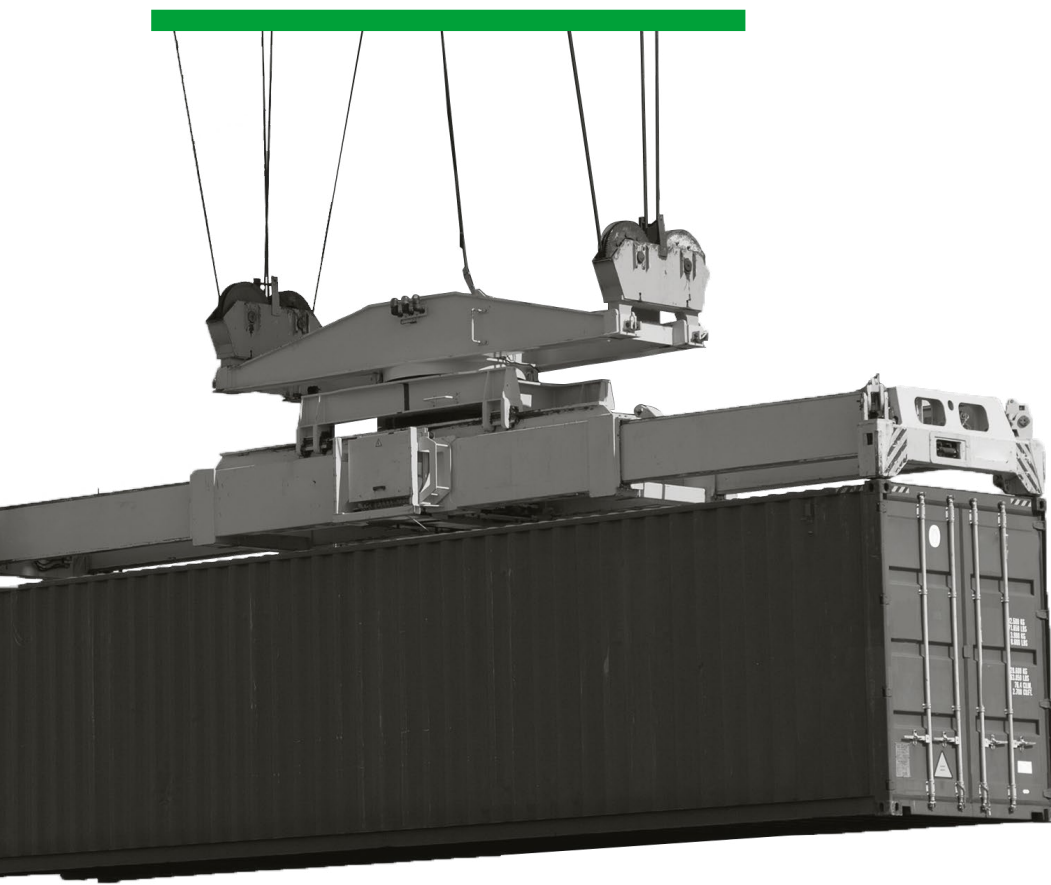


PRACTICAL GUIDE FOR COMBINED TRANSPORT



ERFA KV

Practical guide for a
fast access to CT

Climate protection by modal shift towards Combined Transport
Promotion of regular knowledge sharing on CT (ERFA KV)

www.erfa-kv.de

PRACTICAL GUIDE FOR A QUICK ACCESS ON COMBINED TRANSPORT

CLIMATE PROTECTION BY TRANSPORTATION RELOCATION TO COMBINED TRANSPORT
PROMOTION OF REGULAR KNOWLEDGE SHARING ON CT (ERFA KV)



Department of Transport Logistics
iml.fraunhofer.de



German Promotion Centre for Intermodal Transport
sgkv.de



ERFA KV
erfa-kv.de



Förderung von Erfahrungsaustausch im KV – ERFA KV

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Funding indicator: 03KF0055A
Project period: 01.01.2017 – 31.12.2019

Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages



IMPRINT

Imprint

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1st edition 2020

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PROMOTION OF REGULAR KNOWLEDGE SHARING ON CT

PRACTICAL GUIDE

Short Summary

The practical guide developed within the framework of the project *Erfahrungsaustausch Kombiniertes Verkehr (ERFA KV)* (Regular Knowledge Sharing on Combined Transport – ERFA CT) serves primarily as an orientation for an entry into Combined Transport (CT) and its facilitation. It is the result of various rounds of talks of different ERFA CT working groups during the project, as well as related interviews.

The guide was created to support companies with the introduction of Combined Transport (CT) and to enable them to use CT sustainably with economic and ecological success. Solution oriented brief case descriptions give incentives for further shifts towards CT. In general, the guide addresses the potential of CT and describes the needs of action. Therefore, this document is equally suitable for different target groups and can be used to make the entry in CT easier for companies, as well as other institutions.

As an introduction, the guide defines important technical terms of CT such as the applicable general conditions, legal basis, stakeholders and corresponding loading units. Additionally, the benefits and the necessity of CT are described. Both economic and ecological reasons and arguments for a modal shift are mentioned. The introduction concludes with an outline of current trends.

The main part outlines objectives and requirements for a successful entry into the field of Combined Transport, focusing on three main categories (general conditions, operational organization, and factors of success) as well as different questions arising within these particular areas. In doing so, the reader gets a concise overview of the most important aspects concerning the introduction of CT.

In order to emphasise the relevance of CT on an economic and ecologic level, case studies as well as calculation scenarios for a CO₂ emission comparison and corresponding costs are presented.

Moreover as a source of information, this practical guide gives general information on CT as well as details on contact persons of the industry, which are referred to as CT operators. Internet websites of the latter provide readers with further details, for example on relations and timetables. Additionally, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the German Promotion Centre for Intermodal Transport (Studiengesellschaft für den Kombinierten Verkehr e.V. (SGKV))” and the Fraunhofer IML provide information on the matter of CT.

The main section concludes with best-practice examples of individual group members, which were created within the project.

Finally, the involved project partners, the German Promotion Centre for Intermodal Transport (SGKV) and the Fraunhofer Institute for Material Flow and Logistics, are portrayed and the project ERFA KV is briefly summarized. The closing words again address the consolidation and further requirements for the implementation of Combined Transport which are necessary from the point of view of the project partners.

WHAT IS COMBINED TRANSPORT?

CHAPTER 1

Combined Transport (CT) connects strengths of different transport carriers and is considered the supreme discipline in the sector of freight transport. In general, CT is defined as follows: “*Intermodal transport, in which the majority of the distance covered in Europe is carried by rail, inland waterway or sea and any initial and/or final legs by road are kept as short as possible*” (UN/ECE,2001)¹. In practice, the term ‘Intermodal Transport’ is often used as a synonym for CT. There are various additional definitions for CT, which generally have the following characteristics in common:



Figure 1: ISO container (SGKV 2019)

- Multiunit transport chains consisting of an initial, main and final leg
- Use of standardized loading units (container, swap bodies, trailers, trucks)
- Terminals as interface for
 - Handling process of loading units
 - Change of mode of transport (rail, waterways, road)
- Use of means of mass transport for the main leg to bundle quantities

Combined Transport is characterized by a multiunit transport chain, which commonly consists of an initial, main and final leg. Typically, the main leg covers the longest distance and is conducted by rail or waterways. Within CT, the initial and/or the final leg are carried out by truck.

The loading unit, which contains the goods, remains closed during the entire process of transportation (from dispatch to consignee). Solely customs authorities have the right to open the units in the course of an inspections. The terminal (also referred to as CT terminal, inland terminal, transshipment site or transshipment station) is the interface between the different phases of transport. This is where the units are handled and the mode of transport is changed.



Relevant legal framework

Directive 92/106/EWG (1992)
Directive 96/53/EG (1996)
53. Provisional Order StVZO (1997)
KV-Förderrichtlinie (2017)

WHAT IS COMBINED TRANSPORT? CHAPTER 1

1.1 Market Segments

Combined Transport consists of two main markets, which are illustrated below:

Seaport hinterland transport and continental traffic

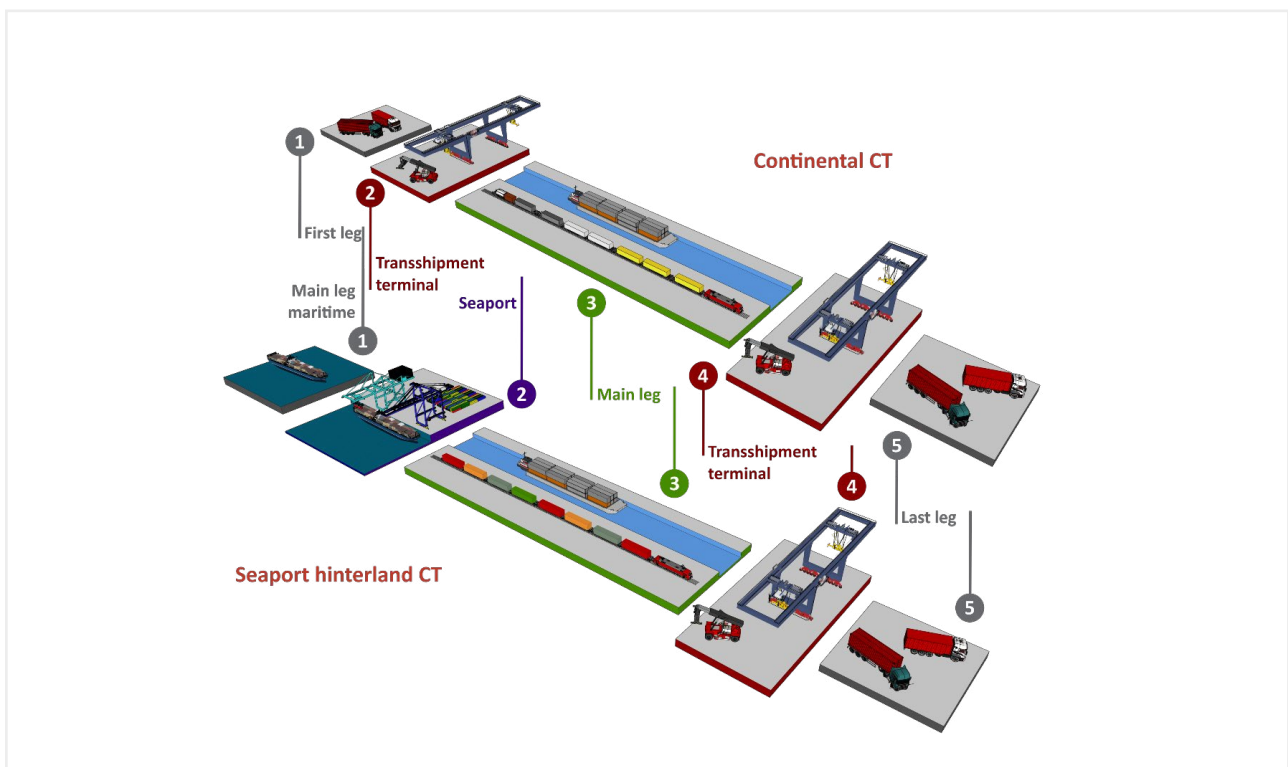


Figure 2: CT market segments (SGKV 2019)

Seaport hinterland transport

Seaport hinterland transport, or often referred to as maritime transport, comprises the inbound and outbound traffic to/from the main seaports. Characteristic for hinterland transport is the carriage of standardised containers (ISO). Hinterland transport focuses on the north-south-axis and serves the hinterland of seaports of the Netherlands, Belgium and Germany, as far south as seaports of the Mediterranean Sea as well as the Black Sea. In overseas transport, combined traffic is currently the dominant mode of transport for container traffic with general cargo and makes up around two thirds of the CT market.

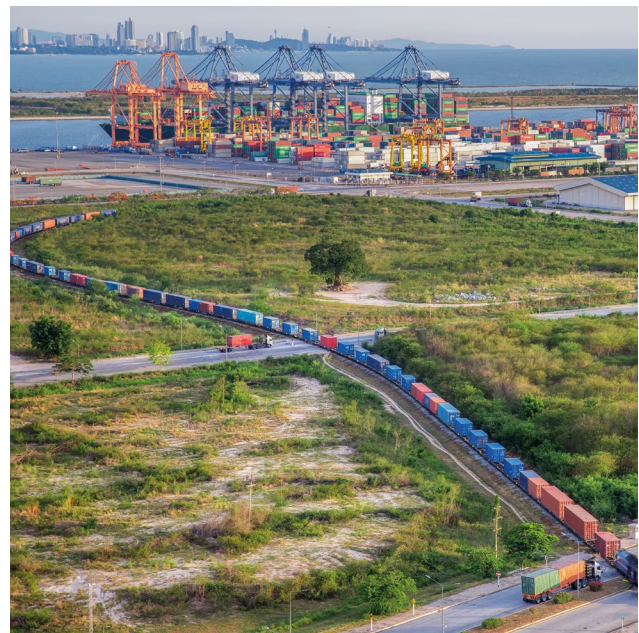
Continental traffic

The second important market is oriented towards continental traffic and focuses on the transport of goods within a continent. Unaccompanied CT is the most common mode of transport on the north-south and east-west axis of Europe. This means that solely the load units are transported unaccompanied, without any further driving personnel. In Europe goods on the north-south and east-west axes are primarily transported unaccompanied. This means that solely the load units are transported without accompanying driving personnel. The main leg of the journey is mainly carried out by rail. Important waterways for the main leg by barge are the rivers Rhine and Danube. Continental traffic represents about one third of the transported quantities of European CT. Loading units typically transported within continental traffic are non-iso-standardized containers (such as bulk or tank container, less frequently refrigerated containers), swap bodies (also referred to as swap bridge or swap trailer) as well as trailers (also referred to as semitrailer).

Special forms of continental traffic

Special forms of continental traffic are the short sea traffic and transalpine traffic. In the sector of short sea traffic, meaning short distance traffic of coastal shipping, the handling method Roll-on Roll-off (Ro-Ro) is applied. This technique refers to the loading and unloading of motor vehicles, railway wagons and intermodal transport units onto or from a short-sea vessel and is used in accompanied as well as unaccompanied CT.

Rolling Road (RoLa) describes the loading of the complete truck, including tractor and loading unit, onto rail. Among other fields of applications, it is used in transalpine traffic. This form of transport is part of accompanied combined transport, as the truck driver himself drives along with the complete tractor unit.



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WHAT IS COMBINED TRANSPORT? CHAPTER 1

1.2 Participants

Combined Transport links a multitude of different participants along the transport chain. Therefore, a well-functioning cooperation and collaboration is essential for an efficient intermodal transport chain. Each participant has to complete certain tasks, however, the boundaries are becoming increasingly blurred.

The following figure shows important participants and their central tasks:

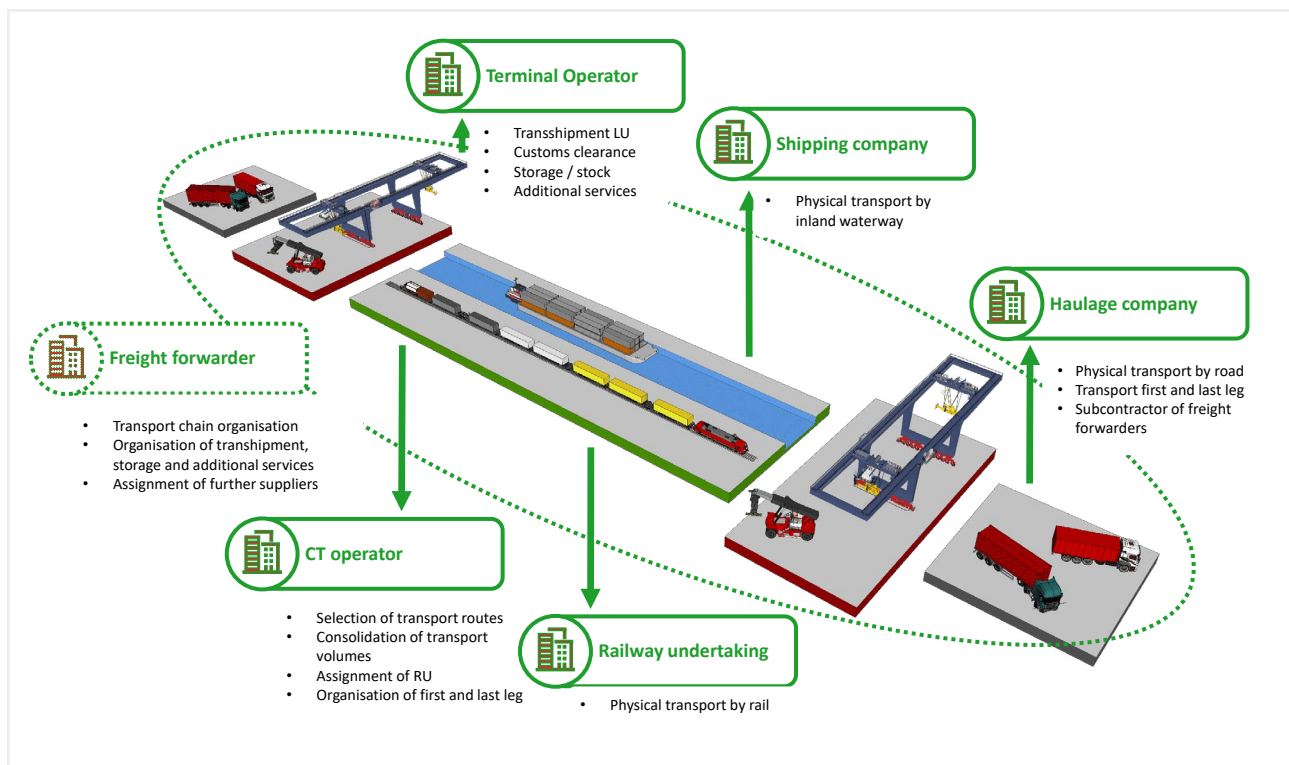


Figure 3: (some) CT participants and their central tasks (SGKV 2019)

A list of rail and inland ship carriers is given in chapter 4.2.

1.3 Loading Units

CT standard loading units (LU) meet the following main criteria:

- Loading units are transport containers in which goods are packed, shipped and then unpacked.
- Protection of goods during the entire process of transport, e.g. from environmental influences.
- The containers' technical design enables the use of conventional CT handling devices (in particular gantry crane and reachstacker) to transfer goods from one mode of transport to another.

The standard LU in CT are containers, swap bodies, trailers and complete trucks (RoRo, RoLa). The best known and most common form of LU in CT is the container. Various innovations of modes of transport resulted in the development of different types of loading units, as well as specific handling systems adjusted to the requirements and characteristics of the individual loading units.

At the same time, the container ships used in the international and intercontinental sea traffic influence the standardization of loading units in terms of dimensions, weight and features. Standardized loading units have various advantages: economical and easy handling, optimized usage of space, easier storage, as well as greater means to collect data, statistics and invoicing.

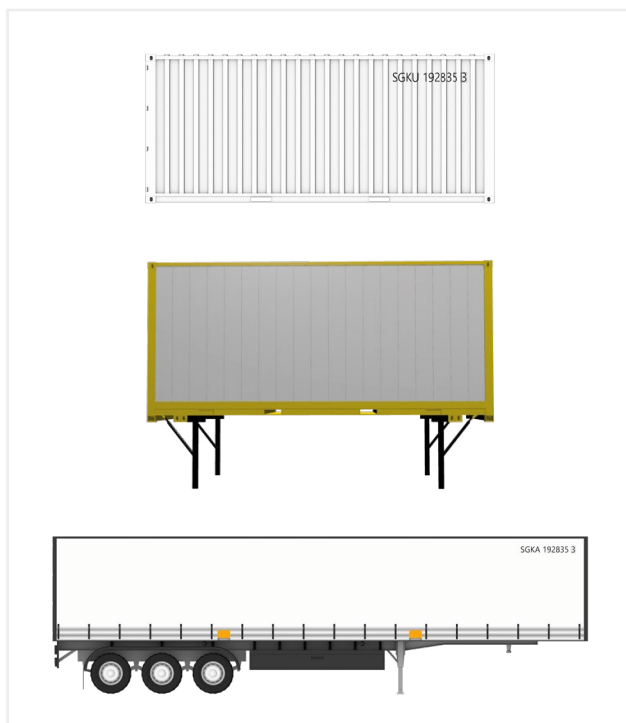


Figure 4: Standard LU of CT (container, swap body, trailer) (SGKV 2019)



Labelling

BIC Code (according to ISO 6346)
ILU Code (according to DIN EN 13044)
CSC label



Standardization

ISO R-668 (Classification, dimensions and ratings)
ISO T-1161 (Corner and intermediate fittings)
ISO R-1897 (Internal dimensions)
ISO 1461 (Hot dip galvanized coatings)
DIN EN 283 (Swap bodies - testing)
DIN EN 284 (Swap bodies dimensions and general requirements)

WHAT IS COMBINED TRANSPORT?

CHAPTER 1

In seaports, conventional LU handling is done vertically with ship-to-shore cranes (STS). In inland terminals, however, mainly rail mounted gantry cranes (RMG) or rubber tired gantry cranes (RTG) are used. Especially in smaller inland terminals, reachstackers are used exclusively to move LU. During the process of handling, LU are transferred from one mode of transport to another or are temporarily stored in the premises of the terminal until further shipping.

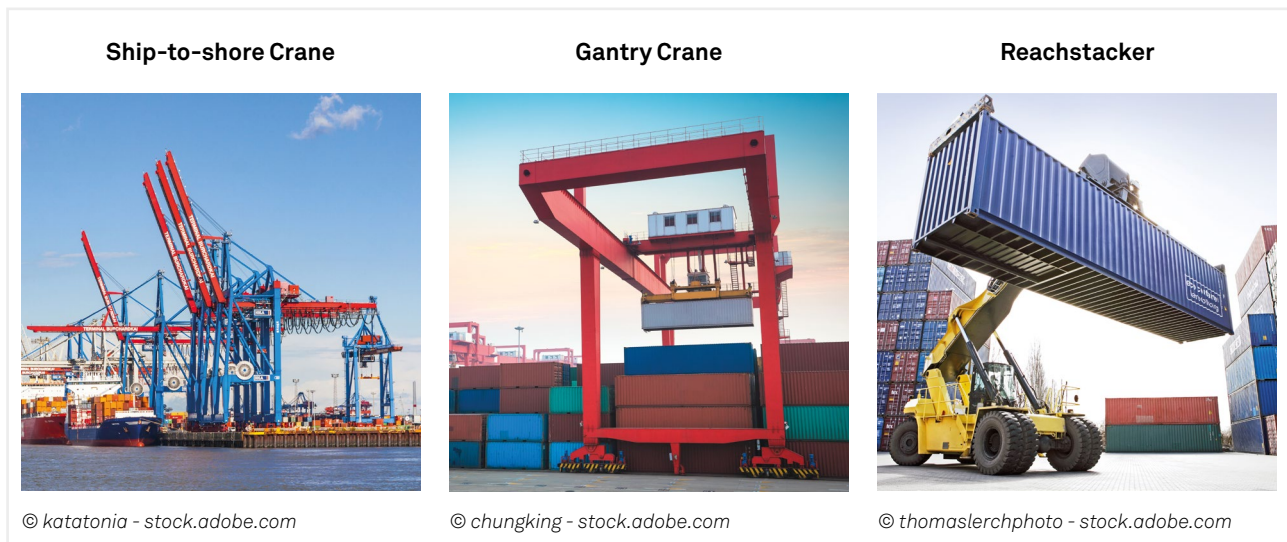


Figure 5: CT handling equipment (SGKV 2019)

Direct traffic via road makes up the largest proportion of freight traffic (2017: about 70 % of the total transport services). Due to their loading volumes, trailers are the dominating type of LU in the sector of long-distance road freight transport. However, according to experts 90 % of these trailers are not suitable for crane handling. Therefore, conventional equipment cannot be used to handle these units in CT. In order to achieve a further shift of freight traffic volumes off the road to rail or waterways, there is great potential in the use of innovative handling technologies for non-craneable LU.

Against this background, in the last decades different systems have been developed to allow the use of non-craneable LUs (mainly trailers) in CT, too. Some examples are CargoBeamer, LOHR, HELROM, Meagswing, ContainerMover, Mobiler, NiKRASA and ISU. These systems move LUs mostly laterally or horizontally by using special terminal equipment and/or special wagon handling technology. NiKRASA and ISU are exceptions to this. Both systems offer adapters solutions enabling the use of conventional handling and wagon equipment for a vertical handling.

WHY DO WE NEED COMBINED TRANSPORT? CHAPTER 2

CT combines usefully economic and ecologic factors of the transport industry and has various business and national economic benefits compared to other transport systems.

2.1 Economic Advantages

Business Economic Benefits of CT







	Increased weight limit (44 t)
	Exemption from vehicle tax
	Reduced toll costs
	Exception to driving bans
	Federal funding
	Social compatibility

Figure 6: Business Economic Benefits of CT (Source: SGKV 2019; illustration: IML 2019)

National Economic Benefits of CT





	Less road traffic
	High level of transport safety
	Environmental compatibility
	Intelligent combination of transport modes

Figure 7: National Economic Benefits of CT (Source: SGKV 2019; illustration: IML 2019)

WHY DO WE NEED COMBINED TRANSPORT? CHAPTER 2

Increased weight limit (44t)

The gross weight limit of 40 tons per truck in standard road freight transport does not apply for the initial or main leg of CT. Here, trucks can weigh up 44 tons.²

Motor vehicle tax waiver

No vehicle tax applies for trucks used for the initial and/or final leg of CT.³

Exception to driving bans

Driving bans on Sundays or bank holidays do not apply for trucks used for the initial and final leg of CT.⁴

Federal funding

Within the framework of the Directive on the promotion of transshipment facilities of Combined Transport, non-federally owned companies can receive non-repayable federal funding of up to 80 % of the costs of construction and expansion of CT transshipment facilities.

Intelligent combination of transport modes

CT combines intelligently modes of transport according to their strengths. Both, freight trains and barges are means of mass transport and are used for the main leg. This way, greater volumes of goods can be transported at once, which gives CT an advantage in comparison to trucks. Moreover, CT is more flexible due to the use of trucks on the initial and final leg compared to rail-only freight transport (point-to-point delivery, no rail connection to the client is needed).



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2.2 Ecological Advantages

The transport sector is one of the most polluting industries, with about 19 % of the total greenhouse gas emissions in Germany (in CO₂eq). Road traffic accounts for about 96 % of these emissions (UBA 2018). Considering the CO₂eq emissions in the EU-28 states in total, the transport sector in Germany accounts for about 25 % (Eurostat 2019).

In Germany, the modal split in freight transport indicates that a percentage of roughly 70 % of the total transport service (tkm) is carried out on road. Furthermore, road transport covers 79 % of all quantities transported (t). This shows that the road is the dominating mode of transport in Germany (Federal Statistical Office (Destatis) 2017). The second strongest mode of transport is rails with 19% (tkm) and 9% (t), followed by inland waterways with 8% (tkm) and 5% (t). Forecasts of the Federal Office of Economics and Export Control predict an increase of 38.9% in the volume of transport service in the sector of road freight transport by 2030 (UBA 2016⁵), resulting in further capacity bottlenecks.

The remaining shares are made up of sea and air traffic and crude oil pipelines (BAFA). These developments bear opportunities for CT. As it uses the transport mode with the lowest level of emissions (CO₂eq-greenhouse gas) in the main leg, CT is considered as one of the most environmentally friendly transport systems. A block train with the length of 740 meters can substitute 52 trucks with trailers.⁶ In addition, the weight advantage of the 44 t in CT compared to the 40 t in standard road traffic has a positive effect on the climate balance by reducing truck transports.

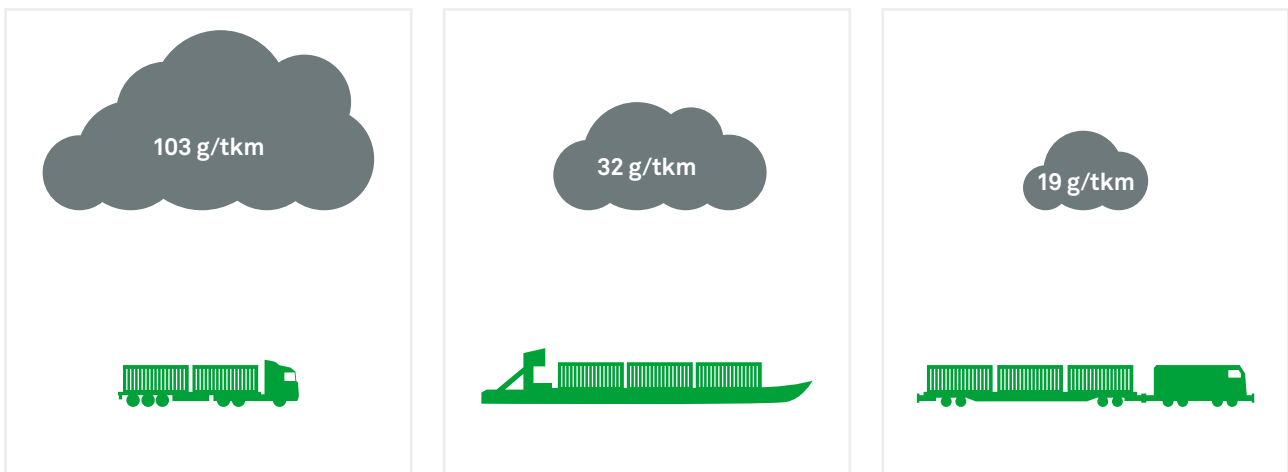


Figure 8: Comparison of emissions levels of individual transport modes in freight transport – reference year 2017 (UBA 2018); illustration (SGKV 2019)

WHY DO WE NEED COMBINED TRANSPORT? CHAPTER 2

2.3 Current Trends

The previous chapters illustrated ecological as well as economic benefits for a stronger use of CT. Besides monetary aspects, intermodal shifts can also positively influence current as well as medium to long-term trends in the transport industry.

Climate protection

Cutting down on CO₂ emissions is not only in the focus of politics but also of society. In comparison to pure road freight transport, CT can reduce CO₂ emissions in greater volumes (see chapter 5). Furthermore, CT can improve the image of the transport industry and can be used as a tool for positive marketing, as Green Logistics is currently becoming more and more important to clients.

Digitalization

In the last 5 to 10 years, digitalization has gained great importance. It goes far beyond the original definition of converting analog documents into digital formats. The digital transformation of economy, society and federal state, which means recognizing and exploiting the potentials of digital technologies/solutions, has also great impact on the logistic industry. Examples for new developments are the increasing use of data interfaces for simplified communication and data transfer, the establishment of digital forwarding agencies for transportation processing or the increasing number of booking platforms for a better price comparison and more transparency. In addition to tracking and tracing, the use of Big Data can also enable forecasts of capacity planning and/or environmental influences in the supply chain. New technical solutions, such as truck and train gates, allow for a fast digital collection of information on the loading units in the moment of entering or leaving the terminal. The digitalization has also led to an increasing number of automated CT terminals, especially in the area of seaports.

Shortage of skilled workers

An overall current negative trend is the severe shortage of drivers in the entire logistics industry, as well as the associated lack of young professionals, leading to delivery bottlenecks. Currently there are about 60,000 vacancies in the sector.⁷ Especially among young people, environment protection is an important topic. The promotion of a stronger application of CT could benefit from this development. Another favorable aspect of CT is the use of trucks only for short distances in regional and local transport, which facilitates a work life balance. CT links different modes of transport to an overall system. It therefore offers various career opportunities. However, practical aspects and benefits of CT are rather experienced in everyday working life than taught in vocational school. Therefore, actions are being taken now to permanently introduce CT as content of vocational schools.



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Increase in capacity

After a favorable political decision in 2018, the federal ministry of transport focuses on the widespread use of 740-meter-long block trains (EU standard length). This would give CT shippers the opportunity to transport between eight and twelve containers more per train.⁸ After 30 years of cutting down on rail tracks and insufficient maintenance, the rail infrastructure could benefit even more from additional plans to introduce trains with a total length of up to 1,500 meters. Furthermore, in the end of 2016 the Siding Connection Directive was renewed, which provides financial support for the construction and expansion of rail connections.⁹

Another recent development of the industry is the use of increasingly larger container ships, with a total loading volume of more than 20,000 containers. This also affects the infrastructure of ports and waterways. In the recent years a growing number of investments have been made to, e.g. excavate port accesses, acquire bigger jib cranes as well as to enlarge the land for temporary container storage.

The growing volume of trailer transport within CT represents another important market trend. In comparison to stackable containers, interim on shore storage of trailers in inland ports consumes more space. Besides expanding capacities of storage space, there are innovative concepts for trailer stacking and innovative handling technologies for non-craneable LU, which have already been designed and tested on the market.

Freight Structure Effect

The development towards a growing number of high-quality and lighter goods, which is known as the freight structure effect, will lead to an overall decline in transported volumes and total transport service in all areas of the freight transport sector. Especially in the growing sector of high-quality general cargo experts see great potential for shipments via rail or waterways within CT. Due to the freight structure effect, the frequency of shipments is also increasing. The growing number of shipments play to CT's advantage.

Institutional CT funding

Non-federally owned companies can receive federal funding of up to 80 % of the costs of construction and expansion of transshipment facilities/terminals. Applications need to be directed at The Federal Railway Authority (EBA) and the Directorate General for Waterways and Shipping (DGWS). Switzerland and Austria also provide federal funds for the promotion of the combined transport infrastructure. Federal transshipment stations can receive financial support based on the 'Bundesschieneausbaugesetz (BSchwAG)', a German directive to support the expansion of the state owned rail infrastructure. Due to this directive the German network of CT terminals is well established. The directive is renewed regularly to review and if necessary to adjust the applying funding conditions to current market developments. The next renewal is in 2022.

HOW TO GET STARTED WITH CT?

CHAPTER 3

What general conditions apply for me as a shipper or carrier? How can I organize a potential entry in CT and which factors do I need to consider to be successful?

Answers to frequently asked question of the ERFA CT working groups:

General Conditions	
For CT suitable types of goods, time of transport and transport distances.	
Are my goods suitable for CT loading units?	<ul style="list-style-type: none"> · Yes, nearly always if your goods can be packed into a container, swap body or a trailer and can be transported in it securely. · It is also possible to apply special equipment in CT according to cargo characteristics (general cargo/ bulk material and its volume, weight, temperature and ventilation requirements).
What are currently reasonable transport distances for CT?	<ul style="list-style-type: none"> · A transport distance of 300 km or more makes it reasonable to consider CT and to get quotes. (only 1 % of the total CT transports are shorter than 300 km). When transporting goods to seaports, however, CT is already worth considering from 200 km on. · Distance to nearest suitable terminal: 30 km (10 % of successful CT shippers also have longer distances to terminals; distances of up to 100 km are still reasonable in case of very long total transport distances).¹⁰ · In cases of a total transport distance of at least 300 km with an initial leg of 30 km, CT runs cost-neutrally compared to truck transport. For shipments with a total distance of 500 to 700 km CT is often significantly cheaper.
How can I find my starting point and destination?	<ul style="list-style-type: none"> · Search online for terminals nearby (about 30 – 75 km radius) e.g.: intermodal-map.com, railfacilitiesportal.eu (see chapter 4.1), which also give their according contact details. · Research on operators' websites concerning up-to-date timetables. · Compare them with your own schedules.
What shipping times can I expect?	<ul style="list-style-type: none"> · Departures according to regular shippers' timetables (1-6 times a week at the same time: departure is traditionally in the evening, arrival in the morning). · Punctuality in CT is at times less reliable compared to road freight traffic. · Possibility of interim storage in terminals (buffering), if needed. · Partial transport organization via two modes of transport can be useful (switch to trucks on short notice, however, main transport distance via rail).

Operational Organization

General organization and procurement of information

<p>How do I find contact persons?</p>	<ul style="list-style-type: none"> · Experienced or newly founded carriers with knowledge on CT (who can organize all aspects of the shipment, in case of acquired CT expertise). · Terminal operators (give information on possible connections, carriers and operators) – e.g. refer to intermodal-map.com, railfacilitiesportal.eu · Operators (offer rail transport and handling); see chapter 4.2 for a list. · Contact established shipping companies for marine transport (some also offer to organize the linked seaport hinterland transport). · Refer to online booking platforms (e.g. box2rail), digital shipping agencies (e.g. FreightHub) or collaborative communication platforms (e.g. NexTrust).
<p>What kind of loading unit do I need for the shipment?</p>	<ul style="list-style-type: none"> · Containers, (craneable) trailers or swap bodies → Some terminals only handle containers → Some shippers have dimension limits for loading units due to heights of tunnels and bridges → LUs can be bought, rented, leased or already be included in the carrier's quote → Advantage: total gross weight of 44 tons permitted in the initial as well as final leg.
<p>Do I need to make changes to my own processes?</p>	<ul style="list-style-type: none"> → Note: create awareness — CT depends on A-B-connections (terminal A – terminal B), as well as on the organization of the initial and final leg. · Yes, in case my processing times are not compatible with the carrier's timetable. → Check internally time frames and punctuality rates · Yes, in case my current carrier does not offer CT solutions. → E.g. new procurement, parallel placing of orders with road and rail forwarding agents, training for dispatcher · Yes, in case the operator only offers circular tours. → It is the carrier's responsibility to review the capacity utilization (carriage without load or fully loaded)
<p>What is the minimum order quantity?</p>	<ul style="list-style-type: none"> · 1 LU for the first order (container, swap bodies, trailer) · Larger discounts for continuous shipments · From the operator's point of view, 80 % train utilisation is usually necessary. · Fixed quantities in case of company trains (the capacity utilization risk bears the carrier).

HOW TO GET STARTED WITH CT?

CHAPTER 3

Factors of Success	
Aspects of a successful entry into CT	
Transport quantity and frequency	<ul style="list-style-type: none"> · The more goods are transported, the better. · The typical market's minimum requirement is 3 circular tours per week (often only circular tours are offered).
Heavy goods	<ul style="list-style-type: none"> · CT's big advantage is in the transport of heavy goods due to its increased 44-ton weight restriction in the initial and/or final leg.
Transport distance	<ul style="list-style-type: none"> · With a growing transport distance of at least 300 km, CT is increasingly cost effective and therefore more attractive.
Night / bank holiday driving bans	<ul style="list-style-type: none"> · Transports which suffer from bans on driving at night and on bank holidays, as well as restrictions on truck traffic, for example in Austria or Switzerland, can avoid them by using CT.
Willingness to engage with CT as a topic	<ul style="list-style-type: none"> · Obtain information and compare: <ul style="list-style-type: none"> → Training of dispatchers → Information websites see chapter 4.1 → Combined operators see chapter 4.2
Social responsibility as an important business factor	<ul style="list-style-type: none"> · Using CT reduces CO₂ emissions as well as the traffic load on roads significantly. · These external factors work in favor of CT. However, they are only important to companies, which considering social responsibility as a priority themselves or their customers do so.
Appropriate connection nearby	<ul style="list-style-type: none"> · The crucial aspect, which often leads to the failure of inquiries, is still the availability of suitable train connections.

WHERE TO FIND INFORMATION?

CHAPTER 4

In order to have a successful start of CT it is essential to obtain information/knowledge on CT as a transport system, as well as on the corresponding market participants, also referred to as combined operators, who organize and carry out CT transports.

4.1 Information Websites

General Information

sgkv.de
intermodal-info.com
retrans.at
tis-gdv.de

Geographical Information

intermodal-map.com
railfacilitiesportal.eu

Technical Information

containerhandbuch.de
bic-org.de
ilu-code.eu
DIN SPEC 91073

Climate-Related Information

bmu.de
umweltbundesamt.de
ecotransit.de

Information on Funding

bmvi.de
eba.bund.de
gdws.wsv.bund.de
bav.admin.ch
bmvit.gv.at

Statistic Information

genesis.destatis.de
ec.europa.eu/eurostat
kba.de
bag.bund.de

WHERE TO FIND INFORMATION?

CHAPTER 4

4.2 Combined Operators

CT is characterised by a variety of market participants who operate nationally and internationally in different regions. The following table provides an overview:

Examples for Rail Operators

Adria Kombi d.o.o.	ERS Railways B.V. Eurogate Intermodal GmbH (EGIM)	Kombiverkehr Deutsche Gesellschaft für kombinierten Güterverkehr GmbH & Co. KG	Rhein-Ruhr Terminal Gesellschaft für Container- und Güterumschlag mbH
Am Zehnhoff-Söns GmbH (AZS)	European Cargo Logistics GmbH (ECL)	Konrad Zippel Spediteur GmbH & Co. KG	Rocombi SA
Ambrogio GmbH	European Gateway Services B.V. (EGS)	LINEAS GROUP NV/SA	Roland Spedition GmbH
AS Baltic Rail	Far East Land Bridge LTD.	Lineas N.V.	S.C. Rail Container S.R.L.
Bentheimer Eisenbahn AG	Froidcombi S.A.	Locon Logistik & Consulting AG	Samskip Van Dieren Multimodal
Bertschi AG	Gartner KG	Mercitalia Intermodal S.p.A.	Societa Alpe Adria S.p.A.
Bohemiakombi spol. s.r.o.	GB Railfreight Ltd. (GBRf)	Metrans a.s.	TFG Transfracht Internationale Gesellschaft für kombinierten Güterverkehr mbH
BoxXpress.de GmbH	General Transport Service S.p.A. (G.T.S.)	Move Intermodal NV	TMR Logistics AB
Cabooter Railcargo B.V.	Green Cargo	Multi Modal Rail B.V.	TPnova - Transportes Portuários SA
CargoBeamer GmbH	Greenmodal Transport S.A.	Naviland Cargo	Trans Eurasia Logistics GmbH
CargoNet AS	GVT Intermodal B.V.	NECOSS GmbH	TRANSANA Spedition GmbH
CFL Multimodal s.a.	Hannibal S.p.A	neska Container Line B.V.	TransContainer Europe GmbH
CMA CGM SA	Hellmann Worldwide Logistics GmbH & Co. KG	Nosta Rail GmbH	Trasporti Internazionali Transmec S.p.A.
Combiberia SA	Hupac Intermodal SA	Novatrans SAS	TX Logistik AG
Contargo Rail Services GmbH	IFR S.r.l.	Optimodal Nederland B.V.	VIIA
DB Cargo BTT GmbH	IGS Intermodal Container Logistics GmbH	P&O Ferrymasters B.V. (POFM)	WBT Weets Bahn Transport GmbH
DistriRail B.V.	IMS Cargo Austria GmbH	PANEUROPA Transport GmbH	Wenzel Logistics GmbH
duisport agency GmbH	InterRail Europe GmbH	PCC Intermodal S.A.	Westfälische Landes-Eisenbahn GmbH (WLE)
Duvenbeck Logistics GmbH	IRS InterRail Services	Rail Cargo Austria Aktiengesellschaft A.G	ZigsXpress GmbH
Ecologistics Ltd.	Italcontainer S.p.A.	Raillogix B.V.	
Eisenbahngesellschaft Ostfriesland-Oldenburg mbH	K+S Transport GmbH	Ralpin A.G.	
Emons Rail Cargo GmbH		RheinCargo GmbH & Co. KG	
Erontrans Sp. z o.o.ecl			

Examples for Inland Waterway Transport Operators

Am Zehnhoff-Söns GmbH	European Gateway Services B.V. (EGS)	Imperial Logistics International B.V. & Co. KG	SACO Shipping GmbH
ARKON Shipping GmbH & Co. KG	Frankenbach Container Service GmbH	neska Container Line B.V.(Alcotrans)	Ter Haak Intermodal (THI)
Börde Container Feeder GmbH	Greenmodal Transport S.A.	Reederei Deymann Management GmbH und Co. KG	W. Combi Cargo Transportlogistik GmbH & Co. KG
Contargo GmbH & Co. KG	GVT Intermodal B.V.	Rhenus Maritime Services GmbH	Walter Lauk Ewerföhreerei GmbH
DFDS Germany ApS & Co. KG	Haeger & Schmidt Logistics GmbH		



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CALCULATION SCENARIOS

CHAPTER 5

The following scenario compares the CO₂ emissions of the transportation of 2 TEU, each weighing 10 tons, by truck with those of a CT transport chain. The calculated CO₂ emissions as well as the mileage of the scenarios are based on the calculations of EcoTransIT (Well-to-Wheel).¹¹

In this case study, the level of CO₂ emissions of road transport is considered constant for the transport by truck as well as for the initial and final leg. The amount of the emissions is estimated to stay level until 2030. This also applies to for the CO₂ emissions of the handling process. In general, these sectors of the transport industry could potentially benefit from possible further innovations of electric mobility, which could lead to an additional reduction of CO₂ emissions. In this scenario, renewable energies make up 53.6 % of the energy mix for trains in 2018.¹²

For the year 2030 we referred to data provided by Deutsche Bahn (German Railways), as ECOTransIT has not carried out any calculations for this period. On this basis, the energy mix of trains is estimated to consist of 80 % of renewable energies. Therefore, the results will be translated to the percentage of 80 %. The following two examples describe possibilities on how CT could currently reduce CO₂ emissions in the year 2030 compared to truck-only transport.



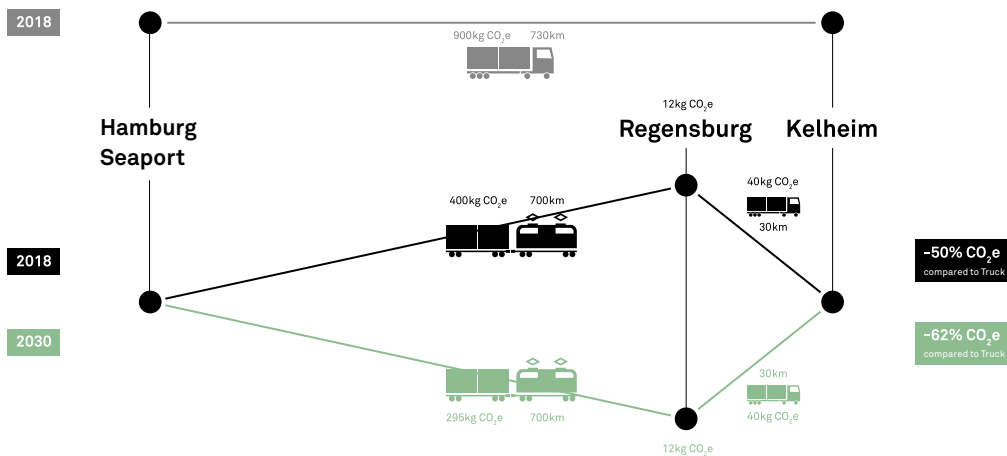
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Calculation of CO₂ Emissions

The first transport relation consists of the seaport hinterland transport from north to south starting in Hamburg's seaport and terminating in Kelheim. In CT, the main leg is carried out by rail from Hamburg's seaport to Regensburg. In this case, an initial leg is not necessary as the goods can be transferred from ship to rail directly in Hamburg's sea-

port. This way, the level of CO₂ emissions can currently be reduced by 50 % already. By 2030, the savings can rise up to 62 % if the share of renewable energy in the energy mix for trains increases to 80% as expected.

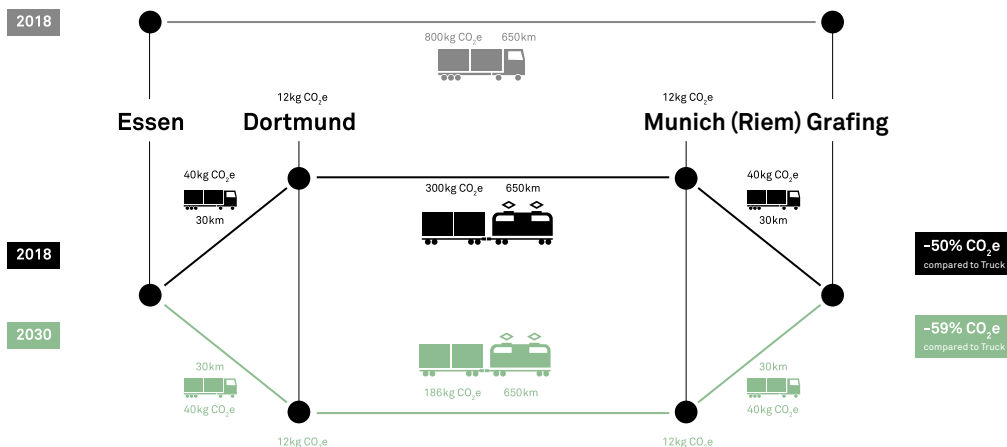
Relation Hamburg Seaport – Kelheim:



The second scenario describes the route from Essen to Grafing, near Munich. The graph of the CT transport chain shows that the cargo is handled in Dortmund and in Munich Riem. In this case, a reduction of CO₂ emissions of

up to 50 % is already achievable, too. By the year 2030, the cut down on emissions could even increase up to a level of 59 %.

Relation Essen – Grafing:



EXAMPLES OF BEST-PRACTICE

CHAPTER 6

Company: Fichtl Unternehmensgruppe

CT experience: yes

EFRA KV Group: Regensburg

Special quality: Diversified use of CT



What makes CT interesting for your company?

We work not only as forwarding agent but also as shipper with our own small terminal. For our clients we also forward goods in containers per cargo ship. Therefore, CT is very important to us, in fact it is essential.

What have been your experiences in CT (good approaches and obstacles)?

Generally, our experiences have been positive. However, there are also difficult phases, for example, economic peaks (like in the past years) can lead to a literal run on terminals and push them to their capacity limits.

A higher degree of digitalization can be a solution to these phases (currently there is still too much paperwork), as well as the construction of further small depots. The latter exist already and just need some reactivation or in some cases a connection to the infrastructure.

What are your plans for the future concerning CT?

Our possibilities are limited. We will continue our efforts to promote CT and we will try to transport greater volumes per rail. However, this depends on various factors.

Do energy suppliers have sufficient free capacities? What will the price development be like? At the moment, there is no connection from Regensburg for semi-trailers.

Company:	DB Cargo AG
CT experience:	yes
EFRA KV Group:	Lausitz
Special quality:	CT profits from a continuing development of an increasing use of containers



What makes CT interesting for your company?

More and more companies are demanding faster availability of the goods dispatched as well as the shipment of smaller volumes. Furthermore, we note a continuous trend in the use of containers. We can optimally meet all these requirements in CT — both for customers with and without their own rail access.

What have been your experiences in CT (good approaches and obstacles)?

We already offer different CT solutions for various clients. An obstacle that we need to encounter is that clients have industry specific requirements for logistics. Examples for this are the need of certified LUs for the transport of beverages, just-in-time shipments or change of transport modes. We meet this demand by developing individual logistic concepts and providing the necessary resources, for example LUs for bulk and free flowing material, which can be transported per truck as well as per train. We monitor all phases of the transport chain to be able to provide a reliable change of transport modes. Upon request we also coordinate the initial and final leg via truck.

What are your plans for the future concerning CT?

Our goal is to further develop and strengthen CT in Europe. We want to offer customer-specific concepts and are aiming at cross-sector logistic solutions for block train and single wagonload traffic. To achieve our objectives, we use our knowledge, individual consulting services and suitable equipment.

EXAMPLES OF BEST-PRACTICE

CHAPTER 6

Company:	Stenaline GmbH & Co. KG
CT experience:	yes
EFRA KV Group:	Dortmund
Special quality:	CT hinterland transport for marine tours play an important role



What makes CT interesting for your company?

CT is interesting for marine routes because of the hinterland transport as the first and last mile.

What have been your experiences in CT (good approaches and obstacles)?

We are currently operating our own routes to Kiel and Rostock for unaccompanied transport. Additionally we offer a variety of services for accompanied transport by ship. Our efforts focus on the expansion of intermodal traffic and a shift of greater volumes from road to rail transport. Even though interest in CT is evident on the market, it is difficult to receive transport volume commitment from carriers, as prices for road transport are often still lower than for rail transport, depending on the capacity utilization.

What are your plans for the future concerning CT?

For the future, we are planning to increase hinterland transport volumes by using existing infrastructure or constructing new networks for transport distances longer than 300 km.



Company:	Wecon GmbH
CT experience:	yes
EFRA KV Group:	Dortmund
Special quality:	Swap bodies offer advantages in CT

What makes CT interesting for your company?

Compared to road transport, CT offers to some extent more favorable prices for the transfer of swap bodies to clients for long distances (e.g. to Austria, Switzerland Italy). Moreover, for us at Wecon, a manufacturer of swap bodies, CT is a market segment with great potential.

What have been your experiences in CT (good approaches and obstacles)?

In CT, delays in the transport chain can lead to problems in the coordination of the final leg causing extra costs for additional craning and storage fees. However, these issues could be avoided by improved communication. Furthermore, there is still limited knowledge on the various opportunities CT has to offer amongst forwarder, logistic specialists and shippers when they had not been engaged in the topic before.

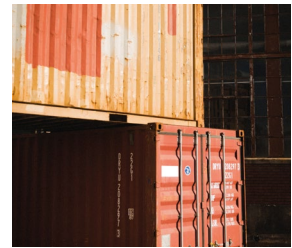
What are your plans for the future concerning CT?

We are planning to increase our communication on the opportunities CT offers for the industries, especially against the background of the shortage of drivers as well as ongoing discussions on CO₂ emissions.

EXAMPLES OF BEST-PRACTICE

CHAPTER 6

Company:	TEDI / Container Terminal Dortmund
CT experience:	yes
EFRA KV Group:	Dortmund
Special quality:	Interim storage at the CT terminal site and a nearby location offers advantages



What makes CT interesting for your company?

Our cargo is shipped via the Container Terminal Dortmund where we can use the highly predictable transport volumes of the established system traffic. This way we profit from a constant flow of goods. Our advantage is the closeness of the terminal to our site and we are intensively using the good connection to the ports in the north and west of Dortmund. By making use of the possibility to store cargo temporarily at the terminal, we can optimize our goods receipt planning.

What have been your experiences in CT (good approaches and obstacles)?

We have experienced a high level of flexibility within the established network. Depending on the location, however, it is possible that dependencies on the terminal operator exist in CT. In CT, companies need to calculate with longer transport times compared to direct truck transport. Nevertheless, we consider CT as the more favorable solution for us because of economic as well as ecologic reasons (Green Logistics).

What are your plans for the future concerning CT?

We regularly review the possibilities of CT in our transportation planning.



Company:	Anhalt Logistics GmbH & Co. KG
CT experience:	yes
EFRA KV Group:	Hamburg
Special quality:	CT is the solution to the truck driver shortage

What makes CT interesting for your company?

CT gives us the opportunity to react to peaks at short notice and handle them. Especially in times of driver shortage and customers' declining storage capacities, an increase in equipment can give companies a higher level of flexibility in their operational processing.

What have been your experiences in CT (good approaches and obstacles)?

It is essential to have expertise in the field of CT and a network of contacts to CT operators. It is advisable to acquire knowledge by browsing websites on CT, or to refer to the webpages of SGKV as well as CT experienced forwarders. We profited from the participation in the ERFA-KV Working group of Hamburg and various trainings as well as events to expand our network. Here, gaining access to established high-quality CT relations with easy market access is important. We made some comparisons of CT and road freight traffic concerning costs, reloading situations as well as transport requirements (e.g. 44 ton regulation). The communication between forwarder and operator is usually conducted electronically via an interface.

What are your plans for the future concerning CT?

Because of the reasons mentioned above, such as the shortage of drivers and optimization of flow of goods, we want to continue to invest in CT in order to achieve further shifts from the road to the more environmentally friendly option rail. In order to achieve this and to have the required regulatory framework, it was and still is essential that politics show engagement and give support.

EXAMPLES OF BEST-PRACTICE

CHAPTER 6

Company:	VEGA / TX Logistik
CT experience:	yes
EFRA KV Group:	Frankfurt
Special quality:	Innovative adapter solutions allow for efficient vehicle transportations



What makes CT interesting for your company?

In cooperation with TX Logistik, the automobile forwarder, International Car-Transport and Logistic-Trading Gesellschaft m.b.H. (Vegatrans), was able to make the transportation of vans significantly more efficient and more environmentally friendly by using the innovative adapter system “roadrailLink” (r2L). Previously, vans had been transported almost exclusively from the factory to costumers per road transport. One major reason for this was that there had not been any suitable and economic intermodal solution available (in most cases established solutions such as conventional flat cars were too cost-intensive). The r2L load carrier allows the transport of different kinds of vehicles or machines per train (such as vans, tractor units, cars, trucks, construction and agricultural machines as well as busses). With this approach, forwarders can reach an equal or even better load factor compared to a standard car transporter and have the advantage of avoiding unmatched transport flows.

What have been your experiences in CT (good approaches and obstacles)?

Previously there was no suitable solution to our transportation requirements. This is why we developed the adapter system roadrailLink (r2L) in cooperation with KTT (KässbohrerTransportTechnik). It offers adjustable mobile ramps and can be mounted by reachstackers or gantry cranes to the standard pocket wagon T3000. “By using roadrailLink we can now load 32 additional light tractor units compared to the traditional transport with flat cars”, explains Franz Blum, CEO and partner of Vegatrans. To him another advantage of the system is its universal applicability. “For the first time we can now also link rail inbound traffic with out-bound traffic in automobile logistics which makes the process even more efficient.”

What are your plans for the future concerning CT?

Vegatrans plans to intensify its use of CT. “We are constantly technically improving our system. At the moment we are already fabricating the next series of 32 pieces”, says Franz Blum. Additionally, the company plans to develop systems for the transport of other types of vehicles by train – for example rubber-tyred agricultural and construction machines or buses. Last but not least the adapter concept is an interesting alternative for the (cross-border) transportation of heavy electric vehicles.

Company:	NIKRASA / TX Logistik
CT experience:	yes
EFRA KV Group:	Frankfurt
Special quality:	Innovative adapter solutions allow for the use of non-craneable trailers in CT



What makes CT interesting for your company?

CT is our core business at TX Logistik AG. One major challenge for forwarders who want to increase their business in the area of CT is the lack of suitable (craneable) loading units. NiKRASA can help to overcome this obstacle. With this technology, nearly any non-craneable standard trailer (13.6 m) can be shipped in CT. The loading is carried out equally to a craneable semitrailer via reach stacker or gantry crane, which are usually available in CT terminals. Due to the systems weight-optimized design it does not cause a lot of additional dead load during the transportation by train. This technology is especially attractive for forwarders who do not (yet) have craneable equipment but are interested in getting started in the field of CT without having to make major investments.

What have been your experiences in CT (good approaches and obstacles)?

With NiKRASA forwarders can get active in CT without any high-volume investments. The platform allows for a use of nearly all available semitrailers in CT. Various forwarding companies are already applying NiKRASA successfully on different relations in CT, for example on the route Bettembourg – Trieste.

What are your plans for the future concerning CT?

We are planning to expand the offer of our NiKRASA system within and beyond our CT network.

THE ERFA CT PROJECT

PRACTICAL GUIDE

Project Description

Combined Transport is considered an environmentally friendly and convenient alternative to road-only shipping, as in CT the longest distance is generally completed by train or waterways. An intelligent use of CT additionally offers economic advantages. This is why companies should always consider CT as an option during the process of route planning. However, smaller as well as big companies often do not have the necessary expertise in the advantages and fields of application of CT.

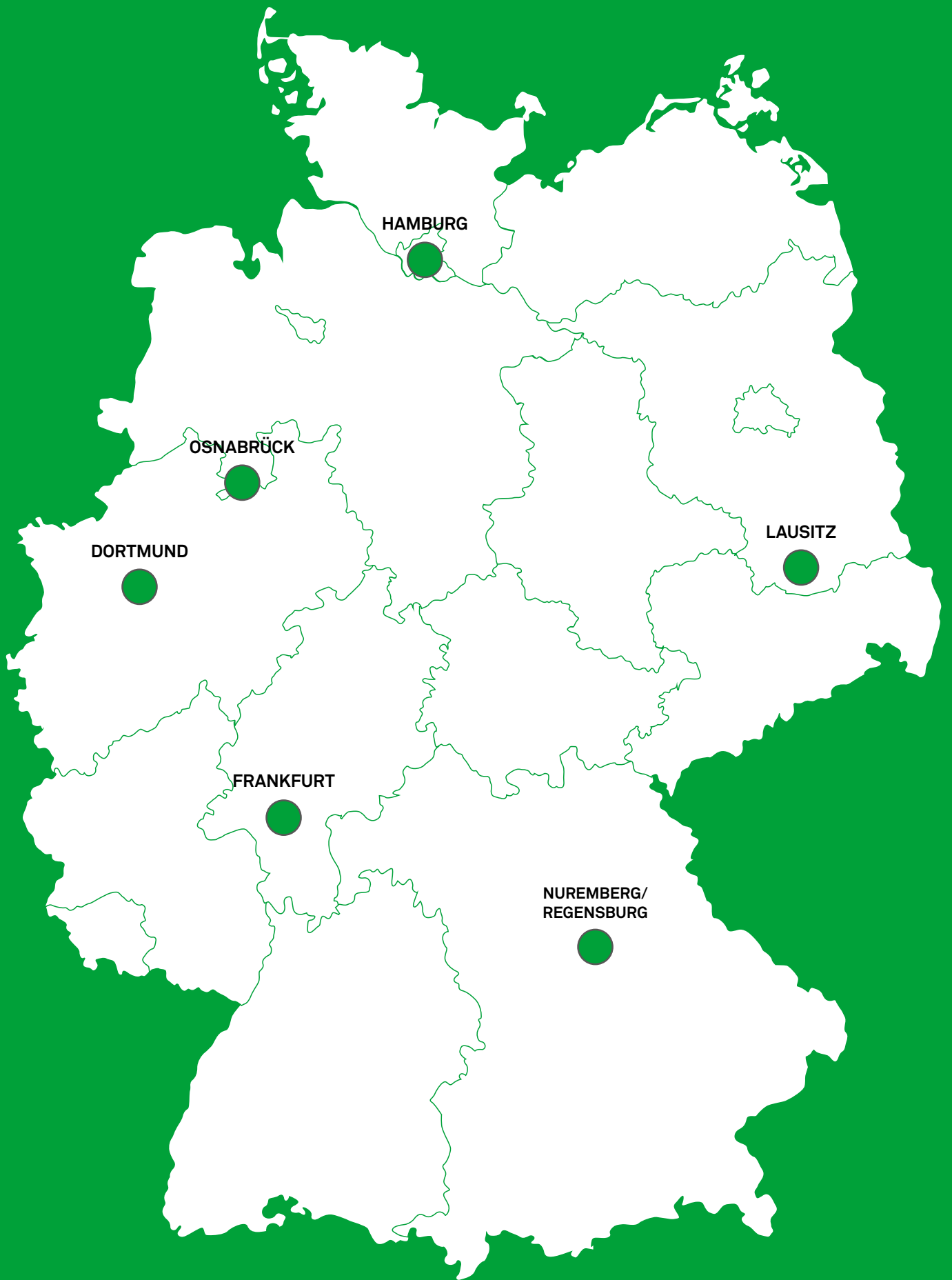
In the past years, CT has grown faster than road freight transport; however, its share of the total freight transport remains quite small. The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety decided to fund the project ERFA CT “climate protection through shifts of modes of transport – regular knowledge sharing on Combined Transport” within the scope of the National Climate Initiative (NCI). Reasons for this decision are the recognition that CT plays an important role in the transport industry and can help to achieve the climate targets as well as to reduce road traffic.

CT is considered the supreme discipline of freight transport. It requires knowledge of the possible applications of the individual modes of transport and of the individual operators in a transport chain. Many road haulers struggle with the market entry because of insufficient training and often due to a lack of transparency among operators. This causes uncertainties among shippers who see themselves unable to influence the route planning of logistics service providers.

Another obstacle is the lack of communication on CT between road haulers and shippers in order to be able to learn from one another, analyze challenges together and to jointly communicate further needs with other operators. This is exactly the starting point of the project ERFA CT. In

cooperation with the SGKV, the Fraunhofer IML selected six regions (Dortmund, Frankfurt, Regensburg/Nuremberg, Lausitz, Hamburg and Osnabrück) in which ERFA CT working groups were established. In each region, different operators of the transport chain met twice a year to share their knowledge on CT regularly. The project started in December 2017 and ended in December 2019. Because of the general positive feedback, ERFA CT group members are drawing up concepts of further collaboration and possible follow-up projects.

The overall aim of the project is to increase CT's share in the freight transport sector as a whole and by doing so to contribute to the modal shift as well as to the achievement of climate targets. The following figure visualizes the established ERFA CT project groups.



HAMBURG

OSNABRÜCK

DORTMUND

LAUSITZ

FRANKFURT

NUREMBERG/
REGENSBURG

THE ERFA CT PROJECT

PRACTICAL GUIDE

Project Partners

Fraunhofer-Institute for Material Flow and Logistics

Since 1981, the Fraunhofer IML has been researching application oriented in the field of material flow and logistics. It is one of the 66 institutes and autonomous research facilities of the Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V..

As part of the institute's division Logistics, Traffic, Environment, the department of transport logistics specializes in matters of the three modes of transport road, rail and waterways. Besides multmodal logistics, the department's main focus is on the development of IT solutions in the field of transport logistics as well as the topics of electromobility and autonomous driving. Logistics service provider, carriers and shippers have been successfully acquired as industrial partners. Public institutions (such as Ministries or port operators) are also among the clients.

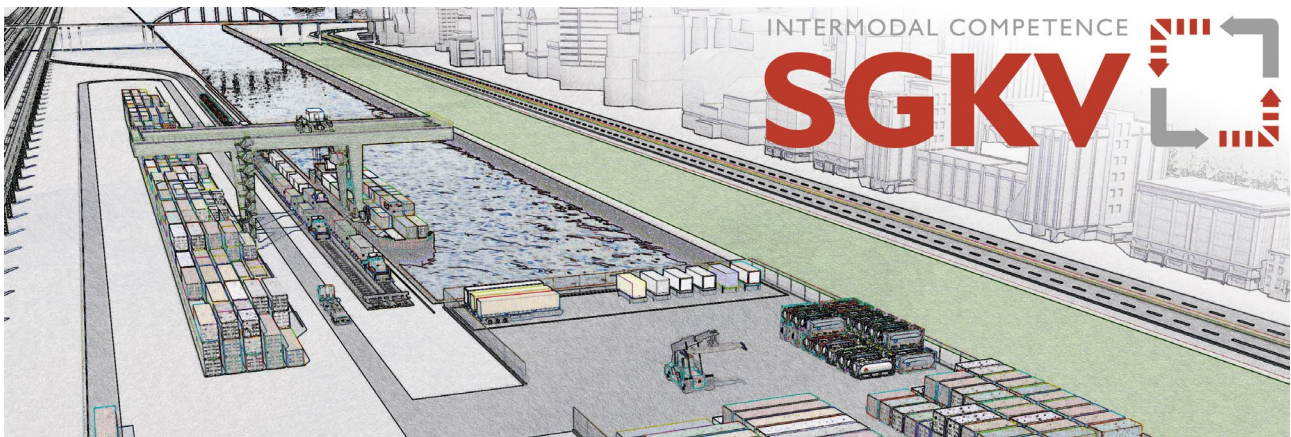
One main field of research at the Fraunhofer IML is the consultancy for logistics companies. This includes for example services such as process optimization of terminals, analysis of weak points and potentials as well as the assistance in the selection and evaluation of handling methods.

Researchers at Fraunhofer IML have successfully conducted various projects in the field of CT, modal shift as well as market and potential studies. Finally, members of the institute have proven their expertise in the organization, moderation and presentation of knowledge sharing groups.

iml.fraunhofer.de



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Studiengesellschaft für den Kombinierten Verkehr (SGKV)

SGKV was founded in 1928, as the truck technology gained access to long-distance traffic. The association is active on behalf of the interests of intermodal rational transport chains. It promotes and carries out research on links between national and trans-national transport and cargo handling, both within and out of companies.

The goal is to strengthen and develop CT further by bringing together research and practice.

As a neutral platform for terminal operators, universities and haulage companies, SGKV wants to organize freight traffic in an environmentally friendly, more efficient, and

sustainable way by means of intelligent intermodal transport chains. SGKV is an initial contact point for issues of CT and offers a broad network of experts.

The association has extensive experience in conducting diverse research projects, for example in the area of profitability analysis or fundamental analysis of CT, evaluation of technological innovations in CT and supply chain security.

sgkv.de





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intermodal-map.com

intermodal-info.com



Endnotes

- 1 Original quote: „*Intermodale[n] Verkehr[s], bei dem der überwiegende Teil der in Europa zurückgelegten Strecke mit der Eisenbahn, dem Binnen- oder Seeschiff bewältigt und der Vor- und Nachlauf auf der Straße so kurz wie möglich gehalten wird.*“ (UN/ECE,2001)
- 2 Legal text: Straßenverkehrs-Zulassungs-Ordnung (StVZO) § 34 Achslast und Gesamtgewicht
URL: https://www.gesetze-im-internet.de/stvzo_2012/__34.html (last access: 31.10.2019)
- 3 Legal texts: Kraftfahrzeugsteuergesetz (KraftStG 2002) § 3 Ausnahmen von der Besteuerung sowie Kraftfahrzeugsteuergesetz (KraftStG 2002) § 4 Erstattung der Steuer bei Beförderungen von Fahrzeugen mit der Eisenbahn.
URL: http://www.gesetze-im-internet.de/kraftstg/__3.html (last access: 31.10.2019)
and http://www.gesetze-im-internet.de/kraftstg/__4.html (last access: 31.10.2019)
- 4 Legal text: Straßenverkehrs-Ordnung (StVO) § 30 Umweltschutz, Sonn- und Feiertagsfahrverbot sowie Verordnung zur Erleichterung des Ferienreiseverkehrs auf der Straße (Ferienreiseverordnung).
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- 10 BVU Beratergruppe Verkehr + Umwelt GmbH & TNS Infratest GmbH (2016): Entwicklung eines Modells zur Berechnung von modalen Verlagerungen im Güterverkehr für die Ableitung konsistenter Bewertungsansätze für die Bundesverkehrswegeplanung; Endbericht. i.A. des Bundesministeriums für Verkehr und digitale Information (BMVI)
- 11 EcoTransITWorld (2019): URL: <https://ecotransit.org/> (last access: 04.11.2019)
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URL: https://www.dbenergie.de/resource/blob/1345644/c5707c725a0831df0c3719356788ff33/allgemeines_strom_kennzeichnung-data.pdf (last access: 04.11.2019)

