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Alliance for
Logistics Innovation
through Collaboration
in Europe



CargoBeamer

INNOVATIVE MULTIMODAL TRANSPORT OF LCL AND LTL CARGO BY RAIL

TL 2025 – Munich
4th of June 2025

The European Technology Platform ALICE

CONTENT

1. Quick poll & Audience Warm-up **(5mins)**
2. The CBoXX solution (15mins)
3. Market potential of CBoXX (5 mins)

4. **Interactive session: Overcoming Barriers to Adoption (25 mins)**
5. **Live Feedback and Conclusion (5 mins)**

Speakers:

Evina Nowak – ETP-ALICE
Dr.-Ing. habil. Hans-Jürgen Weidemann – CargoBeamer
Ronald Halim – Smart Freight Center
Tuul Erdenebold – Smart Freight Center
Denise Beil - FHOO

Overview of the Workshop objectives:



- **Information** on the CBoXX and running/upcoming EU projects
- **Explore opportunities for modal shift from road to rail** by leveraging the CBoXX
- **Identify enablers and barriers for adoption** of CBoXX
- Your specific **feedback and questions** (interactive session)

Interactive Live Poll (using Slido)



#4488446



CargoBeamer CBoXX

CBoXX: LTL-Logistics on Rail



- CBoXX is specifically designed for rail transport of single cargo units (LTL transports)
- Surpassing 40' container and semi-trailer payload by 200%: up to 104 EU-Pallets
- Increased payload weight (up to 50 t)
- Designed to load all types of unit cargo
- Completely automated transshipment from road to rail

Significant portion of cargo uses **standardized packaging units**



Euro Palette

palettized cargo
eCommerce
Industry
Consumer



Cage box

Consumer
eCommerce
Industry



Automotive boxes

Automotive
Supply



Chemical container

Industry
Food

Significant portion of cargo uses **standardized packaging units (2)**



Individual packages in various sizes

Courier and parcel services
Individual mail

Unit Load Device (ULD)

Air freight



CargoBeamer's CBoXX[®] has been optimized for rail (1)

competitive rail logistics for growing industrial and eCommerce and LTL market demands



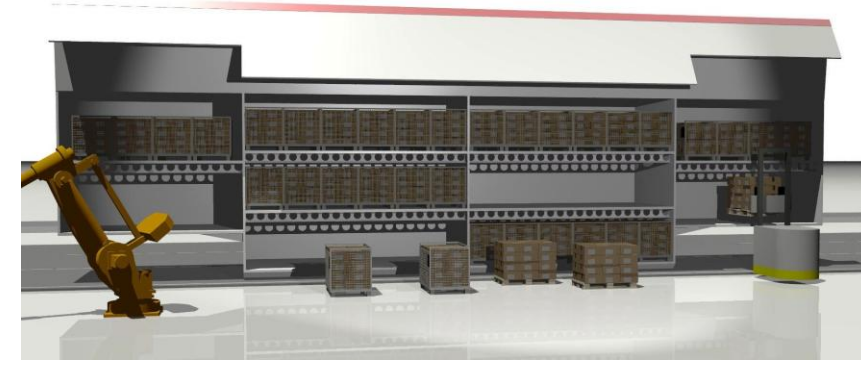
Sea container

- + Optimized for **maritime FCL shipping**
- + Stackable: Up to **20.000 TEU** on ship's
- + 40 ft ct: Worldwide compatibility
- No fit for European pallets (max. **26** pallets)
- Less than **20%** volume efficiency on rail car
- Manual loading via aft steel door
- No automatization
- High unit cost per pallet



Road semi-trailer

- + Optimized for **road FTL transport**
- + High flexibility on last mile
- + 2,4m width allows for European pallets (max. **34** pallets, 28 tons)
- + Dedicated variants for automotive (Mega-trailer), food (Frigo-trailer), bulk (Silo-trailer, walking floor trailer)
- standard trailer are not compatible to rail wagon & container crane
- requires individual driver's
- unit cost higher than rail transport



new: CargoBeamer CBoXX

- + Optimized for **rail LTL transport**
- + **70%** volume efficiency on rail cars
- + Optimized for European pallets (max. **104** pallets, 48 tons)
- + Robotized loading & eCommerce warehousing
- + **Unit cost reduction over 50%**
- requires dedicated terminals
- no public road transportation

CargoBeamer's CBoXX[®] has been optimized for rail (2)



A 40' container is designed for maritime shipping...



payload up to...

25 pallets / 26 tons

in one standard 40' container

A CBoXX is tailored for rail.



payload up to...

104 pallets / 34 tons

in one CBoXX

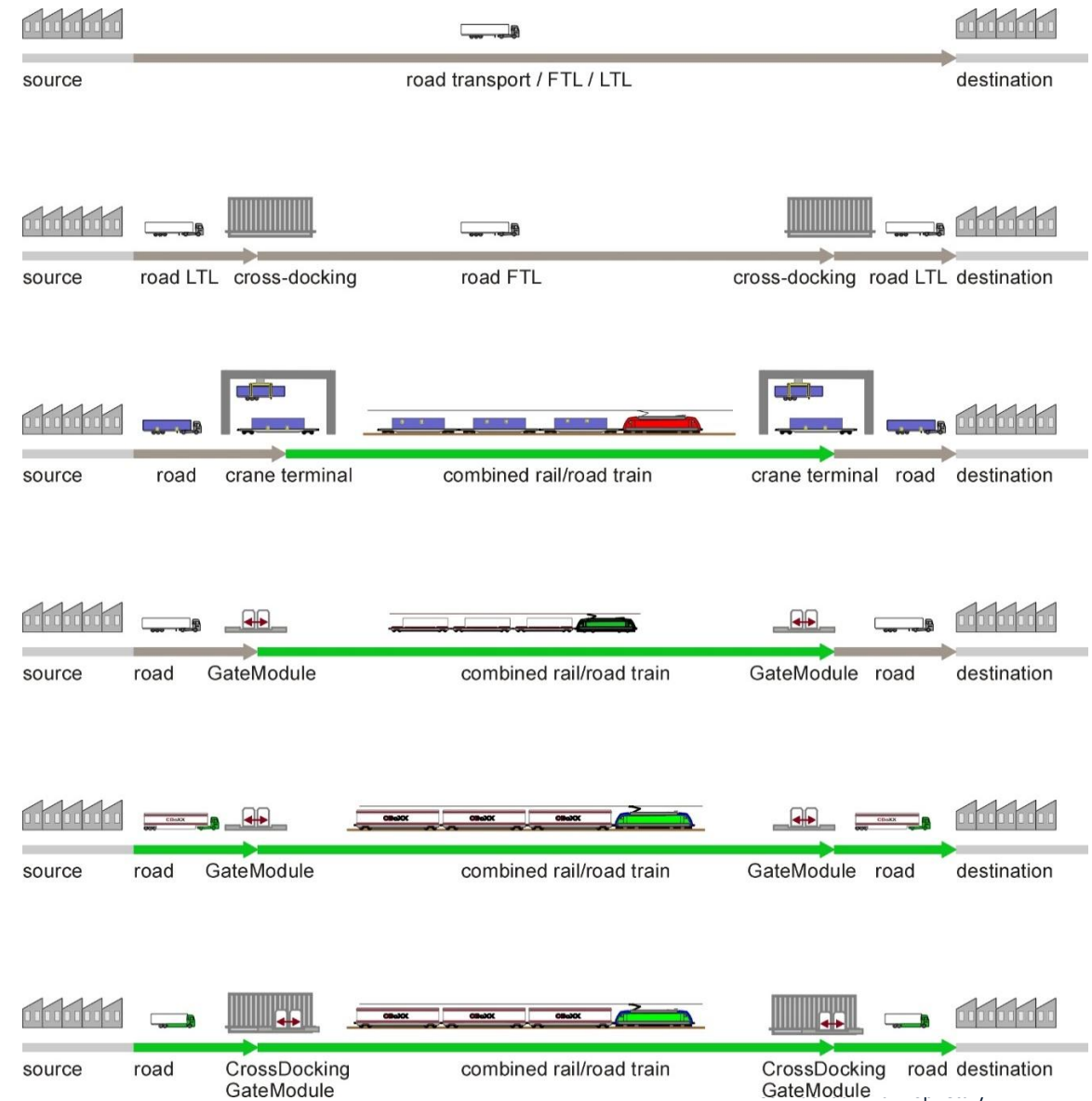
CBoXX Functional Prototype, 2021



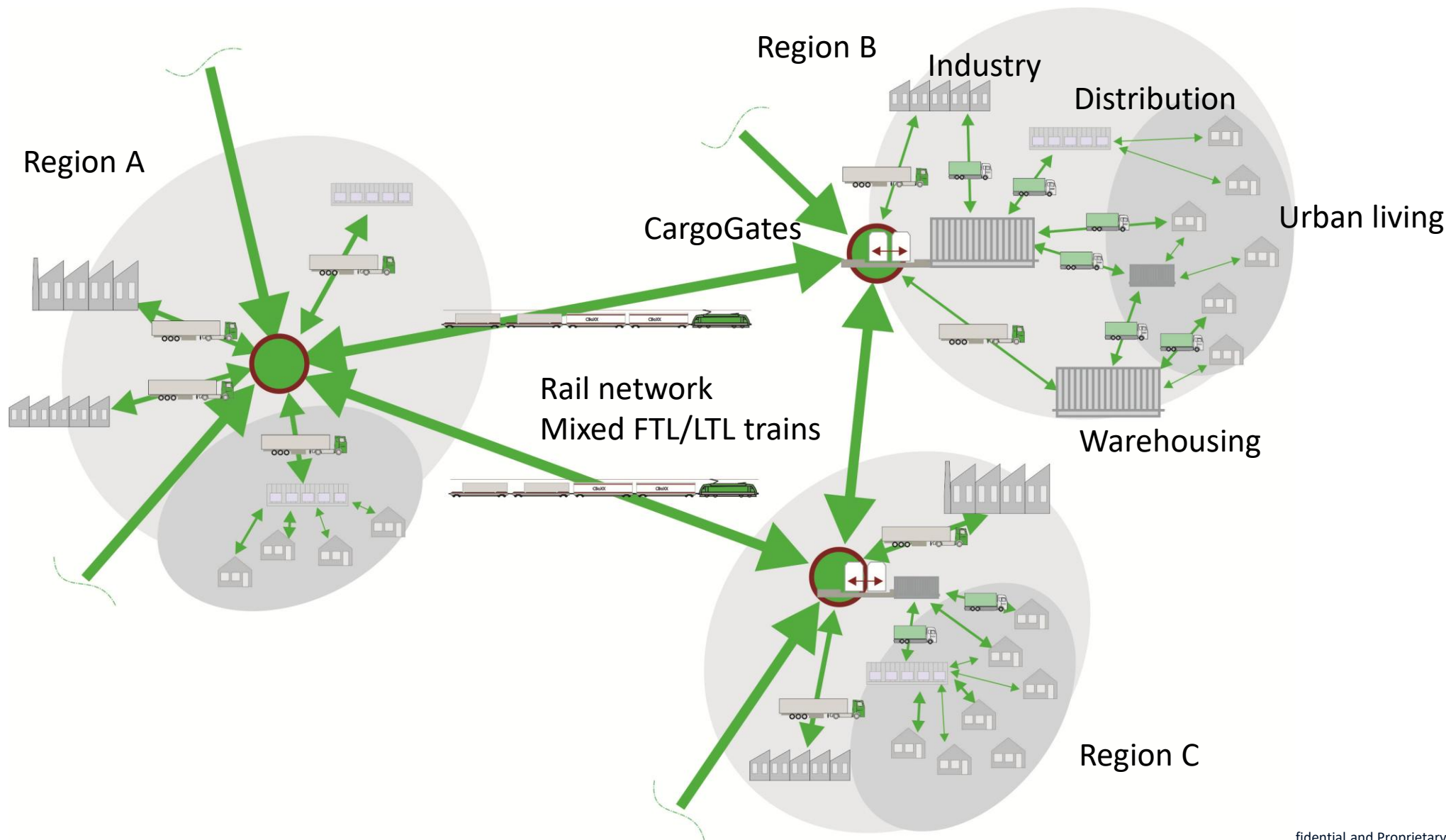
The CBoXX[®] concept allows the evolution from Diesel road truck's towards automated emission-free bimodal door-door FTL & LTL cargo logistics



- 1) Classic ramp-to-ramp road transport, mega-trailer
- 2) Consolidation in the freight warehouse
- 3) Classic intermodal transport with railway trailer
- 4) CargoBeamer with mega trailer, FTL
- 5) CargoBeamer with CBoXX, FTL, local terminal tractor with E-drive
- 6) CargoBeamer with CBoXX, LTL, local distribution truck with E-drive



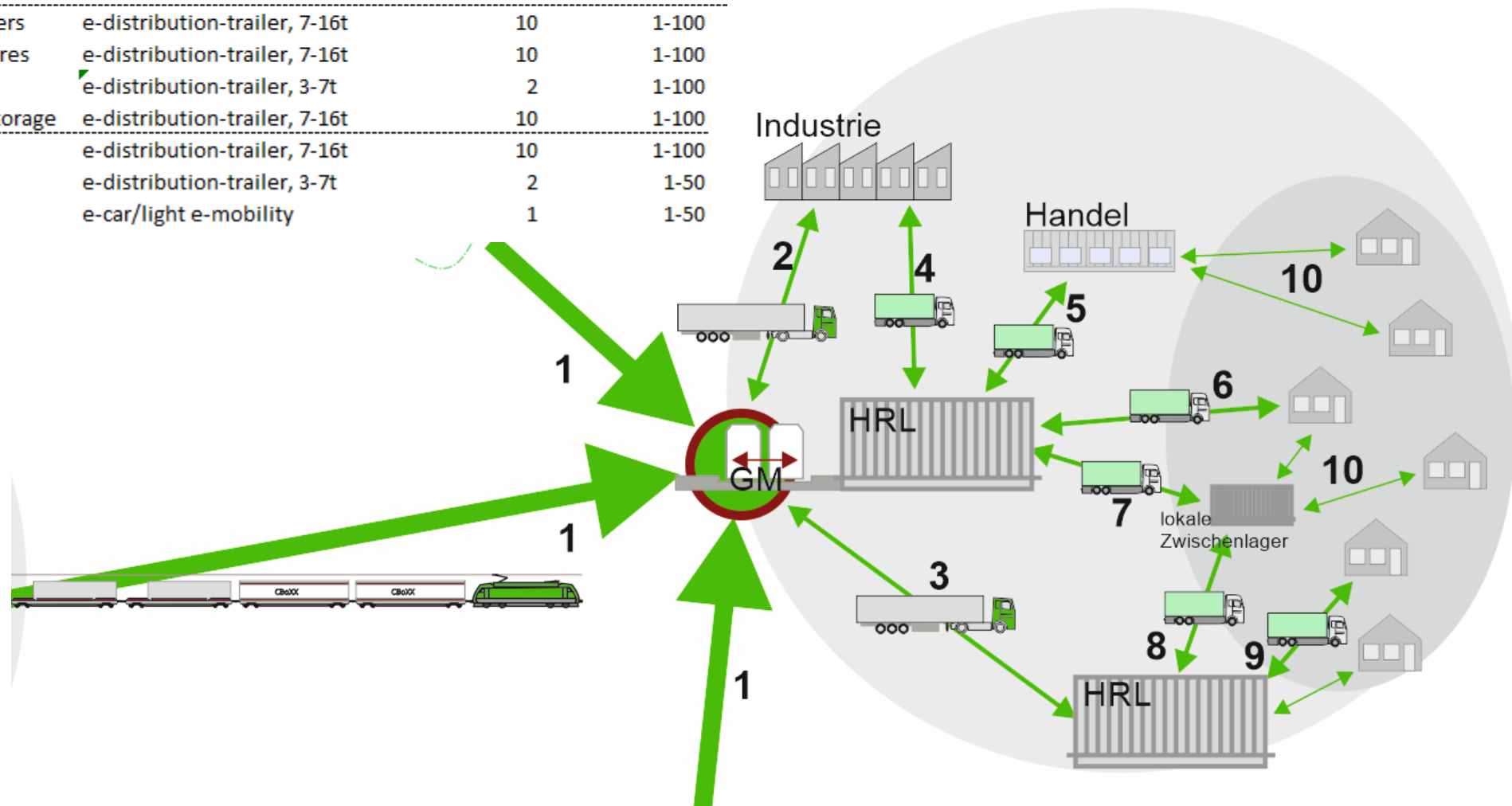
Emission-free bimodal cargo logistics into urban living spaces (1)



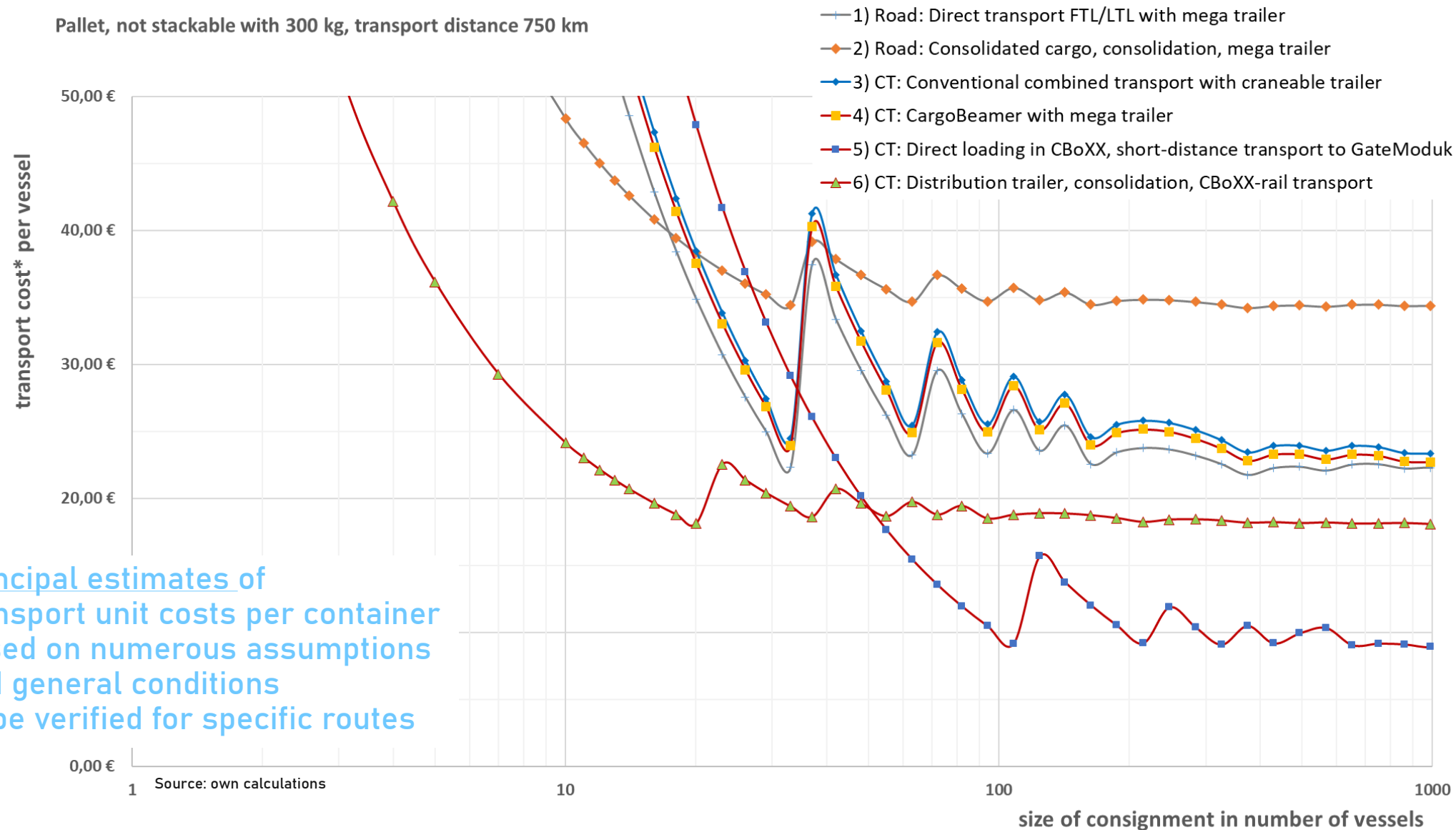
Emission-free bimodal cargo logistics into urban living spaces (2)



Mode of transport	Transport method	Net tonnage per drive, typical, [t]	Distance range typical, [km]
1 Timed rail freight transport	CargoBeamer train	800-1200	200-15.000
2 FTL distribution from/to industry customers	e-semi-trailer	24	1-100
3 FTL distribution from/to cargo centres	e-semi-trailer	24	1-100
4 LTL distribution from/to industry customers	e-distribution-trailer, 7-16t	10	1-100
5 LTL distribution from/to commercial centres	e-distribution-trailer, 7-16t	10	1-100
6 LTL distribution from/to consumers	e-distribution-trailer, 3-7t	2	1-100
7 LTL distribution from/to 'Meso' interim storage	e-distribution-trailer, 7-16t	10	1-100
8 LTL interlinking interim storage	e-distribution-trailer, 7-16t	10	1-100
9 LTL distribution from/to cargo centres	e-distribution-trailer, 3-7t	2	1-50
10 distribution to individual consumers	e-car/light e-mobility	1	1-50



The CBoXX[®] concept results in cost leadership





CBoXX: A New Chapter in LTL-Logistics on Rail

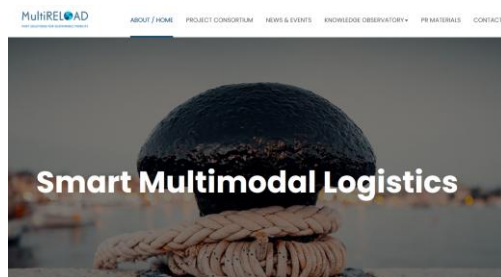
- ✓ optimized for rail
- ✓ payload of up to 40-50 t (mega trailer: 26 t)
- ✓ unit cost reduction over 50% compared to road and conventional combined transport
- ✓ can be moved on works premises just like a trailer
- ✓ possibility of completely automated loading and unloading of goods directly from the shelves due to openable sides and dedicated cargo spots inside the CBoXX
- ✓ completely automated transloading of the CBoXX with the CargoBeamer GateModule Technology – within minutes for the whole train of 36 wagons!
- ✓ remains in the loading gauge p/c 400 – Europe-wide employable
- ✓ dedicated compartments and spots for each cargo unit – no stacking, enhanced security and cargo monitoring



EU-Project “MultiRELOAD” 2021-2025

The European project **MultiRELOAD** is part of the Horizon 2020 initiative by the European Union and consists of over 20 consortium members such as DUISBURG HAFEN, HAFEN WIEN, FRAUNHOFER IML and NOSTA.

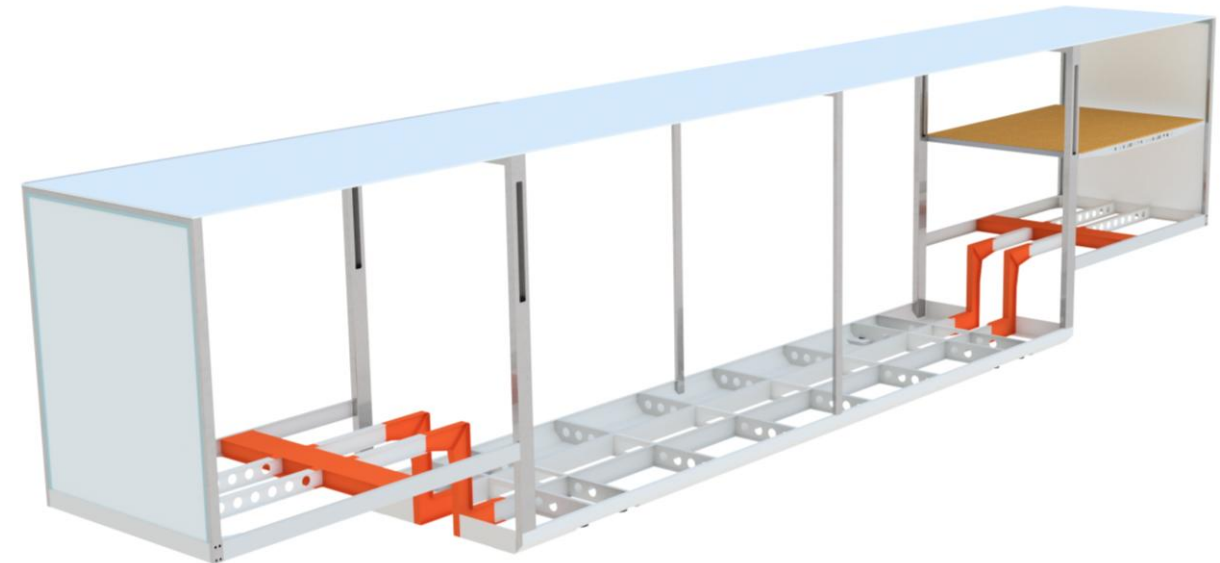
- Goal: **to boost innovative multimodal freight** transport solutions and facilitate a shift from road to rail.
- CargoBeamer’s contribution:
 - in-house concept, optimization of design
 - realization and certification of the **CBoXX**
 - **first customer transports in 2025**



www.multireload.eu



This project receives funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101069796



CBoXX CAD design optimization 2023

EU-Project “Hologistics / LTLRail” 2025 -2028

The project aims to shift freight from traditional road-based LTL/FTL unit cargo transports (12 manual work steps),



towards a semi-automated, efficient, fully electrified transport chain using rail,



Thereby reducing the 12 manual steps to 9 work steps, out of which at least 4 work steps will be automated.

Assessment is focused on Kaldenkirchen - Domodossola route

Assumptions:

- Rail transport using CBoXX on Cargo Beamer network is more attractive due to:
 - Reduction in travel time: **from 31.7 hours to 23 hours**
 - Reduction in unit costs: **40% compared to normal container**
 - Reduction in handling time: **from 4 hours to 10 minutes**
- Market coverage of CBoXX is assumed to be within 3 hours from Cargo Beamer terminal
- Competition from available modes between origins and destinations is taken into account

Using an **international freight model**, we analyze:

- Transport demand (market potential) for specific route
- Modal shift from other modes to rail mode
- Carbon emission reduction

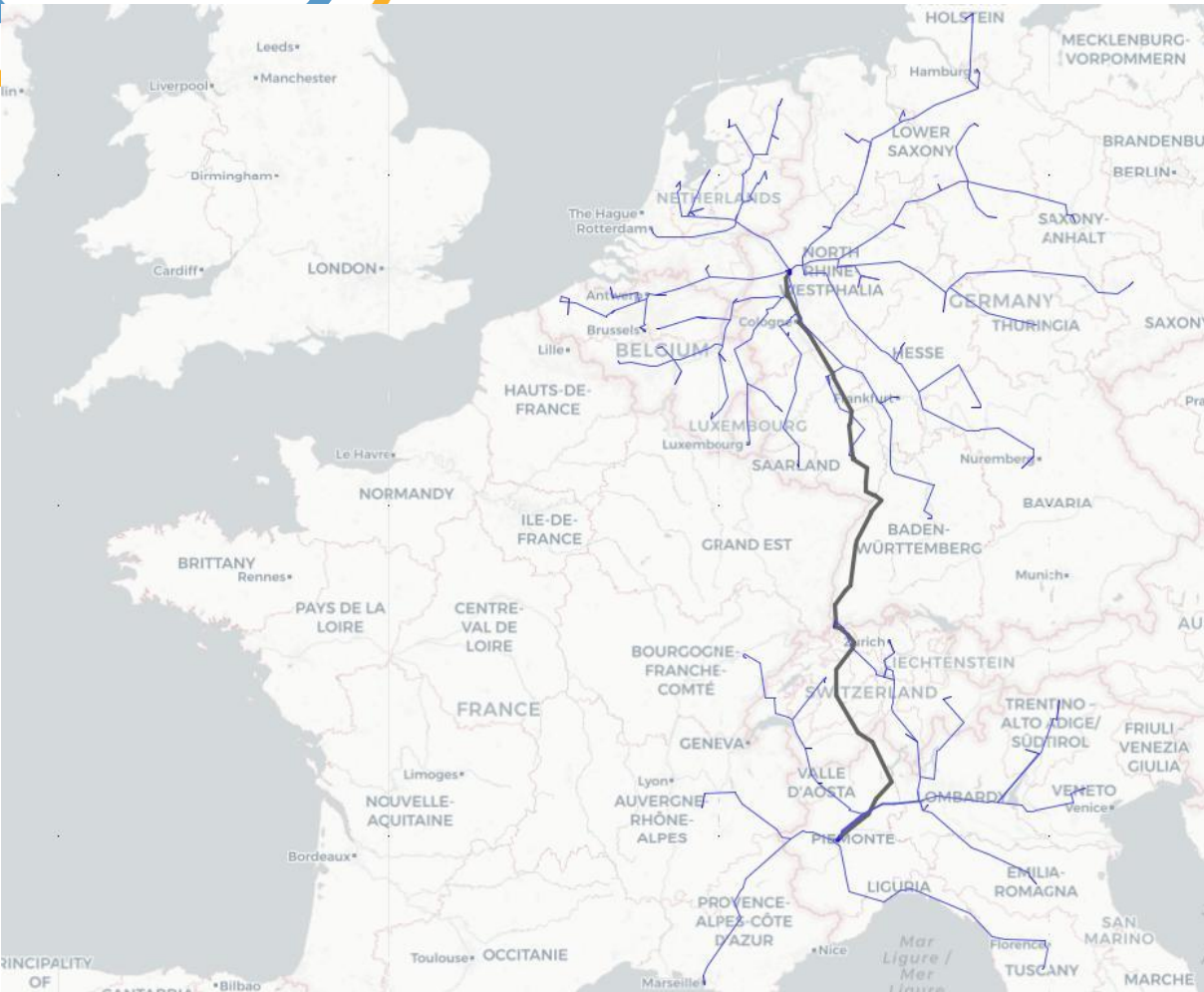


Source: CargoBeamer website

Impacts of CBoXX on transport time and CO₂ emissions

- Total lead time is reduced by on average **23.2%** for all origins and destinations which are part of CboXX- CargoBeamer market coverage
- Total transport costs is on average reduced by **30-40%** for all origins and destinations
- CO₂ emission is reduced by **25%** from 83.82 kg CO₂ per tonne to 62.87 kg CO₂ per tonne across the **total multimodal transport chain** from origin to destination **compared to conventional rail transport**
- CO₂ emission is reduced by **42%** from **origins** to **destination, including the first and last mile transport compared to road transport**

Market potential and modal shift



- Within the defined market boundaries :3 hours of truck drives from terminals:
- Market potential of CBoXX in Kaldenkirchen to Domodossola corridor is **5 509 832** tonne, competition from other rail services **are not yet taken into account**

Modal shift potential from other modes to CargoBeamer-CBoXX system

Mode	Baseline Scenario	A1 Innovation Scenario	Modal shift (tonne)	Modal share Baseline	Modal share A1
Rail	5 506 441	5 509 832	3390	12.22	12.23
Road	8 317 036	8 316 148	-888	18.46	18.45
Sea	25 183 831	25 181 815	-2016	55.88	55.88
IWW	6 057 503	6 057 018	-484	13.44	13.44

Modal shift is **relatively small** which indicates

- Shift is likely to happen from other competing rail routes
- Competition with other rail services connecting origins and destinations that are part of the market
- CargoBeamer only is available for specific origin and destination
- Competition with available direct trucking services serving origins and destinations
- Competition with very efficient mode of transport such as sea mode

Your live feedback 2nd slido session



#5637153

Plenary discussion focused on:

- Presentation of feedback results

Discussion around the topics

- Is the CO2 emission reduction part of important consideration in your supply chain logistics services choices? How important is it?
- Is the market ready for this?
- What are barriers to adoption?
- Economic viability and cost concerns (CARGOBEAMER GATE)
- Terminal infrastructure and operational limitations
- Standardization and interoperability issues



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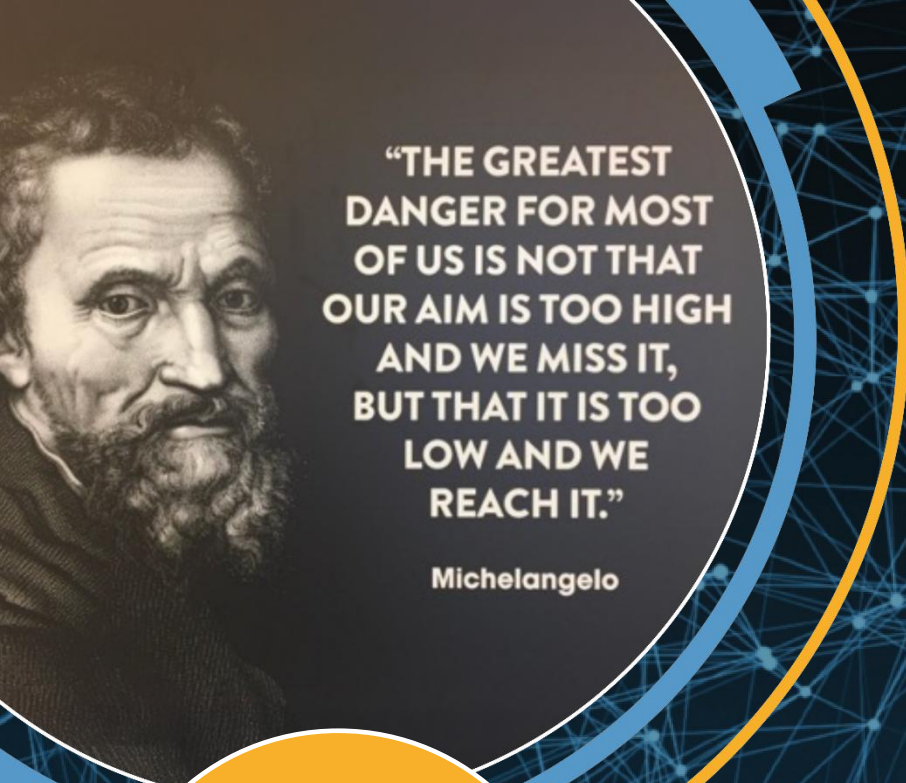
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MANY THANKS!
Let's shape the
future together!
Cargobeamer, SFC,
FHOO and ALICE
ETP
Let's keep in touch !



The European Technology Platform ALICE



“THE GREATEST
DANGER FOR MOST
OF US IS NOT THAT
OUR AIM IS TOO HIGH
AND WE MISS IT,
BUT THAT IT IS TOO
LOW AND WE
REACH IT.”

Michelangelo

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The best way to predict the future is to create it!

Source: President Abraham Lincoln

THANK
you!



[www.
etp-logistics.eu](http://www.etp-logistics.eu)



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backup

Design optimization CargoBeamer GateModule (completed 2024)

Result: New Design: "SingleGateModule ++"

Underfloor Cell

Evolution from external 40"
Control Container to
internal 20" Underfloor Cell

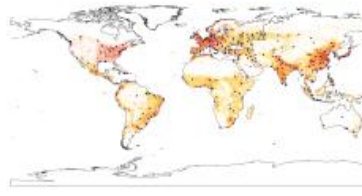
Prefabricated concrete elements

Further optimization: Production efficiency, cabling
integration, cost reduction

Modeling framework to test the market of CBoXX

International
Trade for 221
countries

Trade flow model



Weight model



Mode choice model



Routing model



Model steps sequence

- Covers 221 countries, 657 origins and destinations, 18 commodities worldwide
- Modeling steps:
 - Trade flow model **disaggregates** global trade from country level to trade in NUTS2 level, source of data: COMTRADE, EuroStat, and GTAP (Global Trade Analysis Project)
 - Weight model **converts** trade in monetary unit to trade flow in tonne
 - Mode choice model **predicts** the impacts of innovation project on modal shares and modal shift
 - Routing model **predicts** the traffic patterns on multimodal transport networks
- Uses GIS-based multimodal networks which includes travel time by link and node, border crossing times, capacity
- Estimates
 - Transport demand by product in weight, tonne-km by origin-destination pair by mode on route level
 - Related CO₂ emissions on **transport chain level based on GLEC and ISO 14803 methodology**

Carbon emission reduction potential

- Total emission reduction is calculated for all origins and destinations that potentially could be served by CboXX-CargoBeamer route per year.

Mode	Baseline emission (kg CO2e)	A1 emission (kg CO2e)	Difference (kg CO2)	Difference (%)
Road	900 184 007	900 099 438	84 569	-0.01
Rail	461 534 593	346 434 553	115 100 040	-24.94
Sea	3 379 842 801	3 379 557 108	285 693	-0.01
IWW	380 691 915	380 693 903	(1 988)	0.00
Total	5 122 253 316	5 006 785 002	115 468 315	-2.25

- **Findings:**
 - Absolute emission reduction is significant, **25%** for rail mode
 - The reduction in emission is primarily caused by **increase in load factor** due to CBoXX higher capacity compared to standard 20 feet container.
 - Emission reduction potential from modal shift is limited
 - Increase of emission could happen when there is a shift from sea to rail

Next steps

- Further modeling of the other CargoBeamer networks
- Providing recommendations for :
 - CBoXX: to increase the market potential of CBoXX
 - Policy makers: infrastructure development needed to support decarbonization through the adoption of CBoXX and rail-based transport.
- Reduction of transport cost per tonne kilometer
 - CBOxx will have an advantage due its higher load capacity, however this does not account for infrastructure costs
- Reduction of CO2 annual emissions
 - The higher the use with high volume flows