Maritime & Ports Meeting

Rostock, 27 September 2024

ECG The Association of European Vehicle Logistics

Welcome and Opening by Chairman

Oliver Fuhljahn, *Rhenus Cuxport*

Agenda

09:05	Presentation by sponsor: **Autolink Germnay**
09:15	Presentation by sponsor: **Rostock Port**
09:30	Feedback on Carbon Intensity Indicator: **ECG**
09:40	Port Investment Sturdy: **ESPO**
10:00	Sustainability in terminal lightning: **Musco lighting**
10:25	Alternative fuels for maritime energy converters: **Fraunhofer Institute**
10:40	Round table discussion: **ALL**
11:15	Update on ECG activities: **ECG**
11:45	Dates and venues for the next meeting
12:00	*Meeting close:* Tour of the port and light lunch

Presentation by sponsor

Autolink Germnay

PRESENTATION AUTOLINK

ROSTOCK, 27.09.2024

autolink

COMPANY PRESENTATION

The Autolink Group (www.autolink.de) covers together with her sister company Axess Logistics (www.axesslogistics.com) the complete car logistics market in the Baltic sea region as a market leader.
Together we offer a comprehensive logistics solution throughout Europe.

Branch offices and terminals are available in Denmark, Norway, Sweden, Finland, Estonia, Lithuania, Poland and Germany.

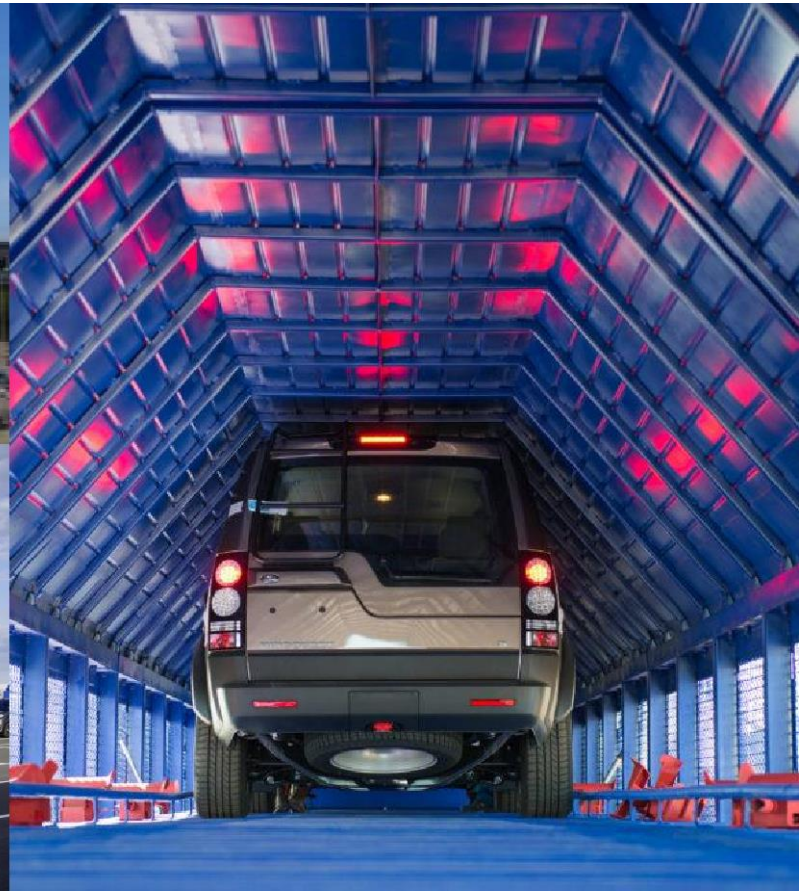
Just over 1,000 colleagues organize more than 1.0 Mio. car transports annually.

GEOGRAPHIC RANGE

- Autolink Group
  - Finland (Hanko)
  - Estonia (Paldiski)
  - Latvia
  - Lithuania (Vilnius)
  - Germany (Rostock, Hamburg)
  - Kazakstan (Almaty)
- Axess Logistics
  - Norway (Drammen)
  - Sweden (Halmstad, Malmö, Gothenborg, Södertälje)
  - Denmark (Fredericia)

COMPREHENSIVE LOGISTICS SOLUTIONS

- Own car terminals around the Baltic Sea for import and export of new or used cars
- Own fleet of modern trucks for car transportation around Europe
- Own fleet of car carrier wagons for transportation in Scandinavia, Eastern Europe and CIS
- Workshop services
- Trained, experienced and highly motivated staff

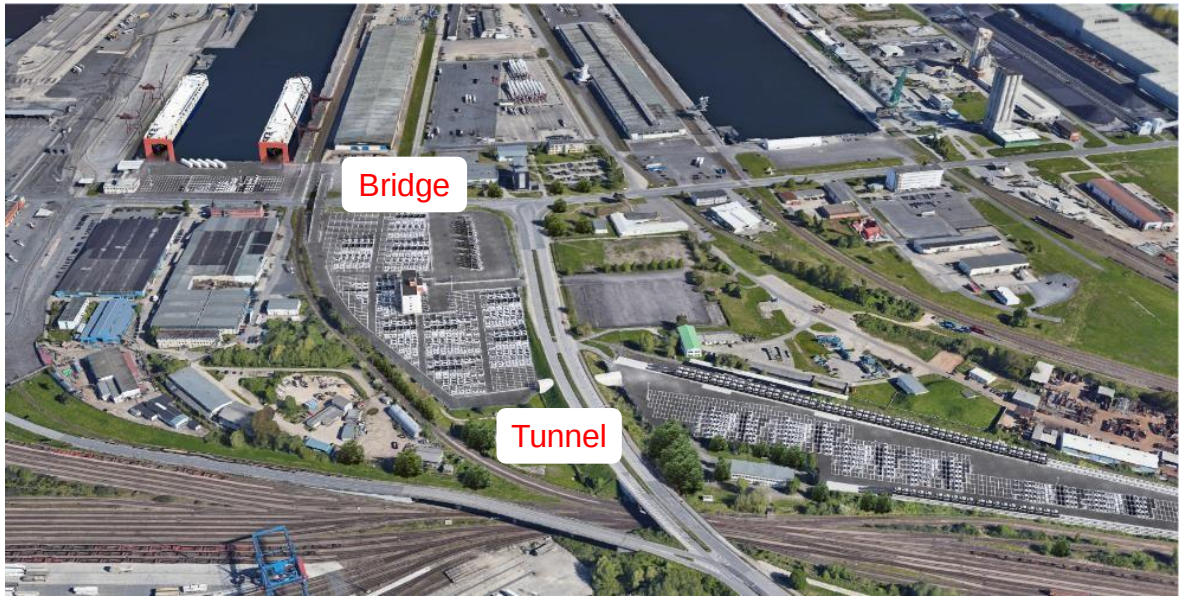


TERMINAL ROSTOCK

On about 75.000 m² we built one of the most modern car terminals in Europe.

Infrastructure:

- Direct motorway access A 19
- Double railway connection with each 600 m use-length and 2 x double-ramp-unload directly located inside the terminal
- 2 x 350 m tracks with mobile ramp for special transports and directly terminal access
- 2 x directly access via own bridge to the maritime cargo with 14 m depth



autolink

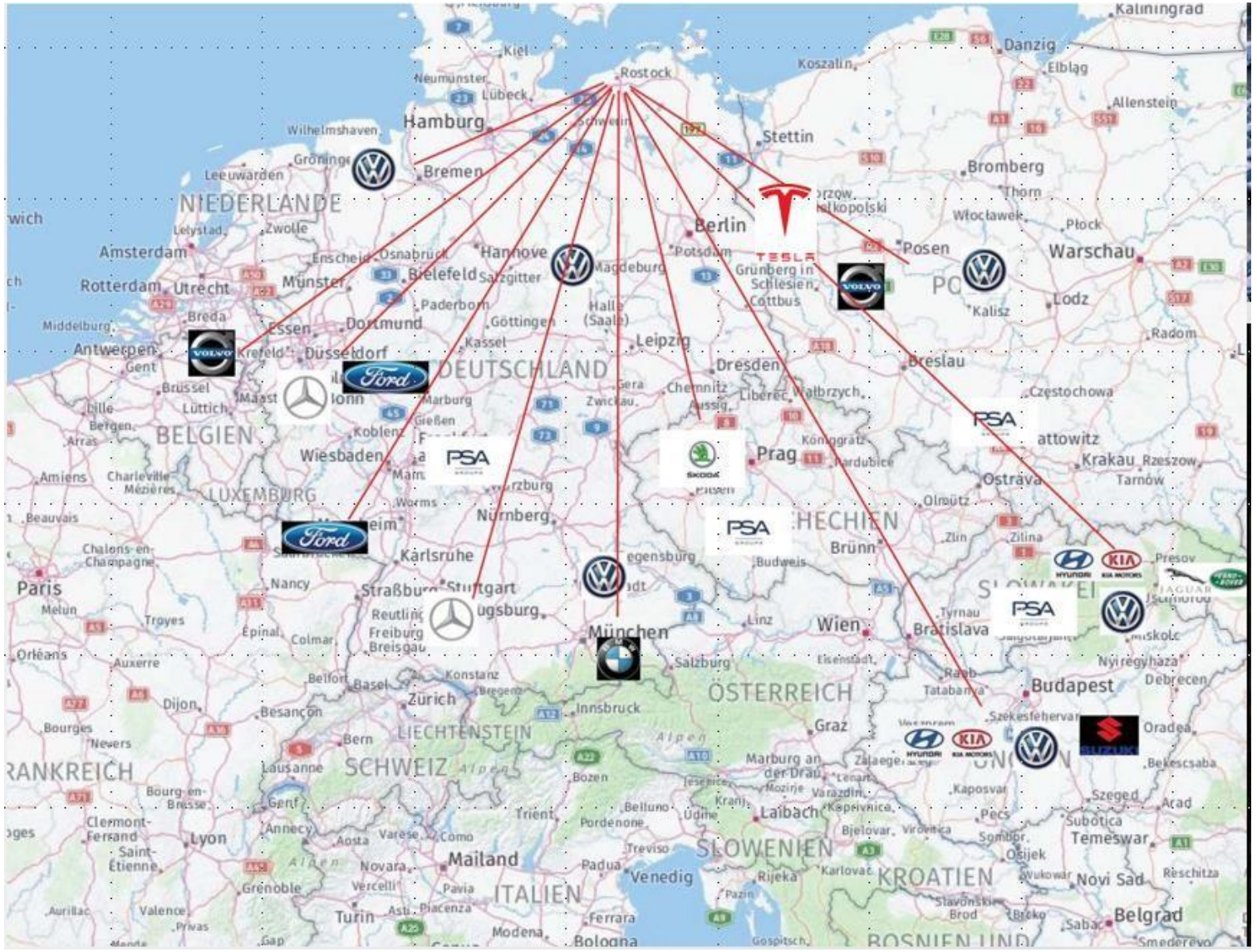
TERMINAL ROSTOCK

- Excellent geographical location.
- Connects Central Europe on the shortest route with Scandinavia
- Autolink or Axess terminals around the Baltic Sea directly connected with Rostock
- CO2-reduction through direct transport
- Reduction in lead times
- Cost savings
- The greenest way to ship cars on the Baltic Sea

autolink

SHORTER AND FASTER TO SCANDINAVIA AND BALTICS

- Shorter way from the most car factories in Germany, Central Europe and South-Eastern Europe
- Directly to/ from the Baltic Sea via the brand-new Rostock Car Terminal
- Safe time, save money, safe CO2
- Studies by Insitute EcoTransit show CO2-emissions for transport to Scandinavia and Baltics via Rostock are upto 49% lower



autolink

Presentation by sponsor

Rostock Port

WELCOME TO ROSTOCK!

ECG „Maritime & Ports“ working group meeting - 27th September 2024

ROSTOCK PORT

Organisational structure

74,9% Hanseatic City of Rostock	25,1% Federal State of Mecklenburg-Vorpommern

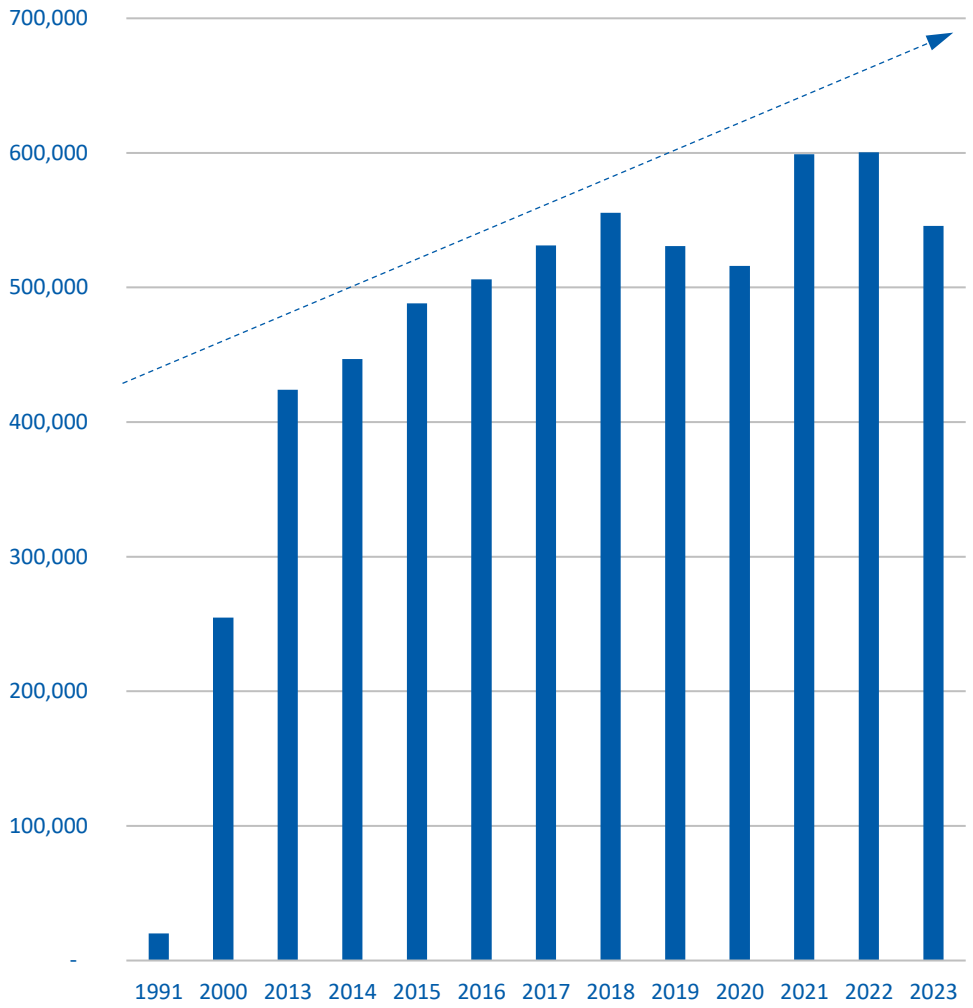
ROSTOCK PORT GmbH

port operator I owner of port infrastructure I landlord I approx. 180 employees

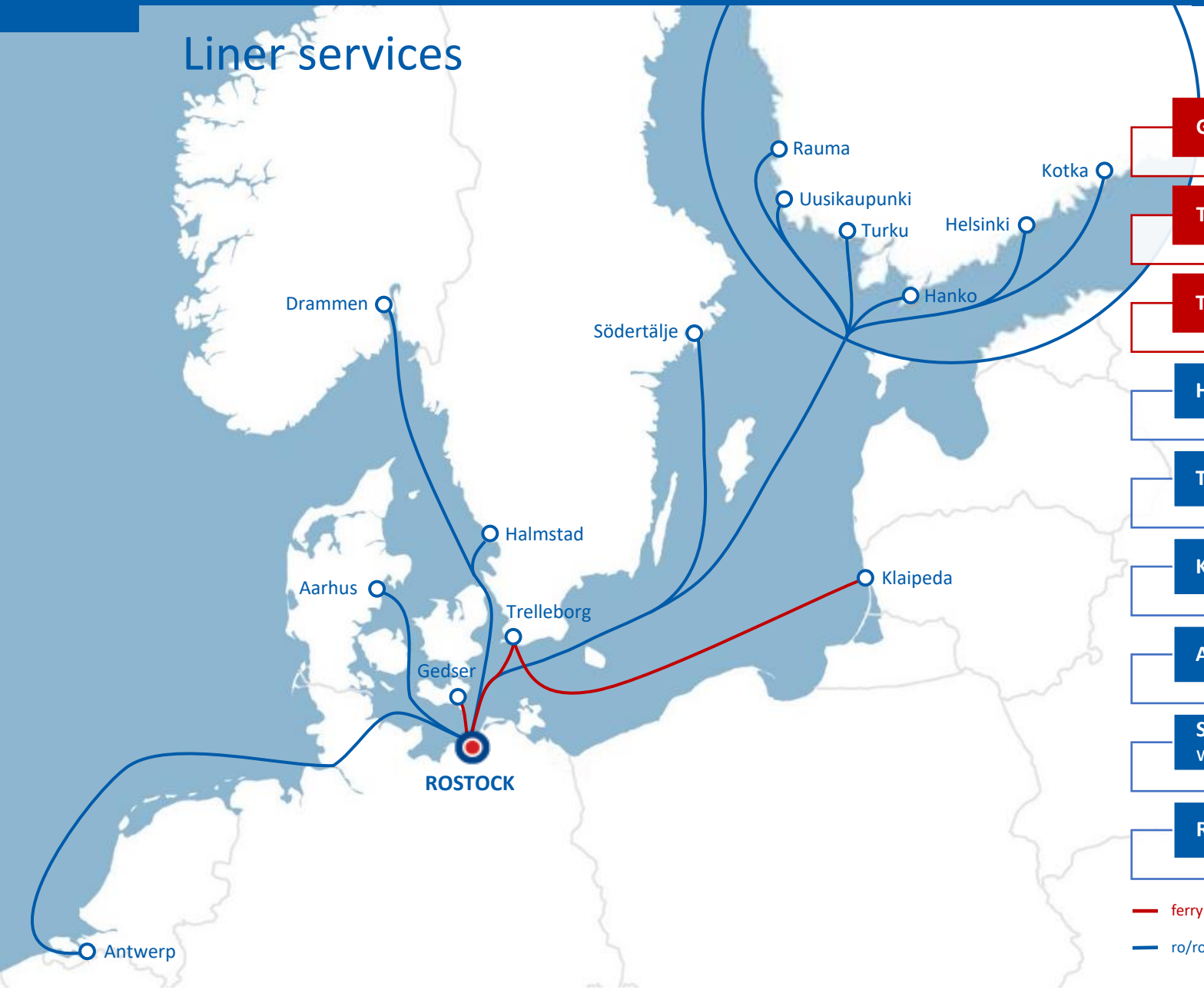
Port of Rostock

- Germany’s biggest and only deepsea port at the Baltic Sea
- short distance to the open sea (1 hr.)
- port area 750 ha with available areas for settlements
- 11km of quay with 47 berths

Ferry & Ro/Ro terminal and freight units



Liner services



Gedser, 2 hours, 10x daily — Scandlines

Trelleborg, 6 hours, 3x daily — Stena Line

Trelleborg, 6 hours, 3x daily — TT-Line

Hanko / Helsinki, 31 hours, each 2x weekly — Finnlines

Turku / Uusikaupunki, 34 hours, each 1x weekly — Finnlines

Kotka, 36 hours, 1x weekly — TRANSFENNICA LTD Highway of the Sea

Antwerpen, 36 hours, 2x monthly — TRANSFENNICA LTD Highway of the Sea

Södertälje / Halmstad / Drammen, multiple times per week — "K" LINE

Rauma, 34 hours, 1x weekly — UPM

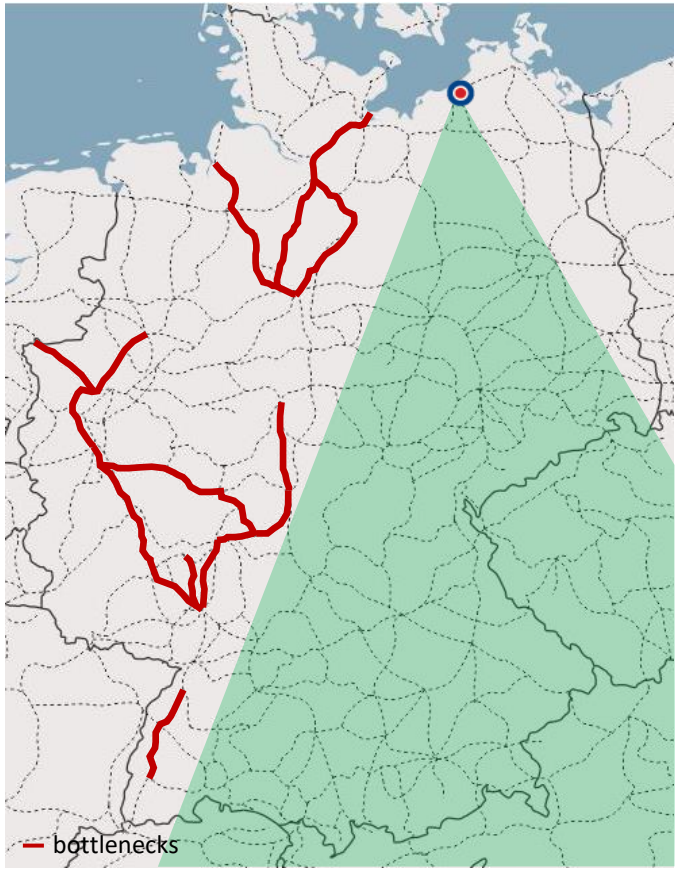
ferry

ro/ro

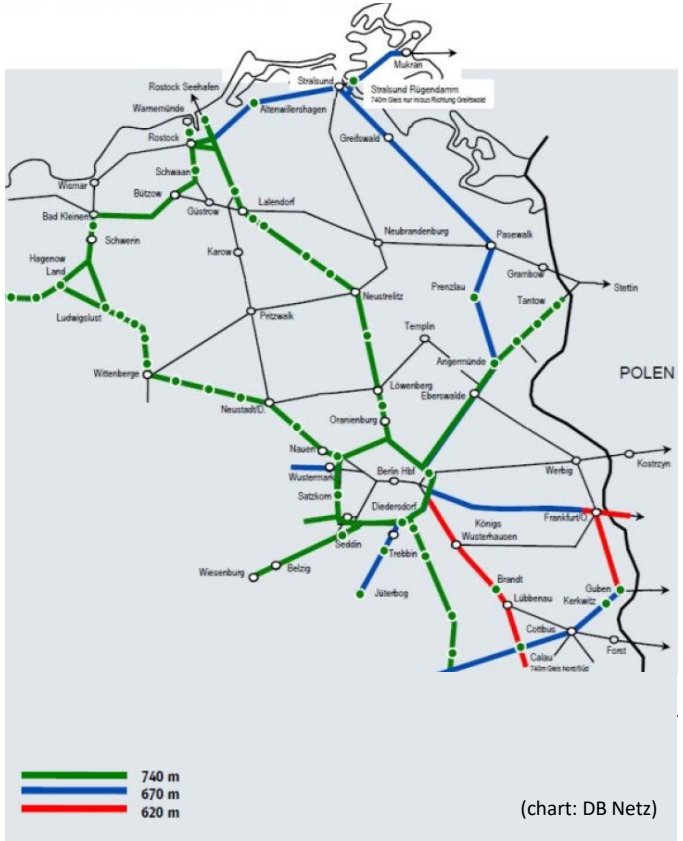
Railway port

54 km rail tracks inside the port, 180 km shunting yard and a 300m € investment of DB InfraGo for the renewal

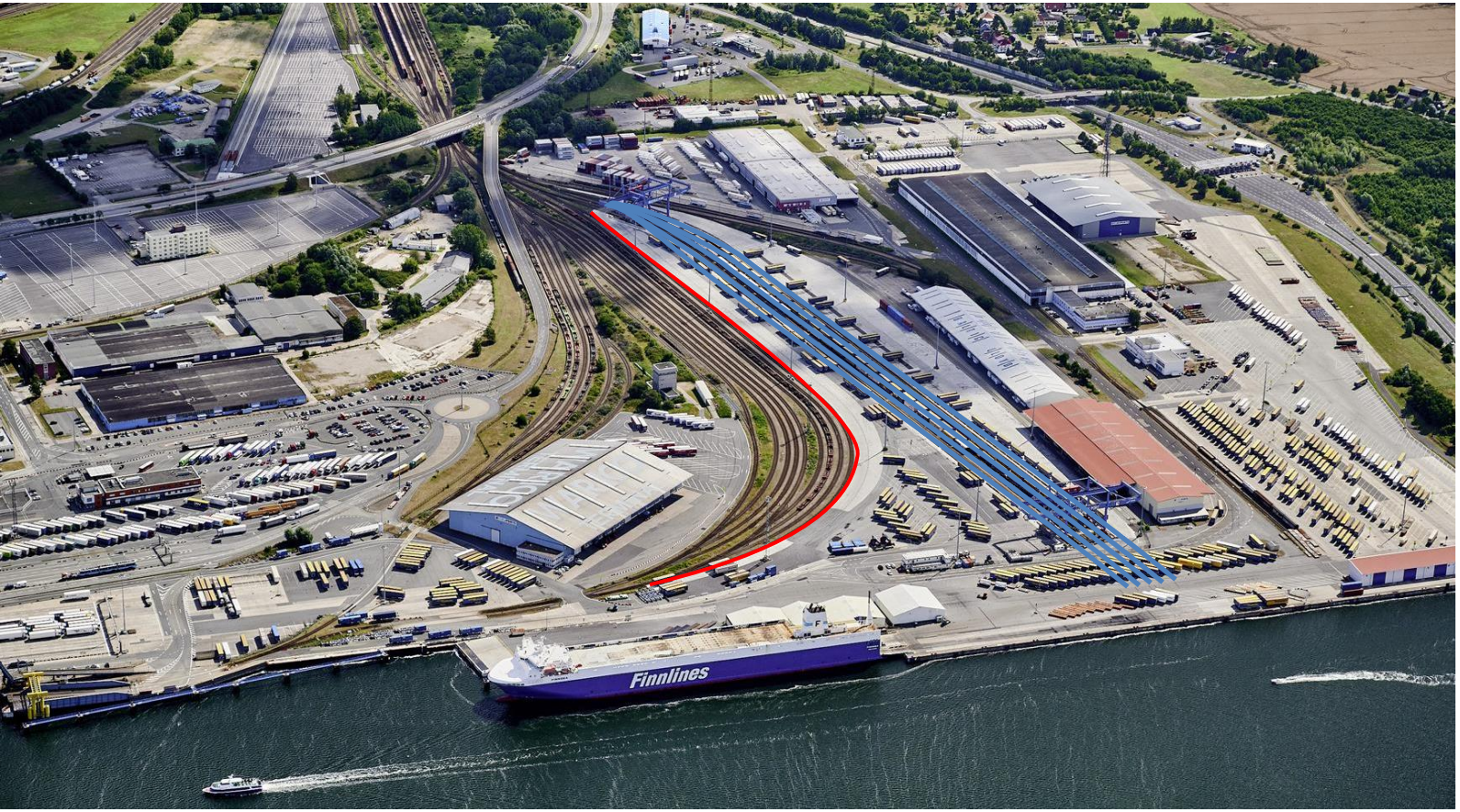
Available track capacity in Rostocks hinterland (in contrast to corridors more westerly)

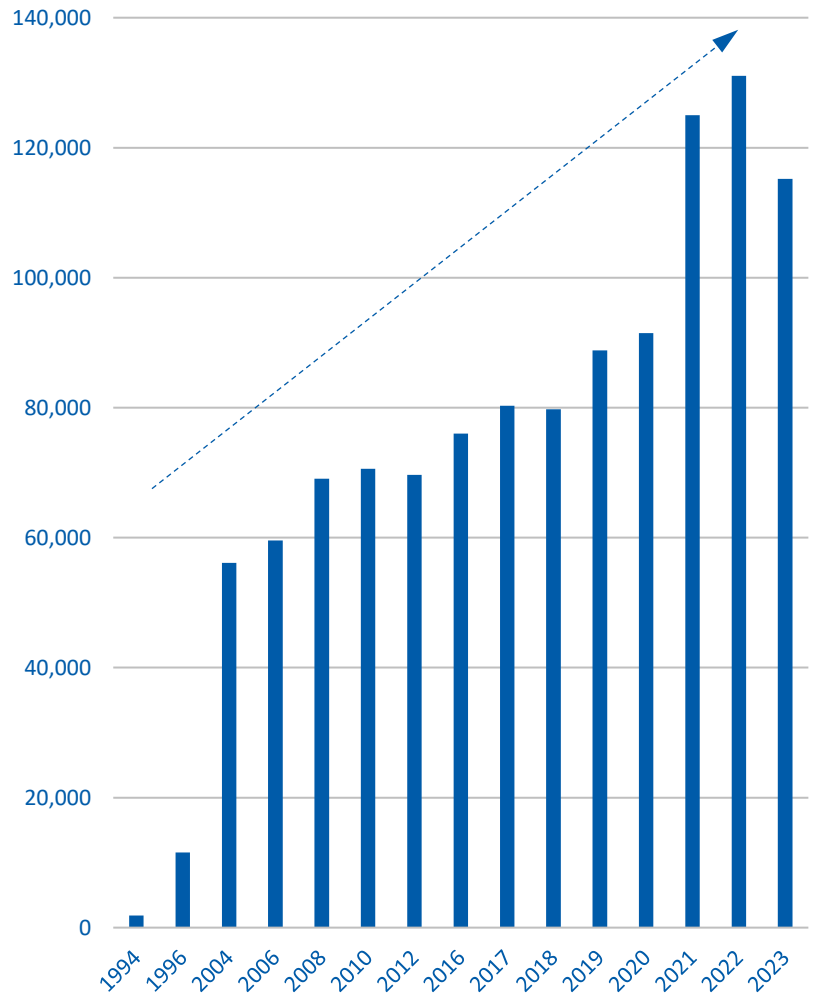


740 m track network in Rostocks hinterland



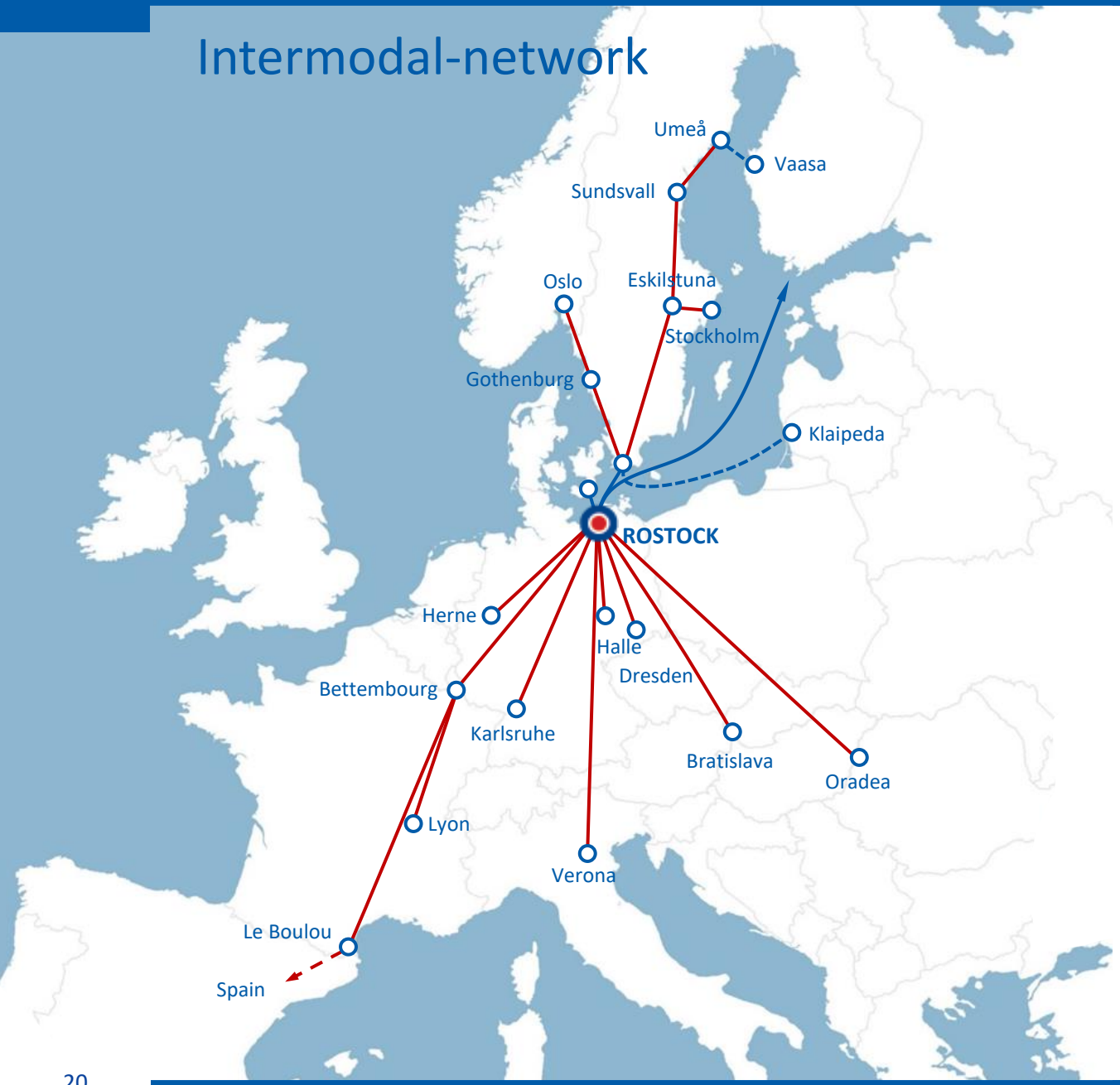
Intermodal terminal





- 5 tracks – 620 m with 2 portal cranes
- 1 track – 740 m with reachstackers
- service: 24/7 365 days
- short distances to the ferry- and ro/ro berths
- terminal expansion until 2025

Intermodal-network



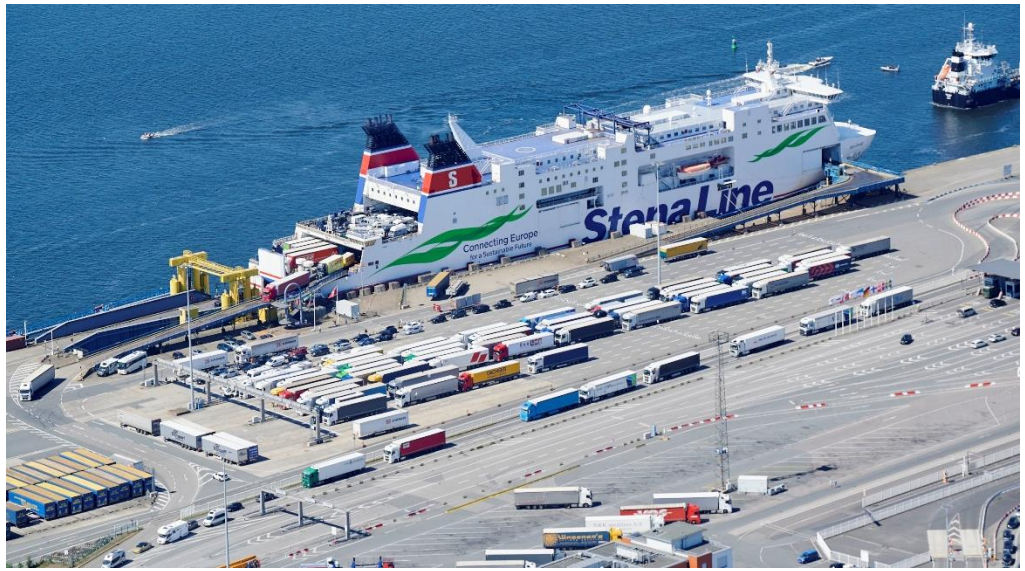
Connections from/to Rostock		
Bettembourg (LUX)	4x weekly	18 hrs.
Bratislava (SLK)	6x weekly	18 hrs.
Dresden (DE)	6x weekly	11 hrs.
Halle (DE)	1x weekly	14 hrs.
Herne (DE)	6x weekly	12 hrs.
Karlsruhe (DE)	4x weekly	16 hrs.
Le Boulou (FRA) via Bettembourg	4x weekly	38 hrs.
Lyon (FRA) via Bettembourg	4x weekly	35 hrs.
Oradea (ROM)	2x weekly	30 hrs.
Verona (ITA)	18x weekly	23 hrs.
single wagon load traffic from Rostock		
within Germany	9x weekly	

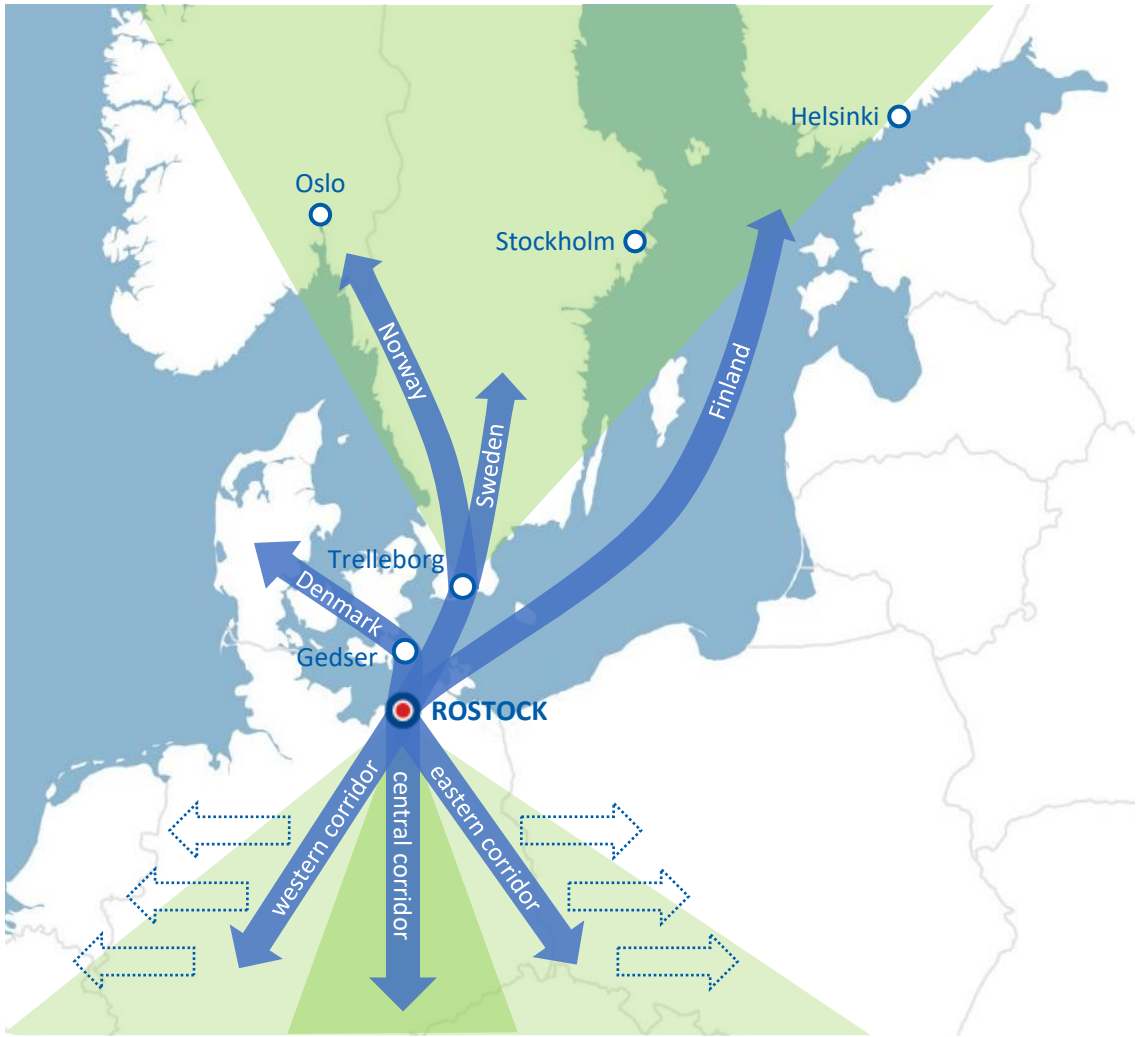
connections from/to Trelleborg		
Eskilstuna (SWE)	14x weekly	11 hrs.
Gothenburg (SWE)	5x weekly	12,5 hrs.
Oslo (NOR)	11x weekly	13,5 hrs.
Stockholm (SWE)	5x weekly	13,5 hrs.
Umeå (SWE) via Eskilstuna	3x weekly	28,5 hrs.

Hub at the baltic sea

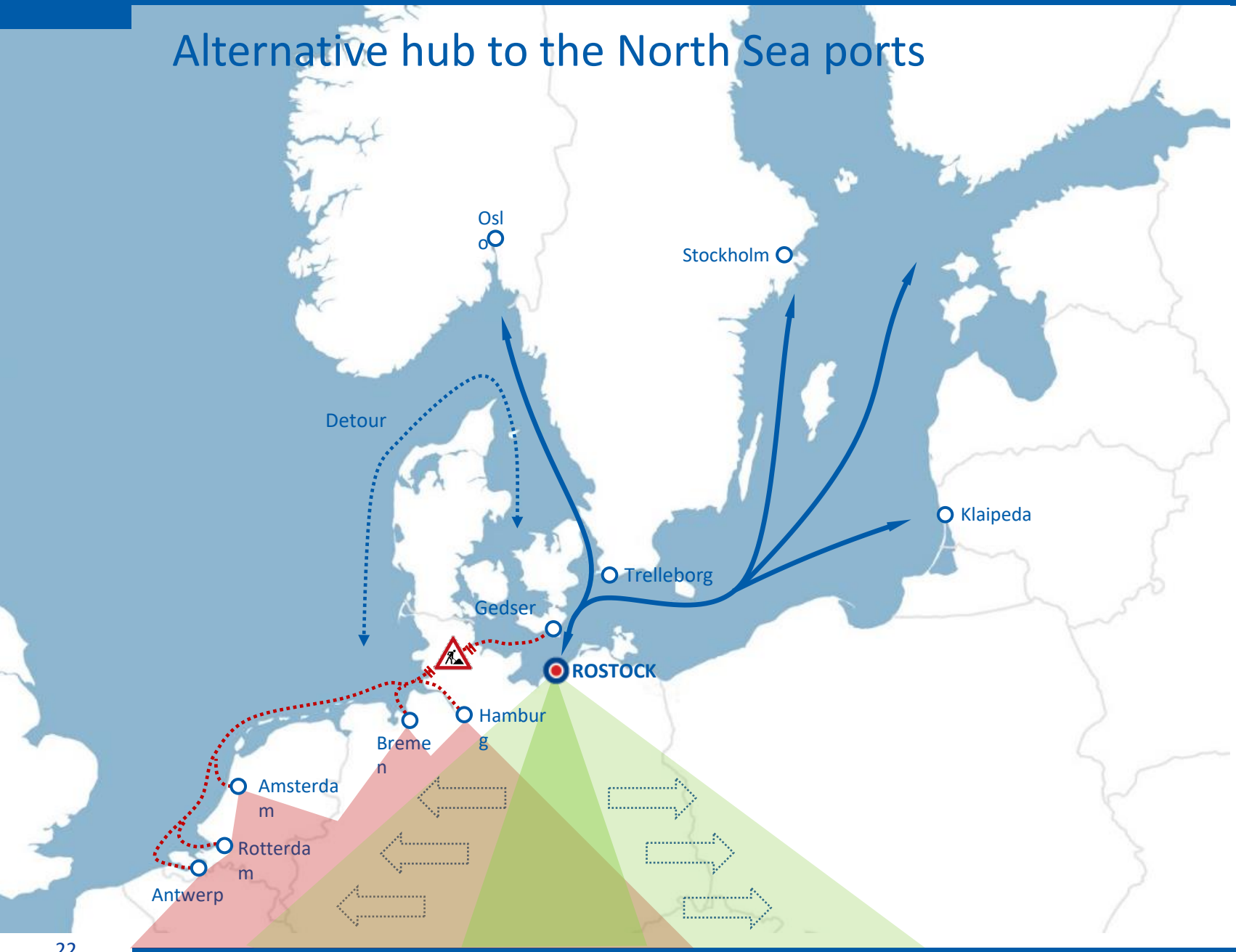
Rostock – the multimodal hub at the baltic sea:

- centrally located
- connection to all modes of transportation
- gateway for multiple corridors





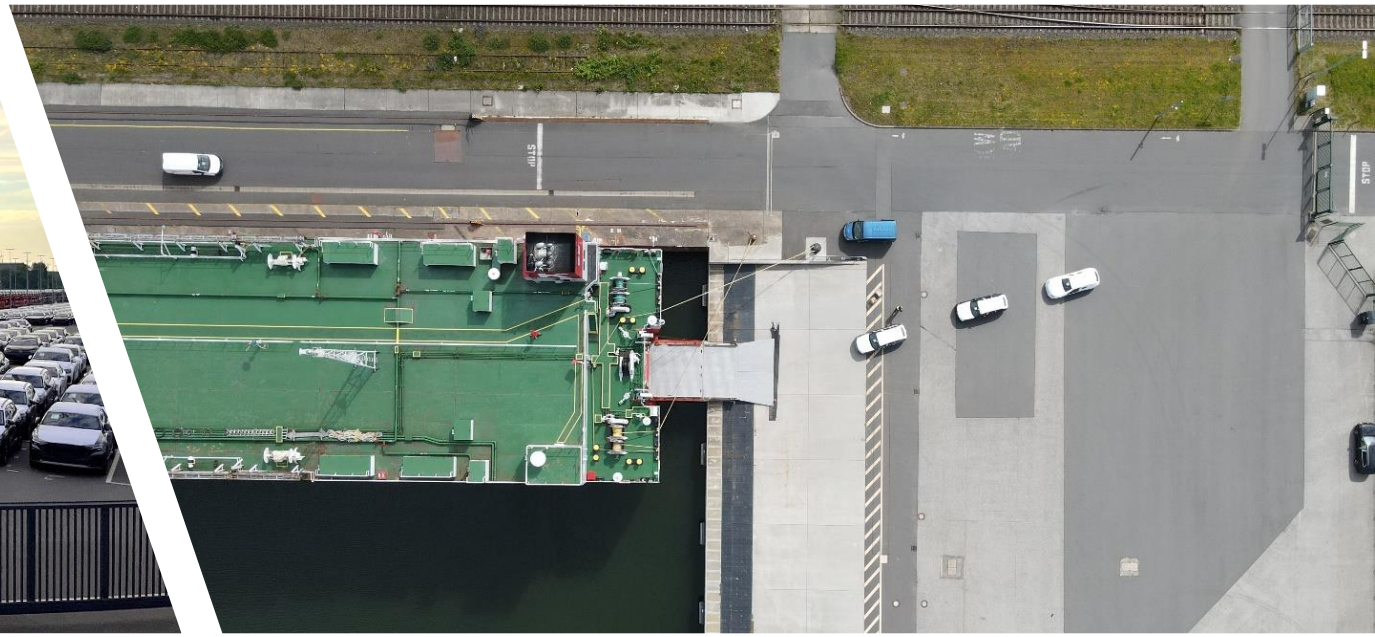
Alternative hub to the North Sea ports



Best geographical and nautical conditions with a very short sea channel guarantee:

- shorter sea and land routes
- ecologically more advantageous transports
- time and frequency advantages
- fuel and energy savings

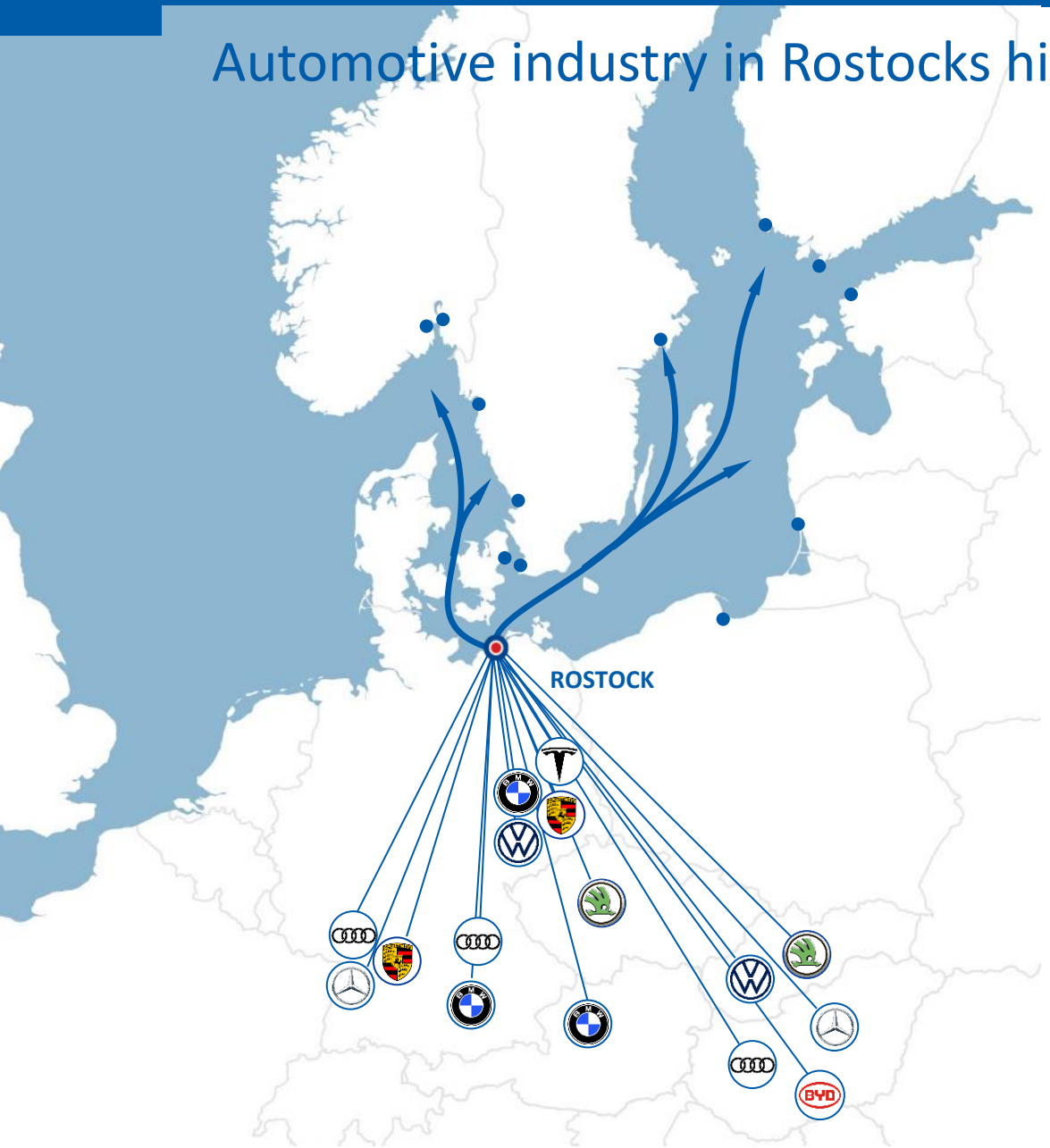
New automotive hub for North Europe



Delivery:	train and truck	**Vehicle:**	compact cars up to trucks
Handling:	Autolink Germany	**Target Markets:**	Sweden, Norway, Finland, Baltics

New automotive hub for North Europe

Automotive industry in Rostocks hinterland



Best geographical and nautical conditions with a very short sea channel guarantee:

- Sweden, Norway, Finland and the Baltic states
- shorter sea and land routes
- time and frequency advantages
- fuel and energy savings
- ecologically more advantageous transports

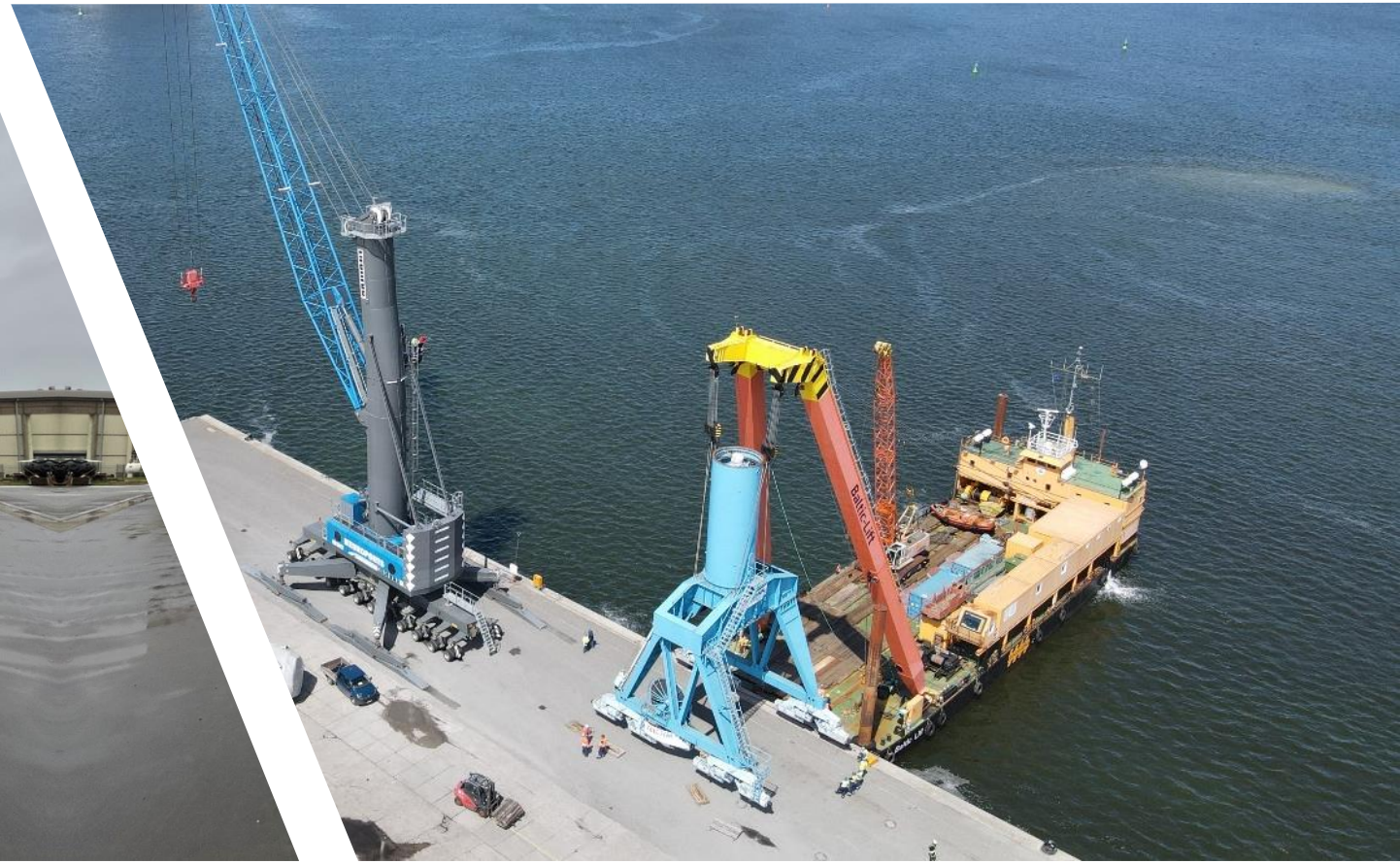
Multipurpose port for break bulk

- highly efficent cargo handling possibilities for all kinds of breakbulk by our partners
- 11 warehouses for storage
- approx. 400,000 m² free and approx. 260,000 m² covered storage space

- ro/ro and conventional loading possible
- berths with direct railtrack connection
- paper, parts of windturbines, construction machinery, container, high & heavy goods

Rostock High & Heavy – TCC 78000 and mobile harbour cranes

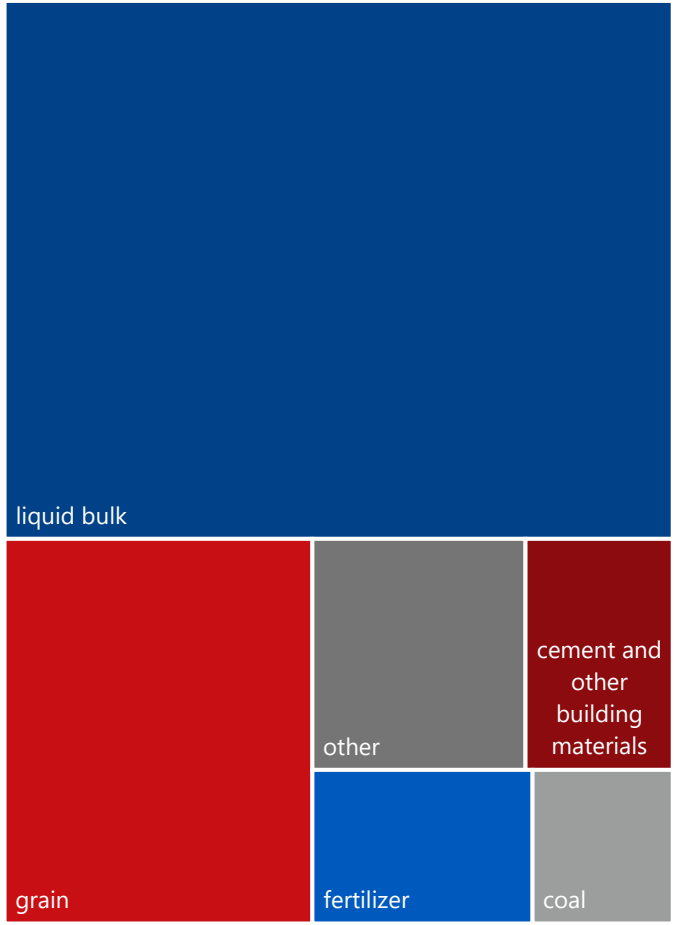
Rostock High & Heavy – ro/ro and external cranes




ro/ro
1,600 t
144t
144t
ro/ro
ro/ro

Multipurpose port for dry and liquid bulk

handling 2023: 13.6 mio. t



Thank you very much! Questions?

ROSTOCK PORT

Feedback on Carbon Intensity Indicator

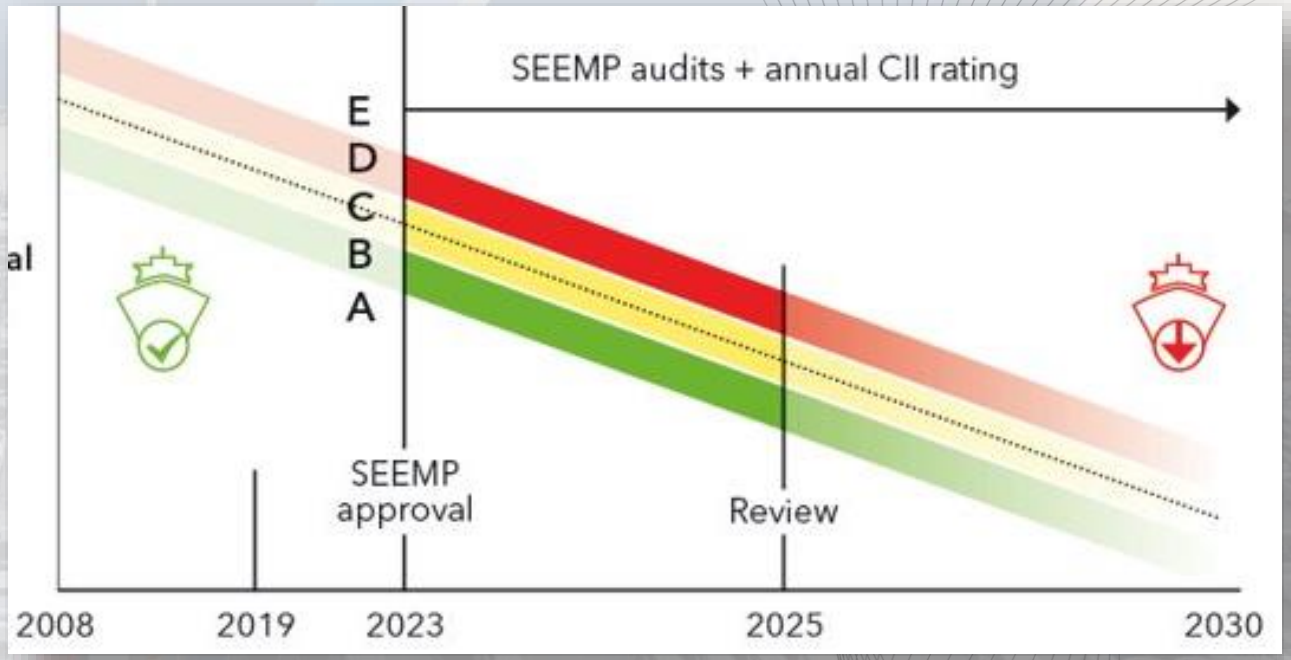
ECG

The Association of European Vehicle Logistics

Carbon intensity indicator

- In force since 1 January 2023

- A rating system that scores vessels based on their CO2 emissions vs cargo carrying "capacity" (not the amount of cargo carried)



The Association of European Vehicle Logistics

ECG members' input on the CII

Shipping lines and ports

Strategies to improve the CII rating

Environmental: Use of alternative fuels

Technical: Propulsion and hull optimization

Optimisation:

- Improving port call efficiency
- Voyage optimization
- Speed reduction
- Altered vessels rotation

Feedback on the CII

- GHG emissions reductions - increasing the use of alternative fuels
- Strategies to improve CII rating – reduce speed → reduce capacity
- No incentives to improve the rating (A or B)
- Capacity issues – long time for unloading
- None of the respondents (ports) put in place measures to incentivize ships with A or B CII rating

Next steps

MEPC 82

30 September – 4 October

- *Energy efficiency of ships*
  - Review of short-term measures – CII and EEXI
  - *MEPC 82* - Data analysis stage
  - *MEPC 83* (Spring 2025) - Guidelines review

- *Tackling climate change - cutting GHG emissions from ships*
  - 2023 IMO Strategy on Reduction of GHG Emissions from Ships – discussion on mid-term measures
  - To be adopted at MEPC 83

Port Investment Study

ESPO

ECG Maritime & Ports Working Group
27 September 2024

PORT INVESTMENTS STUDY 2024

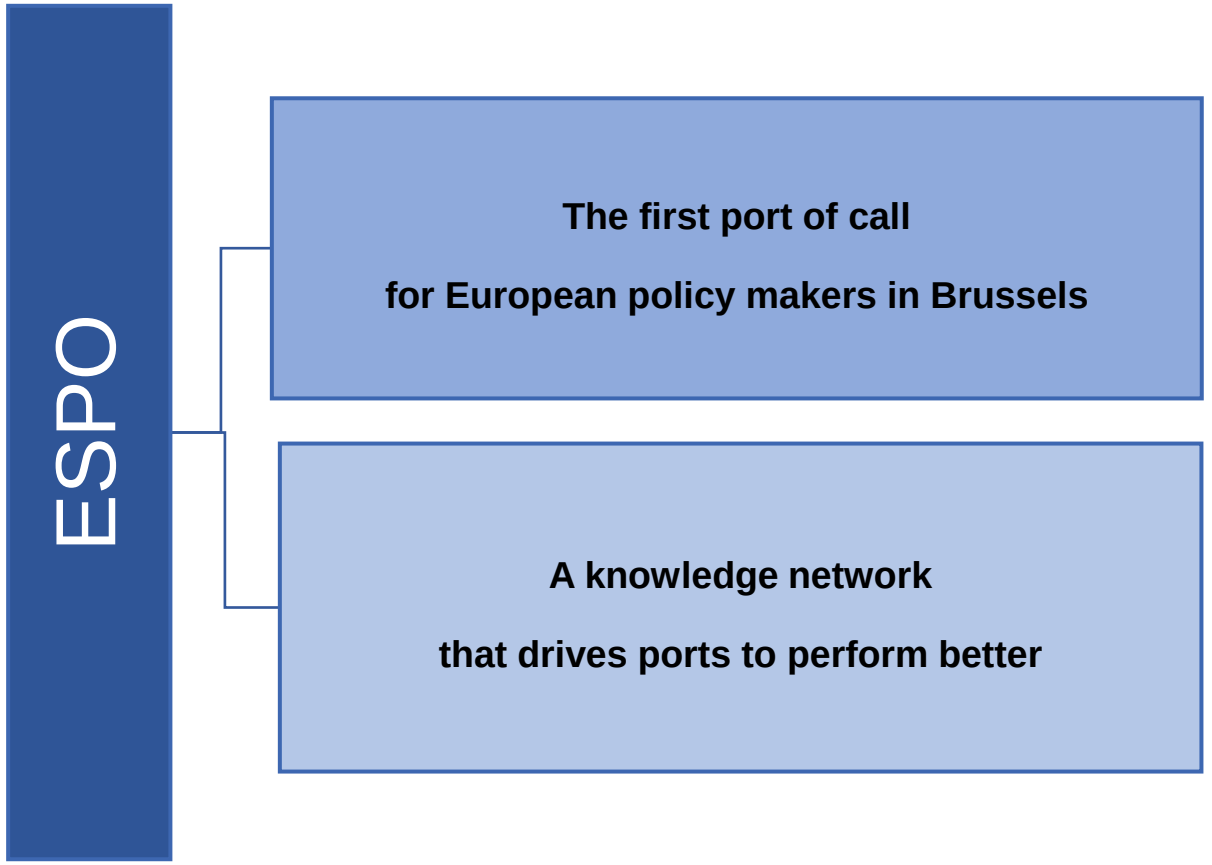
THE INVESTMENT PIPELINE AND CHALLENGES OF EUROPEAN PORTS

Danique de Jonge
ESPO secretariat

European Sea Ports Organisation

ESPO represents the port authorities, port associations and port administrations of the seaports of 21 Member States of the European Union and Norway at EU political level.

ESPO also has observer members in Albania, Iceland, Israel, Montenegro, Ukraine and United Kingdom.



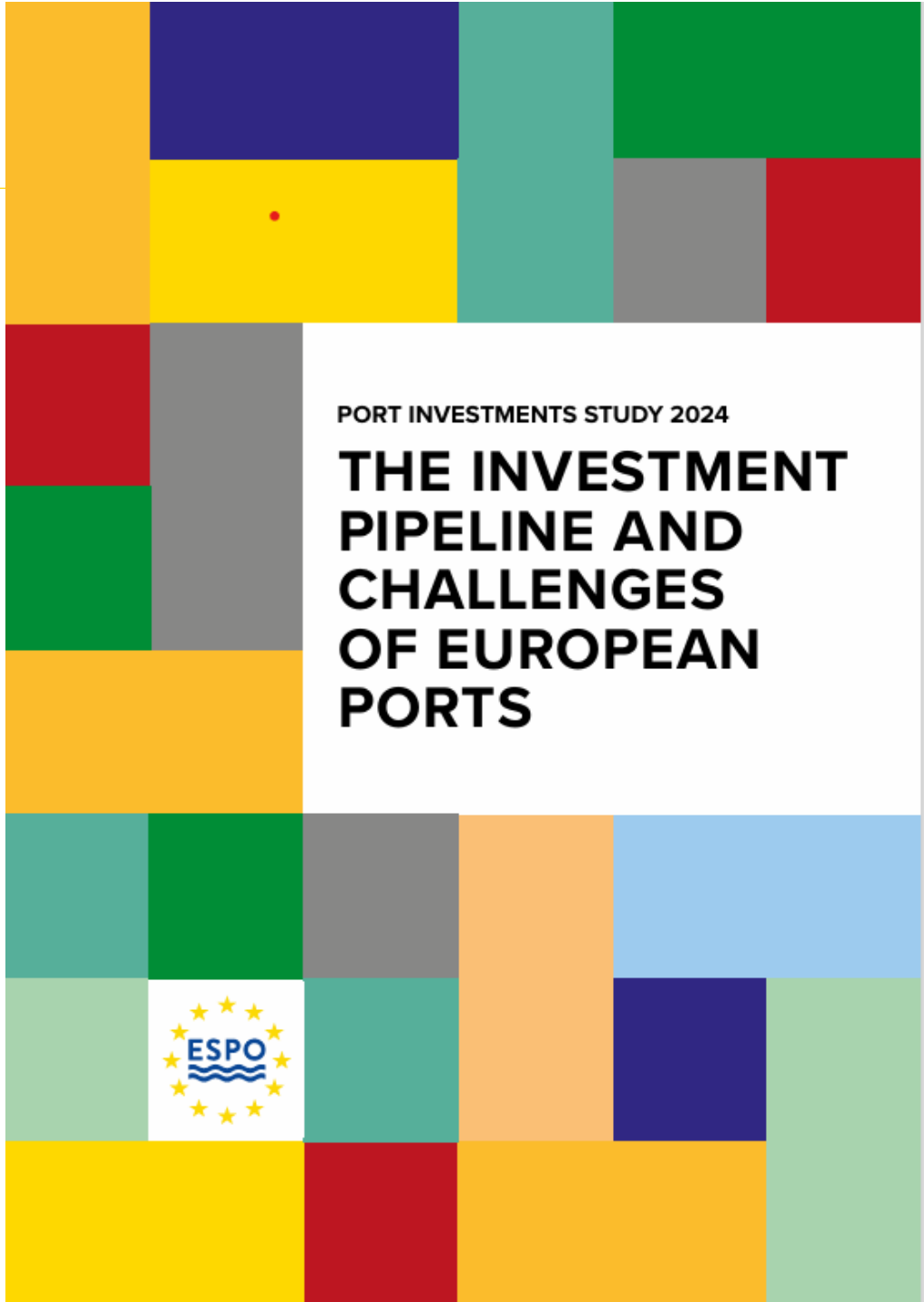
THE DIFFERENT ACTIVITIES AND RESPONSIBILITIES OF EUROPEAN PORTS

- Gateways to the world
- Essential nodes of the multimodal transport chain
- Hotspots for Europe's industrial activity
- Nodes of energy
- Safe and secure shelters
- Hubs of innovation and digitalisation
- Linking Europe's peripheral regions and islands to the mainland
- Key players in the transport of passengers
- Essential part of an emergency supply chain and facilitators of military mobility
- Clusters of blue growth

PORTS ARE MULTITASKERS

THE INVESTMENT PIPELINE AND CHALLENGES OF EUROPEAN PORTS

- Similar study in 2018
- Study analysing the investment needs and challenges of Europe's port managing bodies for the next 10 years
- Study carried out by Dr. Peter W. de Langen, Ports & Logistics Advisory, executed jointly with the ESPO team
- Today presentation of the main findings
  - the complete study, including ESPO's policy recommendations, is available online at www.espo.be

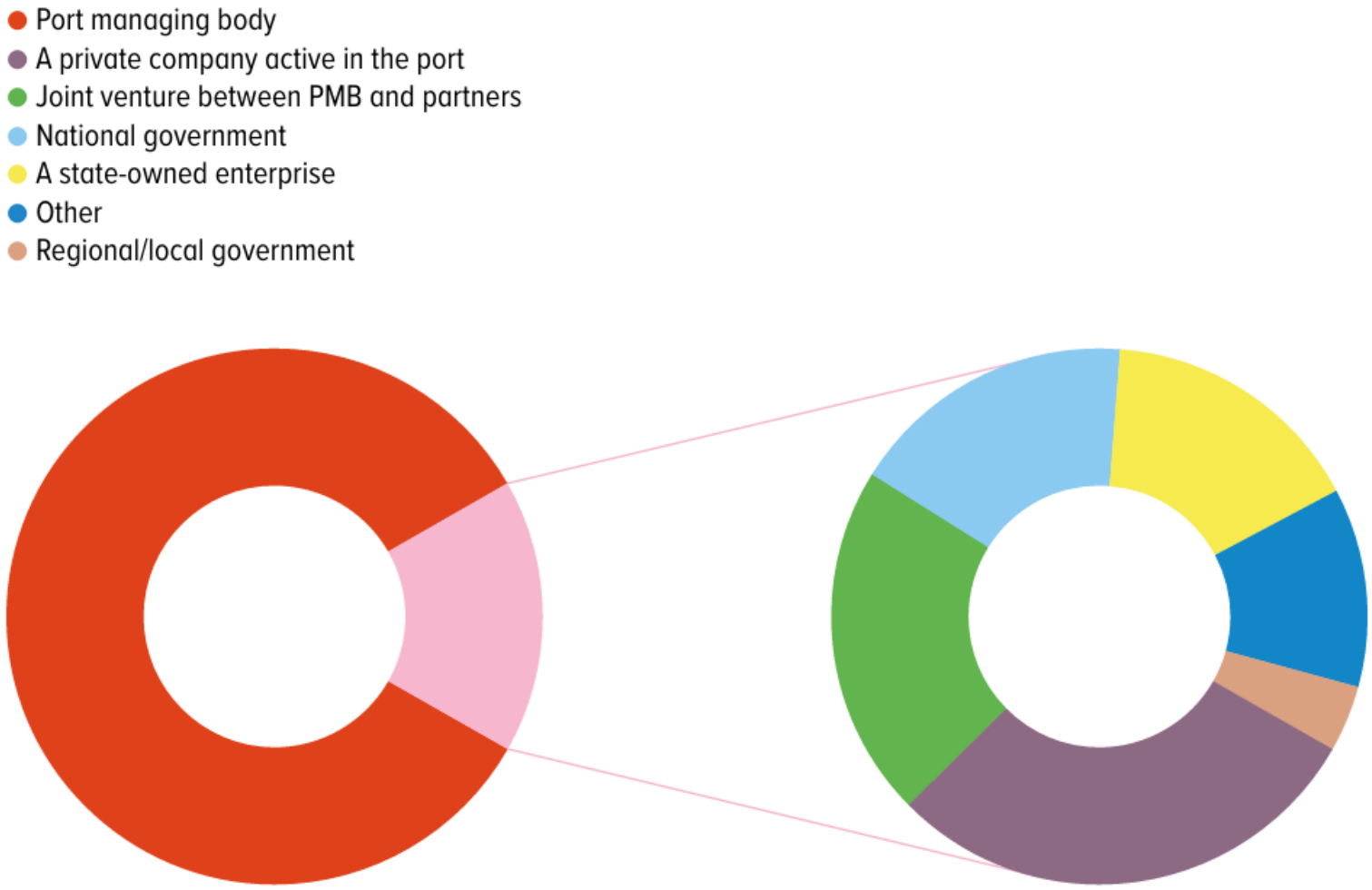


Survey approach – Good representation of EU ports industry

- The total number of responding ports was 84 (vs. 2018 study: 60 ports), which cover more than 70% of the total cargo throughput of seaports in the EU.
- The survey results cover 54 EU core ports, 46 EU comprehensive ports and dozens of ports without a TEN-T status.
- A total of 465 investment projects were included in the survey (vs. 2018 study: 396).
- Given this high rate of responses, the survey results can be considered representative of the total EU ports industry.

Respondent type	# respondents
One TEN-T core port	35
Multiple ports in one port system, including core and/or comprehensive ports	18
One TEN-T comprehensive port	19
One port or port system that is not included in the EU TEN-T network as core or comprehensive port	12
Total number of responding PMBs	84

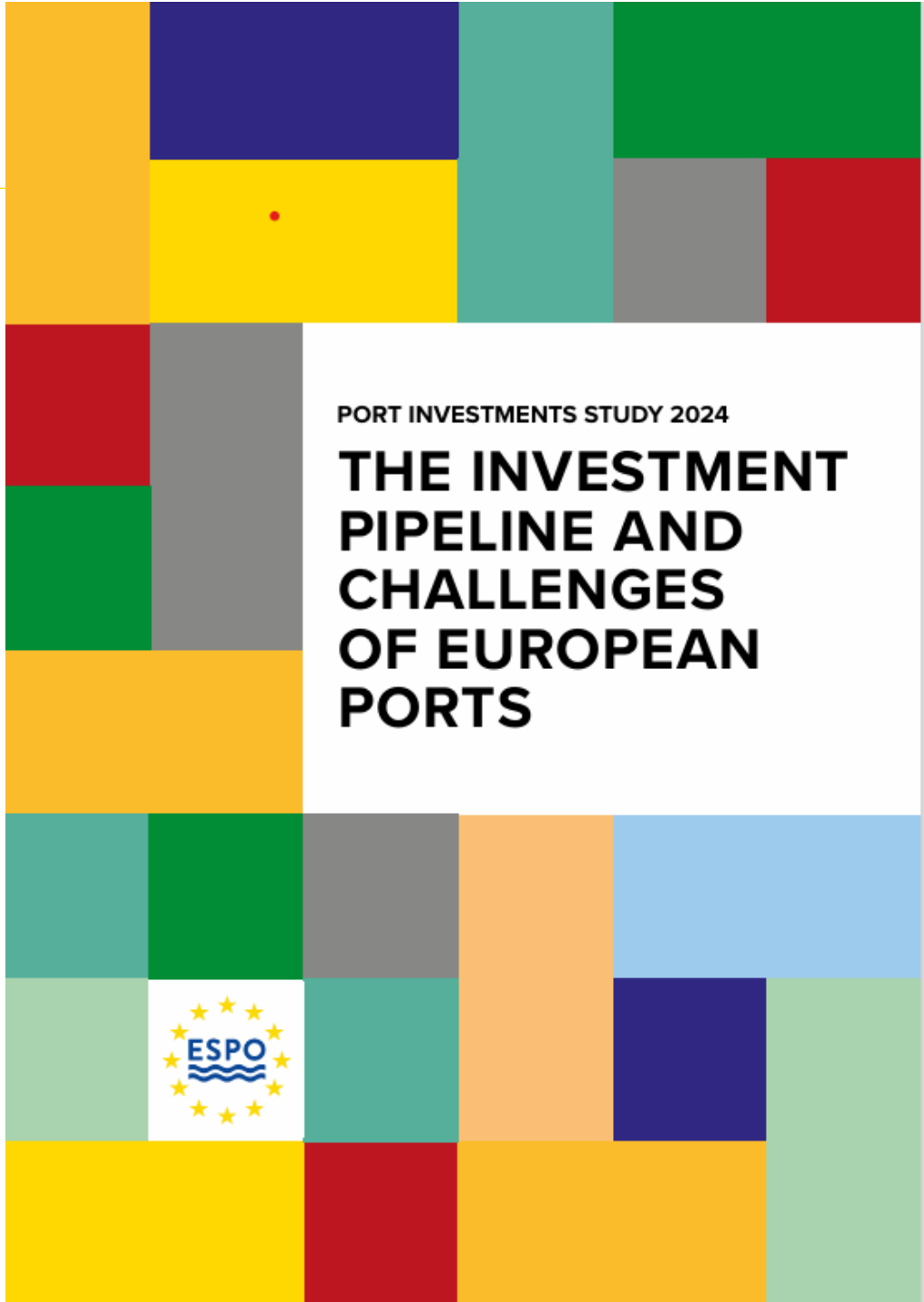
Database of investment projects of PMBs –and some third parties



Source: Port investments survey

- For 84% of projects, the PMB is the main developer. If the PMB is not the main developer, it is often a partner in a JV for the project.
- If that is not the case: for around two thirds of those projects, the main developer is a state entity, for the remainder a private company is the developer.
- NB: for the estimate of investments (see later), the projects for which the PMB is not the developer are excluded.

MAIN FINDINGS

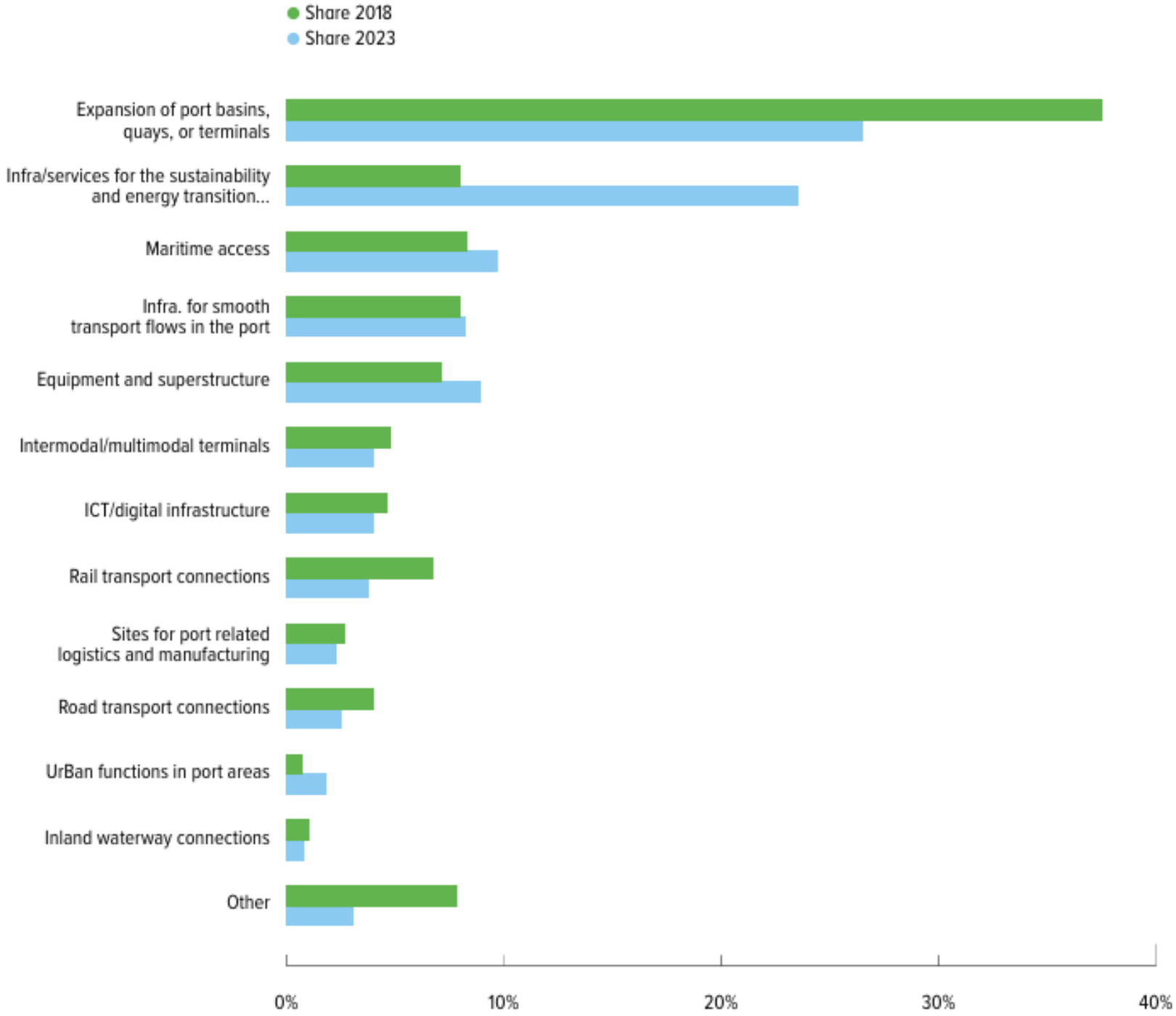


A conservative estimate of the investments of EU ports: about 80 €billion 2024-2034.

- A conservative estimate of the total investment volume of EU's ports suggests that **the total investment pipeline of PMBs in the EU amounts to around 80 €billion for the period 2024-2034** .
    - Excludes maintenance costs of existing infrastructure.
    - Excludes investments by private companies in the port.
- In addition to the investments by the PMBs, private companies operating in the port also will continue to make large investments in new facilities, such as terminals, warehouses and industrial plants, for instance for producing clean energy commodities like hydrogen, ammonia and biofuels.

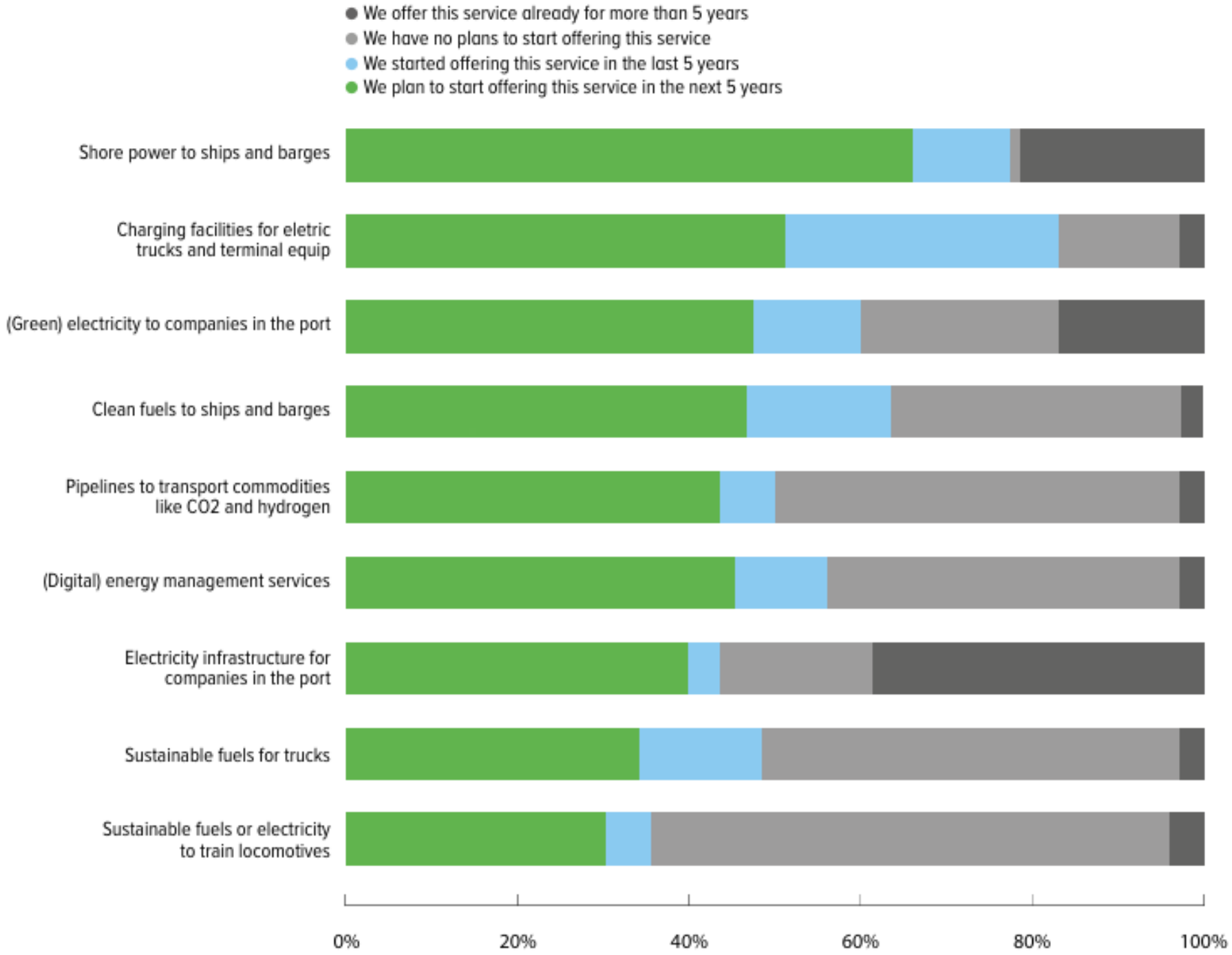
Increase of investments in sustainability and energy transition

- Classical expansion projects remain important, but lose weight.
- **Investments in sustainability and the energy transition gain weight and cover around 25% of total investment projects.**
  - As opposed to 2018: around 10%
- A further split in ‘sustainability and energy transition’ projects is made (see next slides).



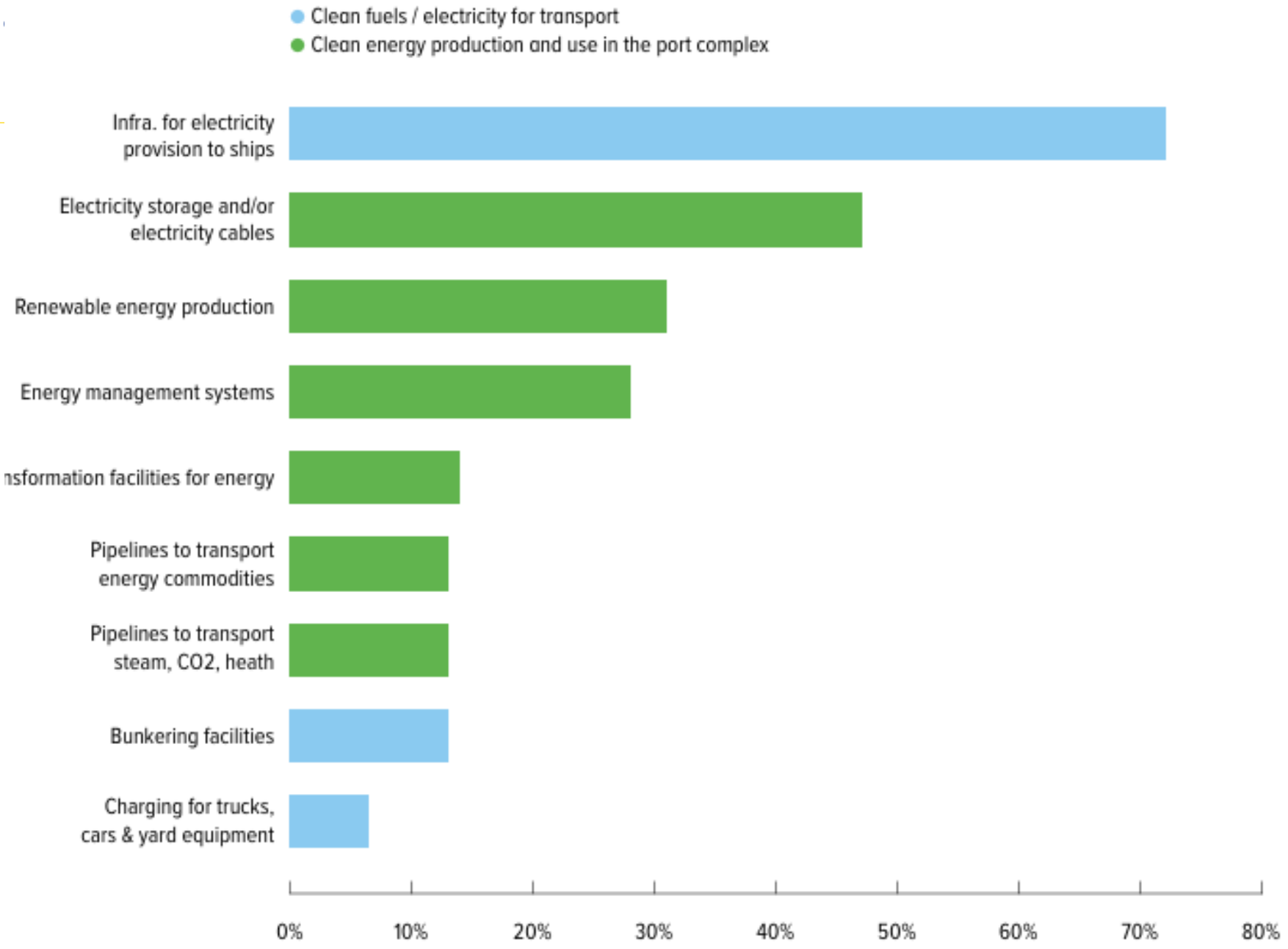
Service provision of PMBs

- A substantial part of PMBs have started offering new services related to energy and sustainability in the last five years.
- A much larger part of PMBs intends to start doing so in the coming five years (shore power, charging facilities for trucks, green electricity, clean fuels, pipelines).
- PMBs change their ‘service bundle’ to accelerate the transition towards clean shipping and clean energy.



Investments in sustainability & energy transition

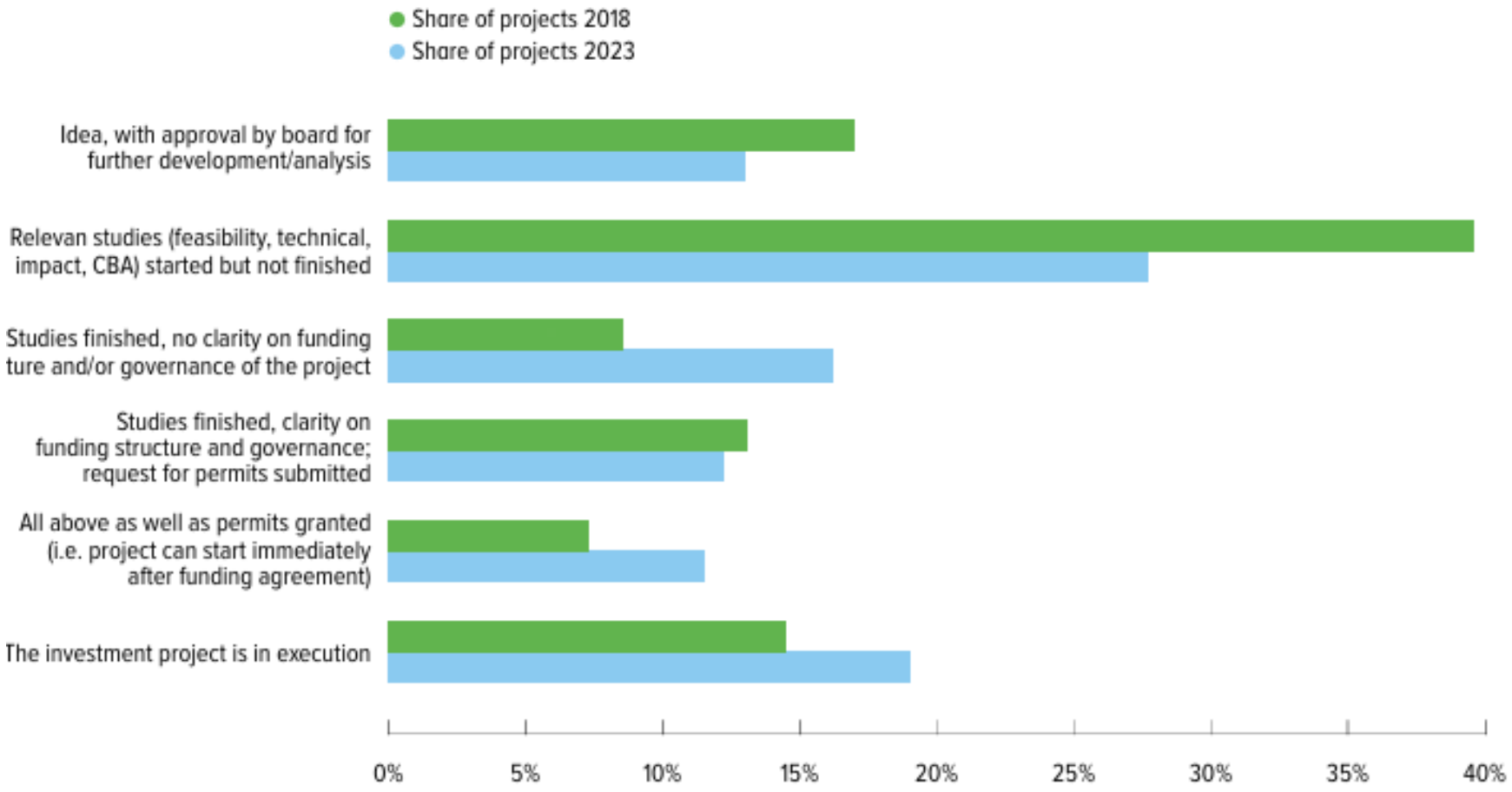
- Port investments cover both clean fuel provision for transport and clean energy production and use in the port industrial complex.
- Clean fuel for transport includes **shore power (>70 of PMBs) and clean fuel bunkering or charging facilities** for trucks and port equipment.
- Substantial numbers of PMBs invest in energy production and storage, pipelines, and energy management.



Examples of RoRo investments in ports

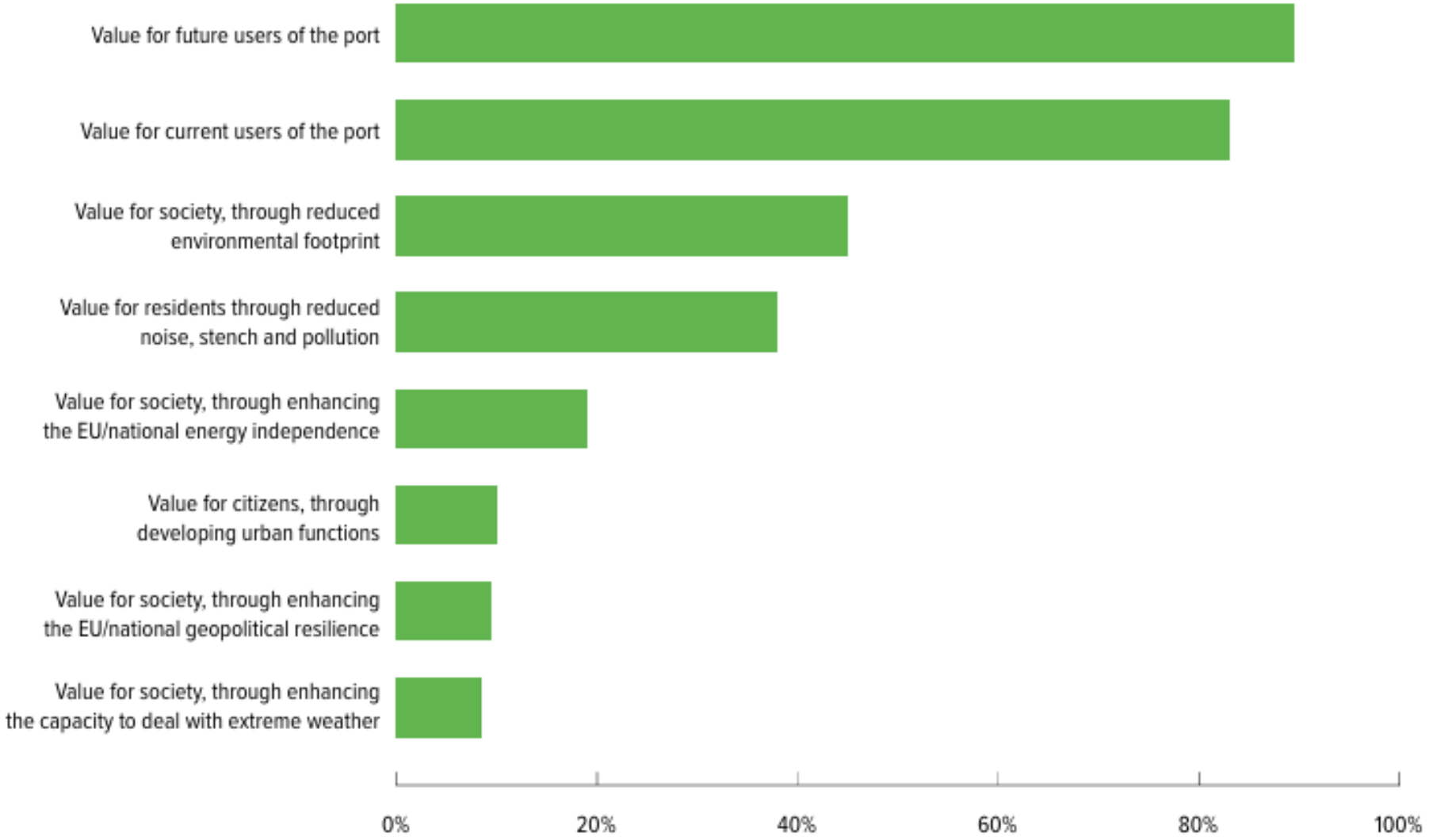
- The investment projects include investments impacting/benefitting RoRo traffic:
  - Shore-side electricity supply to RoRo vessels
  - Producing/buying green electricity for charging stations for trucks and cars
  - Capacity expansion (new basic infrastructure)
  - Vehicle access and water deepening projects, including for receiving larger (RoRo) vessels
  - More storage surface in ports, including high-rise car storage
  - RoRo ramps installations and modifications to gain birthing length and operate vessels simultaneously
  - Better, multimodal hinterland connections (e.g. rail connectivity)

Projects in the pipeline are more mature than in 2018



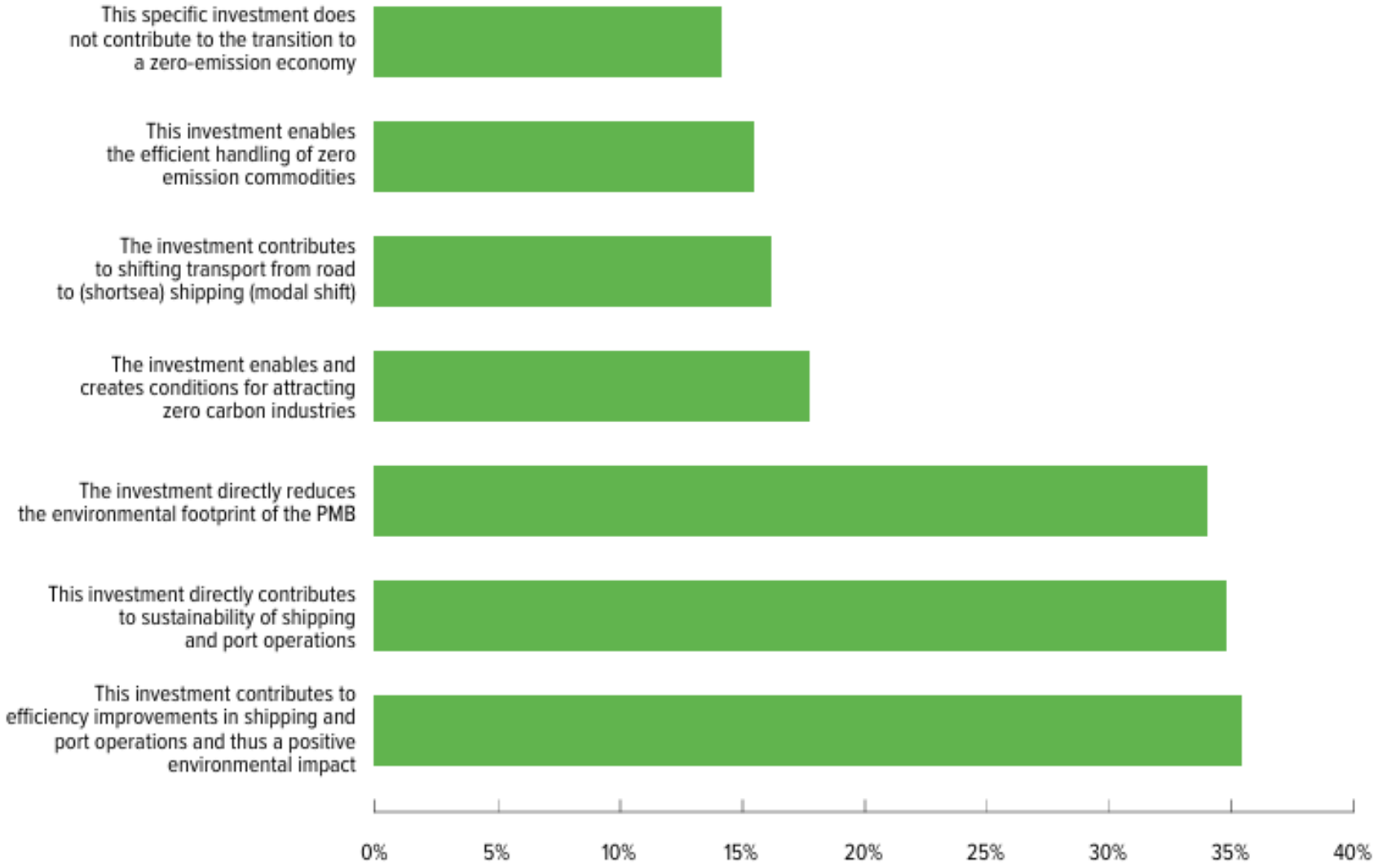
- Less ‘ideas’, and less projects for which studies are not finished than in 2018.
- More projects in execution phase or only pending funding agreement.
- PMBs have matured in terms of having identified new services to be provided and the required associated investments.

The value creation of investments remains broadly the same: covers both users and society at large



- The value creation of the investments in the pipeline is very similar to 2018.
- PMBs are focused on creating value for current and future port users (shippers, shipping lines as well as companies operating in the port).
- PMBs create ‘value for society’ through reducing the environmental footprint and reduced local ‘externalities’.

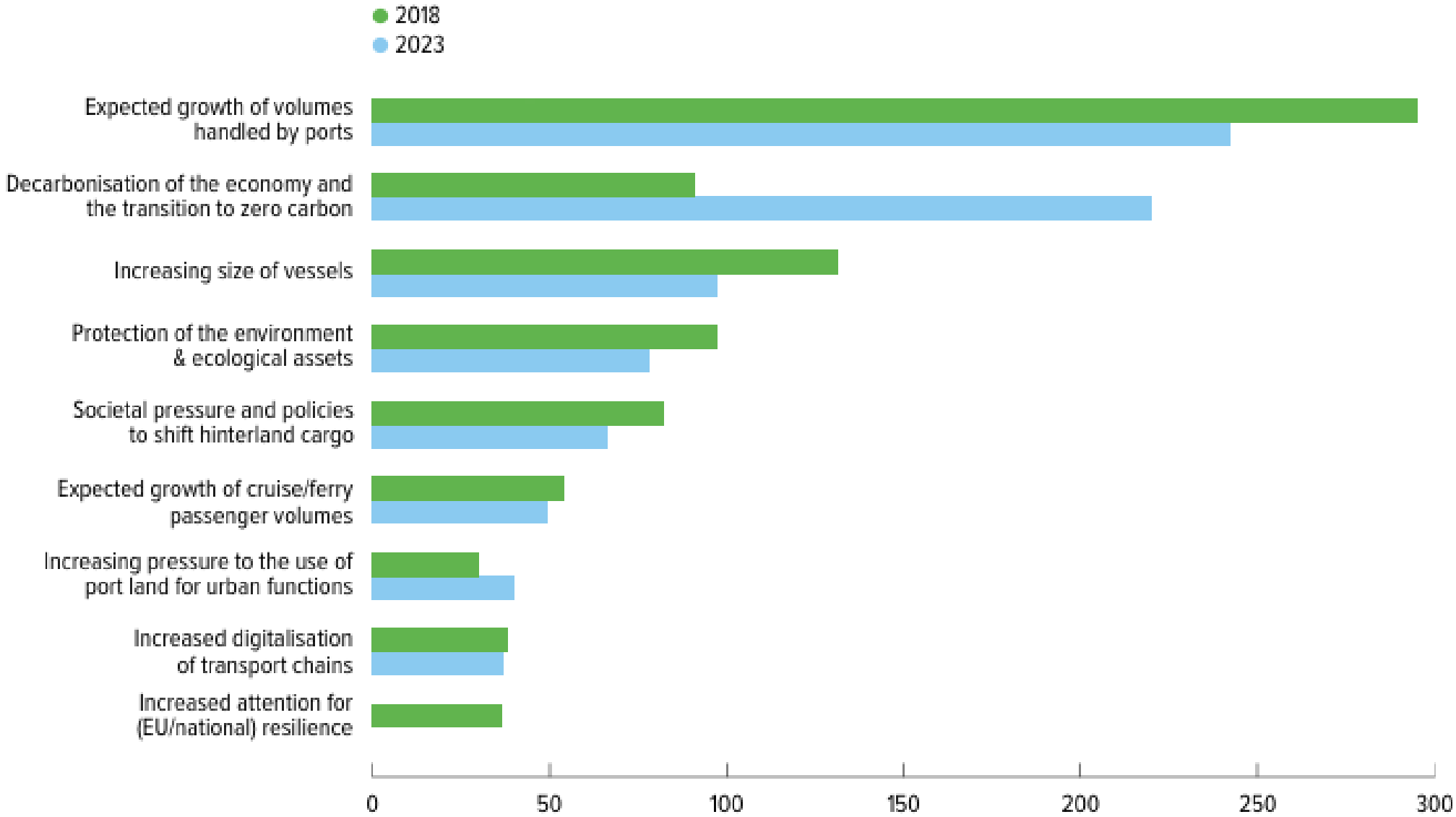
Virtually all projects have positive environmental impacts



The projects not directly aimed at improving sustainability and clean energies generally also have a positive environmental effect, for instance through:

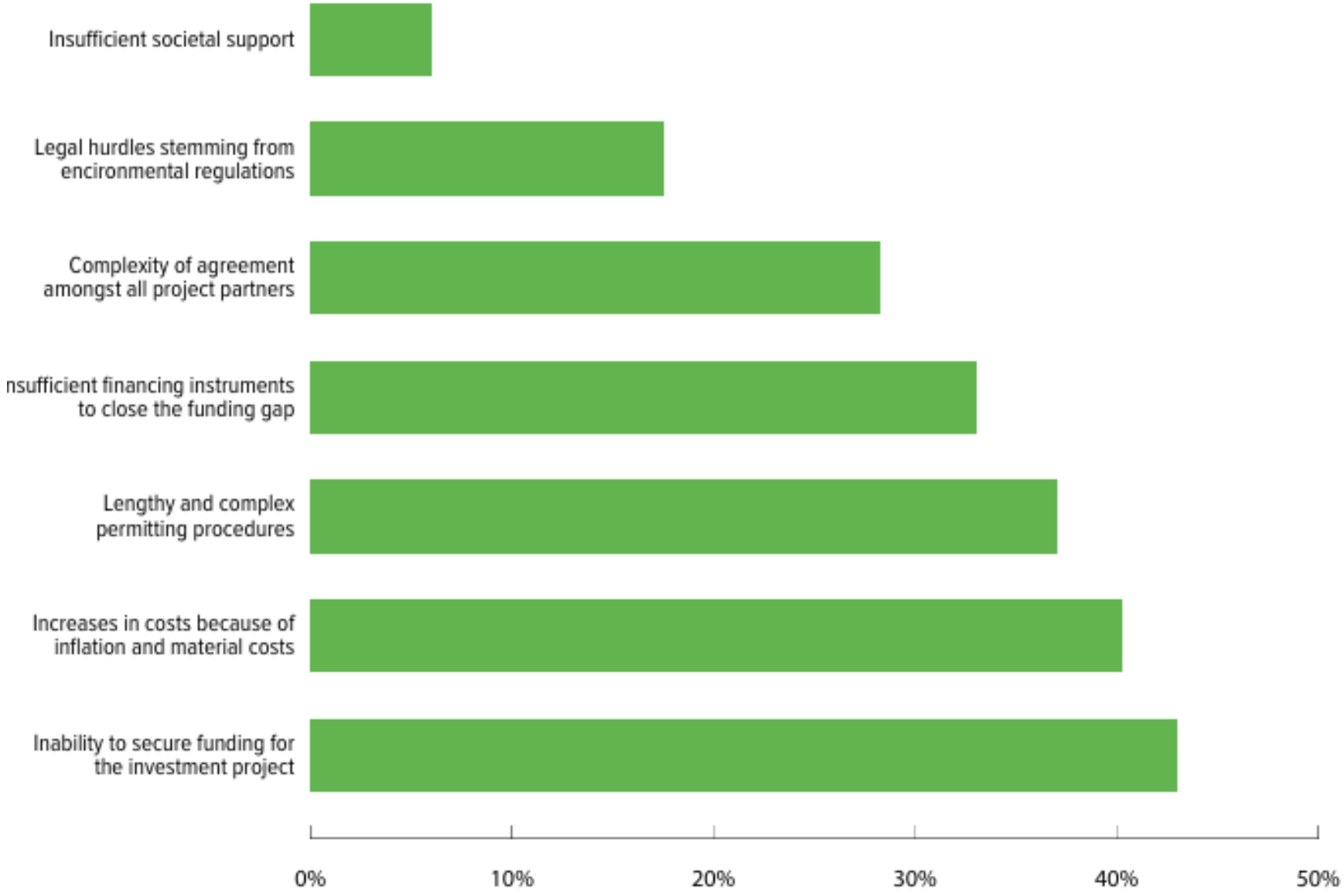
- Higher efficiency in shipping and ports
- Attracting zero-carbon industries to the port
- Promoting a shift to sustainable transport modes
- Enabling transport of clean energy commodities.

Drivers of the investments of PMBs: decarbonization increasingly a driver of investments



Funding and cost increases are the main bottlenecks

- The projects in the pipeline generally have ‘societal support’.
- The three most important bottlenecks are:
  - Bridging the ‘funding gap’ (i.e. securing the public funding required to be able to execute the project);
  - Cost increases in construction;
  - Lengthy and complex permitting procedures.



Challenges to investments – RoRo traffic

Ports are doing green investments (OPS, charging stations for trucks, new fuel bunkering, renewable energy production (offshore, solar), electricity grid investments, multimodal hinterland connections etc.), yet face challenges:

- OPS: large investments, but usage is currently not obligated by law – affecting business cases
- Lack of capacity of the electricity grid
- New fuels: no one size fits all solution yet; impacts planning in the port
- Lengthy permitting procedures
- Lack of space in the port

Congestion in ports, on terminals;

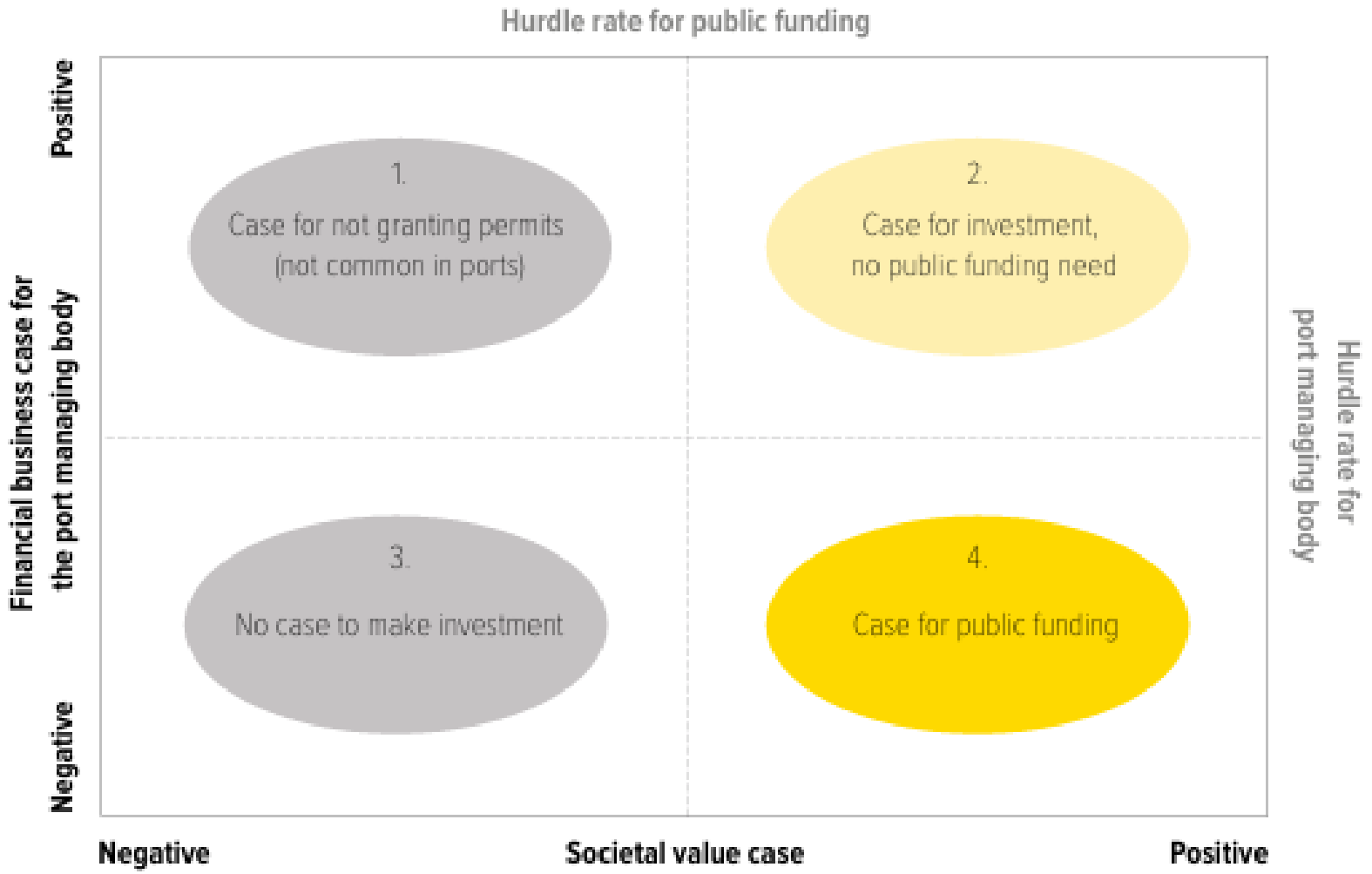
- Different causes: pandemic, withdrawal/lack of capacity, no steady production and unreliable schedules, OEMs changing distribution models, lack of trucks and truck drivers, lack of trains, lack of car carriers spurring transport of cars via containers (leads to disruption, more steps), Red Sea crisis (longer journeys, capacity jeopardized);
- Difficult to create extra space, as space in ports is usually scarce.

Ports try to address the congestion, by:

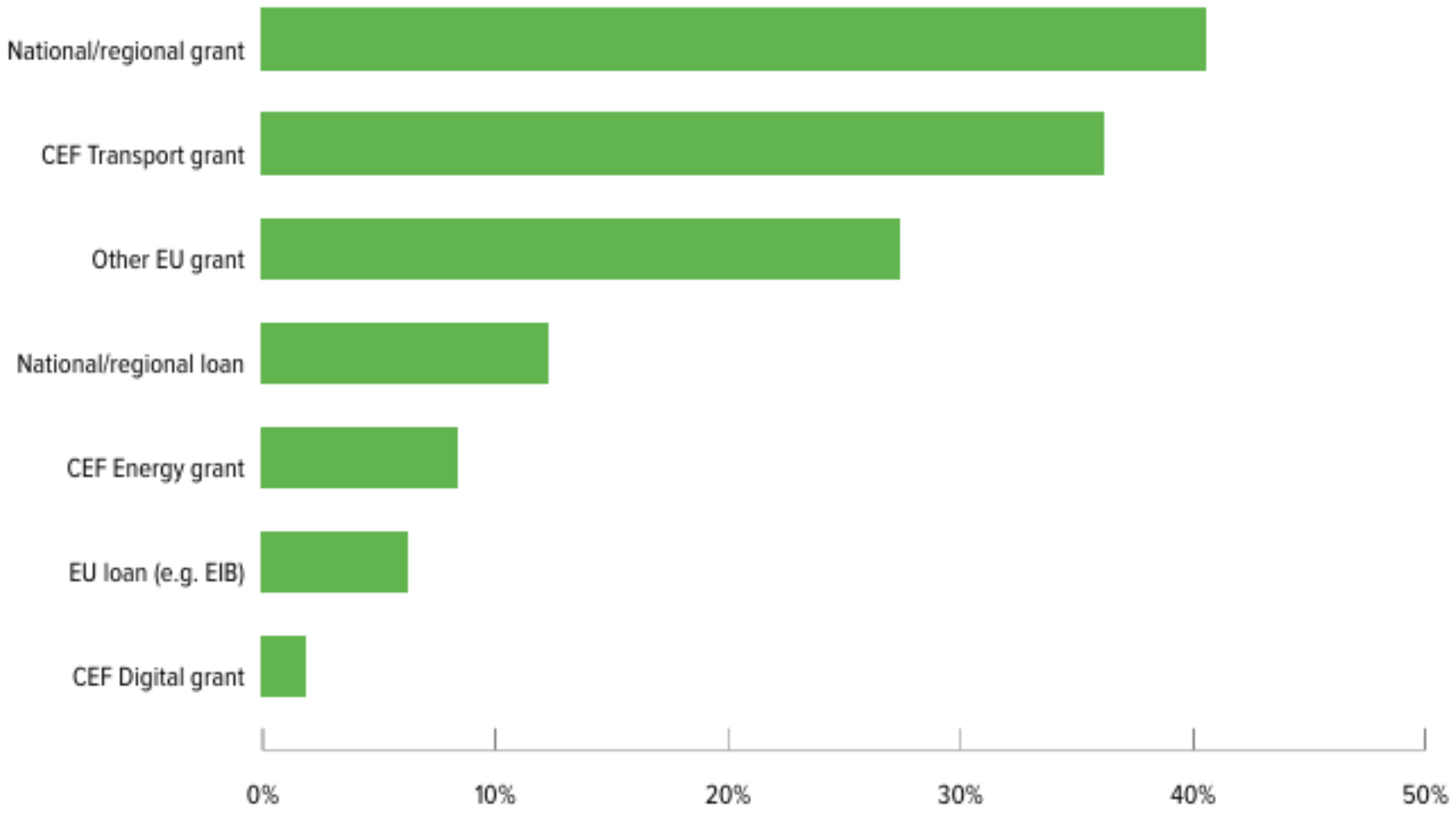
- Stimulate/facilitate more efficient use of the existing space, e.g. via: high-parking areas/car decks (terminal investments)
- Evacuation/relocation from the terminal more into the hinterland, to inland storage places/car compounds close to the port, often as temporary solutions, involving/mobilising all the necessary actors;

  Yet: more steps also creates more risk for the cargo and higher costs;
- More efficient hinterland flows, including via better / more efficient railway connections;

Investment projects of PMBs may often be ‘type 4’ projects: justified/desirable but with a funding gap



Grants are an important element of the desired funding mix



- Around 40% of the projects aspire national regional grants.
- One out of three projects aspire to attract CEF grants.
- Loans (e.g. EIB) less important mechanisms than grants.
- A third of the projects in the execution phase have received a CEF grant - much less have received national funding.

In conclusion

- Ports in Europe do more than before. The new functions of ports are coming on top of their traditional roles. PMBs continue to have substantial investment pipelines - a rough and conservative estimate for the EU ports (only PMBs!) is about 80 billion for the next 10 years. The investment pipeline of Europe's ports reflects this changing and multidimensional role:
- Next to investments in developing basic port infrastructure and keeping it state-of-the-art, port managing bodies are more and more investing to take up strategic and societal responsibilities and achieving Europe's ambitions. This often implies projects with a high societal value, yet slow, low and risky returns on investment.
- New investments arise in part because PMBs adjust to the changing landscape by offering new services (example: OPS).
- The pipeline is more 'mature' than in 2018, in the sense that more projects can be executed relatively rapidly.
- The investments in the pipeline create value for (new) port users as well as society at large.
- However, bottlenecks remain, the most important ones relate to cost increases and dependence on partial public funding.
- Because of the societal value creation, PMBs generally have expectations regarding public funding.

PORT INVESTMENTS STUDY 2024

THE INVESTMENT PIPELINE AND CHALLENGES OF EUROPEAN PORTS

Thank you!

danique.dejonge@espo.be

SUSTAINABILITY IN TRANSPORTATION LIGHTING

By: Hauke Petersen

Sustainability

"Humanity has the ability to make development sustainable - to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."

Brundtland-Report United Nations 1987

Jaxport Cruise Terminal, Jacksonville, FL, USA

Reduced Resource **Consumption**

- Energy savings
- CO_2 reduction
- Avoidance of light pollution
- Longevity of product

APM Terminals, Los Angeles, CA, USA

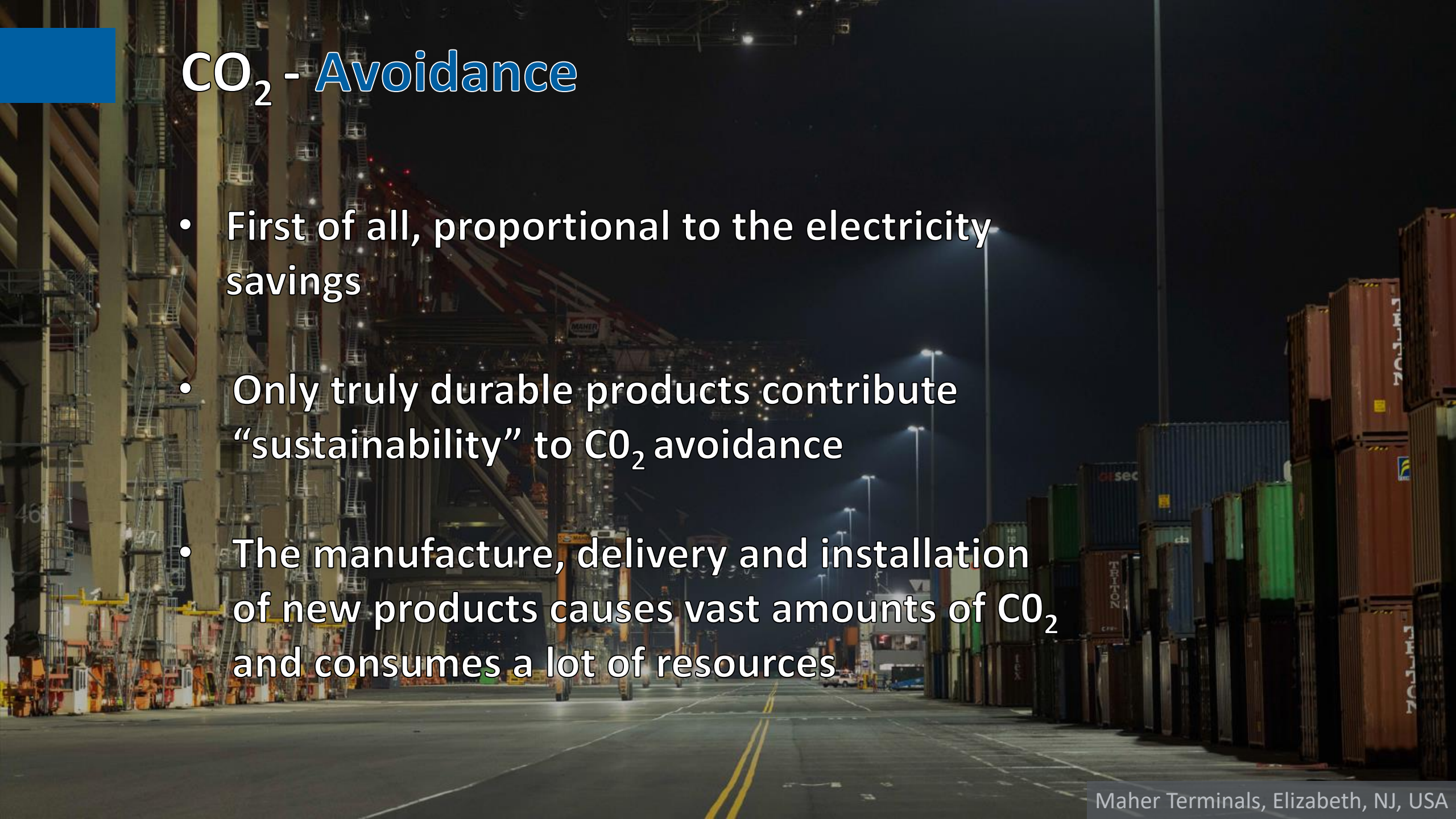
Energy Savings

- With the current LED technology, electricity savings of 50% or more are possible
- If significantly higher savings are promised, ask for a lighting design that proves that you will achieve at least the existing light levels

Port of Cork, Ireland

CO_2 - Avoidance

- First of all, proportional to the electricity savings
- Only truly durable products contribute “sustainability” to $C0_2$ avoidance
- The manufacture, delivery and installation of new products causes vast amounts of $C0_2$ and consumes a lot of resources



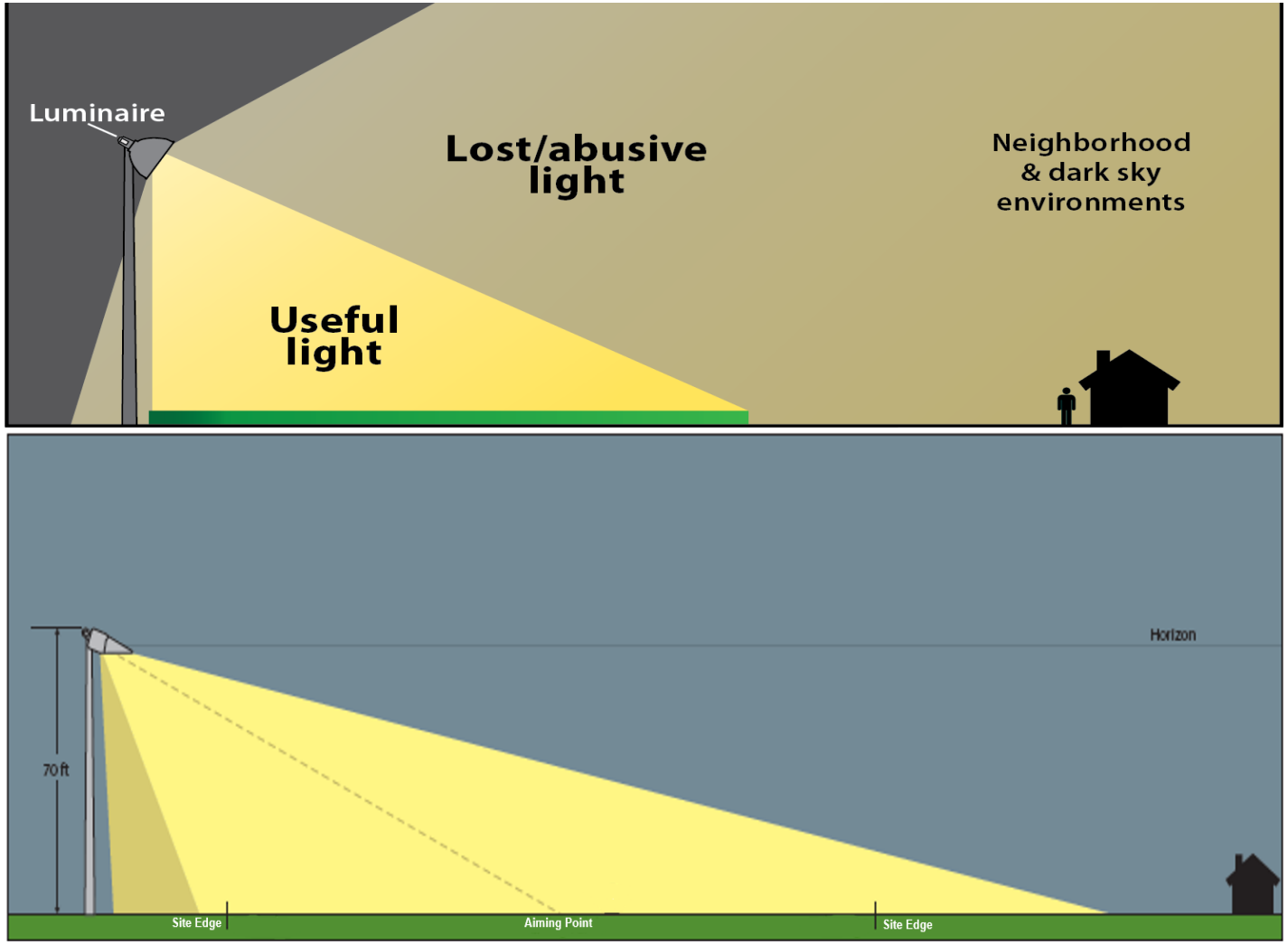
Maher Terminals, Elizabeth, NJ, USA

Spill & Glare Control for Avoidance of light pollution

Fredericia Shipping Intermodal Terminal, Taulov, Denmark

Light **Control**

Fixtures with poor light control waste light by allowing it to go off site and into the surrounding area creating skyglow.



Benefits of Advanced Light Control

- Reduced glare and less off-site spill and glare
- Better visibility with improved uniformity on the ground
- With better control, you reduce the number of fixtures needed to light an area

Creating Light Is Easy, Controlling Light Requires **Innovation**

We've spent more than 45 years designing systems to affordably control glare, while significantly improving energy efficiency

Creating Light Is Easy, Controlling Light Requires **Innovation**

Typical LED

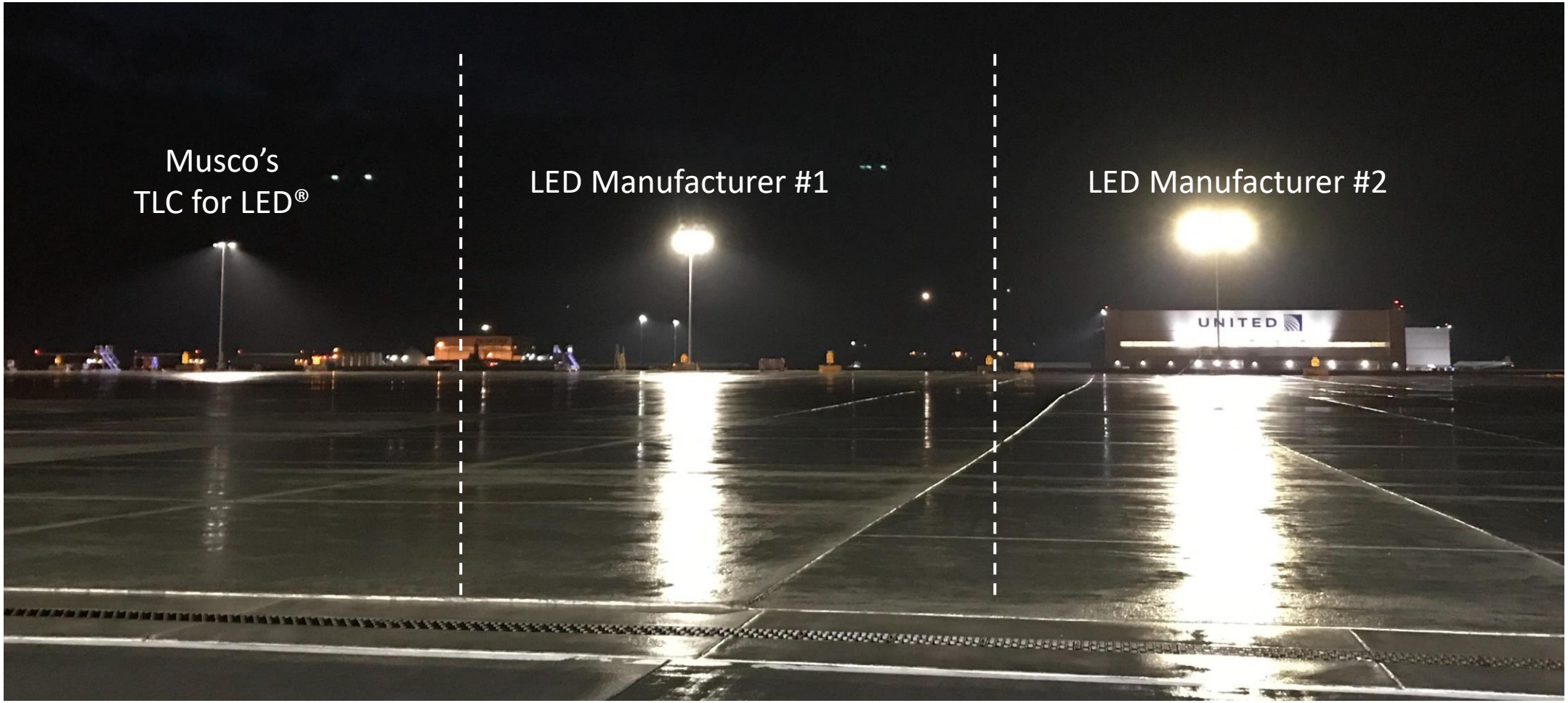
- Missing or inadequte visoring causing stray light and glare
- Integrated drivers lead to heat build-up and shortens the life span of the product.
- Hard to reach electrical components increase maintenance & servicing costs.
- Exposed optics lead to environmental wear and light intensity degradation.

Musco LED

- Interior and extiorior visors ensure maximum usable light and minimises spill and glare
- Tempered glass lens protects optics from environmental influences
- Designed and aligned at the factory with an accuracy of 0.2 degrees
- Convective cooling systems regulates the tempature and preserves the longetivity of the LEDs

Not All LEDs Are Created **Equal**

Due to the intensity of the LED light source, increased measures should be taken to provide optic controls to minimize glare



Longevity

Key Factors to Sustainability

- Products that last 25 years consume only 20% of the resources compared to products which last only 5 years

Enhancing LED High Mast Lighting Longevitiy

- LEDs with proper heat management can have lifetimes of up to 120,000 hours or more

Parts Availability

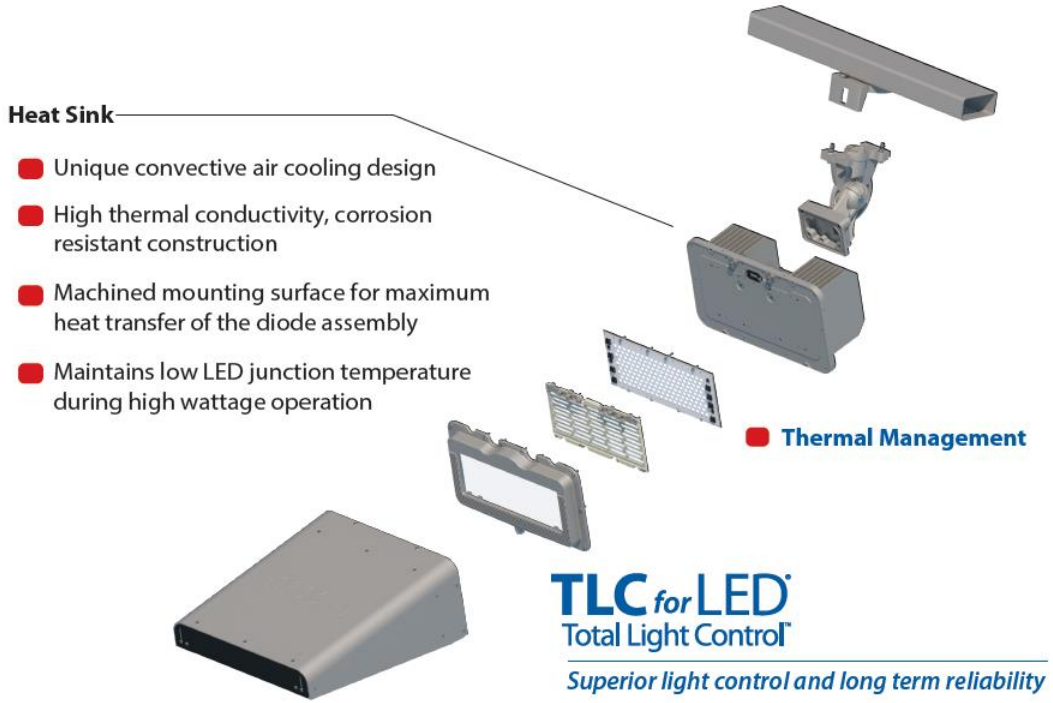
- Spare parts availability for 25+ years ensures overall longevity of the system

Antwerp Euroterminal, Beveren, Belgium

Heat Management

Correct

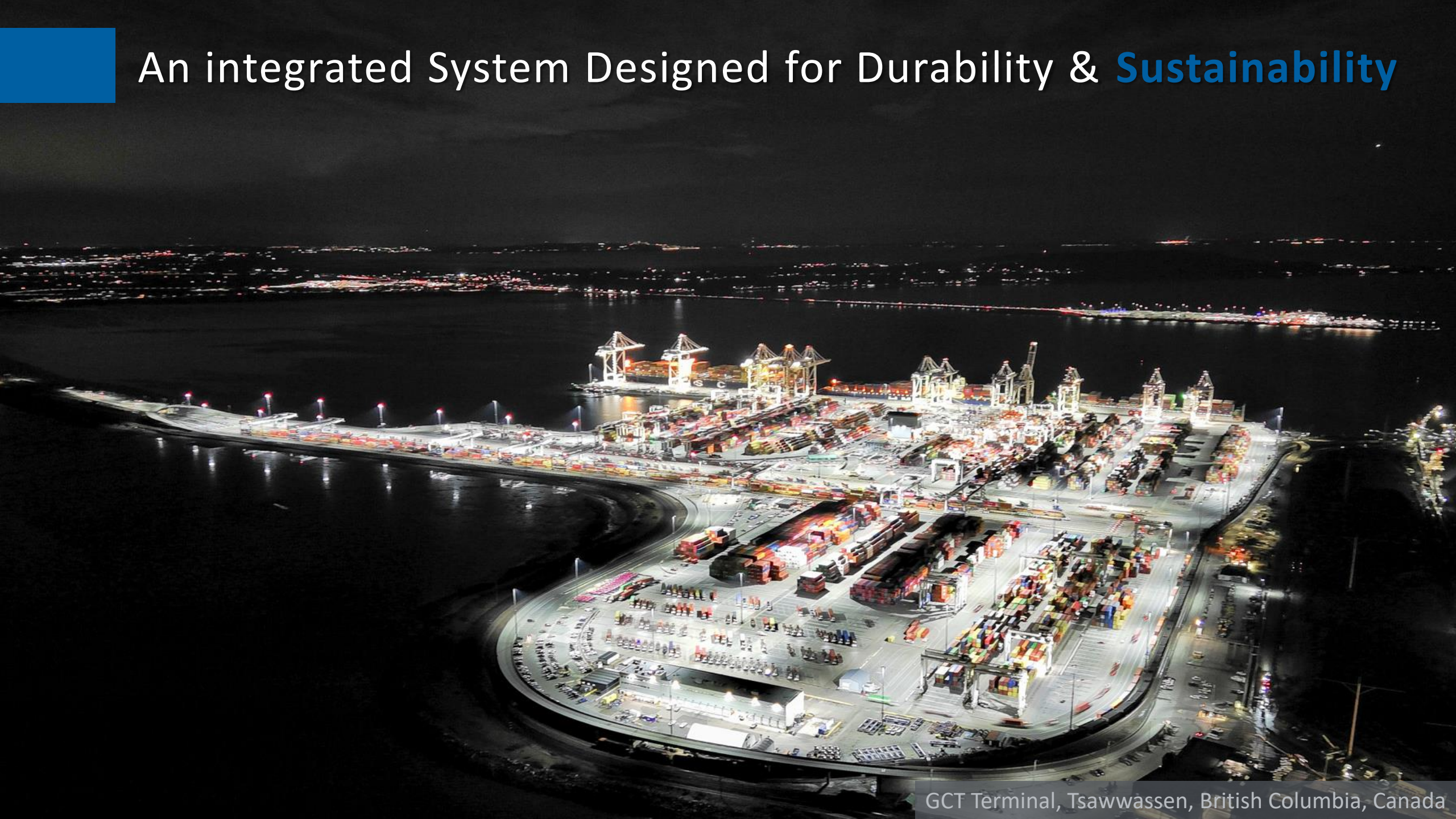
Large cooling surface
Heat transferring materials
Automatice convection ventilation
Remote driver



Wrong

Small cooling surface
Little volume of heat transferring aterial
No convection ventilation

An integrated System Designed for Durability & **Sustainability**



GCT Terminal, Tsawwassen, British Columbia, Canada

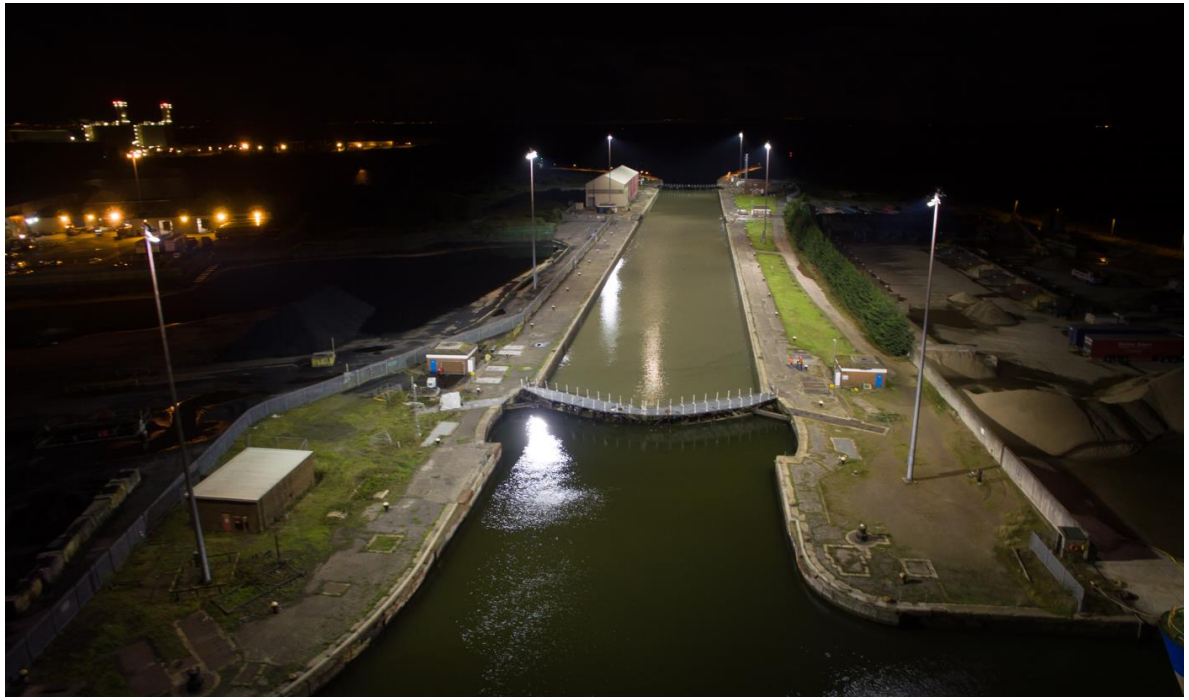
System **Approach**

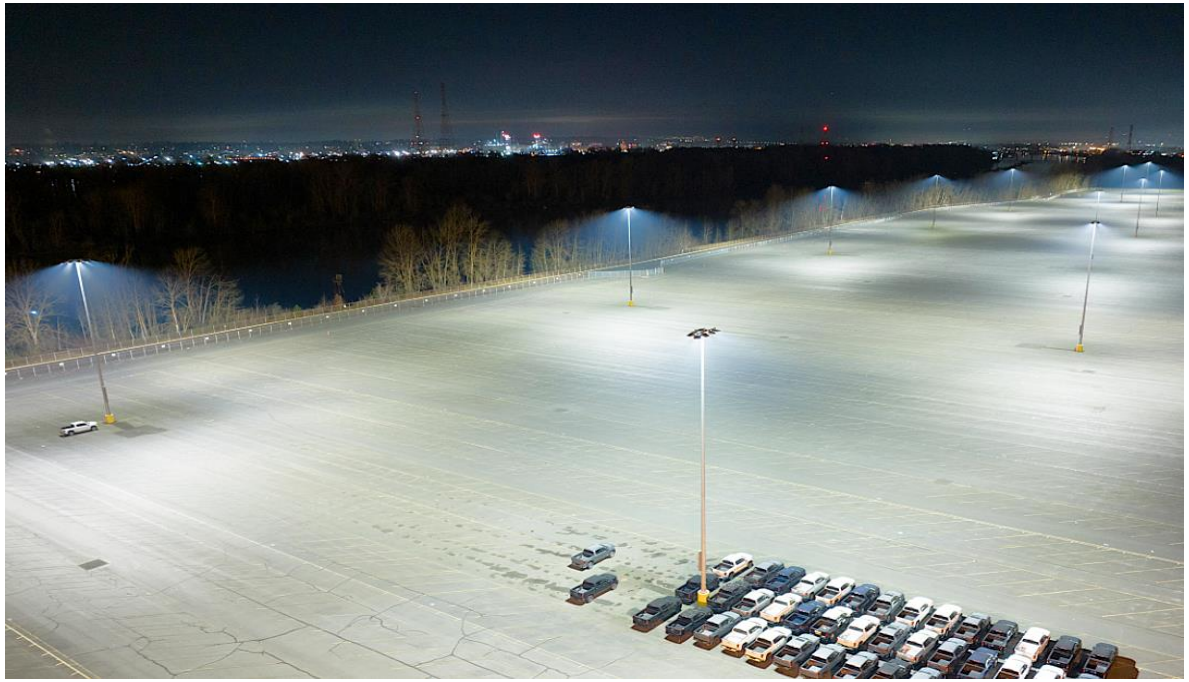
Tailor-made solutions for the specific requirements of your proect

Streamline installation minimizes costs

All components are factory aligned, wired and tested to ensure reliable operation

Integrated system ensures warranty from a single source





Light-Structure System™

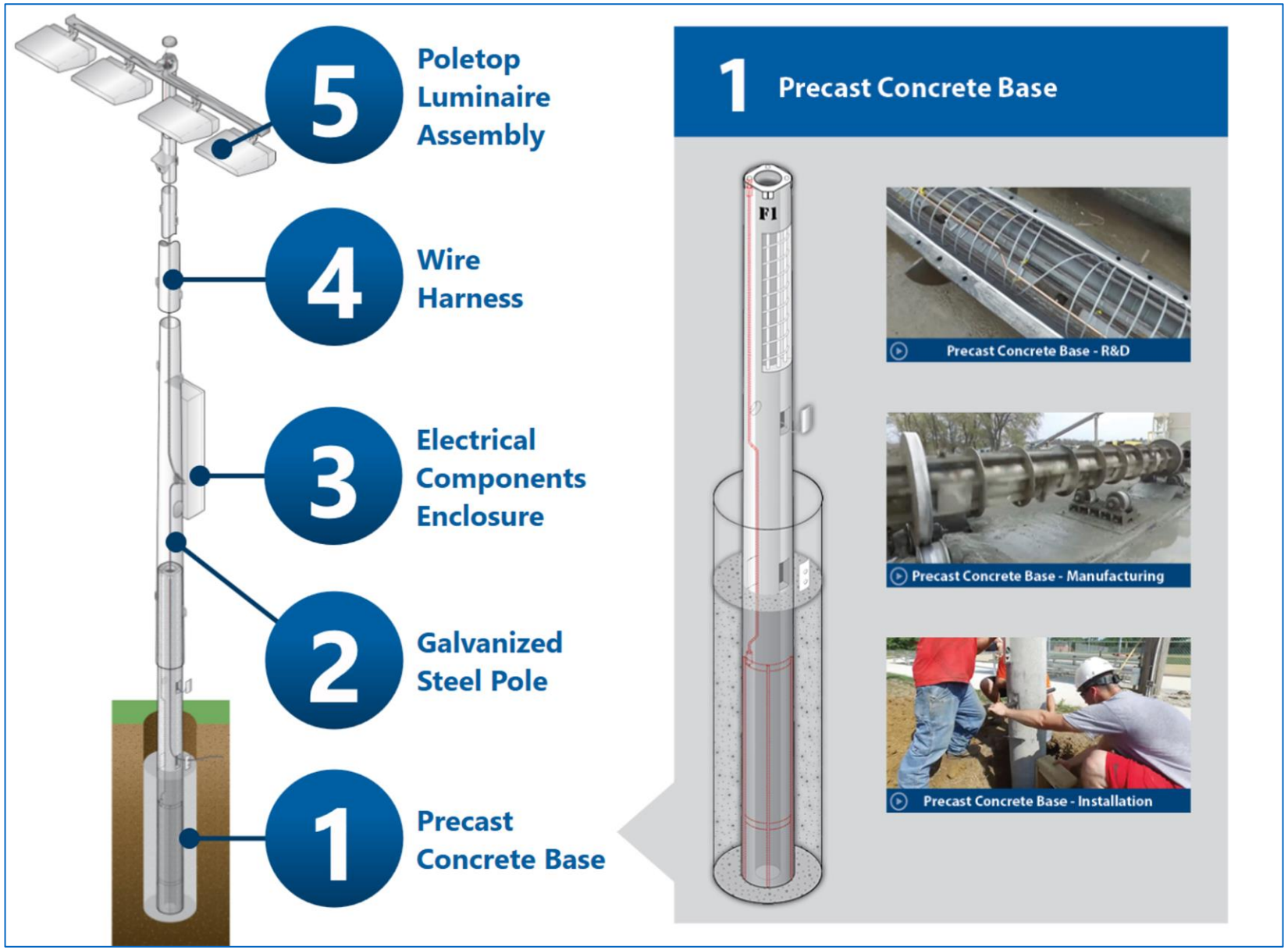
Light-Structure System™

Light-Structure System is designed in 5 Easy Pieces™ from foundation-to-poletop to provide a complete solution for lighting, electrical, and structural needs

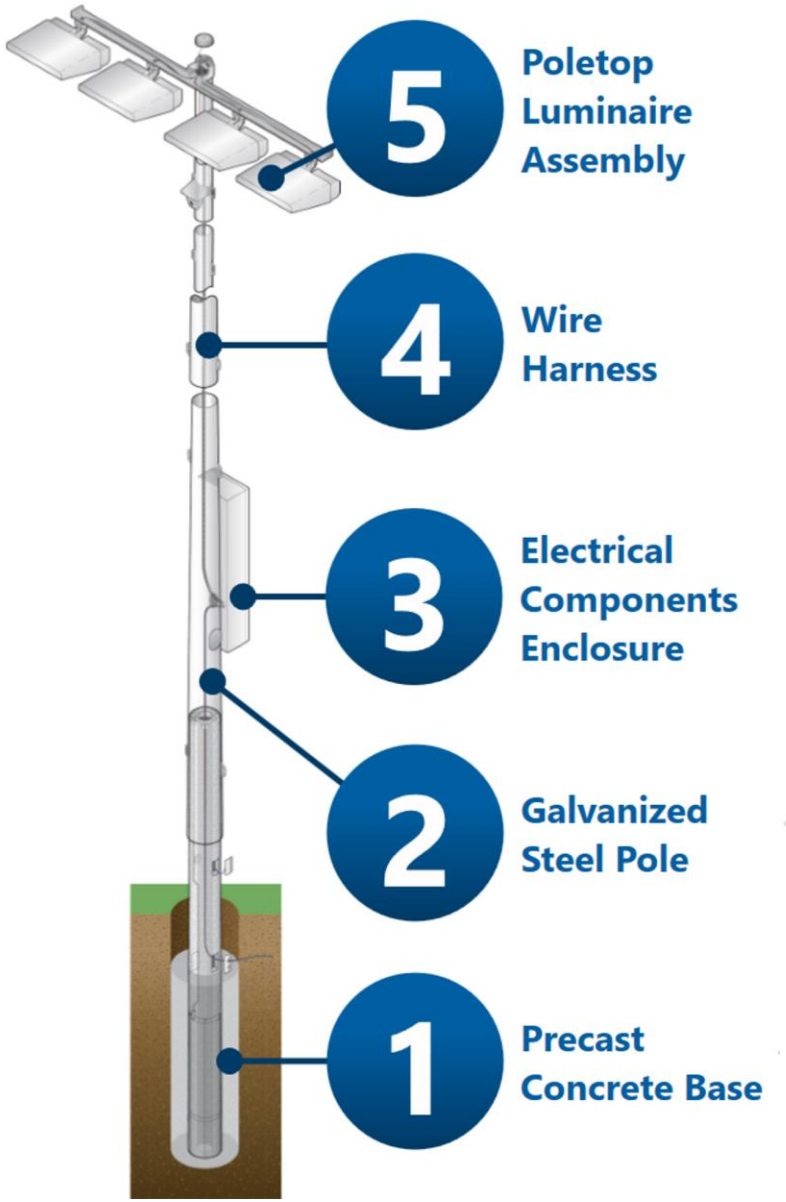
Benefits of the Light-Structure System

- Factory aimed, wired and tested to ensure reliable operation
- Precast concrete base provides a small footprint and eliminates corrosion
- Remote electrical enclosures remove excess weight at the top of the pole and provide easy access for servicing
- Galvanized steel poles slip fit for easy installation and durability
- Built in surge protection

Precast Concrete **Base**



Galvanized Steel **Pole**



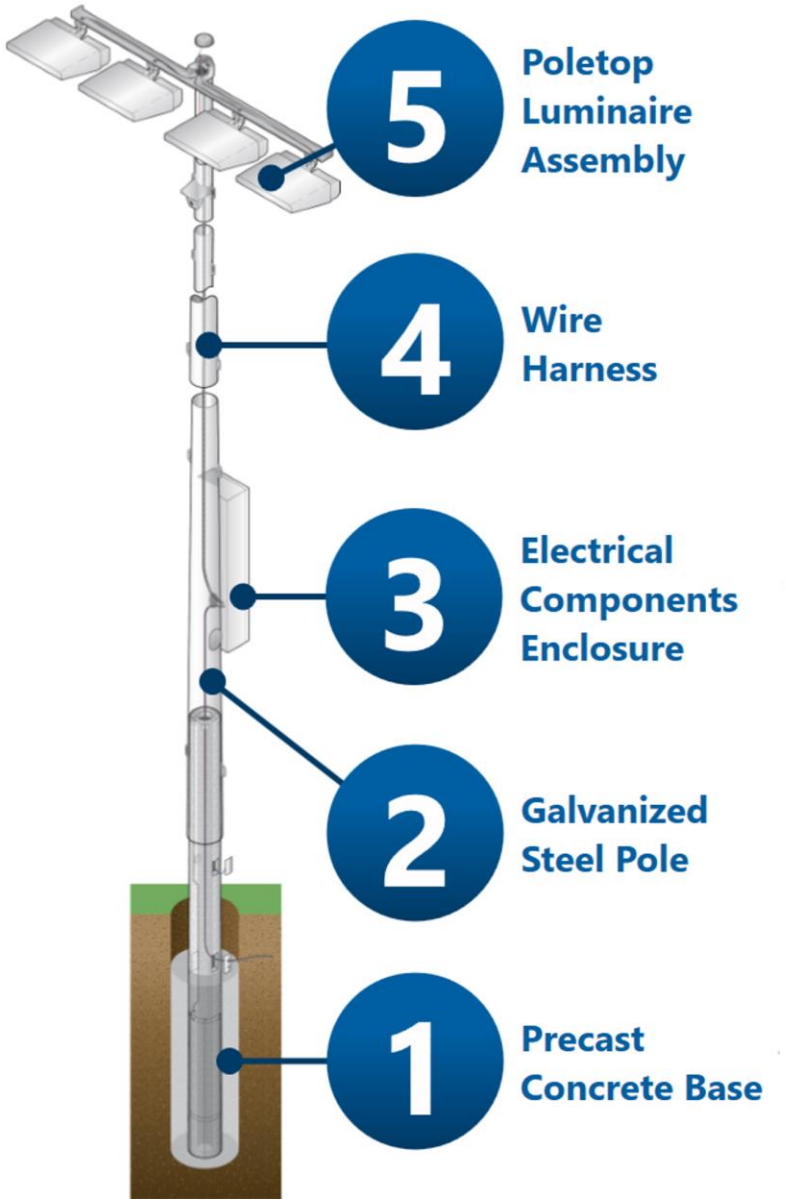
2 Galvanized Steel Pole

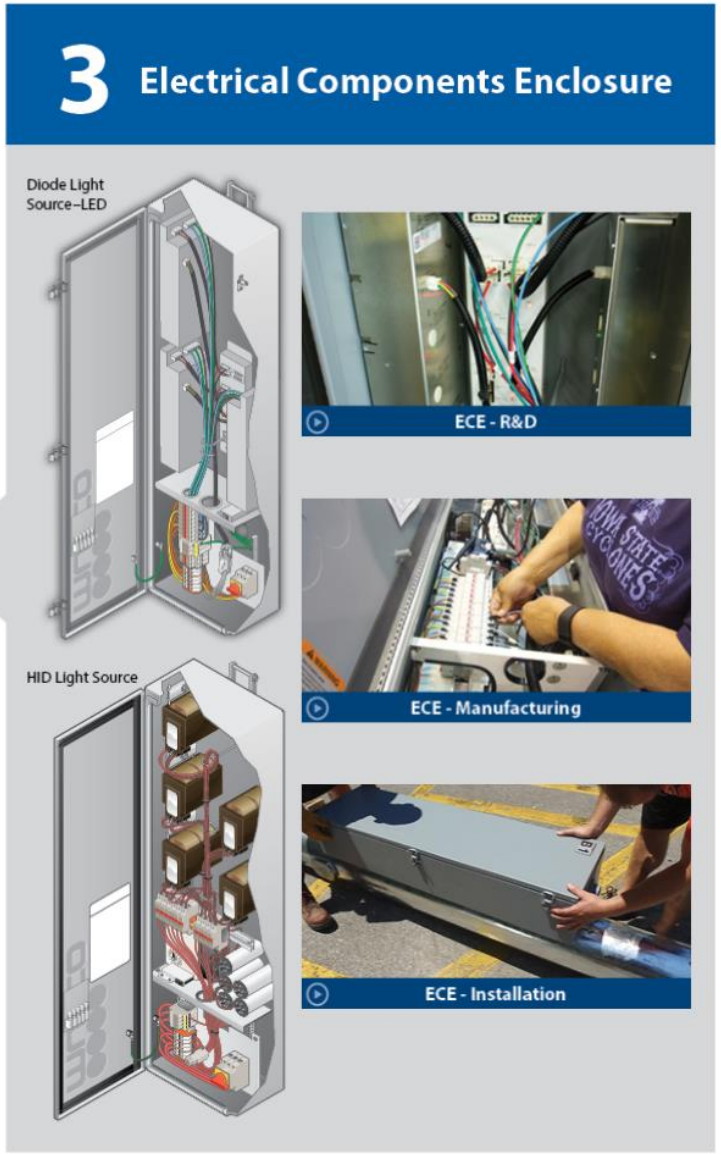

Galvanized Steel Pole - R&D


Galvanized Steel Pole - Manufacturing

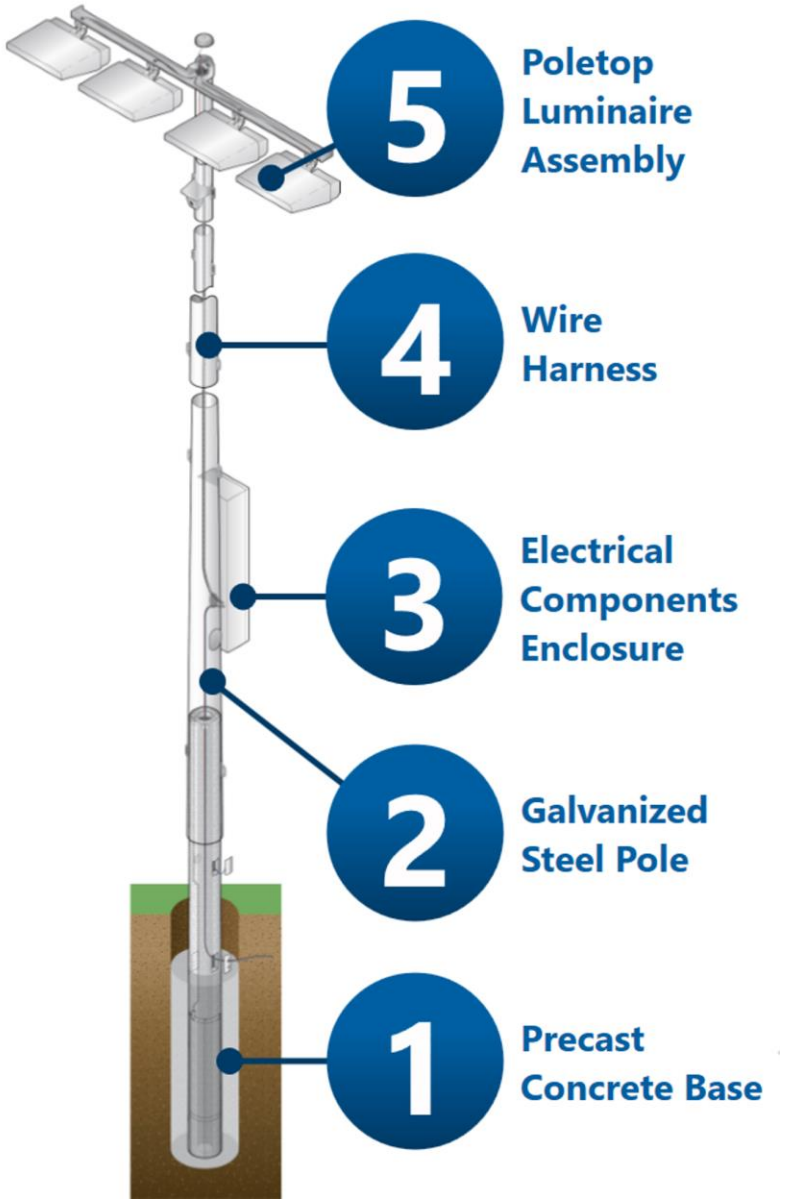

Galvanized Steel Pole - Installation

Electrical Components **Enclosure**

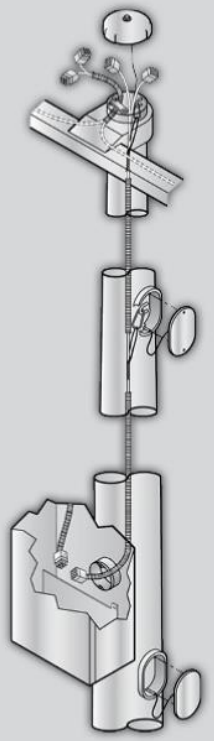




Wire Harness

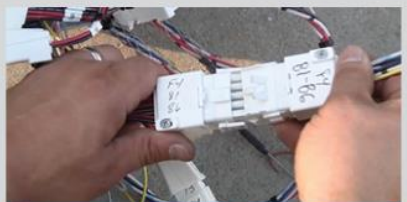


4 Wire Harness

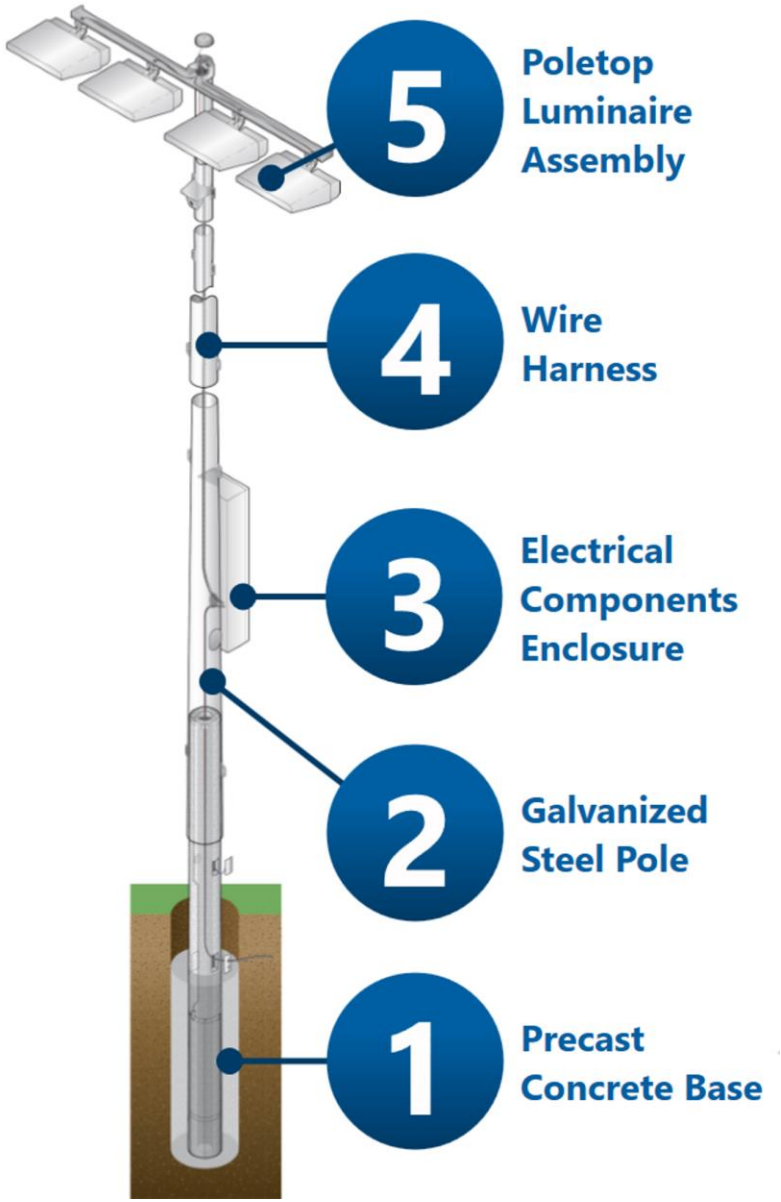



Wire Harness - R&D


Wire Harness - Manufacturing


Wire Harness - Installation

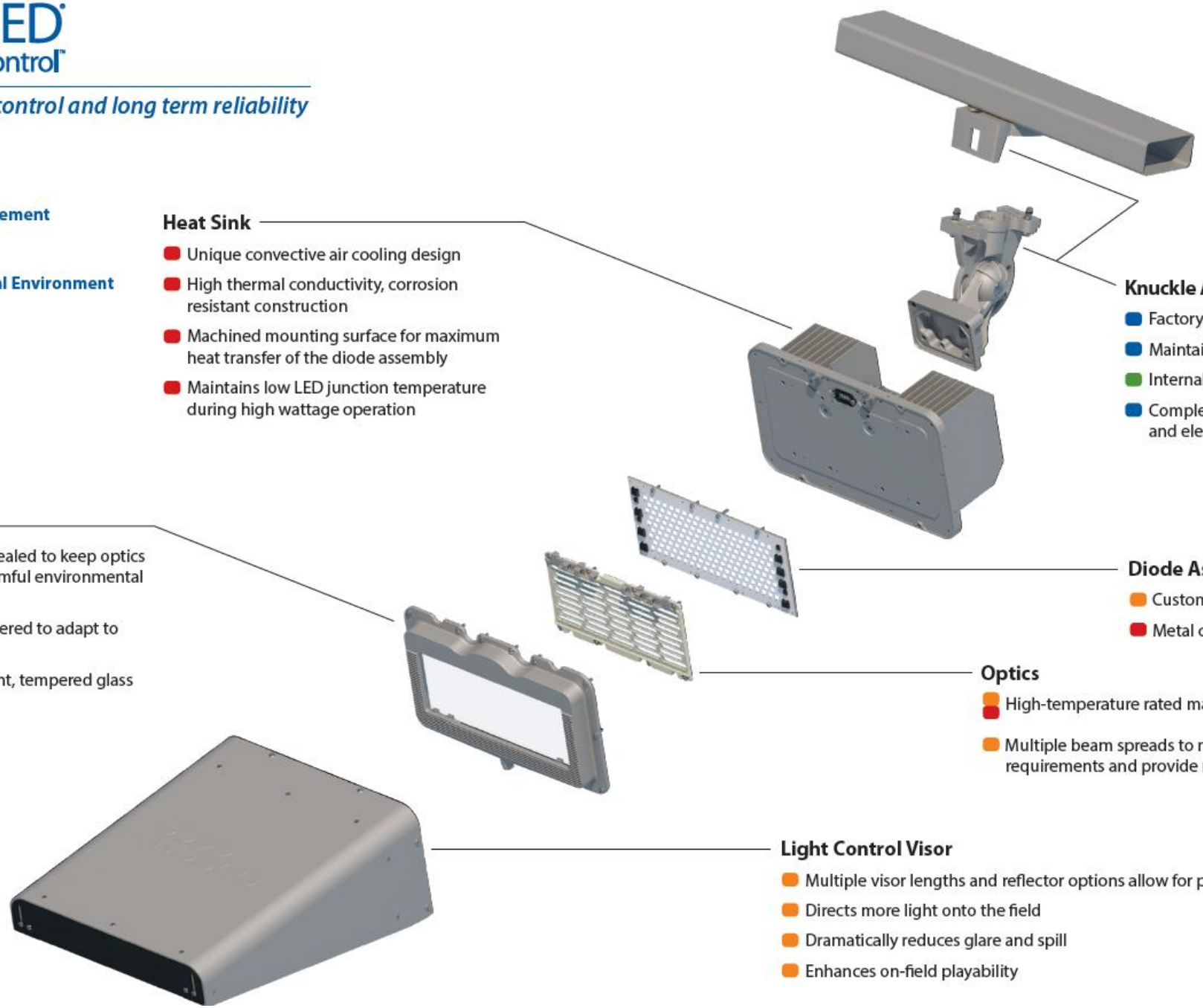
Poletop Luminaire **Assembly**



TLC for LED
Total Light Control™

Superior light control and long term reliability

- Alignment
- Thermal Management
- LED Optic
- Housing Internal Environment



Heat Sink
- Unique convective air cooling design
- High thermal conductivity, corrosion resistant construction
- Machined mounting surface for maximum heat transfer of the diode assembly
- Maintains low LED junction temperature during high wattage operation

Knuckle Assembly and Connection Plate
- Factory aimed to within 0.2 degree accuracy
- Maintains alignment in up to 150 mi/h winds
- Internal wiring protected from elements
- Completes integration of lighting to structural and electrical components

Lens
- Permanently sealed to keep optics away from harmful environmental elements
- Vented and filtered to adapt to environment
- Impact-resistant, tempered glass for strength

Diode Assembly
- Custom high-power diode package
- Metal core printed circuit board

Optics
- High-temperature rated materials for long life
- Multiple beam spreads to meet custom project requirements and provide maximum light control

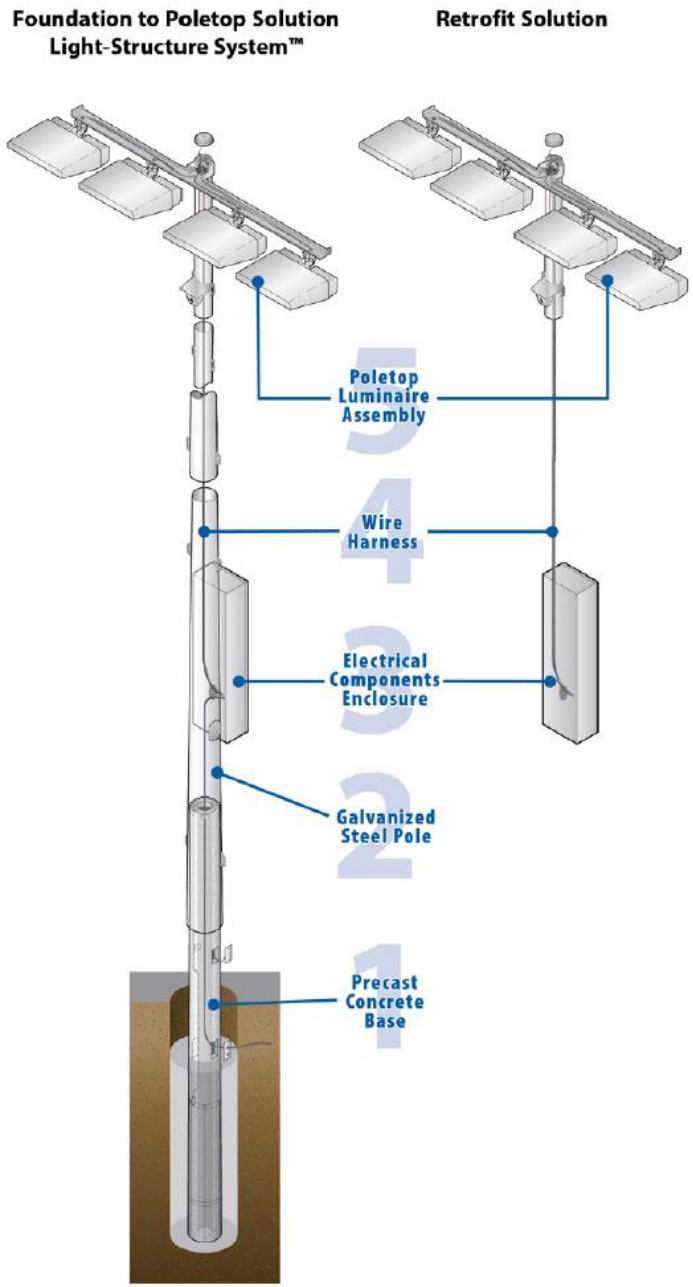
Light Control Visor
- Multiple visor lengths and reflector options allow for precise light control
- Directs more light onto the field
- Dramatically reduces glare and spill
- Enhances on-field playability

Retrofit System

We offer modular lighting solutions fo
and specialty-use pole

Benefits of Musco's approach to retrofits

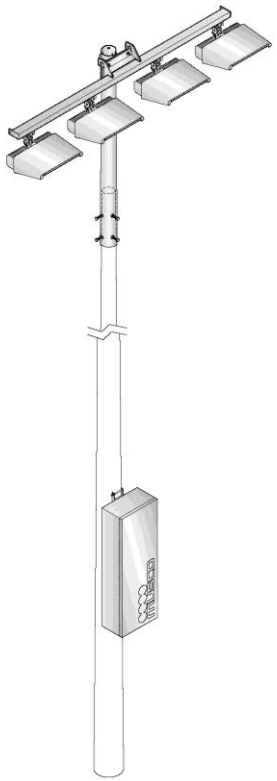
- Factory aimed, wired and tested to ensure reliable operation
- Includes new crossarms, wire harnesses, fixtures, and electrical component enclosures
- Remote electrical enclosures remove excess weight at the top of the pole and provide easy access for servicing
- Guaranteed light levels for the next decade with a 10-year parts and labor warranty



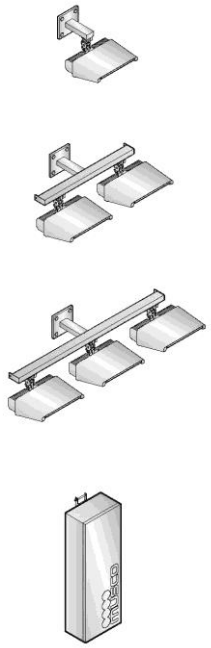
Retrofit **mounts**

We offer modular lighting solutions for existing poles, specialty-use poles, and roof-mounted structures

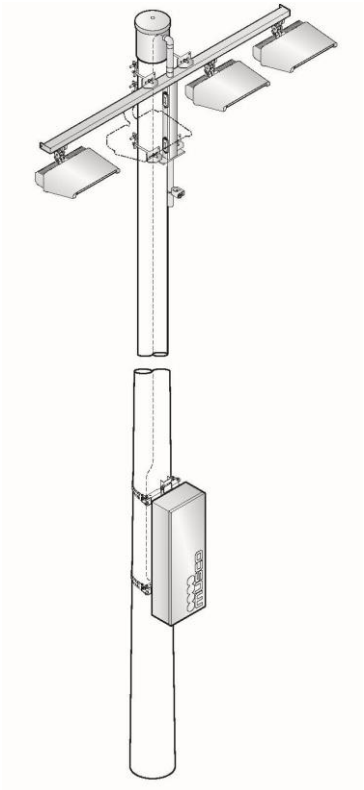
Slip-Mount



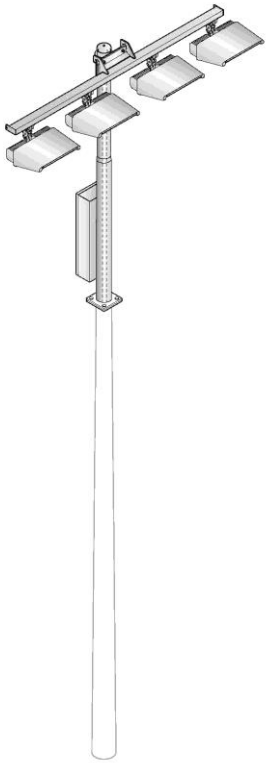
Wall-Mount



Bracket-Mount



Flange- Mount



Why An Integrated System **Approach?**

Responsible Design

Long-Term Warranty

Guaranteed Performance

What's Included In Our **Warranty?**

Musco's systems are backed by a 10-year parts AND labor warranty

musco Lighting

Musco Constant 10™

10-Year Product Assurance & Warranty Program

Musco Sports Lighting, LLC will provide all materials and labor to maintain operation of your lighting system to original design criteria for 10 years. Musco products and services are guaranteed to perform on your project as detailed in this document.

Light

Average illumination levels are guaranteed as described in the Project Details on the following page.

Individual luminaire outages that occur during warranty and maintenance period are repaired when the usage of any field is materially impacted.

Energy Consumption

Average and maximum energy consumptions for your lighting system are guaranteed. Exhibit A provides a 10-year energy cost model based upon the customer provided utility rate and anticipated hours of usage. Changes in rates or usage will proportionately change the costs.

Spill Light Control

Spill light readings at identified locations are guaranteed to be controlled to the values provided in Musco's design documents for your project, shown in Exhibit B.

Structural Integrity

Your project has been designed to _____.
Structural integrity of equipment manufactured by Musco is guaranteed.

ulfillment of our product and services warranty and maintains financial reserves dedicated to warranty. Please keep this document as your signed contract guaranteeing comprehensive

- Page 1 of 3 -

Musco's Constant 10™ Warranty

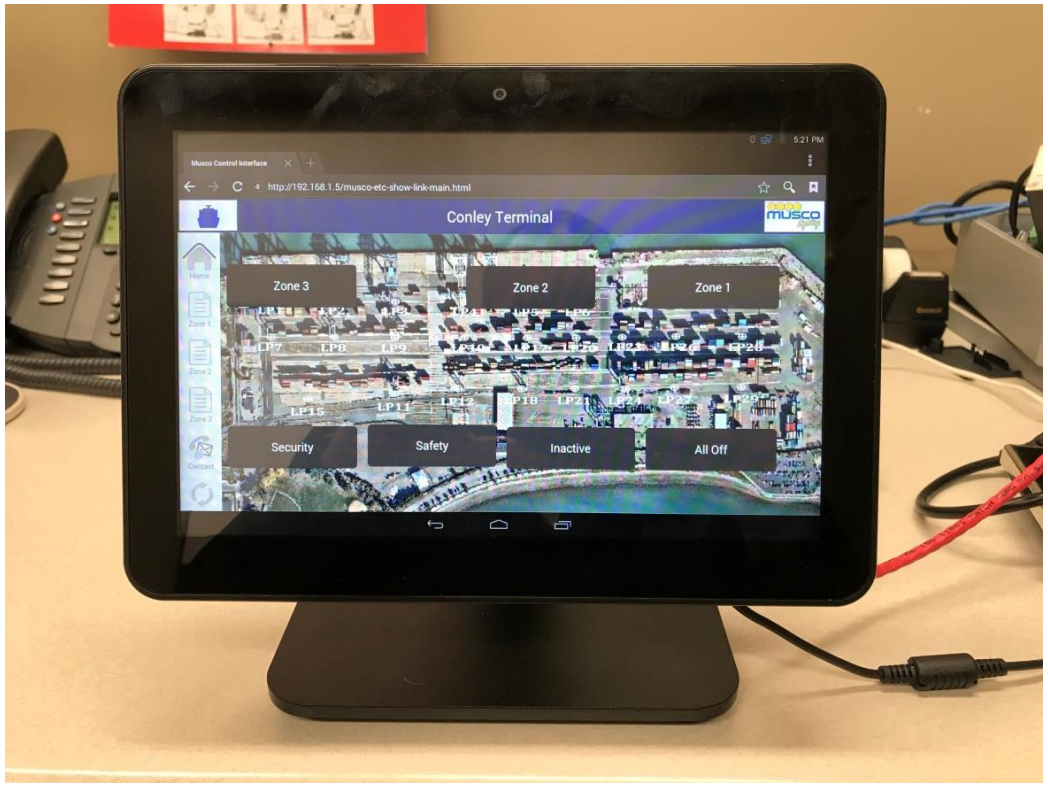
- Guarantees light levels for the duration of the warranty
- Eliminates maintenance costs and concerns
- Backed by a 170+ member warranty/service team

Facts

- Over 60,000 systems worldwide under warranty
- Over 1,400,000 fixtures under warranty

Control **options**

We offer a broad array of control options to best fit your facility and needs



Control Options

- Control-Link® System – Musco's controls and monitoring system provides remote on/off control
- Dimming Capabilities – Multiwatt dimming (high, medium, and low) or varied dimming
- Existing Control Systems – Built to integrate into existing facility management systems
- Activated Controls – Options include pushbutton or photocell controls to activate lighting and/or dimming

PROJECT EXAMPLES

Coastal Cargo Port of Houston
Houston, Texas, USA

Case Study: Antwerp Euroterminal

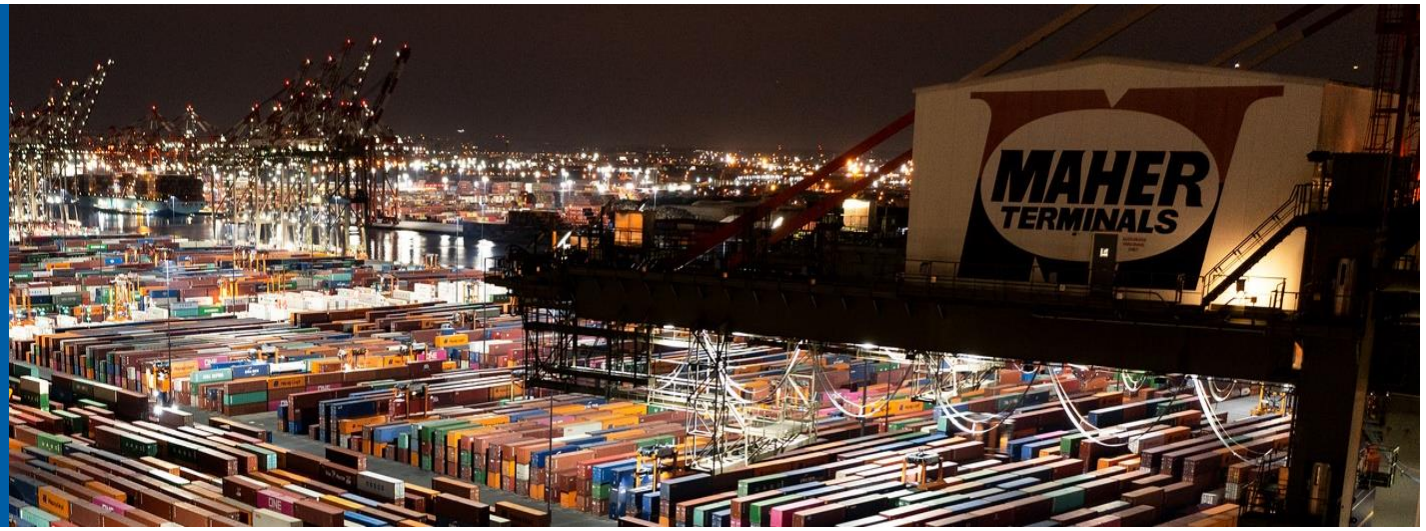
Project Information	
Fixtures	454
Light Level	29 lux
Color Temp	5700k
kW Usage	132.78 kW

Results

Energy Reduction 69%

Case Study: **Maher Terminals**

Project Information	
Fixtures	745
Existing Poles	121
Color Temp	5700 k
kW Usage	879.84



Results

Energy Reduction	55%
15-year Operating Savings	$7,139,503
Energy Rebate	$1,198,352


Before: HPS Lighting


After: TLC for LED®

Case Study: **APM Terminals Los Angeles**

Project Information	
Fixtures	903
Existing Poles	102
Color Temp	4500k
kW Usage	1291.29

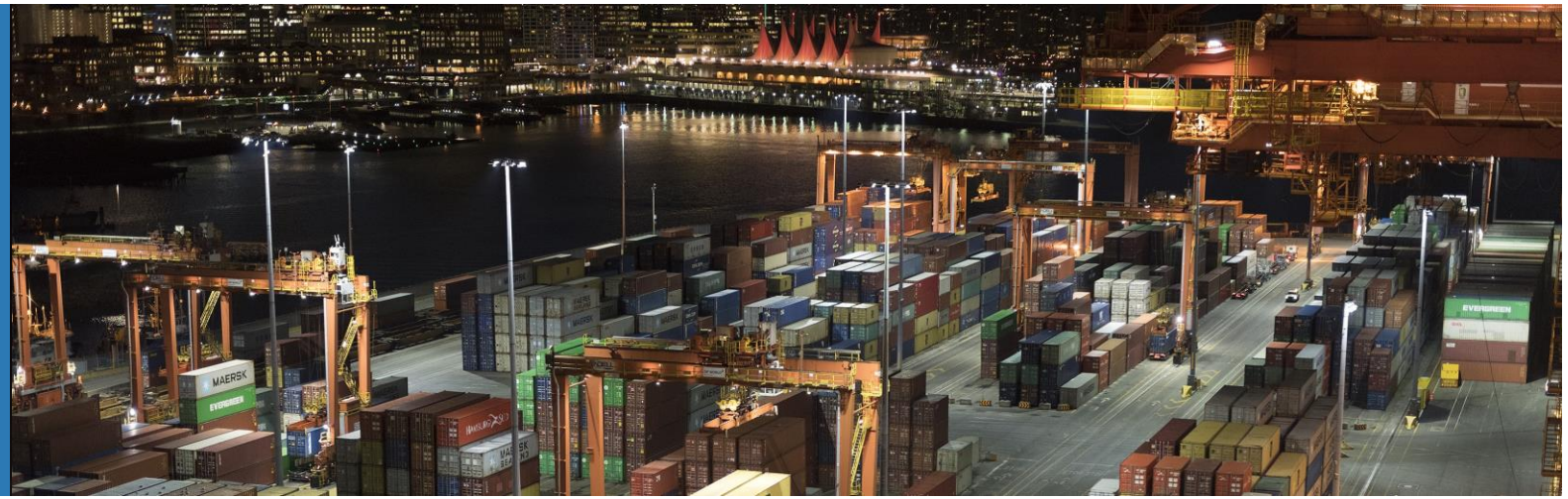
Results

10-year ROI $5,613,408

Energy Rebate Over $1 million

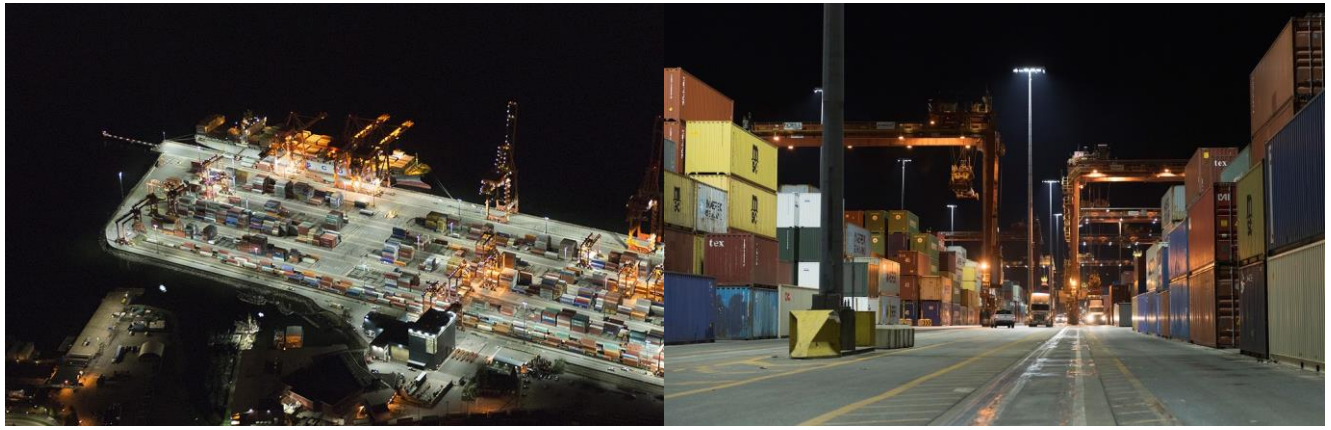
Case Study: DP World Vancouver

Project Information	
Fixtures	285
Light Level	50 lux
Color Temp	5700k
kW Usage	145.8 kW



Results

Energy Reduction	58%
10-year Operating Savings	$1,450,000



Case Study: **Frankenbach Vehicle Logistics Center**

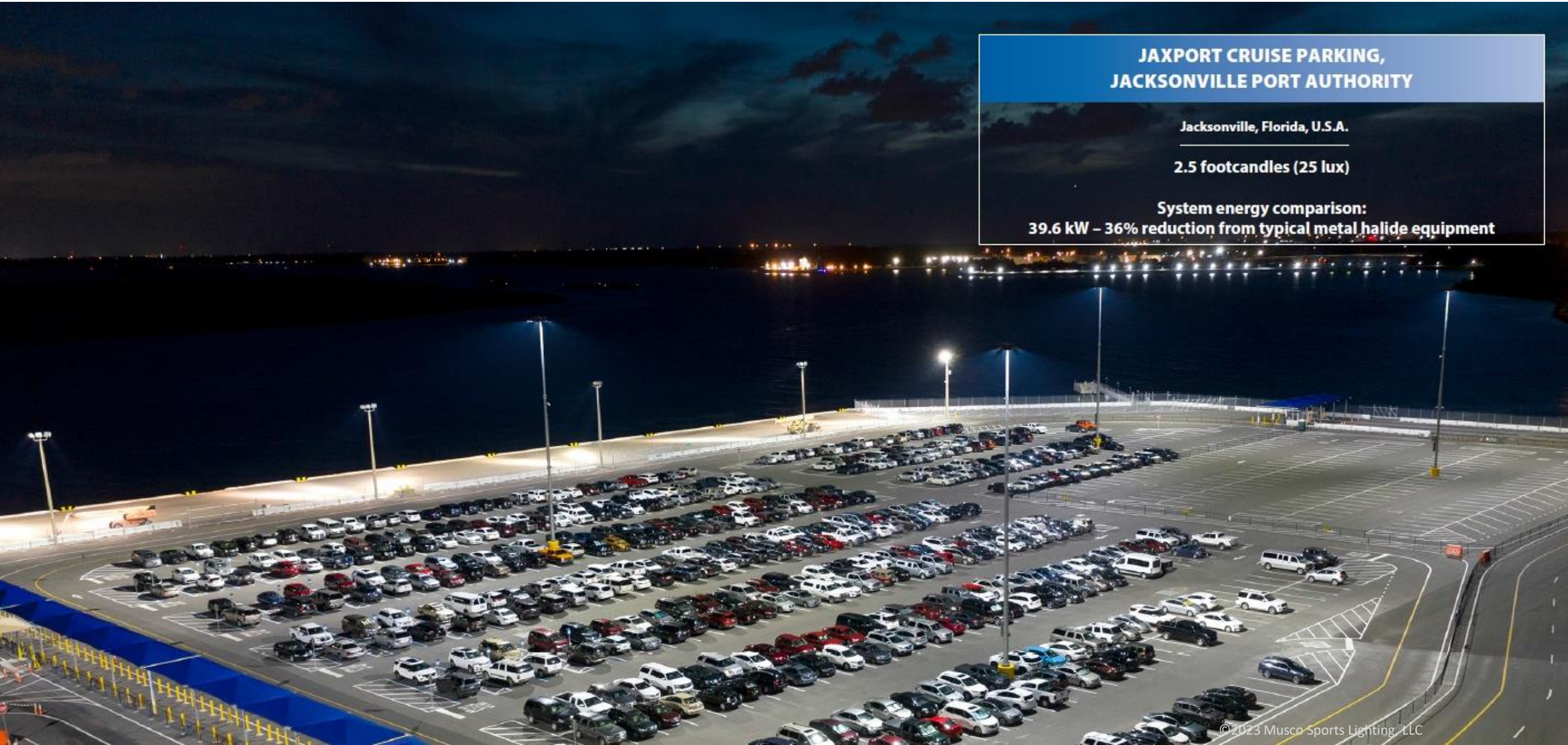
Project Information

Fixtures	48
Light Level	30 lux
Color Temp	5700k
kW Usage	13.4 kW

Results

Energy Reduction	77%
10-year Operating Savings	$575,000

Case Study: **Jaxport Cruise Parking**



Musco's **Innovations**

1976
Company founded

1977
Revolutionized the sports lighting market with SportsCluster® System

1982
Launched Musco Mobile with the lighting at Notre Dame Stadium

1989
Made major improvements in light control with the launch of SportsCluster-2 System

1991
Introduced the first complete foundation-to-poletop solution with Light-Structure System™

1992
Made night racing possible with the introduction of Mirtran™ at the Charlotte Motor Speedway

1999
Introduced remote on/off control with Control-Link® System

2005
Revolutionized floodlighting with the introduction of Green Generation™ Technology, which cut energy consumption in half

2008
Designed and installed a cutting-edge LED system at the White House

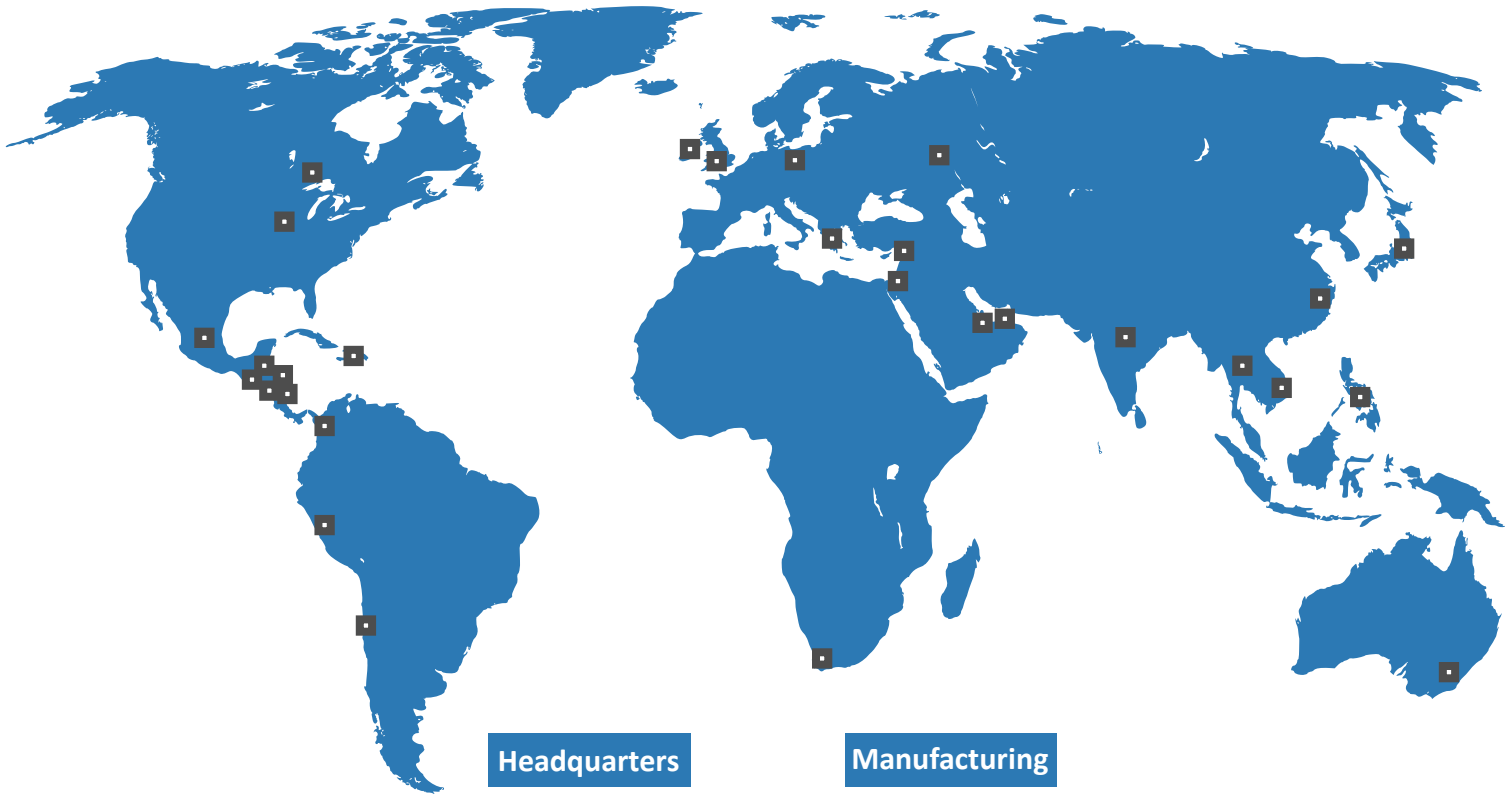
2013
Custom designed an LED solution on the East Span of the Bay Bridge

2016
Introduced TLC for LED® technology, cutting glare by 90% and energy up to 80% from typical metal halide lighting

2018
Launched partnership with ADB Safegate Americas for the airport market

Our global **reach**

Global Offices



Headquarters

Oskaloosa, Iowa, USA

Manufacturing

Muscatine, Iowa, USA
Shanghai, China
Gumi, South Korea

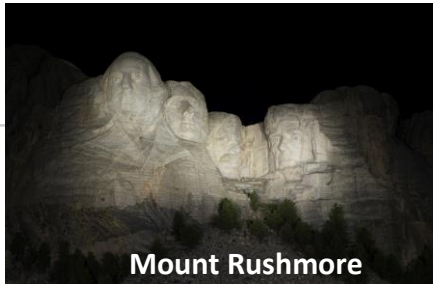
1600
Employees Worldwide

115+
Countries with Musco Systems

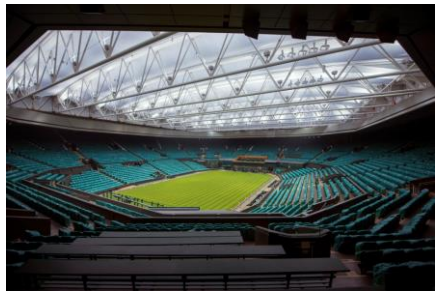
75+
Application Engineers

170+
Member Warranty/Service Team

Special Projec



Our products & **services**

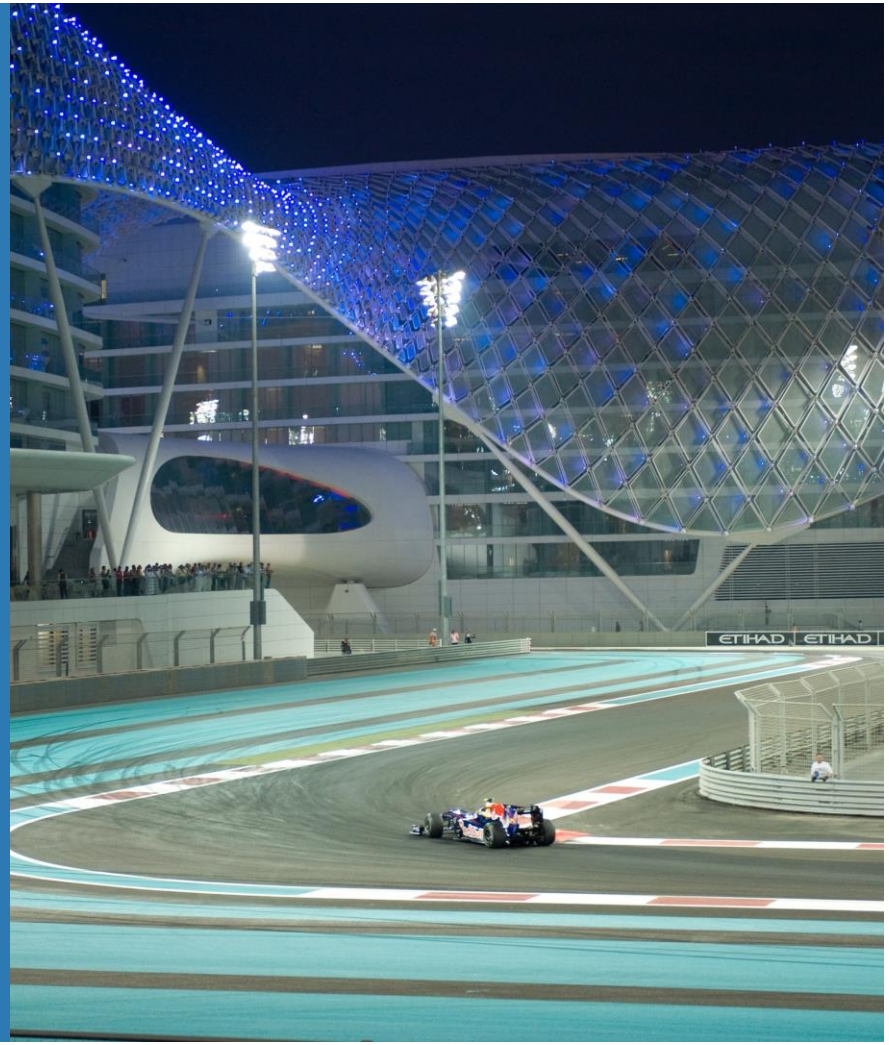


Sports

Transportation & Infrastructure

Temporary & Mobile Lighting

Lighting Services



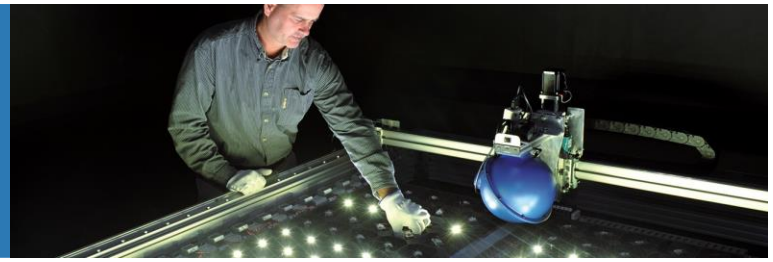
Application **expertise**

Our team is with you each step to ensure you get the results you want

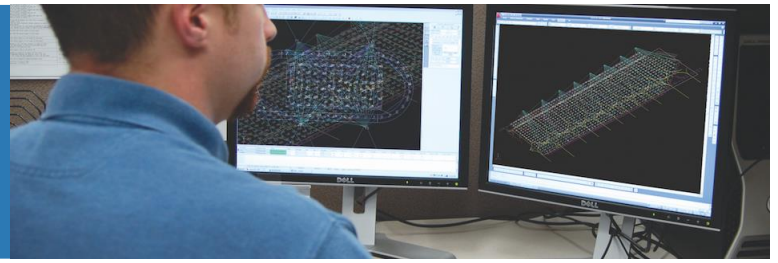
We customize each lighting system to meet the needs of the facility and application.

R&D	We have a team devoted to ensuring reliability and technology improvements
Application Engineers	Our 50+ application engineers create custom designs for each project
Custom Designed	We design the solution to ensure the right quantity and quality of light on the site
Project Management	On-site project management ensures a trouble-free installation

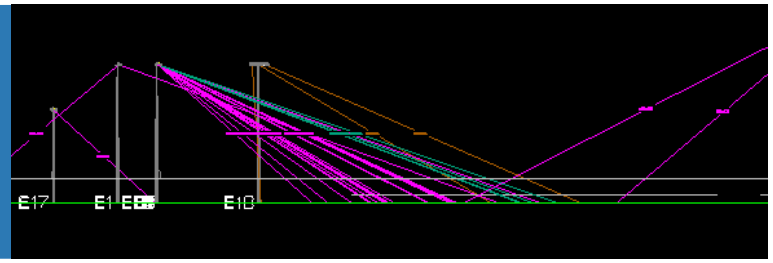
R&D



Application Engineers



Custom Designed



Project Management

Sustainability in Transport & Infrastructure Lighting

Thank you for your Attention

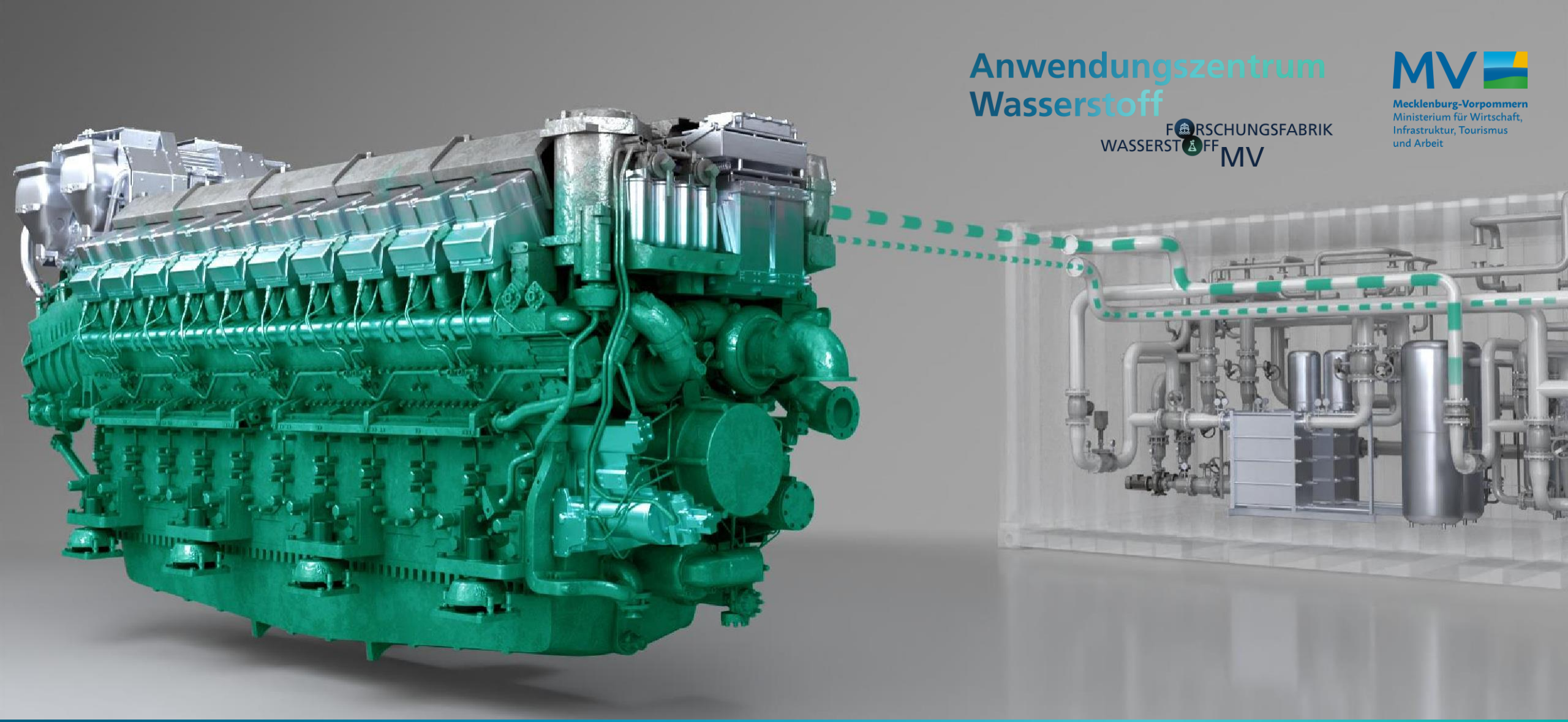
For questions and comments please contact:

Hauke Petersen
Senior Sales Manager
Mob: +49 160/97824263
E-Mail: hauke.petersen@musco.com

Hampden Park Car Park, Glasgow, Scotland, United Kingdom

Alternative fuels for maritime energy converters

Fraunhofer Institute



Application Center Hydrogen

Green solutions for the maritime industry

Fraunhofer IGP

The largest organization for applied research in Europe

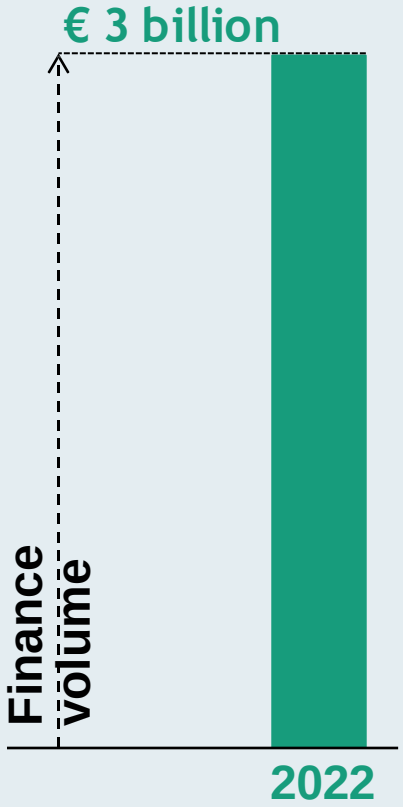
Fraunhofer-Gesellschaft

Fraunhofer-Gesellschaft

At a Glance

Over 30 000 employees

76 institutes and research units



Industrial research in Rostock

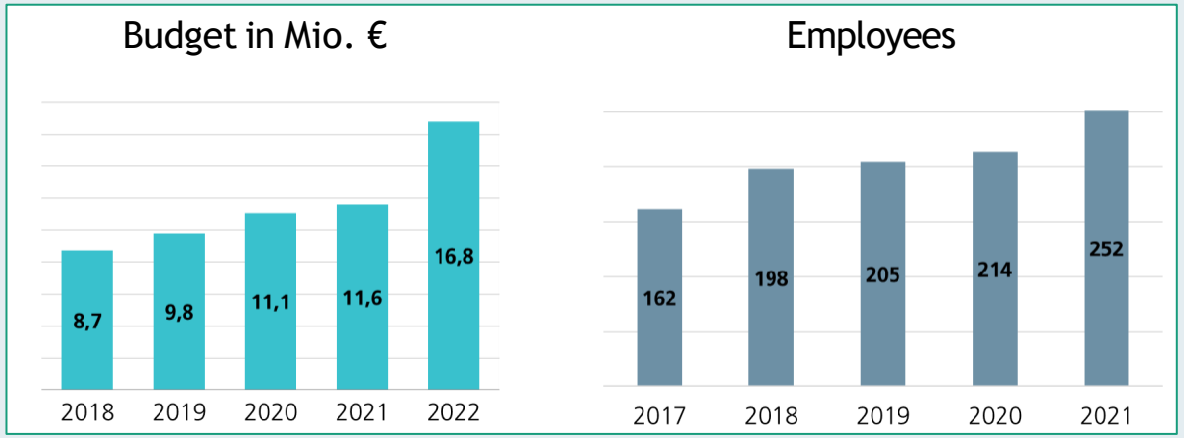
Fraunhofer Institute for Large Structures in Production Engineering IGP

Fraunhofer IGP

Fraunhofer-Institute for Large Structures in Production Engineering IGP

Fraunhofer IGP

- Production- and manufacturing-oriented tasks of the industry
- Concepts and innovations in the field of shipbuilding, steel construction, energy technology, rail, vehicle construction as well as mechanical and plant engineering
- Cooperation agreement with the University of Rostock
- Independent institution since 2017
- Since 2020 first Fraunhofer Institute with headquarters in M-V

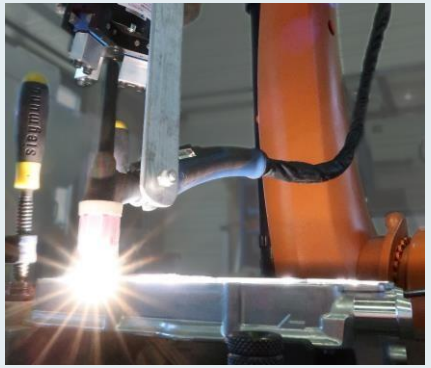


Photos: Fraunhofer IGP Rostock

What are we strong at

Fraunhofer Institute for Large Structures in Production Engineering (IGP)

New competence



Manufacturing technology

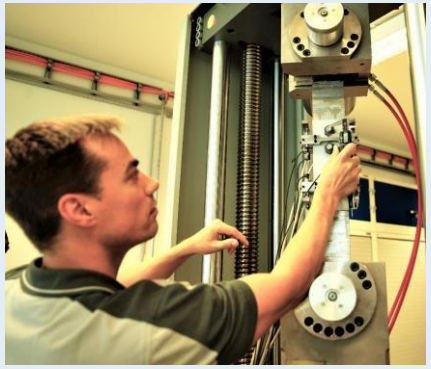
- Joining and Forming by Plastic Deformation
- Mechanical Joining Technology
- Thermal Joining Engineering

New materials and processes

- Adhesive Bonding Technology
- Fiber Composite Technology
- Coating, Weathering and Corrision Protection

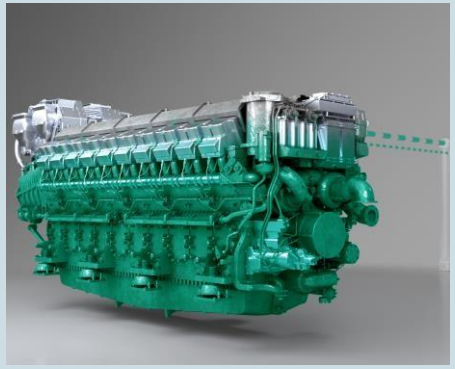
Production systems and logistics

- Factory and work organisation
- Production planning
- Automation Engineering
- Measuring of Large Structures



Accredited test laboratory

- Inspection monitoring and certification body



Hydrogen Application Center

- Enormous potential for the future
- Exisiting know-how in Rostock
- Available infrastructure
- Wide partner network

~ 250 employees, ~17 Mio. € overall budget

Hydrogen Research Factory MV

Hydrogen Application Center

Fraunhofer IGP

Hydrogen Research Factory MV

Interdisciplinary research network

FORSCHUNGSFABRIK WASSERSTOFF MV

PtX Transfer Technical Center

Production path

- H_2 production from water using electrolysis
  - Synthesis of e-fuels
    - Carbon capture

LIKAT

Katalysis LIKAT Leibniz-Institut für Katalyse

PtX Plasma Development Center

Production path

- H_2 production from methane using plasmalysis
  - Technologies for gas treatment

INP

INP FROM IDEA TO PROTOTYPE

Hydrogen Application Center

Transfer path

- Development of alternative energy converter systems
  - Hydrogen-based logistics chains

IGP

Fraunhofer IGP

Hydrogen Research Factory MV

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FORSCHUNGSFABRIK WASSERSTOFF MV

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IGP

Fraunhofer IGP

MV Mecklenburg-Vorpommern Ministerium für Wirtschaft, Infrastruktur, Tourismus und Arbeit

Fraunhofer IGP

Hydrogen Research Factory MV
Hydrogen Application Center

Anwendungszentrum Wasserstoff

Driving force for the economic application of sustainable technologies in the maritime industry

1. Wide range of **test rigs** for **energy converters** (combustion engine, fuel cell + battery)
2. **Retrofit concepts** for converting the fleet
3. Solutions for **production-related challenges** in the context of the H_2 ramp-up
4. Development of **hydrogen-based logistics chains**

Research activities started in July 2023

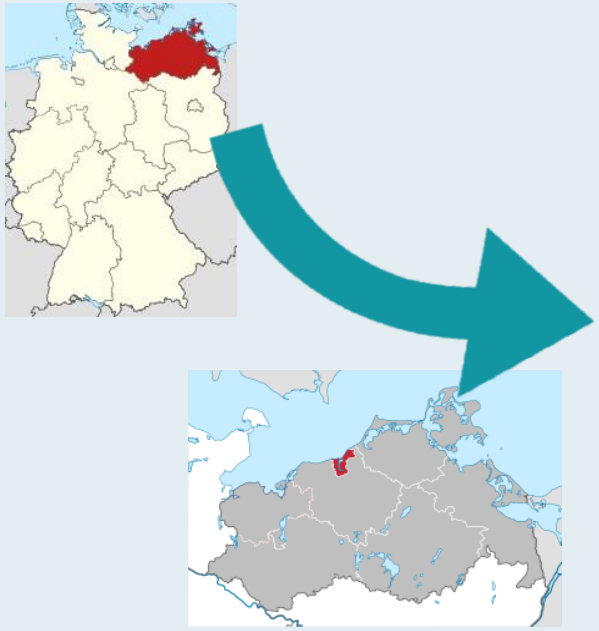
Funding of € 9.9 million for infrastructure

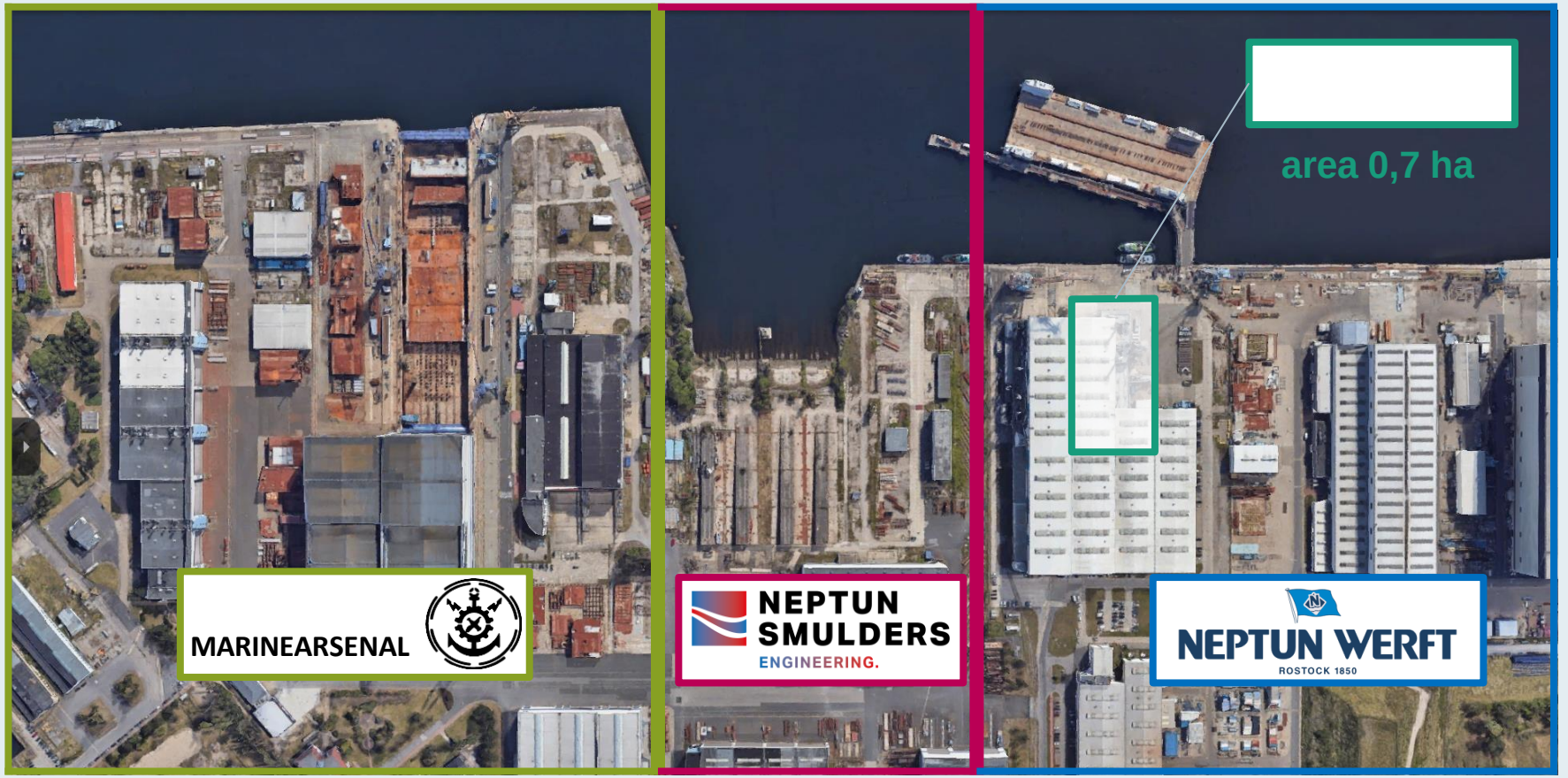
MV Mecklenburg-Vorpommern Ministerium für Wirtschaft, Infrastruktur, Tourismus und Arbeit

Fraunhofer IGP

In best neighborhood
Hydrogen Application Center

Anwendungszentrum Wasserstoff





Address:
Fraunhofer IGP
Anwendungszentrum Wasserstoff
Werftallee 13
18119 Rostock-Warnemünde
Germany

*The site is located in the **direct neighborhood of the maritime industry** and is intended to serve as a nucleus for application-oriented maritime **climate-friendly technologies.***

MV Mecklenburg-Vorpommern Ministerium für Wirtschaft, Infrastruktur, Tourismus und Arbeit
Fraunhofer IGP

Success through teamwork
Hydrogen Application Center

Anwendungszentrum Wasserstoff

Expertise

- Currently **13 employees** at the site
- **Intensive cooperations** with regional partners

LKV ROSTOCK · FVTR · MET · EE · INP FROM IDEA TO PROTOTYPE · catalysis Leibniz-Institut für Katalyse LIKAT

Interdisciplinary team *with many years of experience in the field of combustion engines.*
Further growth *will take place in the near future.*

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Fraunhofer IGP

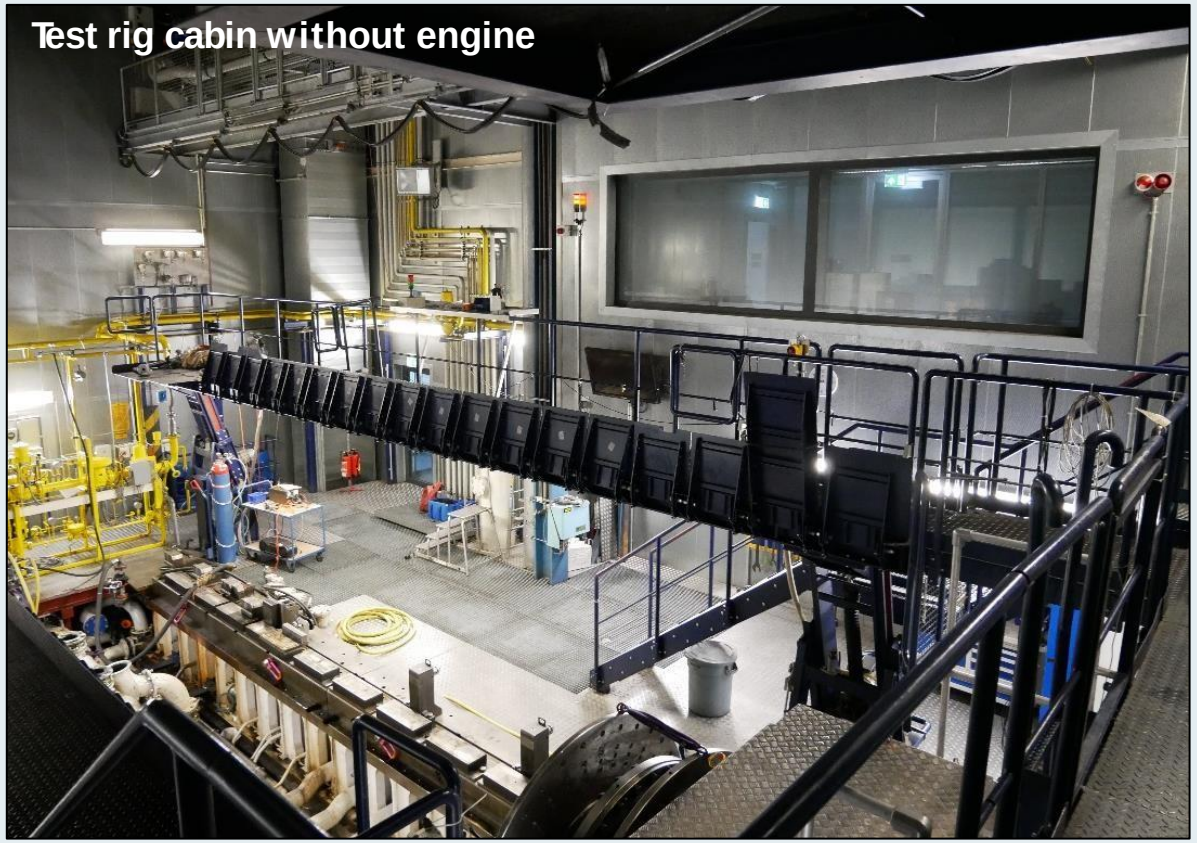
Energy converter test rigs as a key component

Hydrogen Application Center

Anwendungszentrum Wasserstoff

Infrastructure highlights

- **Two test rigs** (circa 16 x 10 m each)
- Power range up to **10 MW**
- Movable **exhaust gas platform**
- **Two more** control rooms for additional test rigs



Test rig cabin without engine

Planned investments

- **Additional** MW-scale **test rigs**
- In-house **multi-fuel** research **engine** (approx. **1.3 MW**)
- **AS dyno** with load shedding scenario
- **Tank infrastructure** for further alternative fuels

__Manufacturer-independent__ infrastructure for the development and evaluation of large-scale __alternative propulsion__ and __energy systems.__

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Fraunhofer IGP

Fuel infrastructure as the foundation

Hydrogen Application Center

Anwendungszentrum Wasserstoff

Infrastructure highlights

- **Conventional fuels**
  - Marine diesel
  - VLSFO
- **Gas fuels**
  - Natural gas
  - Propane
  - carbon dioxide
- **Fuels of the future**
  - Methanol

Planned investments

- **Ammonia supply** (on request, ~1.5 years)
- **Hydrogen supply** (on request)
- Other fuels, lubricants and chemicals and on request (e.g. LOHC)

Extensive range of fuels *to cover the industry's needs as fully as possible*

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Fraunhofer IGP

More than just engine test rigs

Hydrogen Application Center

Anwendungszentrum Wasserstoff

Infrastructure highlights

- Trisectional **test rig cabin** for subsystems and **components** (10 x 14 m)
- **3,600 square meters** of roofed workshop area (height 22 m)
- **Crane capacity** up to **150 t**

View of the workshop area

Ready-made control rooms

Component test rig (under construction)

Planned investments

- Modular test rig for a flexible maritime propulsion system incl. **reformer, fuel cell and battery**
- Functional prototype for **plasmalysis**
- Large **pallet storage** system

Large-scale infrastructure *in accordance with the requirements of the maritime industry. Room for* ***further growth***

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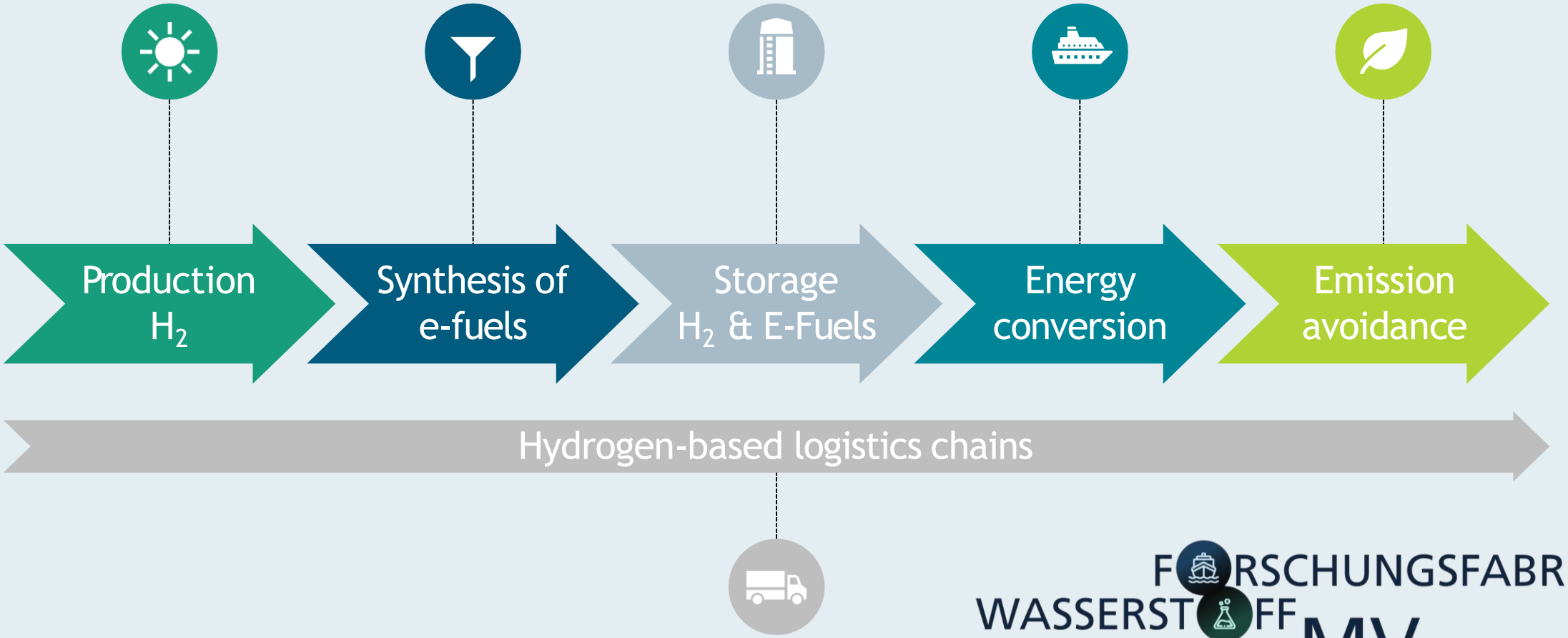
Fraunhofer IGP

Value chain for climate-friendly shipping

Solutions made in Mecklenburg-Vorpommern



FORSCHUNGSFABRIK WASSERSTOFF MV

MV Mecklenburg-Vorpommern Ministerium für Wirtschaft, Infrastruktur, Tourismus und Arbeit

Fraunhofer IGP

Thank you for your attention!

„Water is the coal of the future. The energy of tomorrow is water that has been decomposed by electricity. The decomposed elements of water, hydrogen and oxygen, will secure the energy supply of the earth for an unforeseeable period of time.“

- Jules Verne 1875

Contact

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wilko.fluegge@igp.fraunhofer.de

Roundtable discussion

- *Port congestion and waiting time at ports*

Update on ECG activities

- *Current topics*
- *New initiatives*
- *ECG General update*

Current topics

FuelEU Maritime

31 August 2024

Submission of monitoring plans

• • •

2024/2025

Adoption of implementing acts

• • •

1 January 2025

Implementation

- *Sets requirements for the annual GHG intensity of energy used by ships*
- *GHG emission calculated as well to wake*

- Different instruments published by Commission for supporting compliance
- ***EU Guidelines*** on demonstration of GHG/ Marine Fuel Certification '<u>Proof of sustainability</u>' will be published in the next months – compliance with Renewable Energy Directive (RED)

New initiatives

Rail initiative

Background: increasing interest for rail transportation to tackle key issues

Status: a steering group has been established to define and prioritize key topics

Activities of Working Groups will be launched accordingly

Invoicing initiative

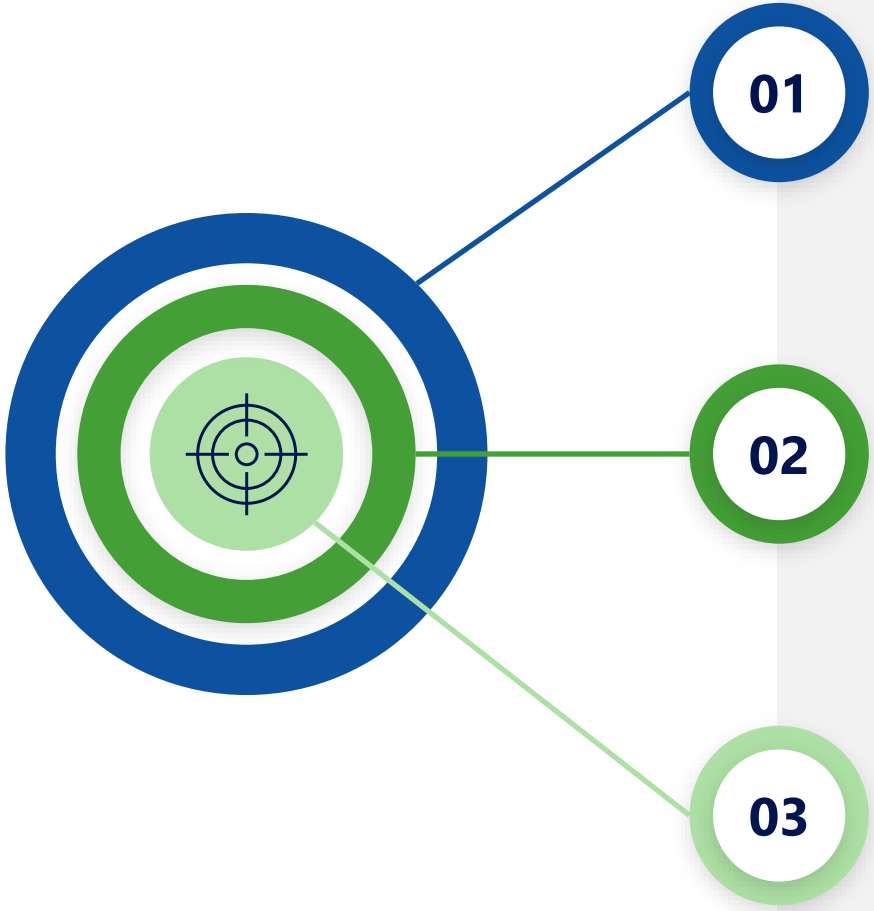
Background

Invoicing as an issue for ECG members

- 65% of the respondent LSPs reported in the ECG tech Board survey that the too long invoice payment times have high or very high impact

- 75% of the attendees at the ECG General Assembly identified invoicing standardisation as a priority topic for ECG

Invoicing initiative



LSP task force to be convened to work on a questionnaire for the ECG membership

Kick-off meeting → 19 September

Send out the **questionnaire** to all ECG main delegates and analyse the results to know the causes of the payment delays. Possibly quantify the problem. What can be a solution?

Once our understanding of the LSP issues is sufficient, **involve the OEMs** too to have the views of the 'other side' too

Purpose is to **understand the challenges** and to **draft the questionnaire** along these lines

Purpose is to **finetune the analysis** of the problems encountered, quantify their impact and understand their root causes

Deep dive with several OEMs in interviews to have their views too. Then present the first findings at the Industry Meeting in October

ECG The Association of European Vehicle Logistics

Negotiation management

Negotiation Academy Potsdam

Relaunch of the programme

- It is delivered by Negotiation Academy Potsdam, part of the University of Potsdam (in person)
- High-standard intensive 2-day programme
- Registrations are now open

Negotiation Management
- 21-22 January 2025
- 4-5 March 2025

Advanced course 'Big Mountain'
- 12-13 November 2025

ECG The Association of European Vehicle Logistics

Working group updates

Emissions standardisation

Training: Sustainability and carbon emissions accounting for vehicle logistics

Tuesday, 19 November

12:00-18:00

Wednesday, 20 November

09:00-13:00

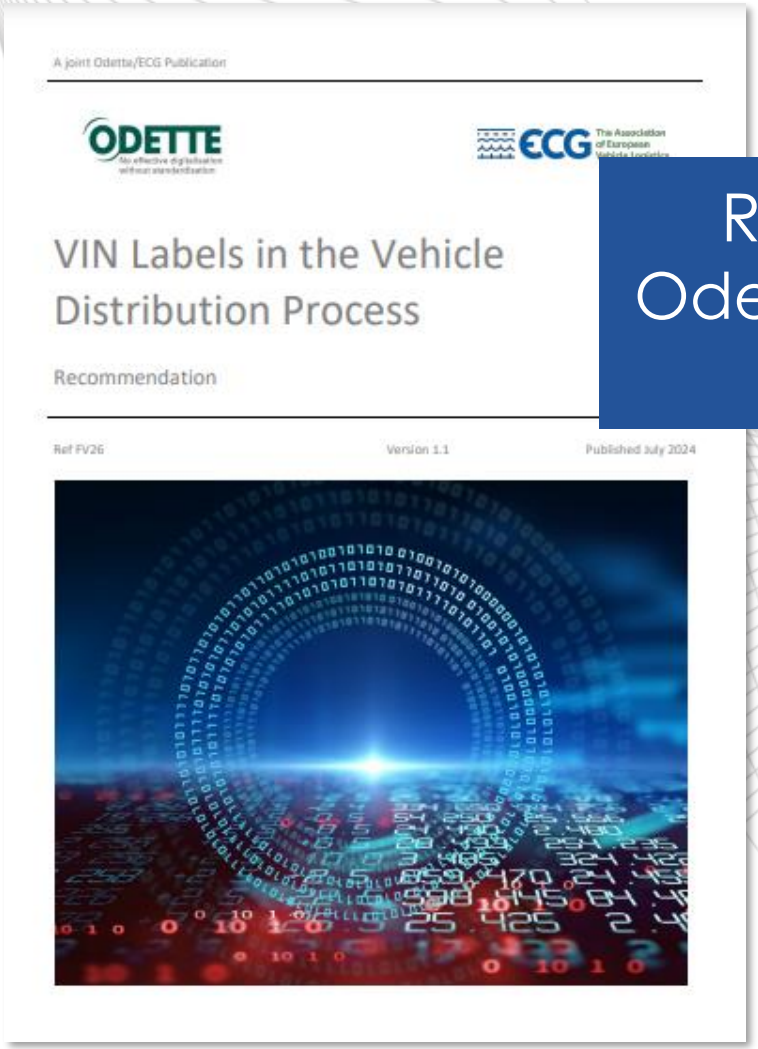
Brussels, Belgium

Training on implementation of the ECG-VDA guidelines

Who? Every service provider interested in using the guideline

Free of charge for all ECG members

Quality



Revision of the ECG-Odette VIN label standard is now available

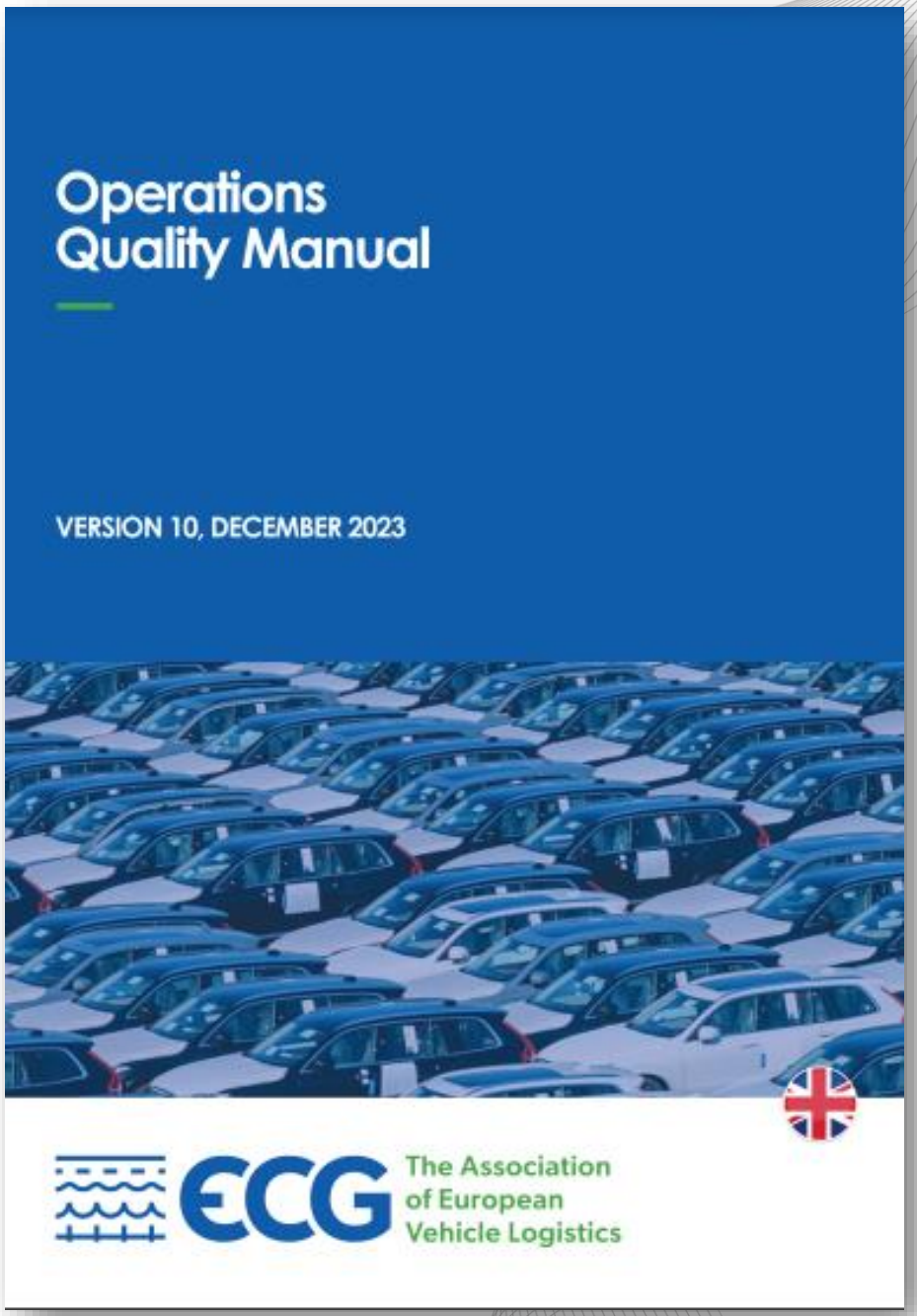
A list of information to be shared with the LSPs for essential for the efficient handling and stowing of the vehicles.

ECG The Association of European Vehicle Logistics

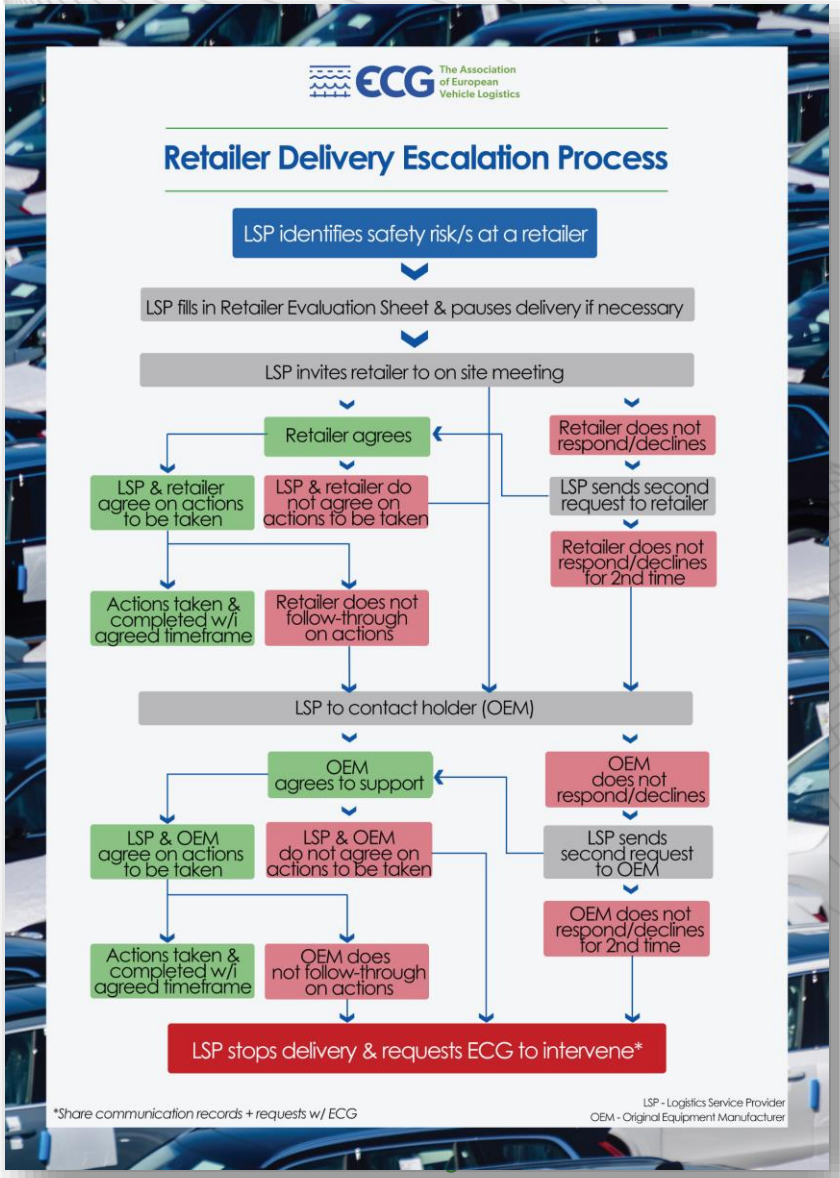
Quality

- Provides a minimum industry standard for vehicle handling
- OQM for Cars and LCVs was last updated in December 2023
- Chapter on the transport of cars in containers added
- Translated to 10 languages

ECG The Association of European Vehicle Logistics



Health & Safety



Work of the subgroup Delivery at retailers restarted

Next step: Discussion at the Industry meeting in October

FVL Legal network

- *Meetings*: 4 times a year online
- *Objective*: forum where legal experts in FVL can network and exchange ideas on legislation that affects our sector
- Are your colleagues already part of the network?

Our publications

ECG The Association of European Vehicle Logistics

Our latest Business Intelligence report

ECG Survey

The Association of European Vehicle Logistics

ECG Survey Website

Our events

Register now!

Latest agenda

Save the date

Our future events

Date	Event	Place
24 October 2024	**Women in FVL**	Hamburg, Germany
24-25 October 2024	**ECG Conference**	Hamburg, Germany
20-21 February 2025	**Alumni meeting**	Barcelona, Spain
22-23 May 2025	**General Assembly & Spring Congress**	Cascais, Portugal

Dates and venues for the next meetings

Next meeting(s)

- February/March 2025 – Valencia, Spain
- June/July 2025 – Any proposals?
- September 2025 – Hanko, Finland

AOB?


Thank you for your attention