SAFE GREEN LOGISTICS A/S

- competitive & sustainable

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Executive summary

- The concept can deliver more than a 60% procent reduction in Co2 emission, based on a multimodal freight with diesel driven trucks for first and lastmile distribution. The potential is much greater given the freight units operate with 100 % electrified and utilize green energy.
- The concept can, based on the input parameters, move upwards of 88% of the total freight volume to a multi-modal distribution (rail long distance / trucks first and lastmile), enabled by the CTS rapid-model.
- The technology and concept is a competitive and sustainable alternative to conventional single carrier freight.
- The concept is 10-15% cheaper than driving a truck
- The concept is based on combined transport of goods and passengers
- City logistics - The solution can incorporate a distribution set-up for deliverance of cargo in the largest cities
- Removes the incentive for social dumping, carbotage driving and non-value-adding long-distance haul by truck
- If fully implemented the Rapid-concept will reduce the travelling time (in DK) between the 10 largest cities in the country
- The Rapid-concept is a scalable concept.
- Based on the created business model the Rapid-concept creates green topline and a positive bottom line
- The business model concludes; the Rapid-concept reduces the congestion and maintenance costs on the roads significantly

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The Company

Safe Green Logistics A/S (SAFE GL) is an innovative company specialized in seamless technological and logistical innovation.

THE MISSION	To fully implement the CTS technology and Concept.
THE VISION	To deliver a greener and sustainable future for transport of both people and products.

The mission is to optimize transport and logistics efficiency in Europe and (globally), by fully integrating and implementing the CTS technology and concept, based on a full-scale multimodal freight concept with rail-freight as the primary source of transport and road freight for short distance haulage. The CTS Technology and Concept is a competitive and sustainable multimodal freight concept because it combines passengers and cargo freight in a full-scale Rapid implementation. This will enable long lasting and seamless freight in Europe and (globally). The Vision is to deliver a cleaner, greener, lean and sustainable transport of both people and products through a Reduces the Co2 emissions significantly distribution and remove non-value adding transport to benefit and accommodate both socio-economic problems and congested roads. SAFE GL will demonstrate an efficient and cost-effective freight logistics system based on multimodal transport as a method in connection with CTS to outperform and deliver green transportation as opposed to e.g. single road carrier freight.
The innovation is based upon a connective and multimodal transfer technology, (between truck/train), Container Transfer System (CTS), a disruptive technology to reorganize the freight logistics networks through suboptimization of loads, regional Bases for short last/firstmile distribution and centralized sorting hubs to facilitate swift and lean expedition of all goods moving in a structured flow.

The Container Transfer System (CTS) and its supporting concept was created to link intermodal freight, enable swift and lean model-shift, facilitating efficient inland & cross border freight and utilize the infrastructure capacity to its utmost. Achieving better overall utilization of infrastructure capacity and contributing significantly to the environmental EU white paper target on Co2 reduction, the concept empowers an overall positive impact for both the freight operators and external costs to society.

What all this means is; By introducing a European (global) network concept, based on existing road infrastructure and adapted rail infrastructure, combined with central hubs, the long-haul freight can be performed by rail whereas the first and last mile distribution are completed by truck. Goods are moving in a large network-based flow not exposed to disturbance of congestion nor environmental exhaustion.
By bringing the disruptive CTS concept to market, SAFE GL will drastically optimize the entire inland freight value chain, through cheaper, faster, efficient, and greener transport of goods.

The company roadmap & technical roadmap

The below company and technical roadmap show the core milestones of the CTS technical development. Besides these listed core milestones many others were achieved along the development path and additional investments from owner and inventor Heine Blach Jensen has also been made before and throughout the establishment of Safe Green Logistics A/S.

2011

SAFE GL is established
€ 3 million invested in concept and teoretical feasibility and development

2011 - 2013

Development and demonstration - investment
0,7 million €

2015 - 2017

Design of series 01 accomplishment - funded € 1,7 million by EU.

2018

virgin journey with the series 01 completing a pilot from Aalborg to Taulov and return

2019 - 2021

Pilot run and technological advancement. Total grant contribution of €2,7 million from EU and 10 mio. DKK from HBJ

2022 -

The optimized, enhanced and modified version is acheived. larger national scale-up with several operating units.

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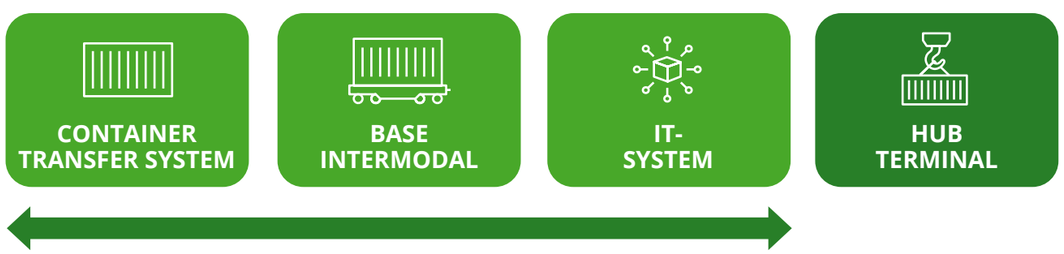
CTS the Intermodal freight, technology & concept

– competitive and sustainable

The four pillars of the CTS technology

SAFE GL has developed a full scale solution. A solution for fast and cost-effective transfer of standard ISO freight containers and or swap bodies between the two modes: rail and road. CTS is the key enabling element of the entire CTS Concept and encompasses the following four pillars:

Long term implementation



(I) Container Transfer System, (II) Base for intermodal operations, (III) IT-system for container identification track/and trace, etc. and (IV) HUB terminal.

I - CTS Technology

The Container Transfer System consists of the operational hardware combination listed in the following.
The technology is patented and is reviewed on a continuous basis.
The Container Transfer System consists of a; Trailer-unit, Wagon-unit, and a regular standard ISO container and any other container with standard iso dimensions incl. a swap body and potentially a bull tank. . The container is moved on its corner casting sliding horizontally between the CTS trailer surface and the train wagon adapter surface. These platforms are, in short description, called; T-unit (trailer unit) and the W-unit (wagon unit).

The units' functionalities

1. The wagon (w-unit) adapter is placed on an existing articulated container wagon enabling the receival and release of a container to and from the adapter.
2. The Trailer unit (t-unit) is a complete integrated CTS trailer equipped with the advanced transfer technology. It is capable of performing a seamless and smooth transfer of a regular ISO 40' or similar container with ISO corner castings. The transfer is performed between the trailer and rail wagon horizontally. The trailer enables fast and efficient container exchange between road and rail modes, without using heavy cranes, vehicles or other equipment.

CTS Trailer Unit

The trailer unit (T-unit) is an integrated truck and transfer chassis. It contains a built in high speed and durable transfer technology. The trailer is equipped rear/front end with custom profiles for easy and frictionless standard ISO container transfer. Strong in its ability to operate under high pressure and resilient in its capacity to perform under high forces. Chain drive transfer aggregates ensure swift and effortless transfer of a container upwards of 40 ton.

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CTS W-unit (wagon unit)

The CTS W-unit is made to ensure compatibility, stability and receiving surface to the CTS T-unit. It is a passive mechanical solution enabling a seamless and effortless receival and release of a standardized container. The transfer in its automation comes from the mounted technology on the truck/trailer. The w-unit ensures and enables the stabilization between wagon, the trailer connecting pal, and the lock and built- in resistance once the two units have been secured and sealed.

No modification of or to the existing wagon is needed, as the CTS wagon unit is mounted on the wagon's existing locking mechanism. The locking mechanism between the CTS Wagon Unit and the Wagon fulfills the standard of EN 12663-2.

- Train wagon standard modification procedure.
- All components are passive, enabling more safety and less maintenance.

The process

The transfer takes place by the truck positioning the trailer parallel to the train-wagon and railway tracks. When the trailer is in the correct position, the system will be activated from the CTS control system inside the cabin of the truck. Upon activation, the air of the trailer is adjusted to match the height of the train wagon, a conical pawl is pushed out at the rear and in front of the trailer, and engages with the rolling profile of the train wagon. When fully connected both devices are now secured together and locked. The container can therefore be released for transfer. The connection ensures that the profiles on each trailer and the train wagon are seamlessly locked. The trailer and train wagon's surface are therefore interconnected and ready to execute the container transfer. A chain drive transfer aggregate ensures an elegant and safe transfer from and to the train wagon via the container's corner castings. Once the container has been moved from or to the trailer, the container is secured to the trailer or wagon's spigots. A trigger can then release and separate the trailer and train wagon.

CTS technology is a highly competitive and network based solution, pulling on the advances and excluding the disadvantages of both rail and road. This multimodal efficient carrier freight solution, as a fully integrated system, will incorporate known technologies with a seamless automated and rapid method of transfer. Including a concept that structures the distribution to accommodate the ever-growing need for product movement. This is specifically visible and noticeable in the capability of transferring any standard ISO certified containers to and from a truck/trailer and a train wagon. This without any adaptations needed on the container(s). This is a key competitive advantage and a unique and differential selling point, making the CTS technology the most advanced and usable technology within the industry offered alternatives. Because of the technology's rapid transfer speed and value adding structural optimization the CTS technology and concept will optimize and overall advance the way people and products are transported.

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The CTS transfer technology is a fast, competitive and efficient method to seamlessly connect rail and road transportation.

II - The Transfer BASE

The requirements at the base level to exchange containers between trucks and trains through CTS are minimal. The only specific need at the base is e.g. an asphalt road in parallel to the railway. The truck equipped with the CTS T-unit will park parallel to the train and move the container sideways onto the train wagon (and vice versa).

- *Truck circulates picking-up and delivering goods only in an approx. 50 km zone.*
- *Low investment cost (only a road parallel to the railway) for establishing bases.*

This process is significantly more energy efficient, less time consuming and needs less labour than conventional operation with container cranes.
It is thought-provoking that the innovation of CTS is a simplification of investment and resources compared to today's practices, and yet it is cheaper and faster and last but not least good for the environment.

III - The IT-system

The IT system, including RFID-based tagging and tracking of containers/units, is the third pillar of the system and will also be fully functional during the commercialization. However, the full potential of the IT-system will be reached with the HUB implementation through controlling and optimizing major parts of the logistical system.
The CTS IT system will be able to operate from a standard tablet computer or from an app by the truck driver. The software has been developed by SAFE GL with the aim to replicate other truck applications in order to promote faster adaptation by chauffeurs. The software will control the truck/train approach, the transfer, and in addition collect/send data about operations, container weight, time, and place, etc. to a central server by internet. This web-based service will provide several benefits such as:

- *Service can display "warnings"; giving SAFE GL an opportunity to make sure the system operates in a reliable way. Identical service can be found in modern cars.*
- *Since the history of operations is stored, technicians can get support from the system when eventual problems occur and in most cases handle eventual issues from a service centre.*
- *A possibility to integrate with other IT systems, e.g. that the clients may have.*

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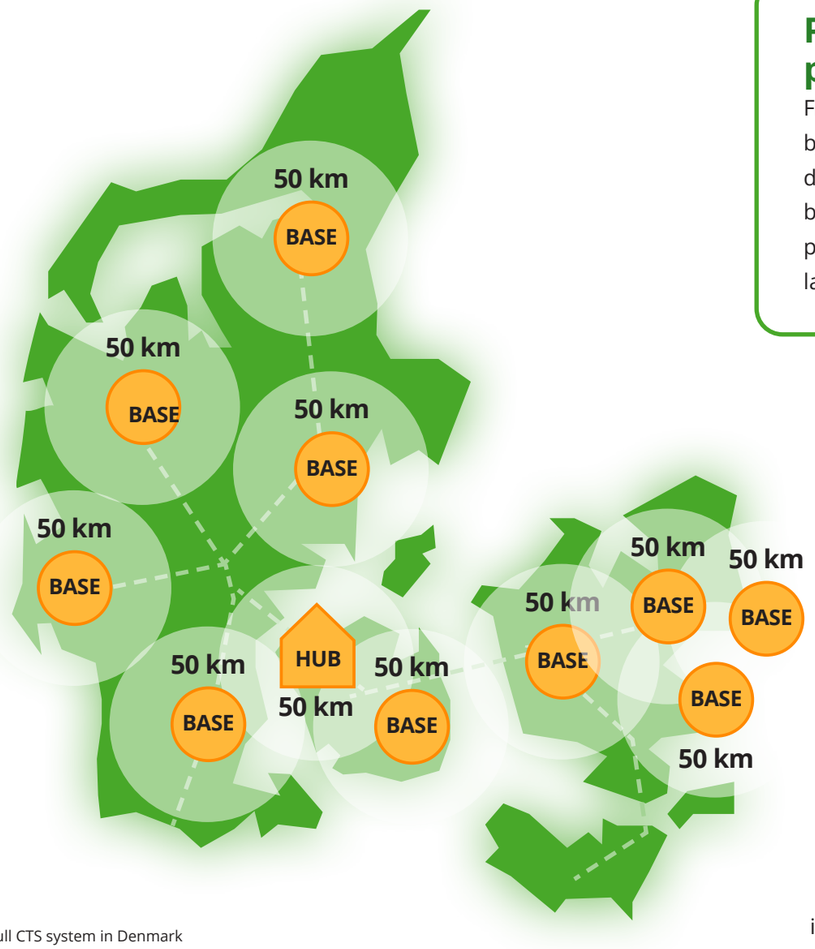


Full CTS system in Denmark

Point to point routes

First and lastmile performed by truck incl. the base-to-base distribution by rail. The figure below illustrates the distribution process from the first- to the lastmile.

Hub-terminal

The Hub model builds upon accumulation of many point-to-point routes, running from east to west and south to north. The hub-model seeks to centralize all goods at the hub-sorting terminal thus effectively handle all goods at one place e.g., Noerre Aaby Hub-terminal in this DK example. (More than one hub is required in larger countries).

Rapid

The Rapid-model includes passengers in to the Hub-model and prioritizes passengers and cargo freight equally. Because the cargo moves simultaneously with the passengers the competitive incentive and advantages are obtained against conventional single carrier freight.

IV The Concepts (PtoP/HUB/RAPID);

The CTS technology encompasses an entire integrated concept, adapted and fitted to create more lean and sustainable transportation of both people and products.

By using CTS technology, each container transfer is done in approx 1 min. As the process can be done simultaneously, an entire train set can be unloaded and loaded swift and lean.

These prospects empower the opportunity to both enhance the rate of transportation by intermodal (rail/truck) modes, eliminating bottlenecks such as e.g. time, and cost-vaste in terminals where only cranes or reach-stackers operate. Besides these central hubs or central clusters the CTS technology can operate next to the railway tracks in any area, given the surface is a plane foundation suitable for un/offloading by truck.

The overall freight transport process by using the CTS technology, will for the road-rail point-to-point transport, be performed according to the process shown in the figure below. Trucks carry the goods/containers from the sender to the closest base, a first mile distribution. At the base the truck equipped with the CTS trailer unit will position itself next to the train-line in parallel and in receiving/or transfer distance to the train wagon. When in position the transfer can be initiated. This operation takes approximately 1 min. The cargo is then transported by train to the receiving base. Here the container is transferred, again via CTS, to another truck (another 60 second operation). Once the process is completed the container is then transported the last mile to the receiver for its final delivery destination.

The supporting concepts are built upon the opportunities from the efficient CTS technology to scale and maximize load frequency from a point-to-point setup to combining passengers and people. The focus is on a complete and sustainable utilization of the infrastructure capacity available on rail.

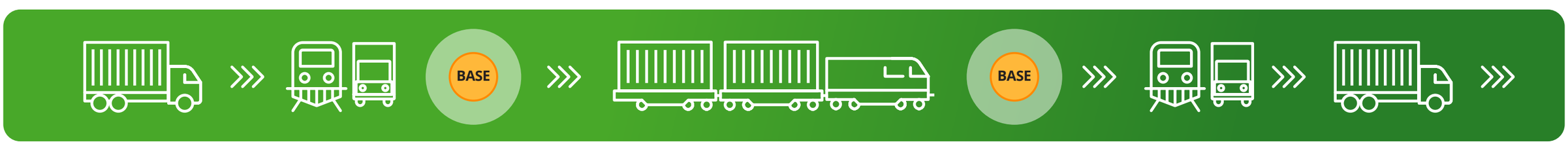
SAFE GL will demonstrate commercial deployment of CTS through initially individual routes comprising of point-to-point transport, with rail used for the long-distance haul and trucks equipped with CTS to perform the transfer in regional based Bases and to deliver or fetch the goods in a first/lastmile radius of 50km.

The CTS Technology and Concept is the vision of a better, more sustainable, reliable, synergized and utilized flow of both people and products. And by linking multimodal freight (rail/road) together, in an efficient and effective manner, the benefacting and impacted areas are undeniable and obtainable.

The CTS Technology and Concept will seamlessly connect the rail and road transportation modes together. By employing the two modes in alliance, extracting the best of the two modes, whilst implementing core technology to support a swift and lean transfer between modes of transportation, infrastructural road limitations can be accommodated and mitigated, thus gaining the competitive and sustainable advantage towards other freight alternatives.

By prioritizing passenger transportation equal to cargo freight external costs on society, e.g. congestion, pollution, emission, and overall work-life-balance can be mitigated if not completely remedied.

Overall transportation process of CTS concept.



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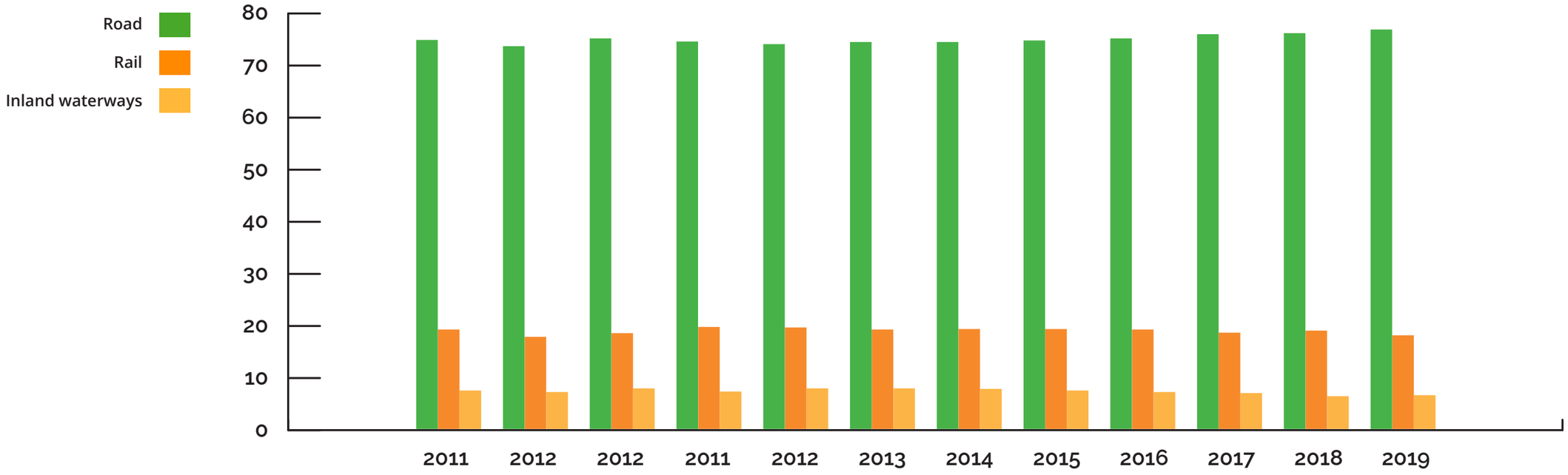
Target market and user requirements

In the freight transport industry, containers or trailers with goods are transported by different modes: road, railway, sea, inland waterway/ waters, or air. Within the EU road transportation are by far the preferred mode of transport and in 2019 more than 75% of all cargo was transported by road. Within the EU below modal of the model split of inland freight, indicates just how dominant road freight transport are The main target market of the CTS technology is constituted by inland freight transport service providers, both currently basing their services on trucks and freight containers, plus the small segment of transporters already using rail transport but is experiencing high transactional costs by goods being released late, waiting expenses or other non-value adding costs. By enforcing CTS in all operations these costs and societal challenges can be avoided because the technology offers an efficient and cost-effective method through a seamless & lean automated distribution.



https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Freight_transport_statistics_-_modal_split

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The requirements

Below, the current requirements of the inland freight transport sector are summarized:

- Requirements for a more environmentally friendly freight transport network that utilizes less fossil-based fuel and emits less greenhouse gas (GHG). GHG emissions from transport have increased 36% from 1990 data. Trucks and busses are responsible for about a quarter of CO2 emissions from road transport and for some 6% of total EU emissions. Despite improvements in fuel consumption efficiency in recent years, trucks emissions are still rising, mainly due to increasing road freight traffic.
- Requirements for significantly reduced number of vehicles on roads (reducing traffic, accidents, and overall work-life-balance costs). The European transportation infrastructure is currently under huge pressure to meet the major challenges in rising transportation demand.
- Requirements for safer and faster transport. In 2010, Europe experienced 1.115.253.000 road accidents resulting in 30.268 fatalities per million inhabitants in Europe. Road accidents represented the highest external cost of the entire freight transport sector Rail can provide 13 times safer transports than trucks by following the highest safety standards and regulations.

The effective and efficient operating of the road haulage market has been critical to the European economy. Railway transport is associated with a number of benefits related to, not only the transportation efficiency but also to the society and environment. This shift is in line with a number of initiatives by the EC aimed at revitalising rail freight transport. The railway market has shown the greatest potential for growth over long distances but its integration in the global freight transportation has not been effective. The identified barriers limiting the massive utilization of the rail transport are reflected in the following requirements:

- Requirements for improved organization of the rail traffic with corridors giving priority to freight and increasing efficiency in operations.
- Requirements for a larger network of road-rail interfaces for intermodal operations. In Denmark, currently there are only 3 road-rail interface sites (Høje Taastrup, Taulov and Padborg), which are equipped with cranes for cargo exchange. The very high capital required to build identical interfaces (approx. €6.5 million) prevents the expansion of these sites.
- Requirements for a faster and more cost-effective technology for cargo transfer between trucks and trains on intermodal interfaces. Currently less than 5% of the semi-trailers in the EU can be transferred by cranes or reach stackers, and the process is still time-consuming and expensive. Therefore, the vast majority of cargo are not transported by rail.

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The Rapid business model

The Rapid business model created, calculates the revenue and costs for a Hub set-up, transporting both passengers and cargo. The hub and distribution is operated by a neutral operator using the SAFE GL technology. The Rapid business model assumes that the neutral operator pays SAFE GL a click-fee every time SAFE GL equipment is used to move a container or pallet.

The model is based on a set of input parameters and assumptions and the output of the model includes a yearly financial statement, key figures, the investment required and the expected demand.

The following sections and key figures will give a short overview on the overall operating set-up used for evaluation. For the model's input and assumptions elaboration please find the explanations in our detailed prospect and annex compendium.

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Example 1

The input parameters assumed:

The input parameters assumed are based on industry prices, sales rail passenger prices and CTS expected target sales price. The model`s elaborations and explanation can be found in our detailed annex under the section “SAFE GL Rapid Business Model - A Hub setup transporting both passengers and freight.”

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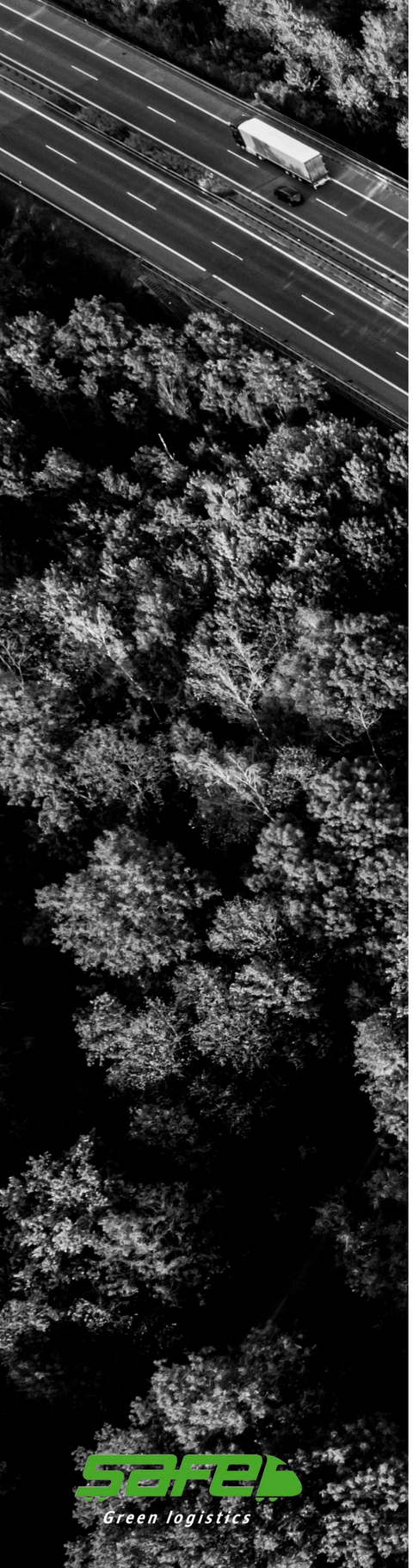


Input Parameters

Expected Utilization

Expected Freight Utilization	60%
Expected Passenger Utilization	60%

Prices

Freight Discount Offered	10%
Passenger Discount Offered	50%

Freight Mix

Type	40'	20'	Pallets
Percentage of Total Units Transported	70%	0%	30%

Click Fees

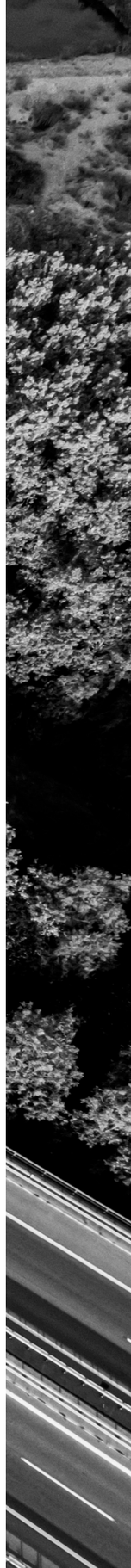
Freight Type	40'	20'	Pallet
Click Fee (EUR)	1,5	1,5	0,05

Assets

	Number required	Investment or Lease?
T-Units	600	Purchase
Wagon-Unit	1.240	Purchase
Swap Bodies	2.000	Purchase
Containers	-	Lease
Freight Wagons	620	Lease
Shunting Locomotives	10	Lease
Bases	10	Purchase
Steering Wagons	32	Lease
Middle Wagons	96	Lease
Locomotives	32	Lease

Train Configuration

	Trainsets	Trips pr. trainset	Freight Wagons	Middle Wagons	Steering Wagons
Aalborg-Odense	6	2.920	10	3	1
Herning-Ringsted	6	2.920	10	3	1
Århus-Tåstrup	6	2.920	10	3	1
Esbjerg-Kastrup	6	2.920	10	3	1
Rødekro-Kbh H	6	2.920	10	3	1



Co^2 Emissions

Input

Truck Emission (g^tonkm)	64
Rail Emission (g^tonkm)	22
Train proportion (%)	88%
Intermodal Emission (g^tonkm)	24

Model Cap. Train & model Expected Utilization

Max. Capacity (Model tonkm)	12.017.029.095
Model Expected Utl. (tonkm)	5.667.955.276

Danish statistics

2019 Total Transport work (tonkm)	6.335.286.000
Transport moved to train (2019) [%]	0,894664468

The transport work for 2019 (danish statistics) of truck transport between the regions is a total of 6.335 million [tonkm]. By transferring the goods volume to the Rapid model as described (Model capacity on trains and the Rapid model's Ex- pected Utilization), the total transport work (tkm) will be 5.546 million (tkm). A Co2 Savings (%) of 57,75 or 67% respectively.

Output (Yearly)

Current Co2 emission (ton)	405.458
Expected Co2 emissions (ton)	171.306
Co2 Savings (ton)	234.152
Co2 Savings (%)	57,75%
Total Transport work (tonkm)	**6.335.286.000**

Output Intermodal (Yearly)

Current Co2 emission (ton)	405.458
Expected Co2 emissions (ton)	133.801
Co2 Savings (ton)	271.657
Co2 Savings (%)	67,00%

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Model output

Financial statement

Revenue	kr.	4.753.284.164
Passengers	kr.	4.023.667.876
Freight	kr.	729.616.288
Variable Costs	kr.	44.958.539
Passengers	kr.	-
Freight	kr.	44.958.539
Subsidy	kr.	77.650.987
Contribution Margin	kr.	4.785.976.612
Fixed Costs	kr.	3.088.264.137
Marketing & PR	kr.	-
Personnel	kr.	284.508.000
Insurance	kr.	10.000.000
Fees	kr.	601.602.136
Fuel	kr.	1.267.938.045
Train Equipment	kr.	315.565.760
Hub	kr.	372.135.034
IT	kr.	2.000.000
Financing Costs	kr.	192.746.303
Bases	kr.	41.768.859
Profits before taxes	kr.	1.697.712.475
Taxes	kr.	373.496.744
Profits after taxes	kr.	1.324.215.730a

Measures of Risk

Contribution Ratio		101%
Breakeven Point	kr.	3.067.168.565
Safety Margin		35%
Operating Leverage		2,53

Investments Required

Neutral Operator Investment	kr.	6.424.876,77

Expected Sales

Type	Units	Revenue
40'	1.036.394	kr. 666.531.986
20'	-	kr. -
Pallets	444.169	kr. 63.084.301
Passengers	23.126.400	kr. 4.023.667.876

Numbers of interest

Payback time (år)	4,85183542
ROI	20,6%

Price Calculator

From	To	# 40's	# 20's	# Pallets	Price
Århus	Kastrup	1	5	10	kr. 10.350

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To learn more about the concept please go to the following web-links;

www.safegl.eu/3034A78ED123AB77996F29D2F75D06FA.mp4
www.safegl.eu/Video/SAFE-Rapid.mp4
www.safegl.eu/Video/final-version-graded.mp4

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