263	26 300
Norway	Czech Republic	2 996	18	148	2 830	10	1 000
Norway	Slovakia	23	7	8	8	1	100
Norway	Hungary	62	15	36	12	4	400
Norway	Ukraine	208	3	203	2	11	1 100
Polish foreign trade		7 312	2 196	4 171	944	538	53 800
Polish tranzit		7 772	1 713	2 571	3 489	385	38 600
TOTAL flows		**15 084**	**3 909**	**6 742**	**4 433**	**923**	**92 400**

Source :ILIM study based on GUS and OECD Foreign Trade Statistics 2010

Tab. 4-7 Estimated flows of cargo between Scandinavia and Central Europe (South-North) Variant 2

South - North		Total tonnage (thous.tonnes)	Susceptibility for containerisation and transport on rails			Expected intermodal volumes	
			High level	Average level	Low level	th. tonnes	Equivalent in TEU
Poland	Sweden	2 447	800	1 013	634	171	17 100
Czech Republic	Sweden	922	207	462	254	54	5 400
Slovakia	Sweden	357	89	131	137	20	2 000
Hungary	Sweden	423	58	211	154	19	1 900
Ukraine	Sweden	214	161	43	10	26	2 600
Poland	Norway	910	273	378	259	60	6 000
Czech Republic	Norway	368	70	174	123	19	1 900
Slovakia	Norway	200	73	60	67	14	1 400
Hungary	Norway	151	11	66	74	5	500
Ukraine	Norway	71	24	30	17	5	500
Polish foreign trade		3 358	1 073	1 391	893	231	23 100
Polish tranzit		2 707	693	1 178	836	163	16 200
TOTAL flows		**6 065**	**1 766**	**2 569**	**1 730**	**393**	**39 300**

Source :ILIM study based on GUS and OECD Foreign Trade Statistics 2010

Tab. 4-8 Estimated flows of cargo between Scandinavia and the Central Europe (summary)

Scenario	Shifting potential			No of loaded containers (in TEU)								
	Susceptibility for containerisation and transport on rails			Scandinavia - Poland and v.v.			Scandinavia - Czech Rep., Slovakia, Hungary, Ukraine			TOTAL		
	High level	Average level	Low level	North-South	South-North	TOTAL	North-South	South-North	TOTAL	North-South	South-North	TOTAL
Variant 1	10%	2%	0%	30 300	13 500	43 800	22 300	9 300	31 600	52 600	22 800	75 400
Variant 2	15%	5%	0%	53 800	23 100	76 900	38 600	16 200	54 800	92 400	39 300	131 700

Source: ILIM own study based on the OECD international trade statistics.

The analysis show relatively high combined flows of cargo resulting from the foreign trade of Sweden and Finland with the Central European countries as potential basic cargo for intermodal transports. It amounts to 50.000-90.000 TEU in the North-South direction and ca. 20.000 – 40.000 TEU in the opposite direction. The flows are expected to be deeply unbalanced. On the other hand these streams of cargo will generate return flows of empty containers amounting to ca. 40% of loaded containers.
The volumes seems to be large enough to build regular connections. To some extent it depends on actual dispersion of loading and unloading locations on NUTS3 basis. Unfortunately due to poor statistics it was not possible to be performed.

4.3. Consolidations of potential flows in the North – South axis with containers transported through the Polish seaports

The expected flows may be additionally consolidated with containers transported through the terminals of the Polish seaports. It is quite large number of containers amounting to 430.000-450.000 TEU p.a. in each direction as far as ports og Gdansk and Gdynia are concerned and ca. 30.000 TEU yearly in exports and imports through the port of Szczecin. Already today, ca. 20% of containers passing the ports of Gdansk and Gdynia is transported domestically on rails.

Tab. 4-9 Reloads of containers in the Polish container seaports in 2011[2]

Szczecin , Swinoujście		Gdansk, Gdynia		TOTAL	
Export PL	Import PL	Export PL	Import PL	Export PL	Import PL
27 776	27 209	441 232	429 815	469 008	457 024

Source: Namiary na Morze i Handel – Kontenery.Transport kontenerowy i multimodalny, Raport 2012.

It may be finally concluded that gathering potential volumes to form block container trains should not be a problem, especially in the North-South direction, under condition that intermodal services will be attractive timewise and pricewise to the customers.

[2] The figures represent only containers addressed to the Polish market or shipped in Poland.

5. Infrastructural bottlenecks

There are main barriers to the development of rail transport services between Scandinavia and Poland

As it was mentioned earlier one of the main barrier for rail traffic between Scandinavia and Poland is created by geographical location. The barrier of water causes a break in continuity of train journey. Necessity of using a ferry require disassemble of a train and exchange of locomotives. Final result is extended transit time of rail supplies in comparison to "truck on ferry" deliveries due to much more time consuming loading and offloading operations.

Due to relatively short distance between Danish islands, Sweden and Germany the process of building fixed infrastructure started. Such objects as bridges over Great Belt or Oresund straits and planned Fehmarn tunnel enable transport with avoidance of ferries. It increases competitiveness of conventional and intermodal rail solutions. Distance between Poland and Sweden excludes such fixed connections so any intermodal trains between these countries will still be based on ferries. It means worst competitive position of rail transport.

Another significant obstacle is quality of track infrastructure. In the last 20 years the demand for raiway freight transport in Poland has drastically fallen due to many reasons as ; decline in mining of raw materials, changes in production profile with growing share of highly processed goods and growing customers requirements in terms of short delivery time. It was also time of dinamically developing road transport.

On the other side intensive utilization of track infrastructure in times of prosperity with paralel negligence in its modernization resulted in extended delivery times.The worsning state of domestic track infratructure in Poland have led to introduction of many speed limits.

Tab. 5-1 Structure of railway lines in Poland by scale of train speed limits

Maximal speed limit (in km/h)	Per cent of railway lines
below 40	9%
from 40 to 80	35%
from 80 to 120	36%
from 120 to 160	16%
above 160	5%

Source : PKP Cargo S.A.

How these traffic restrictions influence transit times of freight trains along the routes important for the North-South flows?

Within the western transport corridor taking use of the ferry line Ystad-Swinoujscie and than reaching the Polish – Czech border crossing in Miedzylesie there are two alternative routes:

- the route Swinoujscie – Wroclaw - Miedzylesie may be passed with the average maximal speed of 63 km per hour meeting 172 sectors with speed limit below 80 km/h

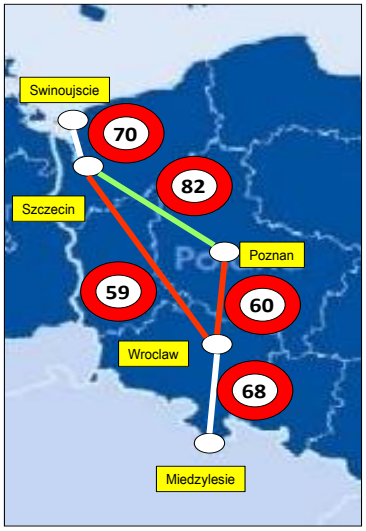
- alternative route linking Swinoujscie with Miedzylesie by Poznan and Wroclaw offers slightly better conditions – average maximal speed of 71 km per hour and 105 sectors with speed limits.

The central corridor using Karskrona – Gdynia ferry line and leading to the Polish – Slovakian border crossing in Zwardon is in a bit better condition.

- the direct line from port of Gdynia to Silesia may be passed with the velocity of 80 km per hour but a train will meet as much as 297 speed limits.

- the route via Warsaw allow to go with average maximal velocity of 92 km per hour with 115 points of speed limits.

Fig. 5-1 Speed limits for freight trains on the North-South railway routes (West corridor)

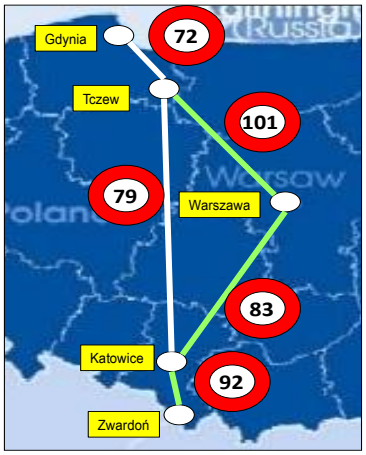


Route			km	No of speed limits /100km	Average speed available (km/h)
No	ex	to			
401	Szczecin	Swinoujście	101	5	70
351	Poznań	Szczecin	213	19	82
271	Wroclaw	Poznan	164	36	60
276	Międzylesie	Wrocław	138	45	68
TOTAL			**616**	**105**	**71**

Route			km	No of speed limits /100km	Average speed available (km/h)
No	ex	to			
401	Szczecin	Swinoujście	101	5	70
273	Wrocław	Szczecin	356	122	59
276	Międzylesie	Wrocław	138	45	68
TOTAL			**595**	**172**	**63**

Source : PKP Cargo

Fig. 5-2 Speed limits for freight trains on the North-South railway routes (Central corridor)



Route			km	No of speed limits /100km	Average speed available
No	ex	to			
201	Gdynia P	Tczew	70	31	72
131	Tczew	Chorzów	492	207	79
139	Katowice	Zwardoń	114	59	92
TOTAL			**676**	**297**	**80**

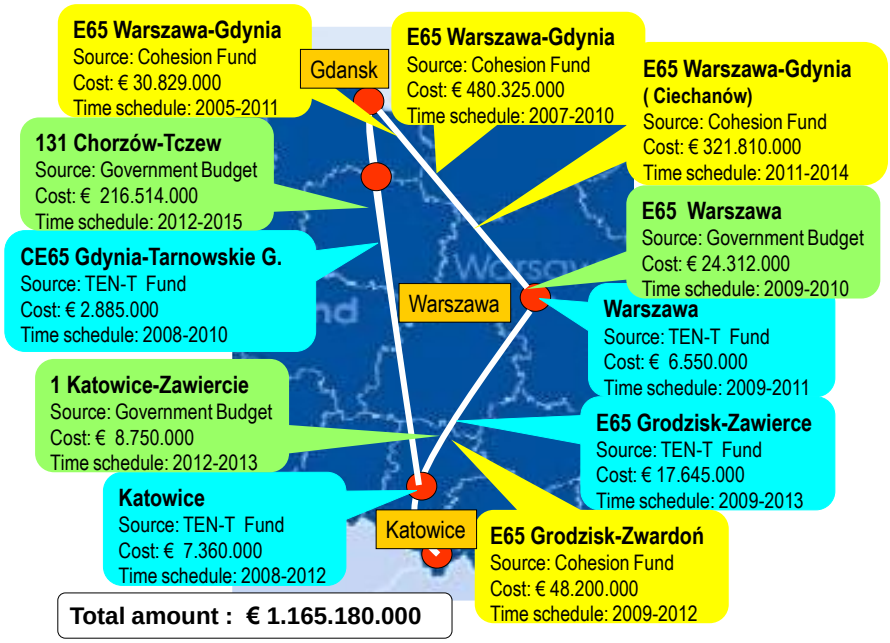
Route			km	No of speed limits /100km	Average speed available
No	ex	to			
9	Gdańsk	Warszawa	323	29	101
1	Warszawa	Katowice	319	28	83
139	Katowice	Zwardoń	114	59	92
TOTAL			**756**	**115**	**92**

Source: PKP Cargo S.A.

Joining the European Union Poland gained access to the funds that may be used for improvements of the railroad network. The series of modernisation investments amounting to 1,6 billion of Euro are in progress with the perspective up to 2015. In 80% the investments are financed from the Cohesion Fund in 17% within the national budget and in remaining 3 % from TEN-T Fund.

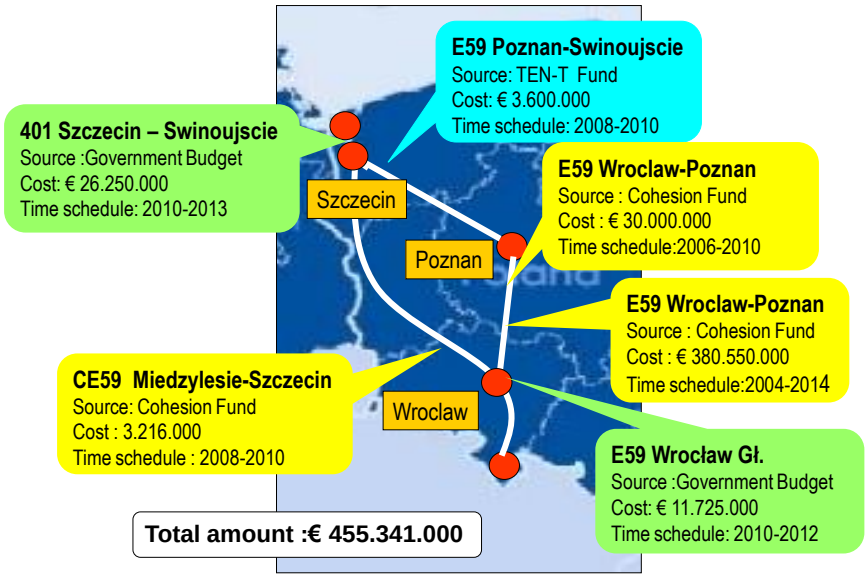
The efforts are focused on the central corridor (70%) to anticipate the cargo flows generated after the Karskrona - Gdynia motorway of the sea concept will be materialised – what is expected in mid 2013. Remaining 30% are invested in the western corridor to increase quality of the transport services already rendered.

Fig. 5-3 Planned modernization investments in track infrastructure (Central corridor)



Source : ILIM own study based on data of PKP PLK S.A.(www.plk-inwestycje.pl).

Fig. 5-4 Planned modernization investments in track infrastructure (West corridor)



Source : ILIM own study based on data of PKP PLK S.A.(www.plk-inwestycje.pl).

The modernising works aimed at obtain average velocity of 160 km/h by passenger trains and 120 km/h by freight trains. The plan is slightly delayed because of Euro 2012 championships priorities.

Equally important for the quality of intermodal transport services is a network of the container terminals. It determines transit times comparable to road transportation as well as the level of supplies punctuality in order to make delivery planning reasonable. It is necessary at the market of rising customers demands for quick delivery time, door-to-door supplies as well as high level of punctuality.

Due to severe competition from the road transport, intermodal transports may be attractive cost wise under condition that block trains will carry 60-70 TEU each direction. It requires 600 metres long tracks at container terminals to be able to fulfil this task. Majority of terminals in Poland do not meet this standard.

Container terminals are located along the important AGCT railway lines, however there are too few of them. In the West European countries with developed intermodal transport services as Germany or Italy the indicator of density of terminals measured in number of terminals per each 1.000 km of track amounts to 1,40 – 2,0 while in Poland it is 0,50 only. According to the PKP Cargo experts there shall be 25-30 modern terminals in Poland to cope with the increased flows. Some 6-8 of them shell be also combined with the logistics centres offering comprehensive logistics services (similary to German Railports)

Majority of contaner terminals in Poland generate high costs in relation to reloaded volumes what results in high charges. The main reasons are:

- lack of 650 metres long loading and offloading tracks what means necessity of dividing draft of wagons and executing extra manoeuvring work,
- bad quality of manouvring yards surface what makes frequent damages of self-propelled handling equipment,
- poor quality of starage yards surface what makes imposible high storage of containers,
- too small surface of storage yards leading to frequent handling problems associated with excess of containers,
- lack of information system managing handling operations,
- lack of modern handling equipment

While investments in rail track infrastructure is domain of state own railway carrier, investments in container terminals is financed by the intermodal operators. During last two years we have been facing intensive investments in terminals what means growing confidence in development of intermodal services in Poland.

The most spectacular investments recently completed :

- Terminal in Dabrowa Gornicza (close to Katowice in the south of Poland) build by Polzug International GmbH) in June 2010 with reloading capacity of 100.000 TEU p.a. storage capacity 1200 TEU and 3 tracks 625 long tom handle complete block trains.

- Terminal in Gadki (close to Poznan) build by Polzug GmbH in August 2011. Terminal is a dry port for deliveries of contaners transferred by the ports of Hamburg and Bremerhaven. Its final planned reloading capacity is ca. 200.000 p.a.
- Terminal in Kutno opened by PCC Intermodal in October 2011 with the yearly reloading capacity of 100.000 TEU p.a. It is equipped with 4 tracks 600 m long and storage yard with capacity 4.000 TEU

Investments planned

- Terminal in Brwinow (close to Warsaw) planned to be completed by Polzug GmbH in 2013
- Terminal in Tczew (close to ports of Gdansk and Gdynia) to be completed in 2014 by PCC Intermodal . The terminal is designed to be the dry port for the five container terminals located in the ports of Gdansk and Gdynia. Planned capacity – 1 milion TEU per annum with storage capacity of 20.000 TEU and 8 tracks 600 m long.

6. Comparative modal analysis of transports between Poland and Scandinavia

6.1. Transit time analysis

Delivery lead time analysis aims at comparing duration of deliveries between selected cities of Norway and Sweden and Poland executed with the use of different modes of transport. Deliveries in trucks will be compared to deliveries of goods in containers on road chassis and rail platforms. A few delivery scenarios were carried out. It was assumed that each delivery starts on Monday 07:00 a.m.

As far as truck deliveries are concerned, the following aspects have been taken into account:

- time schedules of ferries,
- working time of drivers,
- transport scenarios with the alternative use of one and two drivers.

Planning deliveries for example from Stockholm to Katowice the following scenario may be considered:

- there are two ferry connections that may be used for that transport: Karlskrona – Gdynia and Nyneshamn – Gdansk,
- transport may be executed with one or two drivers.

Tab. 6-1 Delivery time of truck between Stockholm and Katowice

Route	Number of drivers	Departure		Arrival		Duration in hours			
		Day	Hour	Day	Hour	Transport	Ferry	Waiting time	Total
Stockholm - Karlskrona - Gdynia - Katowice	1	Mo	07:00	Tu	18:00	16,5	11,0	7,5	35,0
	2	Mo	07:00	Tu	18:00	16,5	11,0	7,5	35,0
Stockholm - Knynashamn - Gdansk - Katowice	1	Mo	07:00	Tu	22:30	9,5	19,0	11,0	39,5
	2	Mo	07:00	Tu	22:30	9,5	19,0	11,0	39,5

Rambol Report April 2011 , ***Błąd! Nie można odnaleźć źródła odwołania.***

In spite of different variants in terms of duration of ferry sailing the overall delivery time is similar.The variant with Nynenhavn-Gdansk ferry is seemingly worst (since the truck loading need not be so early while ferry departure is at 18:00 hours). The example shows also that in journeys including long ferry sail empoyment of two drivers is not applicable.

Tab. 6-2 Delivery time of truck between Oslo and Wroclaw

Route	Number of drivers	Departure		Arrival		Duration in hours				
		Day	Hour	Day	Hour	Transport	Ferry	Waiting time	Driver rest	Total
Oslo - Ystad - Swinoujście - Wrocław	1	Mo	07:00	Tu	16:00	17,00	8,75	7,75		33,50
	2	Mo	07:00	Tu	16:00	16,00	8,75	8,75		33,50
Oslo-Helsinborg-Helsingor-Wrocław	1	Mo	07:00	Tu	17:40	20,00	0,25	0,50	14,00	34,75
	2	Mo	07:00	Tu	03:40	20,00	0,25	0,50		20,75
Oslo-Malmo-Copenhagen-Wroclaw	1	Mo	07:00	Tu	18:00	21,00			14,00	35,00
	2	Mo	07:00	Tu	04:00	21,00				21,00

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In this example all the alternative routes between Oslo and Wroclaw offer similar transit times. In case of transport through very narrow ferry connection between Sweden and Denmark (Helsingborg – Helsingor) or through Oresund Bridge prove the possibility of reduction of transit time by employment of two drivers.

Detailed analysis of transports between Poland and Scandinavia with the use of trucks is presented in tables no 6-3 and 6-4 below.

Presenting delivery time offered by the intermodal operators we have to stress that there is no single regular intermodal service between Poland and Sweden. The analysis combine services of intermodal operators in respective countries with ferry sailings.

As far as Scandinavian intermodal market is concerned, the analysis is based on services rendered by the main operators : Green Cargo and Cargo Net. The nearest terminal from which transport service to Poland may be offered are:

- Ystad – by Green Cargo – corresponding to ferry line Ystad-Swinoujscie
- Malmoe – by Cargo Net – corresponding to ferry line Ystad-Swinoujscie
- Karlshamn – by Green Cargo – corresponding to ferry line Karskrona – Gdynia

Tab. 6-3 Analysis of delivery lead times between Poland and Scandinavia – Truck – 1 driver

From	via	via	to	Road transport		Waiting time		Ferry		Waiting time		Road transport		Duration					
				Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	RT	WT	FR	WT	RT	**TOT**
Oslo	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo 17:30	Mo 17:30	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 10:30	Tu 10:30	Tu 19:00	10:30	03:30	11:00	01:30	8:30:00	**35:00:00**
Goteborg	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo 13:00	Mo 13:00	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 10:30	Tu 10:30	Tu 19:00	06:00	08:00	11:00	01:30	08:30	35:00:00
Stockholm	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo15:00	Mo15:00	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 10:30	Tu 10:30	Tu 19:00	08:00	06:00	11:00	01:30	08:30	35:00:00
Alternative for Stockholm																			
Stockholm	Nynashamn	Gdańsk	Katowice	Mo 07:00	Mo 08:00	Mo 08:00	Mo 18:00	Mo 18:00	Tu 13:00	Tu 13:00	Tu 14:00	Tu 14:00	Tu 22:30	01:00	10:00	19:00	01:00	08:30	39:30:00
Oslo	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 15:45	Mo 15:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 14:00	08:45	06:45	08:45	01:00	06:15	31:30:00
Goteborg	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 11:00	Mo 11:00	Mo 13:00	Mo 13:00	Mo 22:00	Mo 22:00	Mo 23:00	Mo 23:00	Tu 07:15	04:00	02:00	08:45	01:00	06:15	22:00:00
Stockholm	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 15:45	Mo 15:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 14:00	08:45	06:45	08:45	01:00	06:15	31:30:00
Oslo	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 15:45	Mo 15:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 16:00	08:45	06:45	08:45	01:00	08:15	33:30:00
Goteborg	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 11:00	Mo 11:00	Mo 13:30	Mo 13:30	Mo 22:00	Mo 22:00	Mo 23:00	Mo 23:00	Tu 07:15	04:00	02:00	08:30	01:00	08:15	23:45:00
Stockholm	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 15:45	Mo 15:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 16:00	08:45	06:45	08:30	01:00	08:15	33:15:00
Alternative for Oslo / Goteborg																			
Oslo	Helsingborg	Helsingor	Poznań	Mo 07:00	Mo:14:35	Mo:14:35	Mo 15:00	Mo 15:00	Mo:15:15			Mo:15:15	Tu 13:45	07:35	00:30	00:15	00:00	22:20	30:40:00
Goteborg	Helsingborg	Helsingor	Poznań	Mo 07:00	Mo 10:00	Mo 10:00	Mo10:30	Mo 10:30	Mo 10:45			Mo 10:45	Tu 09:05	03:00	00:30	00:15	00:00	22:20	26:05:00
Oslo	Helsingborg	Helsingor	Wrocław	Mo 07:00	Mo:14:35	Mo:14:35	Mo 15:00	Mo 15:00	Mo:15:15			Mo:15:15	Tu 17:40	07:35	00:30	00:15	00:00	26:25:00	34:45:00
Goteborg	Helsingborg	Helsingor	Wrocław	Mo 07:00	Mo 10:00	Mo 10:00	Mo10:30	Mo 10:30	Mo 10:45			Mo 10:45	Tu 13:10	03:00	00:30	00:15	00:00	26:25:00	30:10:00
								Oresund bridge											
Oslo	Malmoe	Kopenhagen	Poznań	Mo 07:00	Mo 15:00			Mo 15:00	Mo 15:45			Mo 15:45	Tu 16:15	08:00		00:45		24:30:00	33:15:00
Goteborg	Malmoe	Kopenhagen	Poznań	Mo 07:00	Mo 10:15			Mo 10:15	Mo 11:00			Mo 11:00	Tu 11:30	03:15		00:45		24:30:00	28:30:00
Oslo	Malmoe	Kopenhagen	Wrocław	Mo 07:00	Mo 15:00			Mo 15:00	Mo 15:45			Mo 15:45	Tu 18:00	08:00	00:00	00:45	00:00	26:15:00	35:00:00
Goteborg	Malmoe	Kopenhagen	Wrocław	Mo 07:00	Mo 10:15			Mo 10:15	Mo 11:00			Mo 11:00	Tu 13:15	03:15	00:00	00:45	00:00	26:15:00	30:15:00

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Tab. 6-4 Analysis of delivery lead times between Poland and Scandinavia – Truck – 2 drivers

From	via	via	to	Road transport		Waiting time		Ferry		Waiting time		Road transport		Duration					
				Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	RT	WT	FR	WT	RT	TOT
Oslo	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo 16:30	Mo 16:30	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 09:30	Tu 09:30	Tu 18:00	09:30	04:30	11:00	01:30	8:30:00	**35:00:00**
Goteborg	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo 12:00	Mo 12:00	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 09:30	Tu 09:30	Tu 18:00	05:00	09:00	11:00	01:30	08:30	35:00:00
Stockholm	Karlskrona	Gdynia	Katowice	Mo 07:00	Mo14:00	Mo14:00	Mo 21:00	Mo 21:00	Tu 08:00	Tu 08:00	Tu 09:30	Tu 09:30	Tu 18:00	07:00	07:00	11:00	01:30	08:30	35:00:00
Alternative for Stockholm																			
Stockholm	Nynashamn	Gdańsk	Katowice	Mo 07:00	Mo 08:00	Mo 08:00	Mo 18:00	Mo 18:00	Tu 13:00	Tu 13:00	Tu 14:00	Tu 14:00	Tu 22:30	01:00	10:00	19:00	01:00	08:30	39:30:00
Oslo	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 14:45	Mo 14:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 14:00	07:45	07:45	08:45	01:00	06:15	31:30:00
Goteborg	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 11:00	Mo 11:00	Mo 13:00	Mo 13:00	Mo 22:00	Mo 22:00	Mo 23:00	Mo 23:00	Tu 07:15	04:00	02:00	08:45	01:00	06:15	22:00:00
Stockholm	Ystad	Swinoujście	Poznań	Mo 07:00	Mo 14:45	Mo 14:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 14:00	07:45	07:45	08:45	01:00	06:15	31:30:00
Oslo	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 14:45	Mo 14:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 16:00	07:45	07:45	08:45	01:00	08:15	33:30:00
Goteborg	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 11:00	Mo 11:00	Mo 13:30	Mo 13:30	Mo 22:00	Mo 22:00	Mo 23:00	Mo 23:00	Tu 07:15	04:00	02:00	08:30	01:00	08:15	23:45:00
Stockholm	Ystad	Swinoujście	Wrocław	Mo 07:00	Mo 14:45	Mo 14:45	Mo 22:30	Mo 22:30	Tu 06:45	Tu 06:45	Tu 07:45	Tu 07:45	Tu 16:00	07:45	07:45	08:30	01:00	08:15	33:15:00
Alternative for Oslo / Goteborg																			
Oslo	Helsingborg	Helsingor	Poznań	Mo 07:00	Mo:14:35	Mo:14:35	Mo 15:00	Mo 15:00	Mo:15:15			Mo:15:15	Mo 23:35	07:35	00:30	00:15	00:00	08:20	16:40:00
Goteborg	Helsingborg	Helsingor	Poznań	Mo 07:00	Mo 10:00	Mo 10:00	Mo10:30	Mo 10:30	Mo 10:45			Mo 10:45	Mo 19:05	03:00	00:30	00:15	00:00	08:20	12:05:00
Oslo	Helsingborg	Helsingor	Wrocław	Mo 07:00	Mo:14:35	Mo:14:35	Mo 15:00	Mo 15:00	Mo:15:15			Mo:15:15	Tu 03:40	07:35	00:30	00:15	00:00	12:25	20:45:00
Goteborg	Helsingborg	Helsingor	Wrocław	Mo 07:00	Mo 10:00	Mo 10:00	Mo10:30	Mo 10:30	Mo 10:45			Mo 10:45	Mo 23:10	03:00	00:30	00:15	00:00	12:25	16:10:00
								Oresund bridge											
Oslo	Malmoe	Kopenhagen	Poznań	Mo 07:00	Mo 15:00			Mo 15:00	Mo 15:45			Mo 15:45	Tu 02:15	08:00		00:45		10:30:00	19:15:00
Goteborg	Malmoe	Kopenhagen	Poznań	Mo 07:00	Mo 10:15			Mo 10:15	Mo 11:00			Mo 11:00	Mo 21:30	03:15		00:45		10:30:00	14:30:00
Oslo	Malmoe	Kopenhagen	Wrocław	Mo 07:00	Mo 15:00			Mo 15:00	Mo 15:45			Mo 15:45	Tu 04:00	08:00	00:00	00:45	00:00	12:15:00	21:00:00
Goteborg	Malmoe	Kopenhagen	Wrocław	Mo 07:00	Mo 10:15			Mo 10:15	Mo 11:00			Mo 11:00	Mo 23;15	03:15	00:00	00:45	00:00	12:15:00	16:15:00

Rambol Report April 2011 , ***Błąd! Nie można odnaleźć źródła odwołania.***

Comparison of services offered by these operators proves significant difference in transit times. While state own Swedish railway base in their network on marshalling yards Norwegian operator Cargo Net base rather on regular connections between combi-terminals.

Tab. 6-5 Time schedules of intermodal operators active in Sweden and Norway
(valid in the 1st part of 2011)

Intermodal operator : Green Cargo

Terminal	D / A	Gothenburg			Oslo			Stockholm		
		Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)
from Ystad	Departure	D1	09:00	25,50	D1	09:00	25,25	D1	09:00	23,00
	Arrival	D2	10:30		D2	10:15		D2	08:00	
to Ystad	Departure	D1	12:00	25,00	D1	11:00	50,00	D1	12:40	42,83
	Arrival	D2	13:00		D3	13:00		D3	07:30	

Intermodal operator : Green Cargo

Terminal	D / A	Gothenburg			Oslo			Stockholm		
		Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)
from Karlshamn	Departure	D1	10:00	24,50	D1	10:00	24,25	D1	10:00	46,00
	Arrival	D2	10:30		D2	10:15		D3	08:00	
to Karlshamn	Departure	D1	12:00	46,25	D1	11:00	47,25	D1	12:40	45,58
	Arrival	D3	10:15		D3	10:15		D3	10:15	

Intermodal operator : Cargo Net

Terminal	D / A	Gothenburg			Oslo			Stockholm		
		Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)	Day	Hrs	Transit time (hrs)
from Malmoe	Departure	D1	19:30	10,50	D1	19:30	12,10	D1	19:30	9,50
	Arrival	D2	06:00		D2	07:40		D2	05:00	
to Malmoe	Departure	D1	18:00	12,00	D1	16:25	14:33	D1	19:00	11,00
	Arrival	D2	06:00		D2	06:45		D2	06:00	

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Tab. 6-6 Transit time analysis of intermodal transports in Sweden and Norway on selected routes including ferries to Poland

Green Cargo				Precarriage		Rail transport		Road transport		Wating time		Ferry		TOTAL
From	via	via	to	Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	
Oslo	Karlshamn	Karlskrona	Gdynia	Mo 07:00	Mo 08:00	Mo 11:00	We 10:15	We 11:30	We 13:30	We 13:30	We 21:00	We 21:00	Th 08:00	**73:00:00**
Goteborg	Karlshamn	Karlskrona	Gdynia	Mo 07:00	Mo 08:00	Mo 12:00	We 10:15	We 11:30	We 13:30	We 13:30	We 21:00	We 21:00	Th 08:00	**73:00:00**
Stockholm	Karlshamn	Karlskrona	Gdynia	Mo 07:00	Mo 08:00	Mo 12:40	We 11:15	We 11:30	We 13:30	We 13:30	We 21:00	We 21:00	Th 08:00	**73:00:00**

Green Cargo				Precarriage		Rail transport		Wating time		Ferry		TOTAL
From	via	via	to	Start	Finish	Start	Finish	Start	Finish	Start	Finish	
Oslo		Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo 11:00	We 13:00	We 13:00	We 22:00	We 22:00	Th 06:45	**71:45:00**
Goteborg		Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo 12:00	Tu 13:00	Tu 13:00	Tu 13:30	Tu 13:30	Tu 22:00	**38:30:00**
Stockholm		Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo 11:00	We 07:30	We 07:30	We 22:00	We 22:00	Th 06:45	**71:18:00**

Cargo Net				Precarriage		Rail transport		Road transport		Wating time		Ferry		TOTAL
From	via	via	to	Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	
Oslo	Malmoe	Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo 16:25	Tu 06:45	Tu 07:30	Tu 09:00	Tu 09:00	Tu 13:30	Tu 13:30	Tu 22:00	**38:30:00**
Goteborg	Malmoe	Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo 18:00	Tu 06:00	Tu 07:00	Tu 08:30	Tu 08:30	Tu 13:30	Tu 13:30	Tu 22:00	**37:45:00**
Stockholm	Malmoe	Ystad	Swinoujś.	Mo 07:00	Mo 08:00	Mo19:00	Tu 06:00	Tu 07:00	Tu 08:30	Tu 06:00	Tu 13:30	Tu 13:30	Tu 22:00	**37:45:00**

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Intermodal deliveries from the Polish ports will last approximatelly :

- Swinoujscie – Poznan 24 h
- Swinoujscie – Wroclaw 36 h
- Gdynia – Katowice 48 h

after train is unloaded from the ferry.

Summarising, according to calculations intermodal deliveries are longer than road supplies by 24-36 hours in case of Ystad – Swinoujscie ferry and ca. 80 hours in case of Karlskrona – Gdansk ferry line.
Road transport is much more flexible in adjusting to ferry time schedules. Another advantage is opportunity for rest of drivers during the sail of ferry what makes overland transit time shorter.

On the other hand duration of deliveries performed in intermodal trains is determined by possibility to mutually coordinate time schedules of operators representing the both modes of transport.

Details of the transit time modal differences are presented in a few following tables.

Tab. 6-7 Transit times for deliveries ex Scandinavia to Poznan (summary)

Lorries

Route				1 driver	2 drivers
Oslo	Ystad	Swinoujście	Poznań	31:30:00	31:30:00
Oslo	Helsinborg	Helsinor	Poznań	30:40:00	16:40:00
Oslo	Malmoe	Kopenhagen	Poznań	33:15:00	19:15:00
Goteborg	Ystad	Swinoujście	Poznań	22:00:00	22:00:00
Goteborg	Helsinborg	Helsinor	Poznań	26:05:00	12:05:00
Goteborg	Malmoe	Kopenhagen	Poznań	28:30:00	14:30:00
Stockholm	Ystad	Swinoujście	Poznań	31:30:00	31:30:00

Intermodal transport

Route				CargoNet + PKP Cargo	Green Cargo + PKP Cargo
Oslo	Ystad	Swinoujście	Poznan	62:30:00	95:45:00
Goteborg	Ystad	Swinoujście	Poznan	61:45:00	62:45:00
Stockholm	Ystad	Swinoujście	Poznan	61:45:00	95:20:00

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Tab. 6-8 Transit times for deliveries ex Scandinavia to Wroclaw (summary)

Lorries

Route				1 driver	2 drivers
Oslo	Ystad	Świnoujście	Wrocław	33:30:00	33:30:00
Oslo	Helsinborg	Helsinor	Wrocław	34:45:00	20:45:00
Oslo	Malmoe	Kopenhagen	Wrocław	35:00:00	21:00:00
Goteborg	Ystad	Świnoujście	Wrocław	23:45:00	23:45:00
Goteborg	Helsinborg	Helsinor	Wrocław	30:10:00	16:10:00
Goteborg	Malmoe	Kopenhagen	Wrocław	30:15:00	16:15:00
Stockholm	Ystad	Świnoujście	Wrocław	33:15:00	33:15:00

Intermodal transport

Route				CargoNet + PKP Cargo	Green Cargo + PKP Cargo
Oslo	Ystad	Swinoujście	Wroclaw	74:30:00	107:45:00
Goteborg	Ystad	Swinoujście	Wroclaw	73:45:00	74:45:00
Stockholm	Ystad	Swinoujście	Wroclaw	73:45:00	107:20:00

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Tab. 6-9 Transit times for deliveries ex Scandinavia to Katowice (summary)

Lorries

Routes				1 driver	2 drivers
Oslo	Karlskrona	Gdynia	Katowice	35:00:00	35:00:00
Goteborg	Karlskrona	Gdynia	Katowice	35:00:00	35:00:00
Stockholm	Karlskrona	Gdynia	Katowice	35:00:00	35:00:00
Stockholm	Nynashamn	Gdańsk	Katowice	39:30:00	39:30:00

Intermodal transport

Route				Green Cargo + PKP Cargo
Oslo	Karlskrona	Gdynia	Katowice	121:00:00
Goteborg	Karlskrona	Gdynia	Katowice	121:00:00
Stockholm	Karlskrona	Gdynia	Katowice	121:00:00

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6.2. Cost analysis

The aim of the study is to describe the different possibilities of transporting goods between Poland, Sweden and Norway taking use of different modes of transport. Cost analysis shall position the intermodal solutions on the competitive freight transport market.

Study assumptions :

- all costs represent the status of spring 2011
- all costs referring to Scandinavian side are based on interviews with logistic companies DHL, Schenker, CargoNet and Green Cargo as well as the ferry operators rendering services in the south part of the Baltic Sea..
- all cost in Sweden are in SEK (the current exchange rate was 1€= 9 SEK)
- the operators were asked to diversified offers in terms of volumes p.a. (equivalent of TEU p.a.- 1,1000,3000 TEU p.a.)
- rates for transport realised in Poland are estimated basing on PCC Intermodal rates valid in sprong 2011

The competition between different alternatively routes used in road transportation are strongly affected by the cost of ferries or bridge tolls. For the purpose of the study a list of ferry charges and bridge tolls to be paid by the trucking companies transporting goods through the south part of the Baltic Sea was made. As it can be noticed there is significant difference in ferry cost depending on volumes brought in by a customer. Those offering large volumes may be able to reduce the cost by ca, 20%.

Tab. 6-10 Shipping costs of transport trucks on ferries in the region of South Baltic Sea (in SEK)

Ferry			Normal price		Large customer price**	
Company	From	to	1 driver	2 drivers	1 driver	2 drivers
Stena Line	Karlskrona	Gdynia	6 223	6 814	4 978	5 451
Polferries	Ystad	Swinoujście	4 145	4 595	3 316	3 676
Polferries	Nynashamn	Gdańsk	6 325	7 075	5 060	5 660
Scandlines (Stena Line)	Gedser	Rostock	3 182	3 182	2 546	2 546
Öresund bridge (based on yearly v	Malmoe	Copenhagen	595	595	476	476
Scandlines (Stena Line)***	Helsingborg	Helsingor	1 424	1 424	854	854
Scandlines (Stena Line), both ferries	Helsingborg	Rostock	4 332	4 332	3 466	3 466

*Prices for a 20t 17m long Lorry including fuel surcharge

**On average about 20% rebate

***HH-line, about 40% rebate

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Similarly to transit time analysis we will compare cost of transport on the selected routes. Let's consider the cost of transport goods with the use of trucks from Stockholm to Katowice i.e. along our central transport corridor leading from the Scandinavian Peninsula to Poland. This transport may be executed utilising Karkskrona – Gdynia or alternatively Nynashavn – Gdansk. Surprisingly this second variant is cheaper by ca. 8% in spite of much longer driving distance. The freight rates were obtained from different logistics operators – and this situation can be regarded as a symptom of competition between the various alternative transport corridors. Forwarding companies do not offer big volume discounts since road freight market is the most competitive one.

Tab. 6-11 Freight charges for truck transport from Stockholm to Katowice

Cost scenario (in SEK)		LORRIES			Cost/truck 1 driver			Cost/truck 2 drivers		
From	via	via	to	Driving distance	1 TRUCK	500 TRUCKS	1500 TRUCKS	1 TRUCK	500 TRUCKS	1500 TRUCKS
Stockholm	Karlskrona	Gdynia	Katowice	1064	12 000	11 400	11 040	13 500	12 900	12 540
Stockholm	Nynashamn	Gdańsk	Katowice	596	11 000	10 450	10 120	12 500	11 950	11 620

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The ”western corridor” linking south Norway and west Swedish coast with Poland offersa few alternative routes. Cost wise the route utilising Ystad – Swinoujscie ferry line is the most competitive. The routes leadnig through Denmark (Oresund bridge or Helsinborg-Helsingor ferry connection) are completely not competitive, being more expensive by 40-70% depending on volume. Reduction of transit time obtained by deployment of two drivers seems not to be attractive enough in terms of very high expense.

Tab. 6-12 Freight charges for truck transport from Oslo and Gothenburg to Wroclaw

Cost scenario (in SEK)			**LORRIES**		Cost/truck 1 driver			Cost/truck 2 drivers		
From	via	via	to	Driving distance	1 TRUCK	500 TRUCKS	1500 TRUCKS	1 TRUCK	500 TRUCKS	1500 TRUCKS
Oslo	Ystad	Swinoujście	Wrocław	1082	10 800	10 260	9 936	12 300	11 760	11 436
Oslo	Helsingborg	Helsingor	Wrocław	1276	18 778	16 864	14 950	20 278	18 364	16 450
Oslo	Malmoe	Kopenhage	Wrocław	1329	18 970	16 976	14 983	20 470	18 476	16 483
Goteborg	Ystad	Swinoujście	Wrocław	782	9 100	8 645	8 372	10 600	10 145	9 872
Goteborg	Helsingborg	Helsingor	Wrocław	976	15 178	13 714	12 250	16 678	15 214	13 750
Goteborg	Malmoe	Kopenhage	Wrocław	1029	15 370	13 826	12 283	16 870	15 326	13 783

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Detailed cost analysis of expenses relating to of truck transport between Scandinavia and Poland are presented in the table 6-13 below.

Tab. 6-13 Freight charges for truck transport from Scandinavia to Poland (summary)

Cost scenario (in SEK) LORRIES					Cost/truck 1 driver			Cost/truck 2 drivers		
From	via	via	to	Driving distance	1 TRUCK	500 TRUCKS	1500 TRUCKS	1 TRUCK	500 TRUCKS	1500 TRUCKS
Rebate/Surcharge						**5%**	**8%**	**1500**	**1500**	**1500**
Oslo	Karlskrona	Gdynia	Katowice	1234	13 500	12 825	12 420	15 000	14 325	13 920
Goteborg	Karlskrona	Gdynia	Katowice	934	11 500	10 925	10 580	13 000	12 425	12 080
Stockholm	Karlskrona	Gdynia	Katowice	1064	12 000	11 400	11 040	13 500	12 900	12 540
Alternative for Stockholm										
Stockholm	Nynashamn	Gdańsk	Katowice	596	11 000	10 450	10 120	12 500	11 950	11 620
Oslo	Ystad	Swinoujście	Poznań	954	9 700	9 215	8 924	11 200	10 715	10 424
Goteborg	Ystad	Swinoujście	Poznań	654	7 800	7 410	7 176	9 300	8 910	8 676
Stockholm	Ystad	Swinoujście	Poznań	1004	10 000	9 500	9 200	11 500	11 000	10 700
Oslo	Ystad	Swinoujście	Wrocław	1082	10 800	10 260	9 936	12 300	11 760	11 436
Goteborg	Ystad	Swinoujście	Wrocław	782	9 100	8 645	8 372	10 600	10 145	9 872
Stockholm	Ystad	Swinoujście	Wrocław	1132	11 300	10 735	10 396	12 800	12 235	11 896
Alternative for Oslo / Goteborg*										
Oslo	Helsingborg	Helsingor	Poznań	1204	14 448	12 642	10 836	15 948	14 142	12 336
Goteborg	Helsingborg	Helsingor	Poznań	904	10 848	9 492	8 136	12 348	10 992	9 636
Oslo	Helsingborg	Helsingor	Wrocław	1276	15 312	13 398	11 484	16 812	14 898	12 984
Goteborg	Helsingborg	Helsingor	Wrocław	976	11 712	10 248	8 784	13 212	11 748	10 284
Oslo	Malmoe	Kopenhagen	Poznań	1257	15 084	13 199	11 313	16 584	14 699	12 813
Goteborg	Malmoe	Kopenhagen	Poznań	957	11 484	10 049	8 613	12 984	11 549	10 113
Oslo	Malmoe	Kopenhagen	Wrocław	1329	15 948	13 955	11 961	17 448	15 455	13 461
Goteborg	Malmoe	Kopenhagen	Wrocław	1029	12 348	10 805	9 261	13 848	12 305	10 761
* Routes not available, standard price 9-12 SEK/km + ferry charges										

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The cost of intermodal deliveries of containers has been estimated. It has to be underlined that there is no intermodal connections between Scandinavia and Poland so far. It is difficult then to receive an offer for carriage of container on rails – to be send in a block train circulating between e.g. Oslo and Wroclaw from one operator or forwarder. In this study the cost is an aggregate of data received separately from different intermodal operators in Sweden, Norway and Poland as well as ferry companies.

Along the west transport corridor taking use of Ystad –Swinoujscie ferry line intermodal transports may be executed. There are combi terminals in Ystad and Szczecin (close to Swinoujscie) and there are two ferries equipped with 600 m long rail track adjusted to carry rail stock. In case of the central transport corridor using Karlskrona – Gdynia ferry line – the situation is much worst so far. There is no container terminal in Karlskrona ferry port (is scheduled to start its operations in mid 2013) and therefore there are no ferries offering transport of rail wagons. In this case the cost of transporting rail wagon on ferry was purely hypothetical and was estimated basing on similar cases.

Tab. 6-14 Freight charges for intermodal transport in Norway and Sweden

Green Cargo

		Transport cost			Total transport cost		
From	to	40FT	1000 TEU	3000 TEU	40FT	1000 TEU	3000 TEU
Preccarriage		800	800	800			
Karlshamn-Karlskrona		1800	1700	1600			
Oslo	Karlskrona	5000	4500	4000	7600	7000	6400
Goteborg	Karlskrona	3600	3200	3000	6200	5700	5400
Stockholm	Karlskrona	4000	3500	3000	6600	6000	5400
Oslo	Ystad	10000	9000	8000			
Goteborg	Ystad	6000	5500	5000			
Stockholm	Ystad	8000	7500	7000			

CargoNet

From	via	via	40FT	1000 TEU	3000 TEU
Oslo	Malmoe	Ystad	7600	7600	7600
Goteborg	Malmoe	Ystad	5800	5800	5800
Stockholm	Malmoe	Ystad	5800	5800	5800

*Prices include road transport for precarriage and Malmoe-Ystad

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Taking into account estimation of expenses to be spent in Poland – the final result of comparison on selected routes is shown in the table below. Intermodal transports are more expensive by ca. 40%

Tab. 6-15 Comparison of rates for carriage of 40FT container on selected routes (€)

Route		Intermodal transport*					Cost of truck	Difference in %
		Intermodal train in Sweden		Feeder*	Intermodal train in Poland*	TOTAL		
From	to	Operator	Rate €*					
Oslo	Wroclaw	Cargo Net	1 575,00	1 000,00	800,00	3 375,00	1 200,00	181,3%
Goteborg	Poznan	Cargo Net	1 200,00	1 000,00	450,00	2 650,00	865,00	206,4%
Stockholm	Katowice	Green Cargo	1 400,00	1 500,00	820,00	3 720,00	1 350,00	175,6%
Rate includes return of empty container								

*Rambol Report April 2011 , **Błąd! Nie można odnaleźć źródła odwołania.**, Polish stretch – ILIM estimation*

There is however important issue to be highlighted. In containerised transport there is a problem of returning empty containers. The forwarding or carriers efforts to take use of empty container for back loads is partially effective only. Some 40-50% boxes are returned empty. This is why this cost is included in the operators' offers.

This big gap between costs of transport of goods in conventional trucks and in container trains may be reduced only under condition of frequent 2-3 departures per week of high volume block trains containing 60-70TEU. Obtaining this target is very challenging.

Tab. 6-16 Comparison of rates for trucks and high volume block trains.

Selected routes			Freight rate for truck € / trip	Freight rate per 40FT container €/trip*	
				50 TEU/train	75 TEU/train
Wroclaw	Ystad	Stockholm	1 255	1 940	1 293
Wroclaw	Ystad	Goteborg	1 000	1 500	1 000
Wroclaw	Ystad	Oslo	1 200	1 860	1 240
Poznan	Ystad	Stockholm	1 110	1 820	1 213
Poznan	Ystad	Goteborg	870	1 420	947
Poznan	Ystad	Oslo	1 075	1 780	1 187

* cost based on trains departing twice per week carrying 50/75 TEUs each

Source : ILIM study based on Ramboll and Trade Trans analysis

7. Conclusions

The main objective of the study produced by ILiM was to describe the necessary steps for enabling regular intermodal connections between the main business centres of Poland, Sweden and Norway, meaning Stockholm, Gothenburg and Oslo with Wrocław, Poznań and Katowice.

The BSR transport system is changing due to huge infrastructure investments in fixed connections as the Öresund Bridge or the planned Fehmarn Belt Link which will increase the competitiveness of rail transport significantly on trade lanes linking Sweden and Denmark with German transport networks.

Meanwhile the profile of transport system between Poland and Sweden remains unchanged since it is still based on traditional ro-ro ferry connections. Poland has a reasonably well developed intermodal service for hinterland container transports via the North Range ports of Hamburg, Rotterdam or Antwerp where railway networks can offer competitive conditions for suppliers compared to road hauliers or feeder fleets.

However, the transport system on the North-South axle, linking Poland with its Scandinavian neighbours is determined by the Baltic Sea separating the two and the most common way for transporting goods is by trucks crossing the sea on ro-ro ferries. It is symptomatic that containers practically are not used on this connection even though there are a few ferries adapted to carry railway stock equipped with rail tracks. The use of rail only participates for approx. 4% (tonnage wise) of the transport service between the two regions.

There are two main transport corridors important for flows of goods between these countries. The first one links the western part of Poland with Scandinavia by using the ferry connection Świnoujście-Ystad and the second links the central and eastern parts of Poland with Scandinavia by using the ferry line Gdynia-Karlskrona.

The Świnoujście-Ystad connection offers co-modal solutions since some of the ferries may carry both trucks and rail wagons. There are several regular railway connections from Malmö to Poznan (6 departures weekly), Wroclaw (3 departures) and Vienna (4 departures). Conventional wagons are mainly used on these routes, however, container wagons may be attached. For the future intermodal trains deliveries through Trelleborg instead of Ystad have to be foreseen. Contrary to Ystad, the ferry terminal in Trelleborg is connected to the rail container yard being important part of the Swedish intermodal transport system.

The Gdynia-Karlskrona corridor in turn does not offer international rail connections yet There is neither rail and intermodal infrastructure in the ferry port of Karlskrona nor ferries carrying railway stock from Karlskrona to Gdynia. The ferry terminal in Gdynia again is not able to receive rail stock as well. However it is going to be changed soon. There are ongoing works in the port of Karlskrona being performed within the Motorway of Sea programme. The newly renovated railway connection with the port and the establishment of new intermodal terminal in the harbour, giving the harbour fully developed intermodal infrastructure to be

fully operational by late summer 2013. In parallel the ferry terminal in Gdynia is also investing in road and rail access to serve ro-ro vessels. Until the end of September 2014 it will be equipped with 1.700 m of roads, 1.400 m of rail track , 40.000 sqm of manoeuvre yards and brand new ramp for handling ro-ro cargo. These investments will certainly open the new opportunities for the intermodal North—South connections.

Since containers are nowadays completely absent in trade between Poland and Scandinavia a few basic conditions are required to be fulfilled in order to start-up intermodal traffic between the analysed regions; the first one being available volumes

An analysis of trade between Poland, Sweden and Norway taking into account cargo's susceptibility to containerisation and to be transported on rails shows moderate volumes (ranging to ca. 15.000-20.000 TEU p.a. in the Polish exports and ca. 30.000-50.000 TEU in imports) that might be attracted by the potential intermodal connections. This volume could, however, be doubled by the transit cargo being transported between Scandinavia and the Czech Republic, Slovakia, Hungary, Ukraine or Belarus.

This volume might also be significantly increased by consolidation of flows to and from Scandinavia with a large number of containers transported between Poland and other continents. Some 850,000 TEU coming to or from Poland are reloaded annually in the ports of Gdansk and Gdynia and another 50,000 TEU p.a. go through the ports of Swinoujscie and Szczecin. To sum it up, the available volume for intermodal transport between Poland and Scandinavia has a large potential; however, the challenge is to convince stakeholders to change their flows from road to rails which might take some time.

In parallel to those opportunities the rail track infrastructure in Poland has to be modernised. Intensity of traffic on the North-South rail routes in Poland is relatively low with a possibility to increase the number of trains but there are severe problems with the quality of the track network resulting in numerous velocity limitations. The commercial speed of trains at an average 30 km/h makes them less competitive time-wise. With the opportunity for European funding the Polish rail track infrastructure is currently undergoing modernization aiming at obtaining trains at a velocity of 120 km/h and the improvement of analyzed transport corridors planned until 2014 amounts to EUR 1.5 bln.

It is quite optimistic that in all countries involved, intermodal solutions are increasingly getting acceptance of shippers. In Poland it encouraged the private sector to invest in container terminals these years. Polzug Intermodal has launched lately operations in the brand new container terminals in Poznan (Gadki) and Katowice (Dabrowa Gornicza) starting to build another new terminal in Warszawa.(Brwinow). In parallel PCC Internmodal started operations in the modern terminal in Kutno. In a few years the dry port of Tczew will consolidate all containers arriving in the ports of Gdansk and Gdynia to send them all to the central and south parts of Poland as well as to the Central European markets. Massive increase of volumes going through the Polish ports has intensify intermodal hinterland connections. Today ca 30% of container volumes leaving Polish ports are transported on rails. The very recent connections are Maersk Amber

Express and Maersk Baltic Express linking the Deepwater Container Terminal in Gdansk in the southern parts of Poland. twice a week each.

Railway transports of course take longer time than truck haulage. Oslo can be reached by truck from Poznan in 2 days while railway transit time takes at least 3-4 days. Truck transport is also much cheaper comparing to 40-foot container rail carriage reaching ca. 30-40% of rail freight charge. The analysis show, that based on operational expenses for container block trains with 3 departures per week, intermodal operators are able to offer competitive freight charges. It needs however the flexible attitude of long term return.

In spite of quite effective intermodal transport systems domestically in Sweden, Norway and Poland, it looks like the market was not able so far to generate volumes large enough to launch block trains connections across the Baltic sea. One of the reason for this was certainly the lack of effective intermodal infrastructure interfaces between Poland and Sweden especially between Karlskrona and Gdynia.

The good news for the further developments is that the both ports have taken a big investment effort to handle intermodal shipments. The bad news is the partial resignation of Cargo Net – one of the leading intermodal operators from their rail services in Sweden announced in the late 2011.

8. Recommendations

In parallel to ongoing infrastructural investments the public sector may support launching intermodal services in obtaining the following targets.

- Performance of market research identifying commodities being susceptible to containerization and transported on rails with concrete routes and trading partners in order to select to select the most promising routes securing profitability. It needs deep field research because existing transport statistics are not helpful.

- Meeting favourable attitude of the intermodal transport operators in offering competitive rates to truck freights. It needs time to win new customers however it should not be difficult to build block container trains due to large possibilities for consolidation new flows with the ones coming through the sea ports. The container flows being the last mile of supply chains linking Europe with the Far East or the North America are in constant growth in Poland and Sweden and may creatively support launching intermodality across the Baltic Sea.

- Solving the problem of empty containers return. Competitiveness of intermodal trains maybe achieved only if the transport of empty containers will be reduced with the help of depots.

From this perspective launching regular intermodal connections between Poland and Sweden and Norway seems to be feasible however challenging.

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