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Author of the report	
Name	Jannis Reisch
Position	Project Consultant
Entity	TransCare GmbH
Telephone Nº	+49 611 7634 181
E-mail	j.reisch@transcare.de

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D1.1 – Assessment of existing LTL market, product and costs

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EXECUTIVE SUMMARY

Companies in the LTL market that provide processed raw materials for production like chemical companies and the supply business, e.g. of the automobile market require reliable transport services that that deliver their products in fast time, offer flexible pick-up times and have reasonable prices. The main flows of LTL cargo move along the blue banana in central Europe to the major production clusters.

In the Antwerp cluster there is a high concentration of chemical companies that provide supply products for European production clusters.

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1 INTRODUCTION

The European LTL market amounts to only five percent of the total transport market but stands for a much higher share of value what shows the importance of this type of cargo. Due to the importance of LTL cargo in production chains and its link between producer, wholesalers and retailers, standardized LTL network distribution is an important precondition for an economy that is based on the division of labor. The "Less than wagonload" project has the objective to develop a smart specialized logistics cluster for the chemical industry in the Port of Antwerp in order to shift transport volumes from road to rail freight. For the realization of this objective the current LTL market is to be assessed intensively.

The purpose of this document is to give an overview over the existing LTL market that is bound only to toad transport as well as its customers and transport participants. Origins of cargo and major destinations result in cargo streams that show the potential for the new Less than wagonload (LWL) solution, defined in task 1.2 of this project. This task explains the requirements of shippers, trucking companies and freight forwarders in the market and how the supply chain processes were built on customers' requirements.

Modern distribution and market developments like just-in-time fulfillment of demand and stockless delivery have contributed to an enormous increase in the partial shipment and less than truck load market. Order quantities and replacement times decrease more and more what benefits the LTL market and its freight forwarders.

LTL business services are considered to serve primarily in the B2B market for the supply of industry and commerce.

1.1 Acronyms

B2B Business to business

B2C Business to customer

bn billion

DSLV Deutscher Speditions- und Logistikverband (engl.: German forwarding and logistics association)

FTL Full truckload

IT Information technology

LTL Less than truckload

LM Last mile

LWL Less than wagon load

mln million

WH Warehouse

2 Less than truck load – definition and differentiation

The total turnover of the European logistics market keeps on growing over the last years since the crisis in 2009 which shows the high importance of the sector. All 28 European countries together with Switzerland and Norway produced a total volume of 1.050 bn. euro in 2016. In 2009 (without Croatia) the total volume amounted to 850 bn. euro.[1]

The share of less than truckload stayed steady at a level of almost 5% of the total logistics market (c.f. Fig. 1). The share of LTL is considered to grow in importance over time due to and the reduction of stocks in production and the increasing e-commerce with accompanying decreasing shipment sizes.

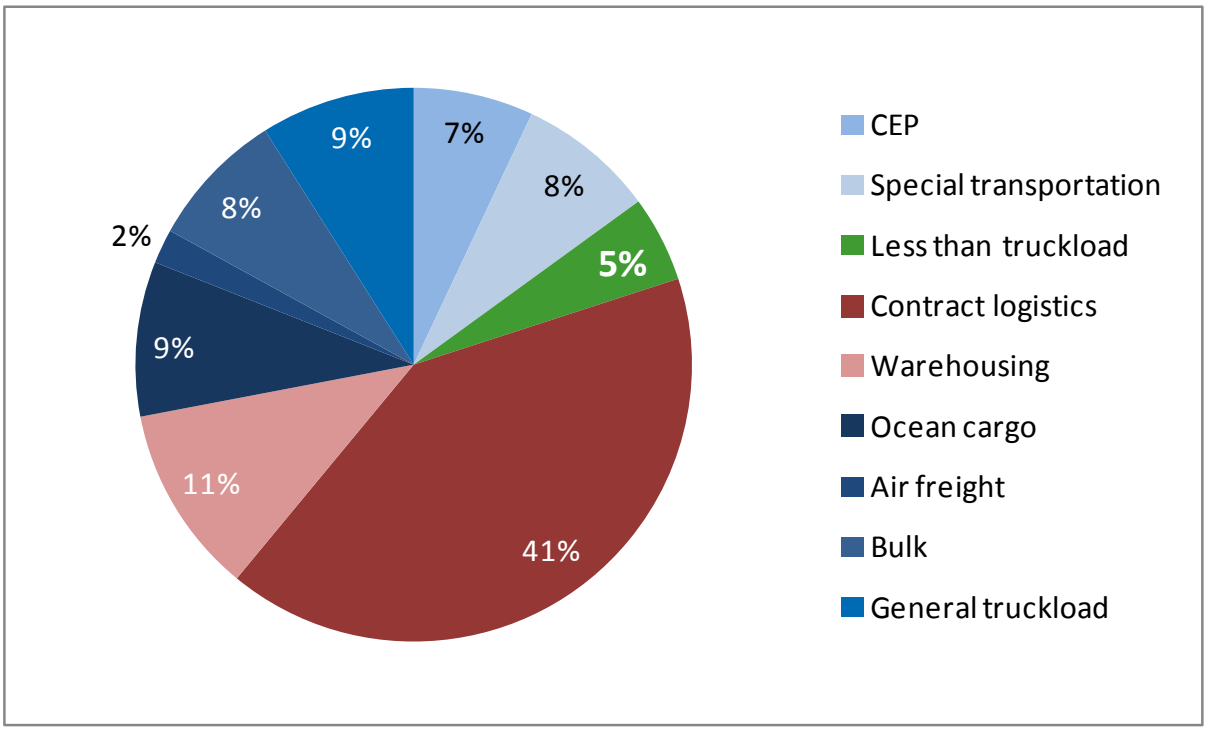

Fig. 1: Market segmentation of the European logistics market[2]

Less than truck load describes shipments of between 3 and 10 pallets from one location respectively from one customer and the transportation of these volumes to their destination. Besides LTL cargo alternative products or services are parcel and express services, which is the shipping of single pieces or packages from A to B, pallet and groupage services which consist of shipments between one and three pallets and full truckloads (FTL) which represents shipments of a number of pallets from one customer that completely fill a long distance truck (cf. Fig. 2).

The product less than truckload cargo includes the processes collection and delivery of shipments from different shippers as well as their consolidation for transport to the same destination.

[1] Data source: Fraunhofer SCS
[2] Data source: Fraunhofer SCS

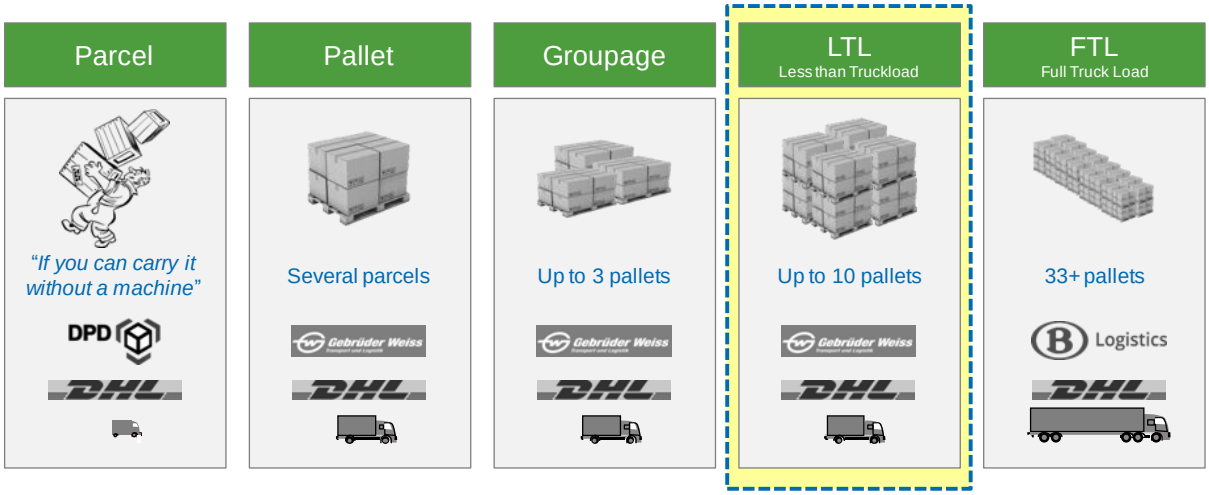

Fig. 2: Product definition

The collection runs are often made by regional transport companies which deliver the collected shipments to a consolidation warehouse of the freight forwarder. In the warehouse, the shipments are sorted by their destinations and consolidated to a truckload for the long-distance main run. Thereby the companies are able to fully use the capacity of big long-distance trucks. This allows the transport of small shipments for competitive and economical prices.

At the destination warehouse of the freight forwarder the shipments are handled again and distributed by last mile trucks to the single consignees (cf. Fig. 3). With a network of warehouses, freight forwarders offer their LTL services Europe-wide and often use regional companies as partner for collection and distribution.

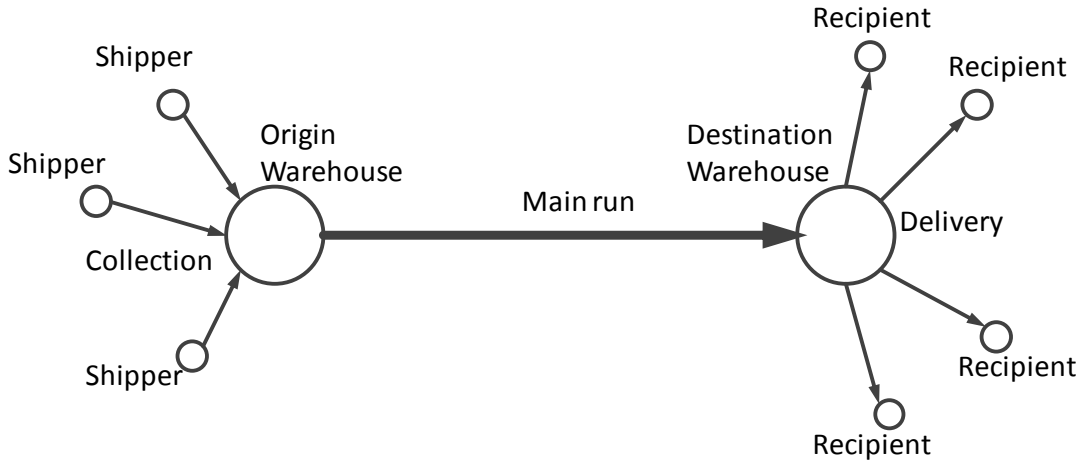

Fig. 3: Scheme of LTL sequence

As further service to the customers the long-distance trucks run on fixed timetables between the warehouses of the forwarding company to guarantee reliable delivery times for different transport distances. Usually they start their run loaded in the late evening as overnight transport and provide the trailer at the destination warehouse in the morning.

The different processes of the supply chain are standardized and industrialized. This includes fast handling processes, frequency and punctuality of the logistical organization. The main advantage is the free road and the resulting shorter transport time and therefore even less personnel costs.

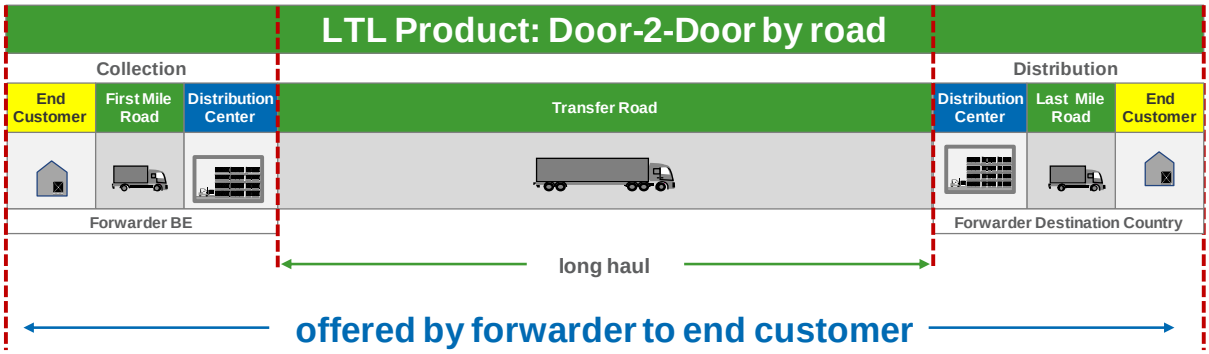

Fig. 4: Process of LTL product

To keep the overview over the different processes of a LTL-transport chain, modern information and communication technique already is and will be increasingly important.

Similar transport services to LTL are parcel and express transports. They also offer collection and delivery of different shipments and the consolidation for transports to the same destination. As differentiation to LTL services and because of the smaller size of the shipments the consolidation is run by automated sorting facilities, where different parcels are often packed up to a pallet for the main run. Due to the considerable increase of online business and the delivery to private consignees over the last years, parcel and express services recorded a big growth in the B2C segment.

LTL hast to be clearly differentiated from FTL transportation. FTL shipments are transports in which a single full truckload is transported in a truck or trailer. The whole load is collected from the customer in one shipment and is directly transported to the consignee without further handling. The shipment fills out the whole loading unit. Generally it is the fastest kind of transport by truck. The main advantages of FTL transportation are the low handling effort within the supply chain and the high occupancy rate of loading space.

In contrast to clearly defined weight and sizes in the parcel market, LTL cargo in the forwarding business has no defined limits. The only condition is that the shipments can be loaded on the vehicle so it fulfills the guidelines of road traffic. Many forwarders allow a maximum individual weight of maximum 2.500kg, although the average weight of a LTL pallet only amounts to 250kg per pallet.

3 Market participants, commodities and LTL market size

The LTL business is considered to serve in the B2B market for the supply of industry and commerce whose suppliers are the main customers.

Important players in the LTL market are forwarding companies with own warehouses, small first and last mile trucks and big long haul trucks and trailers.

In central Belgium close to the Antwerp cluster that is being focused on in this project, there are several forwarding companies from Belgium and internationals that operate in the LTL market such as Essers, Gebrüder Weiss, DHL, Hellmann, Dachser, DSV or Emons.

Supplier companies often make use of LTL services to pick up and deliver components, assembly parts or other materials that are elements of later stages in the production chain. They are typically integral parts of the mechanical engineering industry. Further typical LTL commodities are packages, boxes, bottles and cans, bales and rings, bags, trays, machinery, loading units and clothes (hanging garments).

The typical LTL customer requires the transport of between 3 and 10 pallets and his transport goods can be handled seperately by the individual unit contrary to bulk goods.

Supplier companies often make use of LTL services to pick up and deliver components, assembly parts or other materials that are elements of later stages in the production chain. They are typically integral parts of the mechanical engineering industry. Further typical LTL commodities are packages, boxes, bottles and cans, bales and rings, bags, trays, machinery, loading units and clothes (hanging garments). Another big customer of the LTL market is the chemical industry with a big production cluster in the port of Antwerp. End products of the chemical industry are often packed on pallets as preparation for their transportation. There are octabin pallets, IBC container pallets and bags on pallets used for chemical products (c.f. Fig. 5). A major part of these products is transported internationally on long haul cargo trucks. Our estimate is that approximately 3 million pallets per year with chemical goods are transported internationally from the Antwerp chemical cluster to destinations in Europe with road transport and LTL services.

Fig. 5: Palletized chemical end products

To determine the potential market size for a rail-based LTL product, the cargo flows between the most important countries on the European mainland are analyzed and evaluated with focus on the ability of goods to switch to a rail based LTL transport.

A data extract from Eurostat, viewing international trade, forms the basis for the calculation of the market size on the considered routes, which is recorded in tons transported per year.

The big and most important volume streams in Europe move along the Rhine-Axis between Belgium and the Netherlands on the northern end and Italy on the southern end. Along the axis Germany, France and Switzerland play an important part in the market.

In northern Europe Sweden is an important destination for LTL transports as is Denmark as a transit and destination country. Crossing Germany to the east considerable market participants are Poland Czech Republic, Austria and Hungary.

Over the last years the market share of LTL cargo in Europe has remained constant and amounts to almost 5% of the total transport market. Based on this volume share the market size of LTL cargo between Belgium and considered countries can be calculated.

The total market size between the considered countries with focus on Belgium as origin and destination for LTL cargo were stable over the years from 9,9 mln. tons in 2014 with a drop to 9,5 mln. tons in 2015 and back to 9,9 mln. tons in 2016. The biggest partners for Belgium are France, Germany and the Netherlands (cf. Fig. 6).

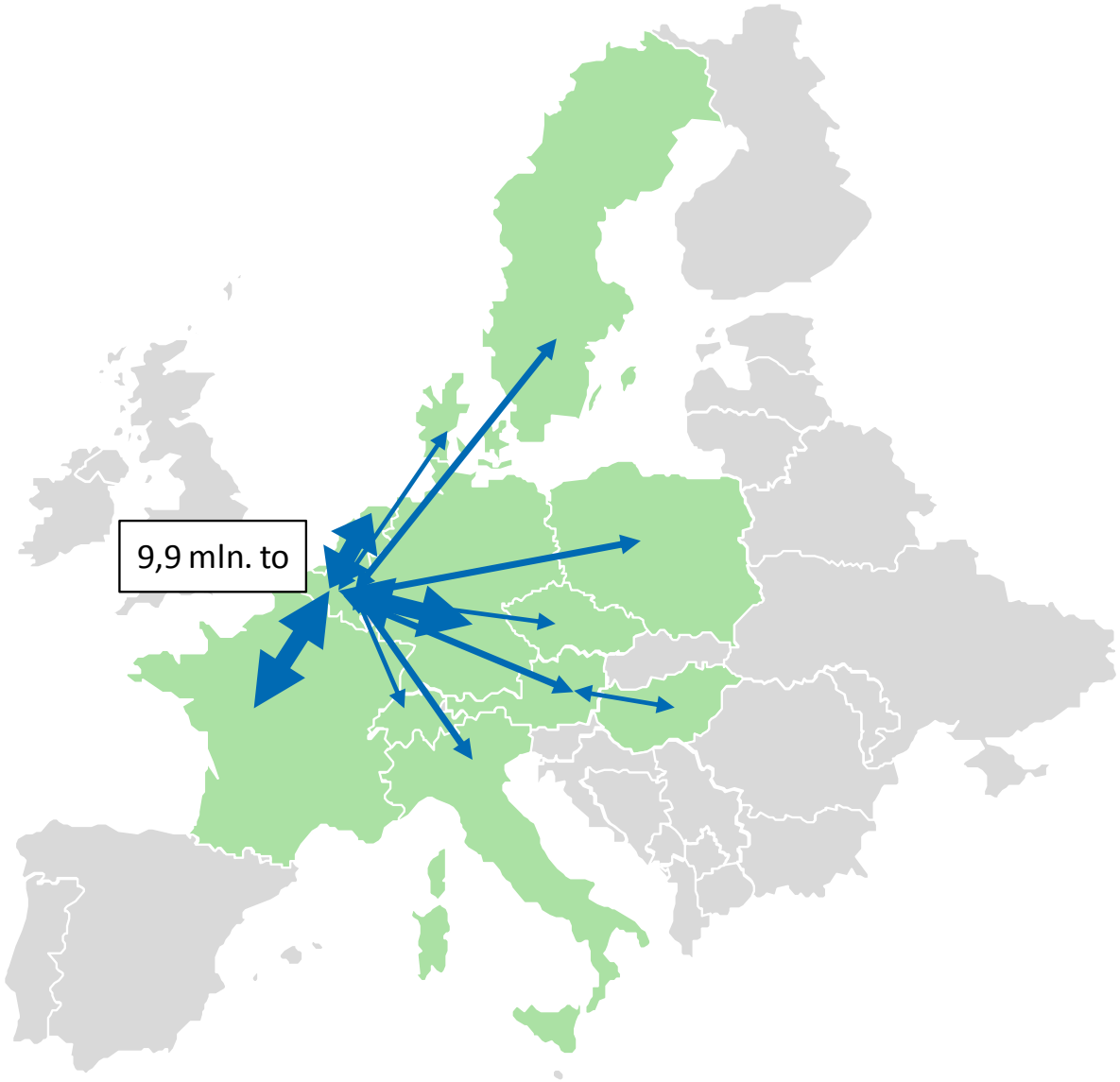

Fig. 6: Overview cargo flows

Fig. 7 lists the total LTL cargo streams between Belgium and the considered countries in 2016. The biggest three partners, Netherlands, France and Germany all have more than double the volume of the other countries. The trade connection between Belgium and the Netherlands is considered to be a special case due to the extremely high share of petroleum products which is equal to a third of the total volume between these countries. These products, for example fuel and oil, do not have any potential for the LTL market, therefore the calculated cargo flows between Belgium and the Netherlands were reduced be 30%.

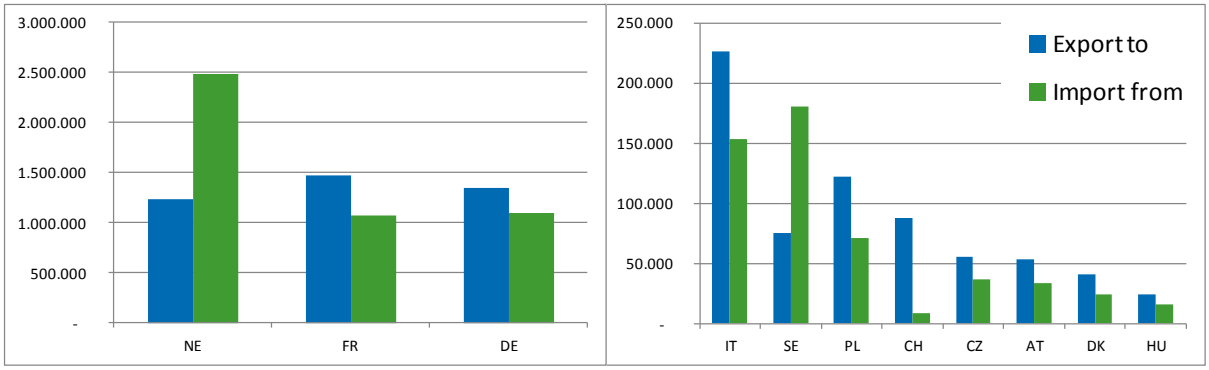

Fig. 7: LTL cargo streams between Belgium and considered countries [tons]

The purpose of this work package is the working out of the "Less than wagonload" rail concept. Expecting a future share between 10% and 20% of the existing LTL market, the following tables illustrate the potential volume of the LWL solution, which is described in detail in deliverable 1.2. Today LTL cargo is almost completely running on the road. The German forwarding and logistics association expects a growth of road traffic volume from 2010 to 2030 of 16,8%. Subject to this outlook the potential market share for the LWL solution in the year 2030 is presented on the right side of Fig. 8.

Considering that rail transportation becomes more attractive with a longer transport distance, the potential LTL volumes for direct neighboring countries like the Netherlands, France or Germany will have a lower share of the total market than for long distance connections. For this reason the potential volumes are reduced by 20% for these three main trade partners.

Year: 2016

Share of LTL market	10%
Value	tons

	Export to	Import from
NE	122.966	248.990
FR	146.961	106.895
DE	135.236	109.281
IT	22.664	15.295
SE	7.555	18.058
PL	12.168	7.059
CH	8.746	866
CZ	5.480	3.672
AT	5.295	3.378
DK	4.069	2.437
HU	2.425	1.566

Year: 2030

Share of LTL market	10%
Value	tons

	Export to	Import from
NE	134.598	272.544
FR	160.863	117.007
DE	148.029	119.619
IT	24.808	16.742
SE	8.270	19.766
PL	13.319	7.726
CH	9.573	948
CZ	5.998	4.019
AT	5.796	3.698
DK	4.454	2.667
HU	2.654	1.714

Fig. 8: Potential market share for LWL solution (10%)

With an average pallet weight of 250kg for pallets in the LTL business the total traffic volume can be converted to number of pallets and therefore combined to wagonloads. Fig. 9 shows the potential wagonloads per year that can be achieved for the LWL solution.

Year: 2016

Share of LTL market	10%
Value	Wagonloads

	Export to	Import from
NE	2.277	4.611
FR	2.721	1.980
DE	2.504	2.024
IT	420	283
SE	140	334
PL	225	131
CH	162	16
CZ	101	68
AT	98	63
DK	75	45
HU	45	29

Year: 2030

Share of LTL market	10%
Value	Wagonloads

	Export to	Import from
NE	2.493	5.047
FR	2.979	2.167
DE	2.741	2.215
IT	459	310
SE	153	366
PL	247	143
CH	177	18
CZ	111	74
AT	107	68
DK	82	49
HU	49	32

Fig. 9: Potential market share for LWL solution (10%) - wagonloads

With a better acceptance of the LWL solution the potential share of the total LTL market could even rise to 20%. The corresponding volumes are shown in Fig. 10. Train runs to countries with only low volumes could run in combination with other volumes that have to use the same routes.

Year: 2016

Share of LTL market	20%
Value	tons

	Export to	Import from
NE	245.932	497.979
FR	293.921	213.790
DE	270.471	218.561
IT	45.327	30.591
SE	15.111	36.115
PL	24.336	14.117
CH	17.492	1.732
CZ	10.960	7.344
AT	10.589	6.757
DK	8.138	4.873
HU	4.850	3.132

Year: 2030

Share of LTL market	20%
Value	tons

	Export to	Import from
NE	269.197	545.088
FR	321.726	234.014
DE	296.058	239.237
IT	49.615	33.484
SE	16.540	39.532
PL	26.639	15.453
CH	19.147	1.896
CZ	11.997	8.039
AT	11.591	7.396
DK	8.908	5.334
HU	5.309	3.428

Fig. 10: Potential market share for LWL solution (20%)

A conversion to wagonloads results in the following yearly rail potential for the LWL concept:

Year: 2016

Share of LTL market	20%
Value	Wagonloads

	Export to	Import from
NE	4.554	9.222
FR	5.443	3.959
DE	5.009	4.047
IT	839	566
SE	280	669
PL	451	261
CH	324	32
CZ	203	136
AT	196	125
DK	151	90
HU	90	58

Year: 2030

Share of LTL market	20%
Value	Wagonloads

	Export to	Import from
NE	4.985	10.094
FR	5.958	4.334
DE	5.483	4.430
IT	919	620
SE	306	732
PL	493	286
CH	355	35
CZ	222	149
AT	215	137
DK	165	99
HU	98	63

Fig. 11: Potential market share for LWL solution (20%) - wagonloads

4 Infrastructure requirements

4.1 Warehouses

The most important process within the LTL supply chain is the handling of shipments in warehouses. A frictionless supply chain requires efficient warehouses. Forwarding companies load and unload pallets to and from trucks. They consolidate shipments to generate full truckloads for the main run and provide short term storage for single shipments. The quality of far-reaching on-time deliveries depends on a functional handling warehouse.

4.2 Pallets

The two most common pallets in the European market are the Euro-pallet and the industrial pallet. Both pallets are standardized and used in the European transport market. The Euro-pallet has a length of 1,2m and a width of 0,8m. The industrial pallet's length amounts to 1,2m and its width is 1,0m. The load capacity is around 1.500kg for Euro-pallets and industrial pallets. For static load industrial pallets can take weight of up to 4.000kg.

In the LessThanWagonLoad project the industrial pallet is considered for standard use in the LTL and groupage market, because the focus of the project lies on the chemical industry where industrial pallets are used more often.

4.3 Trucks

For the first and last mile in the LTL market, trucking companies require small trucks for collection and distribution to the final customer. It can be operated be the freight forwarder which operates warehouse and long haul trucks or by a regional company as sub-contractor. First and last mile trucks have the capacity of 12-16 industrial pallets on one layer.

For the last mile there are the same requirements as for the first mile. It is the reflexion of the first mile at the other end of the supply chain. Only in Switzerland the system works differently as in the other countries of central Europea. Switzerland has a well-working SWL rail network that can provide single wagons in close proximity to the customers. Therefore the main share of the first and last mile in Switzerland already runs on rail.

The long haul of the LTL solution requires long-distance trucks. Generally they carry trailers as loading units that have a capacity of 26 industrial pallets on one layer.

4.4 Information and communication technologies

New communication possibilities, for example the use of electronic data interchange (EDI), mobile communication and automatic identification systems are an important componant of logistical processes. They enable a more efficient coordination between all parties involved in the supply chain of the LTL market.

5 Restrictions

The loading space of long haul trucks provides space for 26 industrial pallets on one layer (cf. Fig. 12). Different models of first and last mile trucks only provide space between 12-16 industrial pallets.

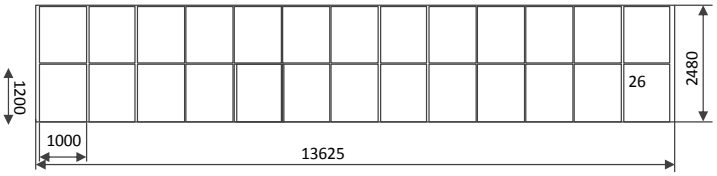

Fig. 12: Scheme loaded 40 feet trailer

Industrial pallets can be loaded with shipments with the maximum weight of 1.500kg for dynamic use.

EUR-pallets that are also an important standard load but not preferred by the chemical industry, can be loaded by the number of 33 on a standard trailer.

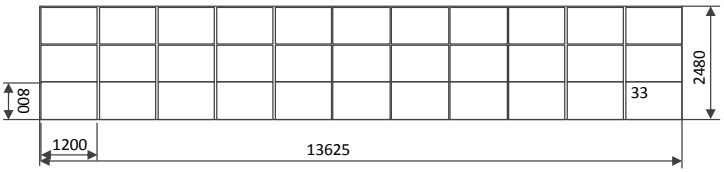

Fig. 13: Scheme loaded 40 feet trailer with EUR-pallets

6 Service production

LTL customers have high expectations to transport times, flexibility, punctuality and reliability of transport services. Besides daily collection of shipments a lead time of two days for European connections up to 1.000km is required.

In the meantime it is part of the general product portfolio of forwarding companies to offer 24 hour-service for distances up to 500km, even to other European countries. Standardized transport production of the LTL service guarantees reliable delivery times. Standard production of a LTL service begins by day. Collection and delivery of collected shipments to the local warehouse usually happens not later than 6 p.m. After handling and registration of all shipments the loaded long haul trucks start their run at late evening as overnight transport and provide the trailer at the destination warehouse in the early morning around 6 a.m. In the warehouse the cargo is loaded to small regional trucks that deliver again by day in agreed time windows with the consignees, so the delivery time complies with the guaranteed 24 hours.

The quality of LTL services improved over time with the implementation of barcoded shipments. The handling became faster and free of errors. Under this condition track-and-trace systems could be implemented within the transport production and the whole transport became more transparent. In the meantime radio-frequency identification is on the way to replace barcodes mid-term.

7 Conclusion

There are high requirements to the European LTL market such as low delivery times, high flexibility and reliability as well as transparency along the supply chain. To cover these challenging expectations, standardized processes were developed over time and the LTL freight service became a modern high performance network.

The biggest cargo streams in Europe move along the blue banana in central Europe. The biggest volumes are transported between Belgium and the Antwerp cluster on on end and Germany, France and the Netherlands as major destinations.

In the Antwerp cluster, which forms the main core of the projects interest, there are 11 of the largest producing companies in the chemical market.The volumes that need to be transported to major production clusters in Europe come on different kinds of pallets that have high potential to run in the ltl supply chain.