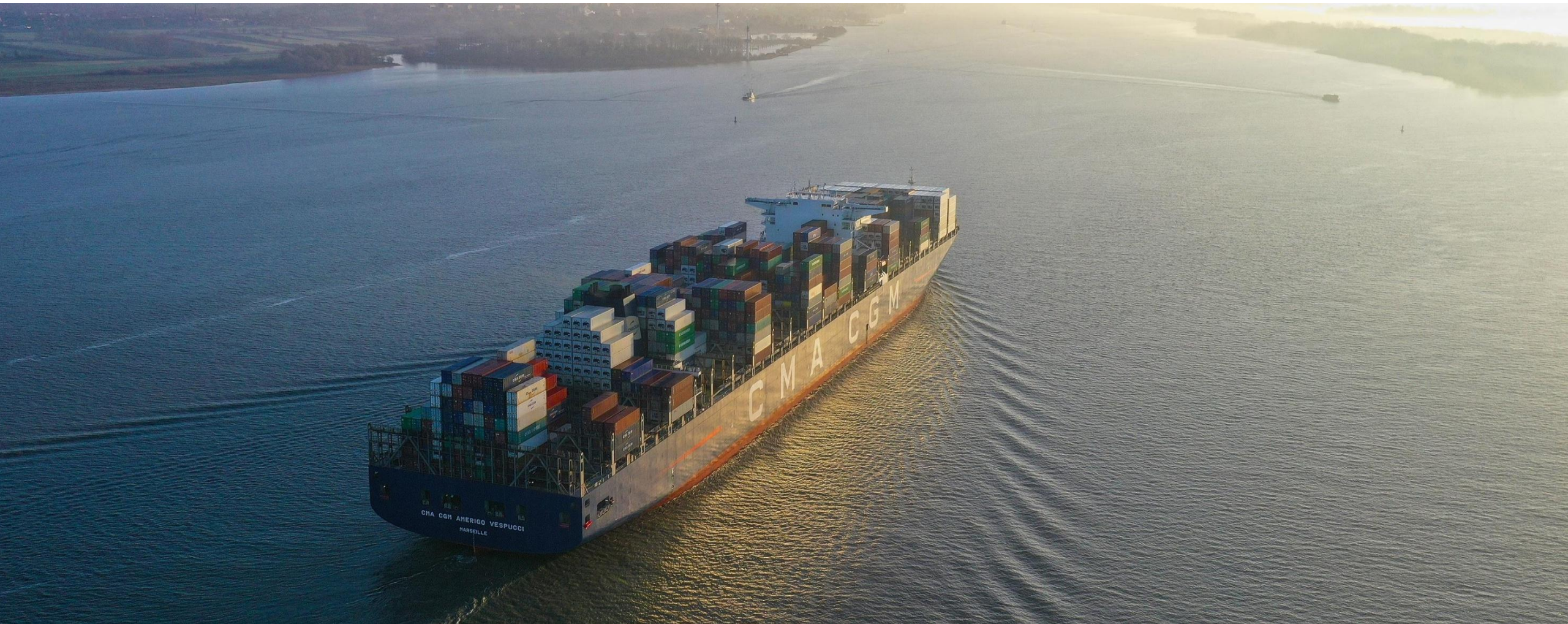


Blue Supply Chains – Supporting Port Authorities and Port Operators to Decarbonise Port Operations



Stefan Breitenbach

Port of Hamburg Marketing | breitenbach@hafen-hamburg.de

#BlueSupplyChains

Blue Supply Chains aims at fostering Port Authorities' role...

...to support **greening of port operation** activities

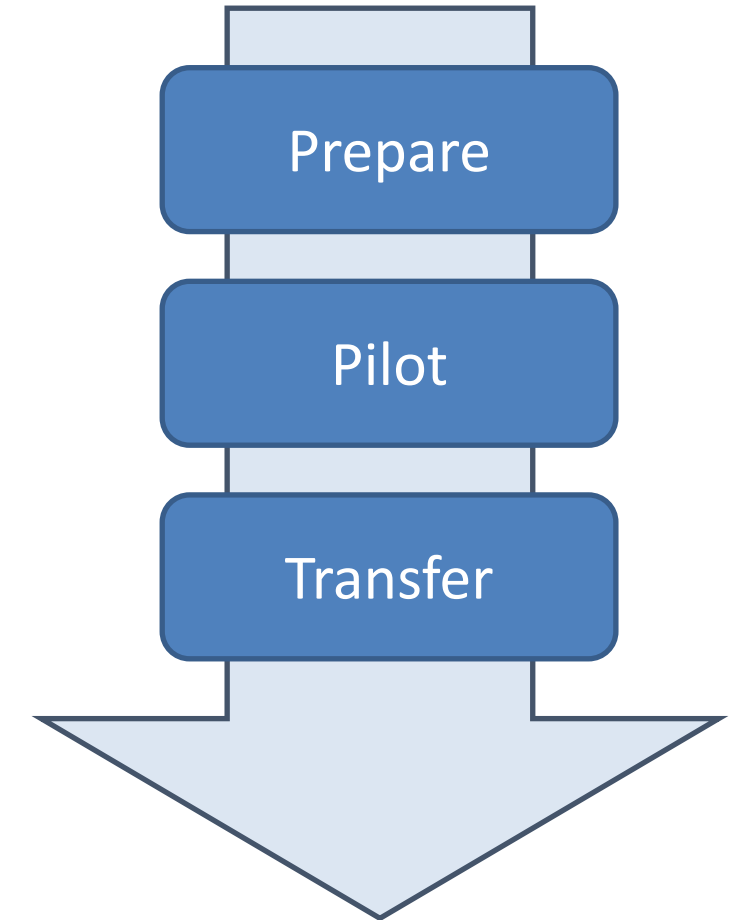
- Mobile on-shore power supply solution (DK)
- Retrofitting concept - diesel RTGs towards alternative fuel powered RTGs (PL)

...in **green energy supply** for transport chains

- Regional green energy supply concept for the port of Umeå (SE)
- Zero-emission inland waterway between Klaipeda and Kaunas (LT)

...in **the set-up of green transport chains** between BSR ports

- Proof-of-concept on cooperation pushing green combined transport solutions between Baltic ports leading to an improved rail ferry service and preparations for necessary adjustments in the ports of Rostock & Trelleborg (SE | DE)
- Start-up pitches to find new green transport solutions (LV)



Project Partners & Associated Organisations

SWEDEN



POLAND



DENMARK



ESTONIA



LATVIA



LITHUANIA



NORWAY



GERMANY



Associated Organization (selection)



Green Energy Supply for Transport Chains

Zero Emission Inland Waterway in Lithuania

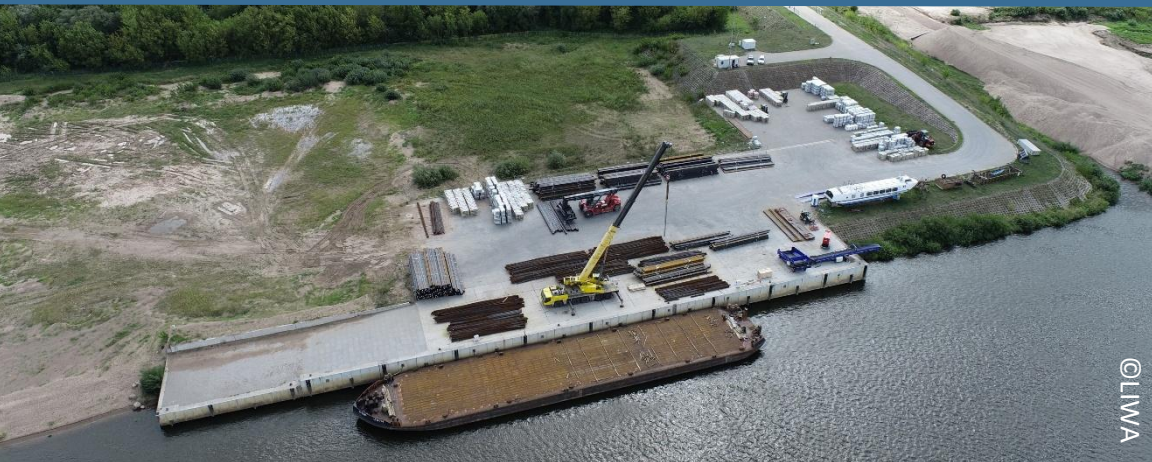


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Electrification of inland waterways to greening transport. Goal was on replacing diesel-powered river transport with electric push boats, supported by extensive infrastructure modernization along the Nemunas River

Green Energy Supply for Transport Chains

Electrification Challenges



Charging infrastructure and energy supply being developed at three key locations

- Klaipeda Port
- Jurbarkas
- Kaunas Marvele Port

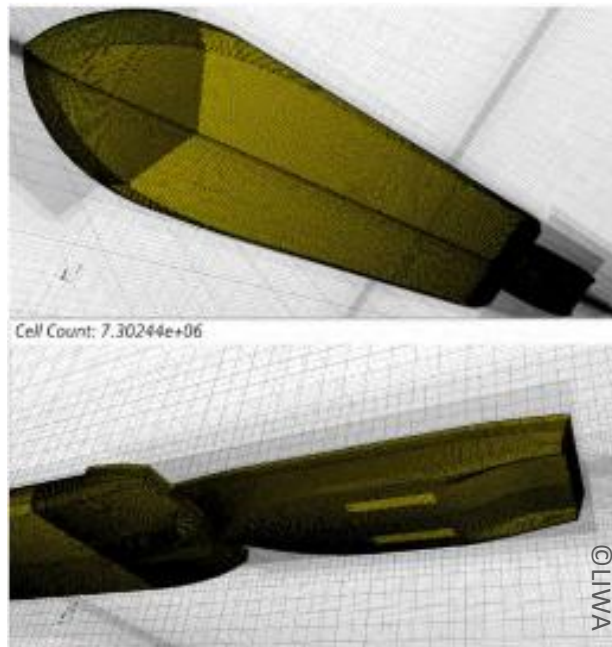
Electric push boat concept design

- Improved design for maximum energy efficiency
- Optimal sailing speed of 8 km/h
- Adapted to challenging river conditions



Greening Lithuania's Transport Chain

Solutions



Electric pushboat concept design

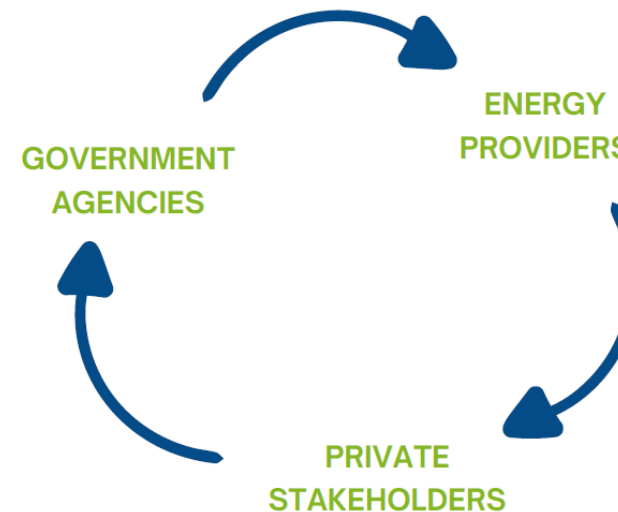
- **Navigability and Vessel Design:** Reliable river infrastructure and vessel adaptability to challenging river conditions
- **Market Viability:** Deploying 6 pushers, 12 barges, and 27 battery containers over six years
- **Operational and Economic Feasibility:** Government-supported service model with transparent bidding ensures operational efficiency
- **Environmental and Societal Impact:** Significantly reduces road freight emissions, replacing 48,830 truckloads annually, cutting 21 tons of CO2 per trip, and improving road safety and biodiversity

Greening Lithuania's Transport Chain

Solutions

- Available shore power infrastructure has maximum charging capacity of only 350 kW per connection
- Dual-connection systems with capacity of 750 kW per vessel are required
- Charging stations are being developed at three key locations of:
 - ✓ **Klaipėda Port:** a primary charging hub that will also support multi-modal logistics
 - ✓ **Jurbarkas:** a mid-route charging and battery exchange point to extend vessel range
 - ✓ **Kaunas Marvele Port:** function as a multi-purpose energy hub, supplying power not only to vessels but also to heavy-duty electric trucks and other transport systems

Charging infrastructure and energy supply



Greening Lithuania's Transport Chain

Methodology



Greening Lithuania's Transport Chain

Lessons Learnt

- 
- © CLIMA
- Charging infrastructure is critical for seamless vessel operations
 - Addressing grid capacity, charging standardization, and long-term energy pricing is essential for the success
 - Regulatory challenges, such as zoning restrictions on renewable energy generation need better alignment with green goals
 - Battery logistics and handling require specialized infrastructure
 - Securing a stable electricity pricing and market readiness are key for stakeholder engagement

Greening Lithuania's Transport Chain

Outputs

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BLUE SUPPLY CHAINS FOR THE BALTIC SEA REGION

BLUE SUPPLY CHAINS

Home

Greening Supply Chains - Emission Free Inland Waterways

05 June 2024

The Lithuanian pilot case investigates in Europe's first emission free inland waterway connecting the seaport of Klaipėda with its hinterland. The pilot area stretches from Lithuanian sea port Klaipėda inland towards the ports of Jurbarkas and Kaunas Marvele.

This landmark project, a collaborative effort of Lithuanian Inland Waterway Authority and Klaipėda Science and Technology Park, aims to transform an existing waterway into a model of sustainability and innovation. This pilot project is not just a testbed for modern technologies but also a source of valuable insights for the entire EU and Baltic Sea Region. It addresses key operational questions, such as the optimal distribution of charging points, the specifications of charging stations, and real-world data on energy consumption in various navigational conditions.

The project explores the potential of alternative fuels, with electricity at the forefront. However, this path is not without obstacles, notably the high initial cost and limited energy density of batteries, which restrict the range of electric vessels. In response, Lithuanian Inland Waterway Authority participates in vessel design, particularly for shallow water navigation, and will engage in a pilot project to evaluate and validate electric technology under real sailing conditions. This includes a detailed analysis of energy consumption in different water levels and vessel speeds, essential for determining the strategic placement of charging stations.

In parallel, Klaipėda Science and Technology Park is making significant strides by developing a modular propulsion system, potentially revolutionizing the concept of emission-free inland water vessels. This system is designed to be universal, adaptable to any vessel within the EU and potentially beyond, and capable of utilizing various power sources, including batteries or alternative fuels like hydrogen or ammonia. A crucial aspect of Klaipėda Science and Technology Park's approach involves a collaborative strategy between shipyards and ship owners, focusing on the practical application and testing of modular, containerized solutions.

Technical study on vessel design for zero-emission inland navigation corridor

The pusher's design was based on electric propulsion, utilizing batteries as the power source, with the assumption that two battery containers would suffice for a complete journey. These batteries, housed in shipping containers, were to be changed only at Klaipėda and Kaunas.

The dimensions of the pusher and barge were specified as 27.8×9.2×1.24 meters and 74.4×15.85×2.05 meters, respectively. The design initially assumed battery containers of 1.5 MWh, but it was noted that ZES containers could provide a higher capacity of 2.7 MWh.

Concordia Damen was commissioned to review this design. Their analysis highlighted a significant issue: the pusher-barge combination might not complete the upstream journey on two battery loads due to the higher energy requirement for upstream travel which takes an estimated 2-3 times more energy than downstream. Also, sailing conditions are not easy: the distance between Klaipėda and Kaunas is about 260 km and currents can reach 1 m/s. This was escalated by the increase in resistance at higher sailing speeds, leading to a disproportionate rise in required power and energy consumption.

An analysis of the sailing route from Rotterdam Duisburg, comparable to the Nemunas route, indicated that the energy requirements at different sailing speeds were significantly higher than anticipated.

DETAILS

Homepage
Go to project page

Project type
[Core Project](#)

Implementation
January 2023 - December 2025

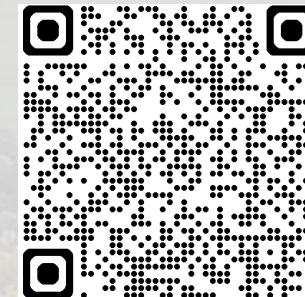
Status
[Ongoing](#)

Contribution to EUSBSR
Policy Area Transport; Policy Area Ship

TARGET GROUPS
Business support organisation
Infrastructure and public service provider
National public authority

SOCIAL MEDIA
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TAGS
Clean shipping
Green technologies
Interoperability of transport modes
Logistics and freight transport
Multimodal transport



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Onshore Power Supply for Small & Medium Ports

Best Practice from Port of Skagen

Retrofitted Rubber Tyre Gantry Cranes

Best Practice from Gdynia Container Terminal

Greening Supply Chains – Emission Free Inland Waterways

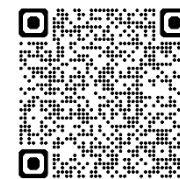
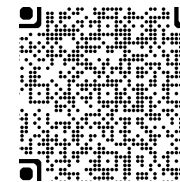
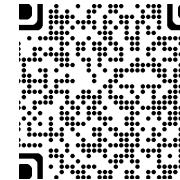
Best Practice from Lithuania

Green Bunkering and Charging Strategy for Ports

Best Practice from Umeå Region

Stakeholder Engagement to set-up Green Transport Corridors

Experiences from the Rostock-Trelleborg Rail Ferry Link



Blue Supply Chains – Supporting Port Authorities and Port Operators to Decarbonise Port Operations

Interreg
Baltic Sea Region



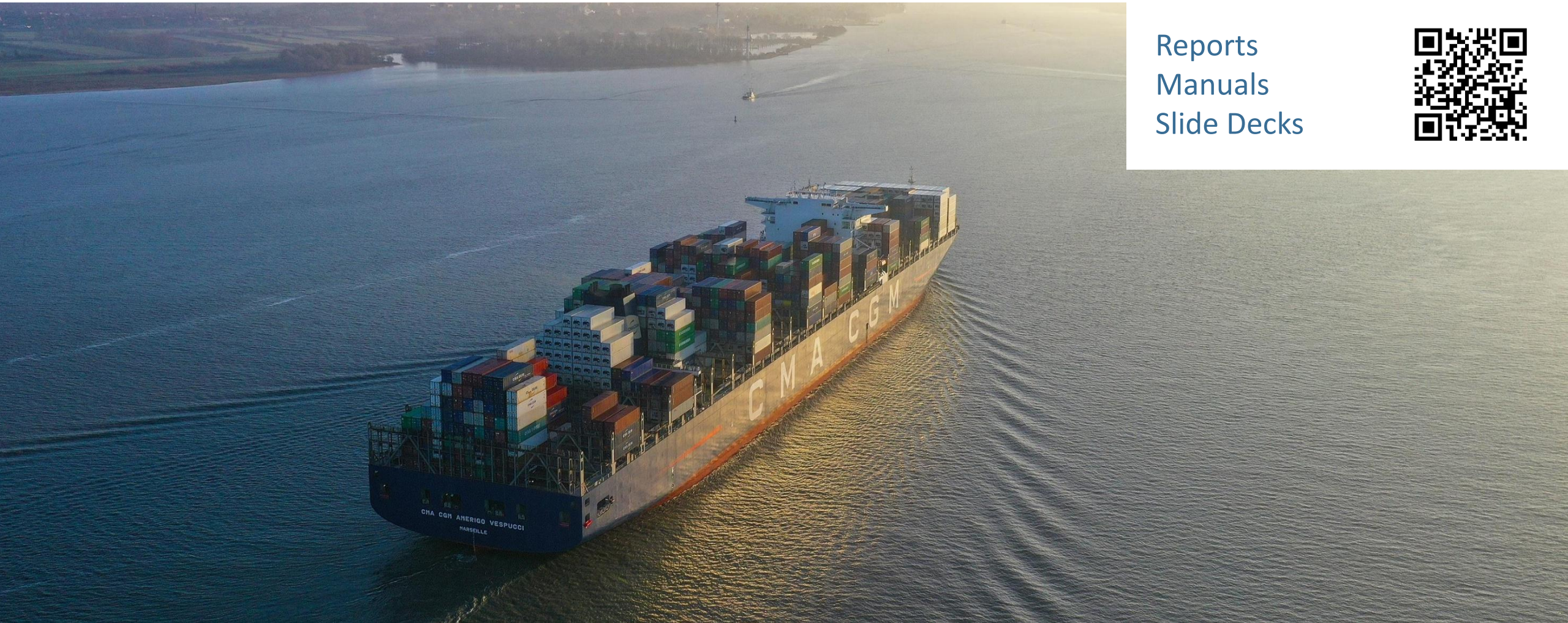
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Stefan Breitenbach

Port of Hamburg Marketing | breitenbach@hafen-hamburg.de

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