

PORT OF HAMBURG -

A NASCENT DIGITAL ZERO-EMISSION PORT



Source: HPA

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Agenda

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Summary

Characteristics of the Port of Hamburg

01



01 Characteristics of the Port of Hamburg

- With respect to sea cargo handling the port of Hamburg is the third largest port in Europe (128.7 mio. tons in 2021).
- The unique characteristic of the tidal port is its location in the middle of the city, consuming about 10% of its surface.
- As a result, usable land is severely limited and residents are strongly affected by vessel emissions.



The need to become a zero-emission port and generate efficiency gains using innovative digital technologies is substantial.

Hamburg is taking a frontrunner role in these areas.

Shore power

02



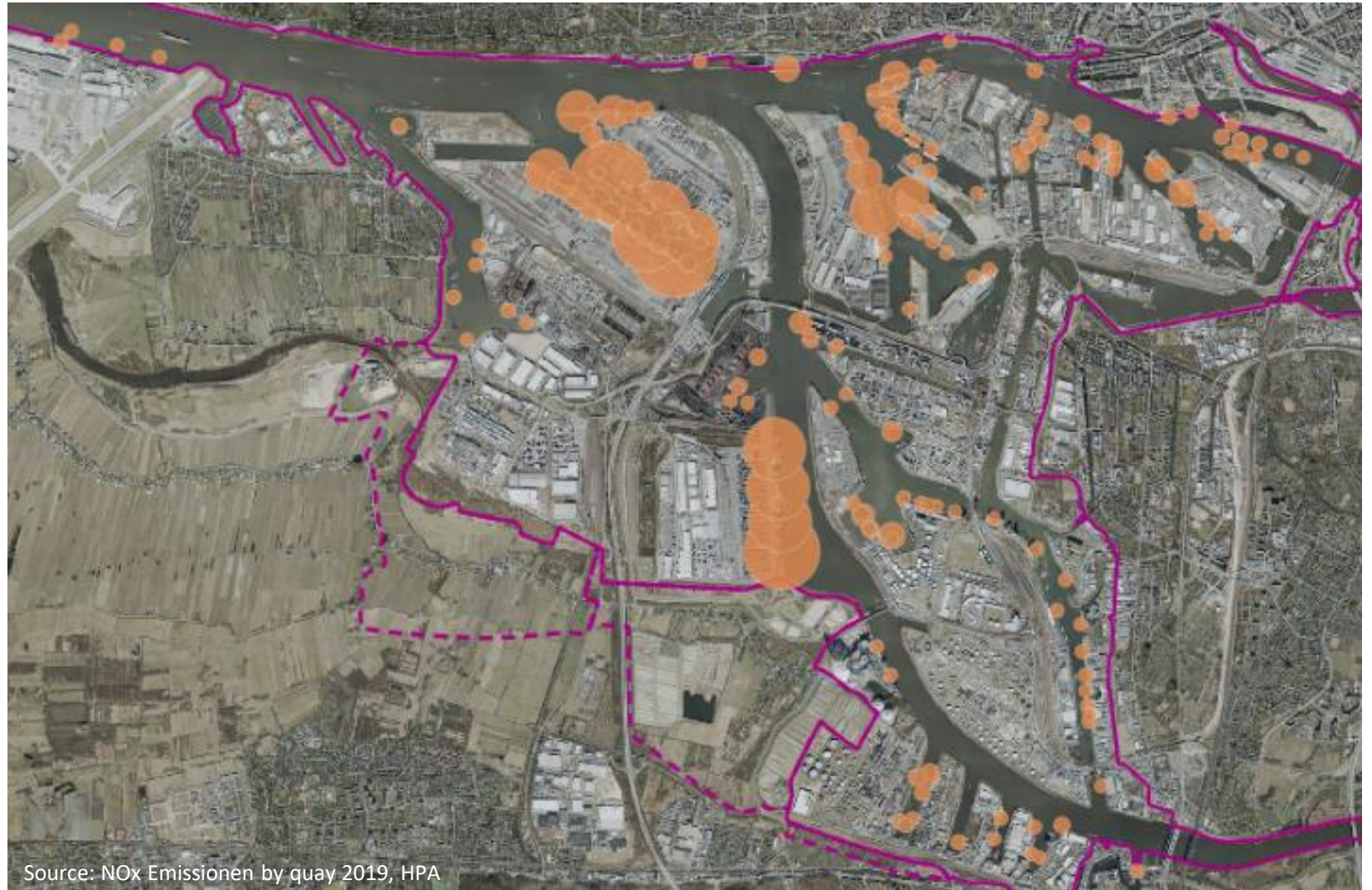
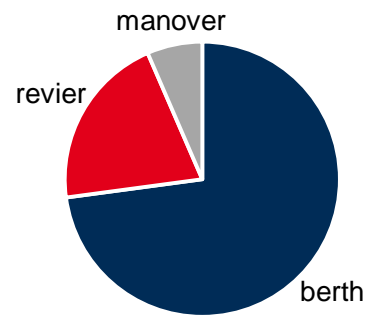
02 Shore power – Emissions

City of Hamburg



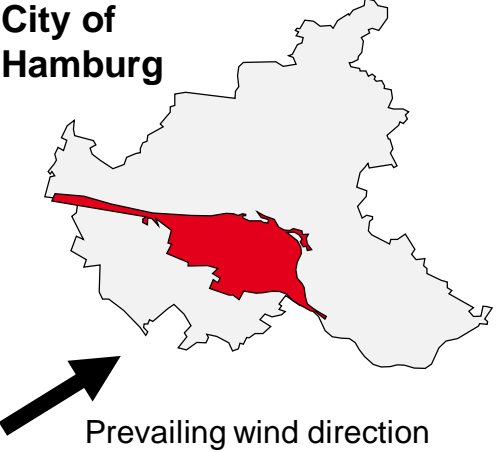
Prevaling wind direction

Share of Emission



Source: NOx Emissionen by quay 2019, HPA

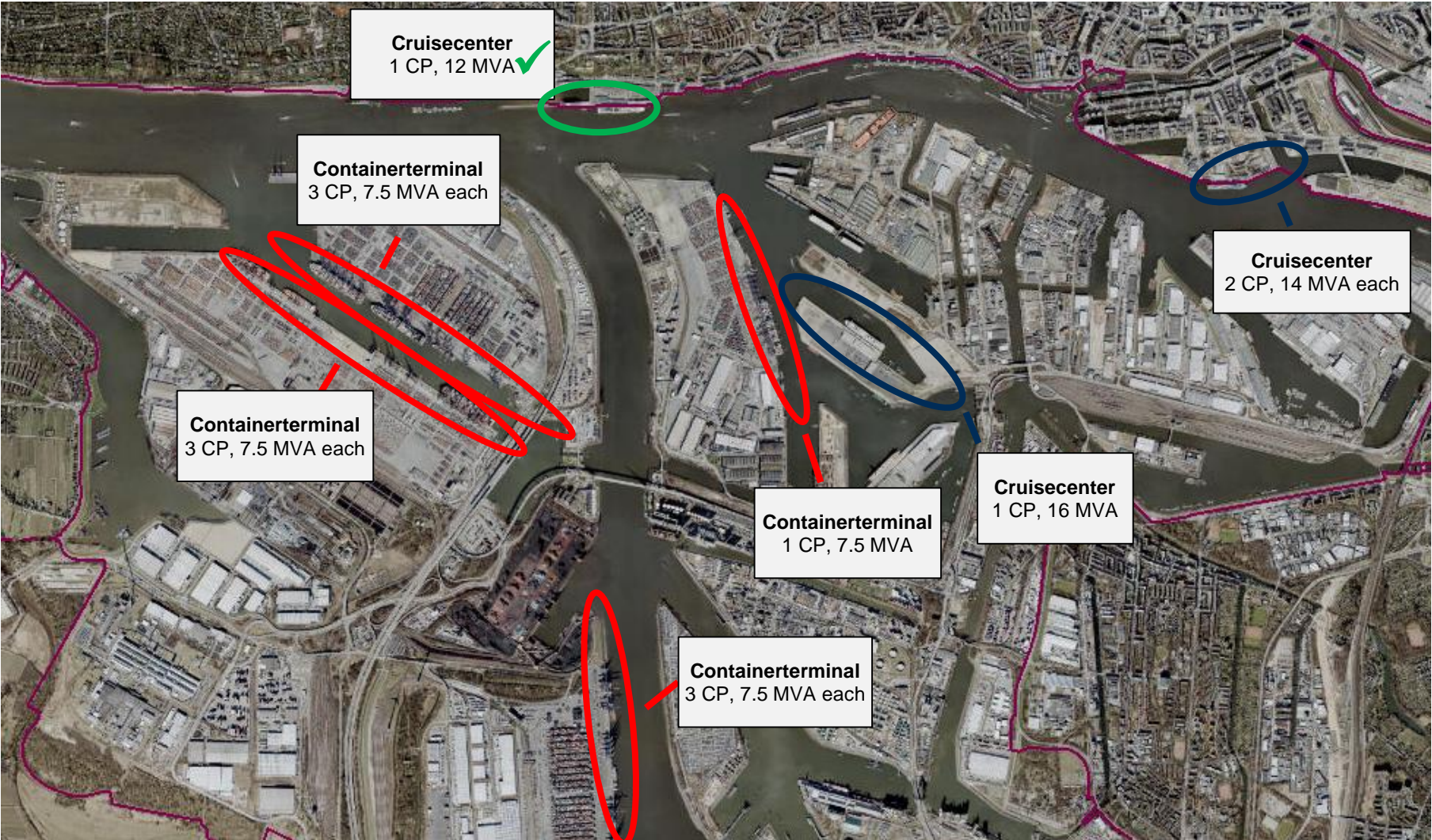
02 Shore power – Current projects



Budget
The budget for all shore power units totals approximately 105 million euros.

Launch

Altona (CC)	2016
Steinwerder (CC)	2023
Eurogate (CV)	2023
Burchardkai (CV)	2023
Tollerort (CV)	2023
Hafencity (CC)	2024
Altenwerder (CV)	2025



CV = Container vessels CC = Cruise vessels CP = connection point; MVA = Mega Volt Ampere

02 Shore power – Emission reduction

CO2-Emissions and SP-readiness of vessels at Hamburg's top quays



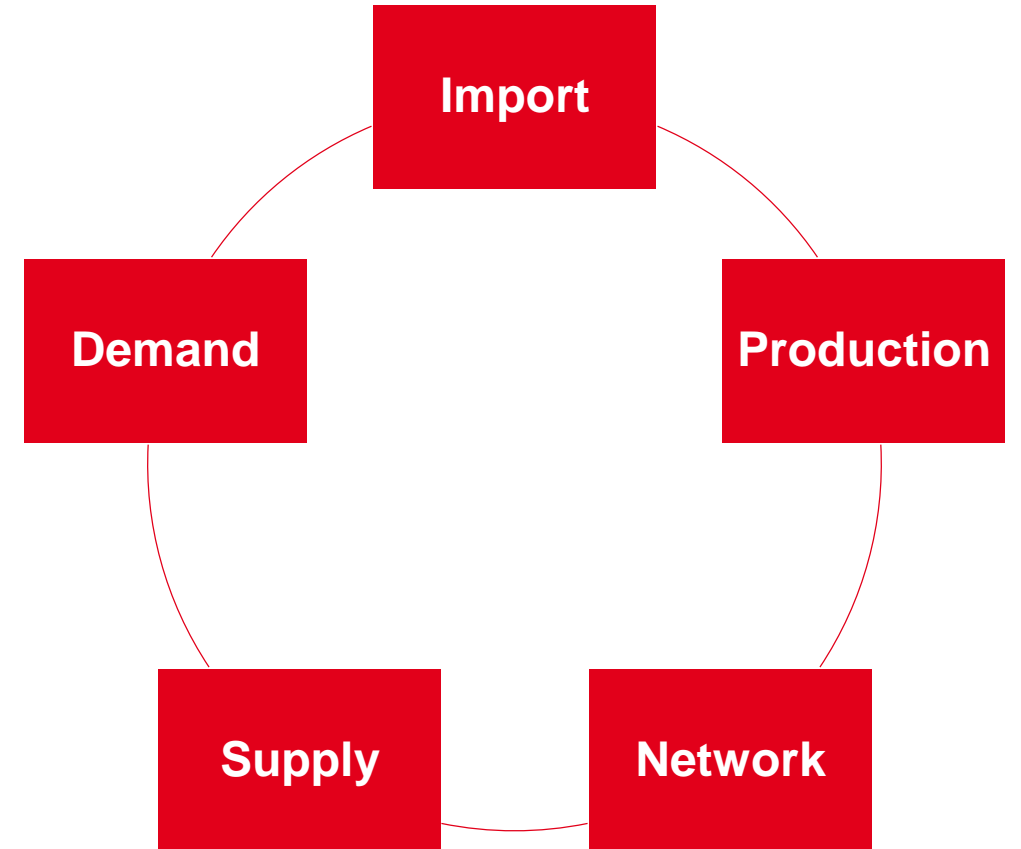
Hydrogen: A future energy source

03



03 Hydrogen: A future energy source

- The HPA is participating in the Hamburg Hydrogen Network with the HyPa (Hydrogen Port Applications) project. The objective of the alliance is to establish a complete hydrogen value chain in Hamburg.
- With its extensive network of potential industrial applications and service partners, the port forms a unique platform for this purpose.

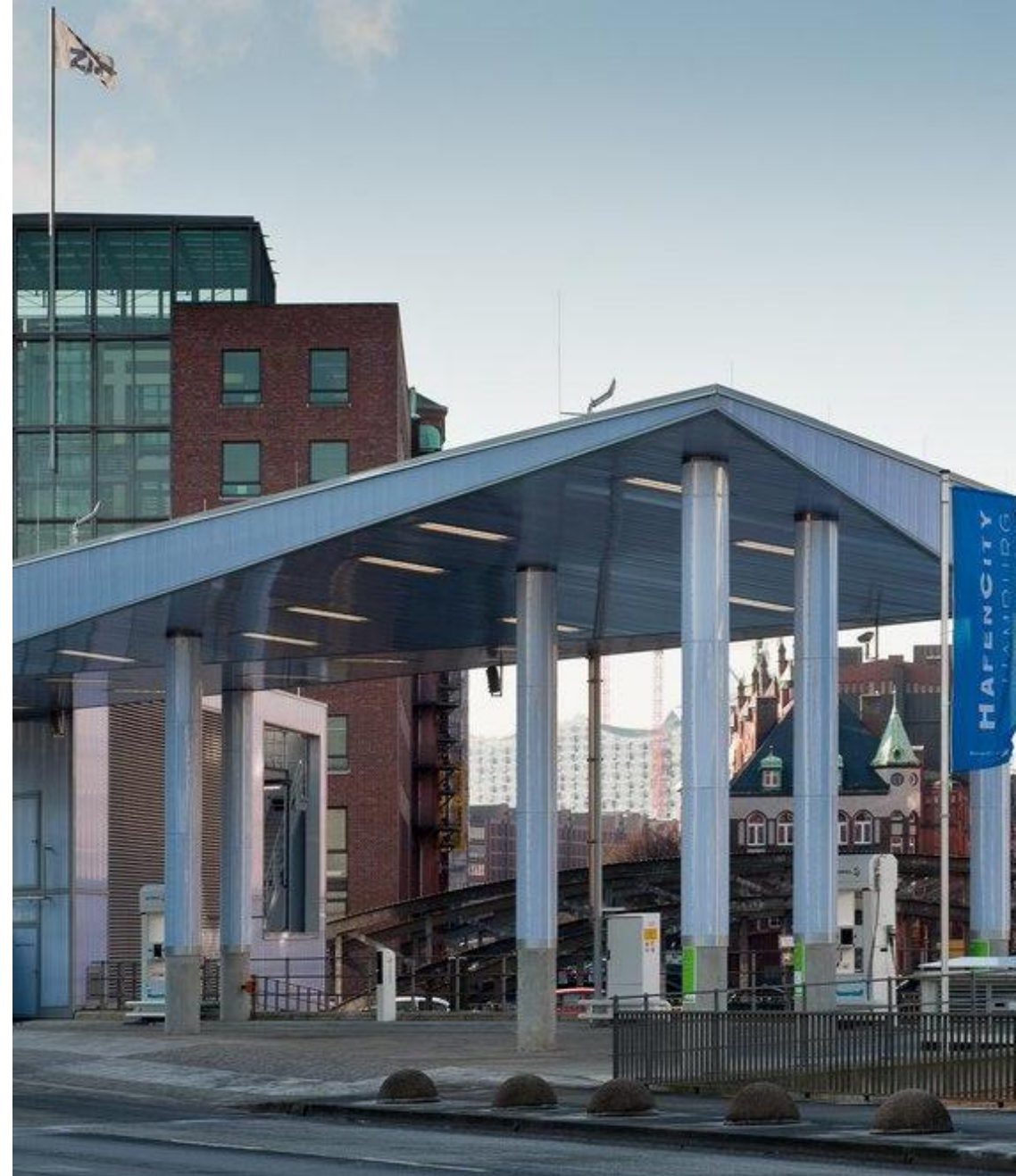


03 Hydrogen: A future energy source

- The HPA as an infrastructure provider and enabler for road, rail and waterway in the Port of Hamburg is setting three different priorities with the HyPa project:
 - Enable the transformation of mobility into the post-carbon era by the provision of multimodal hydrogen refuelling stations for locomotives, ships and trucks.
 - Develop Hamburg as a hub for alternative fuels so that, for instance, hydrogen can be made available in different varieties (e.g. methanol and ammonia).
 - Construct and deploy innovative hydrogen-powered ships.



Economies of scale are necessary to ensure economic efficiency, and the HPA will make an important contribution as a driving force here.

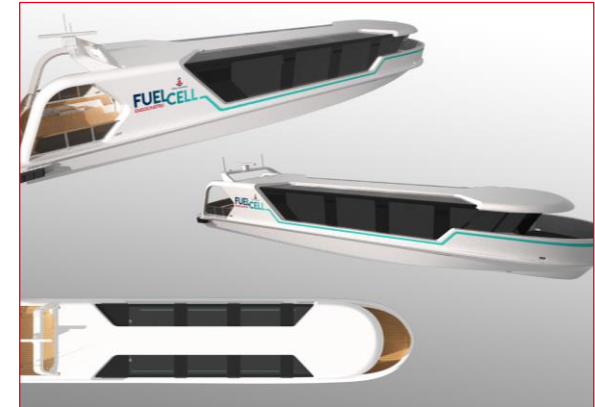


03 Hydrogen: A future energy source

- In the form of its subsidiary "Flotte Hamburg", the HPA puts innovative propulsion systems into practice. The focus here is on electrification and hydrogen.
- Since 2018, "Flotte Hamburg" has also been part of an international research consortium working on a prototype ship that aims to reduce ship emissions by 97%.



Bedleveler and fire-fighting vessel using a plug-in-hybrid engine



Small passenger ship with methanol fuel cell propulsion

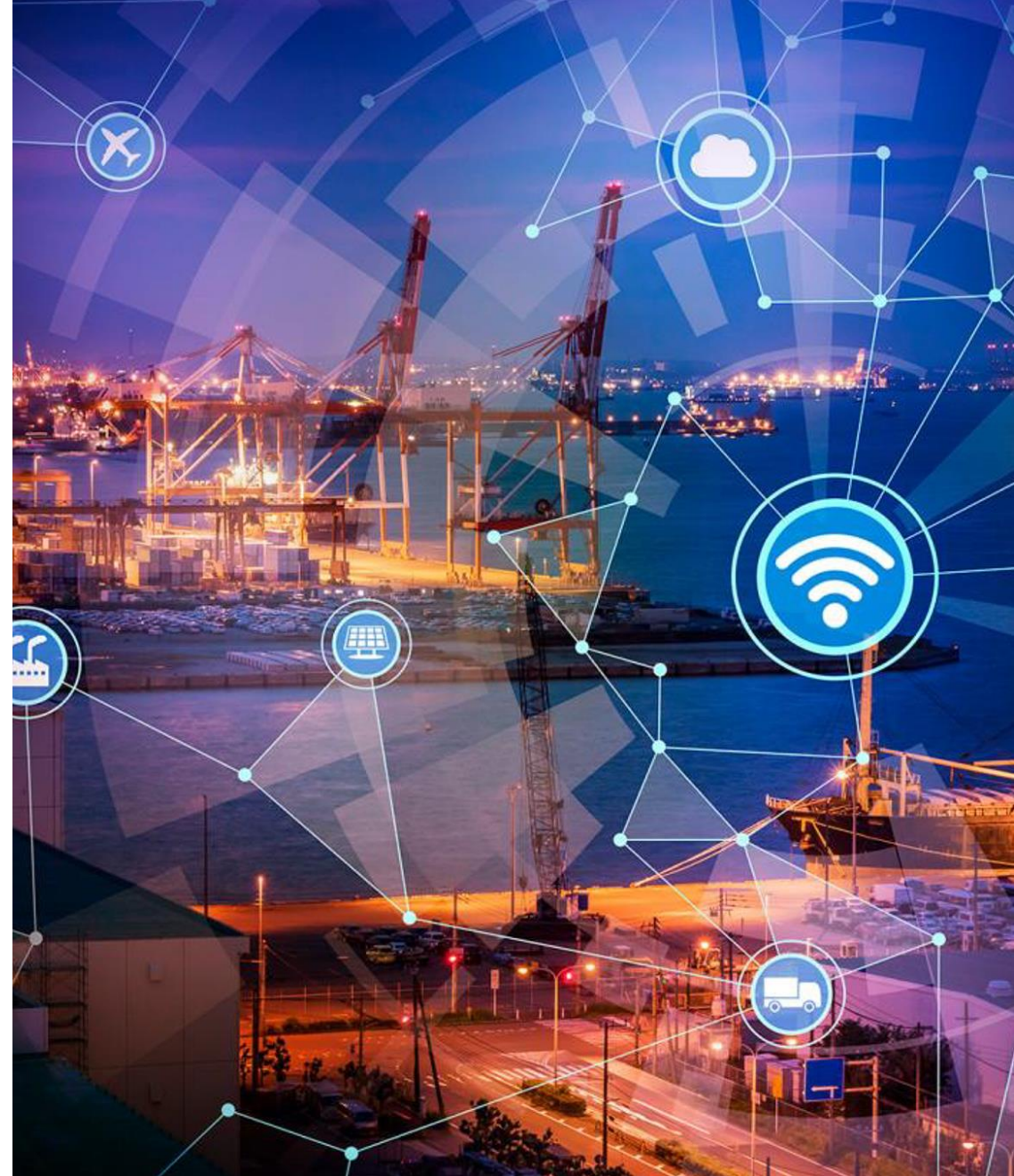
Enhancement of digitalisation

04



04 Enhancement of digitalisation

- In collaboration with a private company the SANTANA project (Service and Data Network Port of Hamburg) seeks to further optimise process control along the supply and transport chains in the Port of Hamburg.
- For this purpose, a "network of networks" is being created to interlink the private logistics network and the public infrastructure management network.
- The newly created network serves as a platform for data sharing and data services and enables both partners to carry out extensive optimisation measures.
- The use of digital twins is one of the ways in which extensive data can be obtained.



04 Enhancement of digitalisation – Seaside Measures

Maritime Shipping – Data Platform NIVE

- Information platform for the exchange of data between port stakeholders
- Ensuring just-in-time arrivals and departures of seagoing vessels
- Reduced pollutant emissions from ships through adapted speeds

Inland navigation – Online queuing system

- Digital display of the occupancy status of waiting berths for inland vessels
- Development of a BI application for inland vessel data on cargo handling
- Reduction of avoidable traffic movements
- Acquisition of data for strategic infrastructure planning

04 Enhancement of digitalisation – Landside Measures

Rail – transPORT rail Next Generation

- Provision of an uninterrupted rail traffic management system
- Foundation for optimising the use of resources in rail freight transport
- Uninterruptible maintenance while maintaining all functional qualities

Road – quantum annealing for traffic flow optimisation

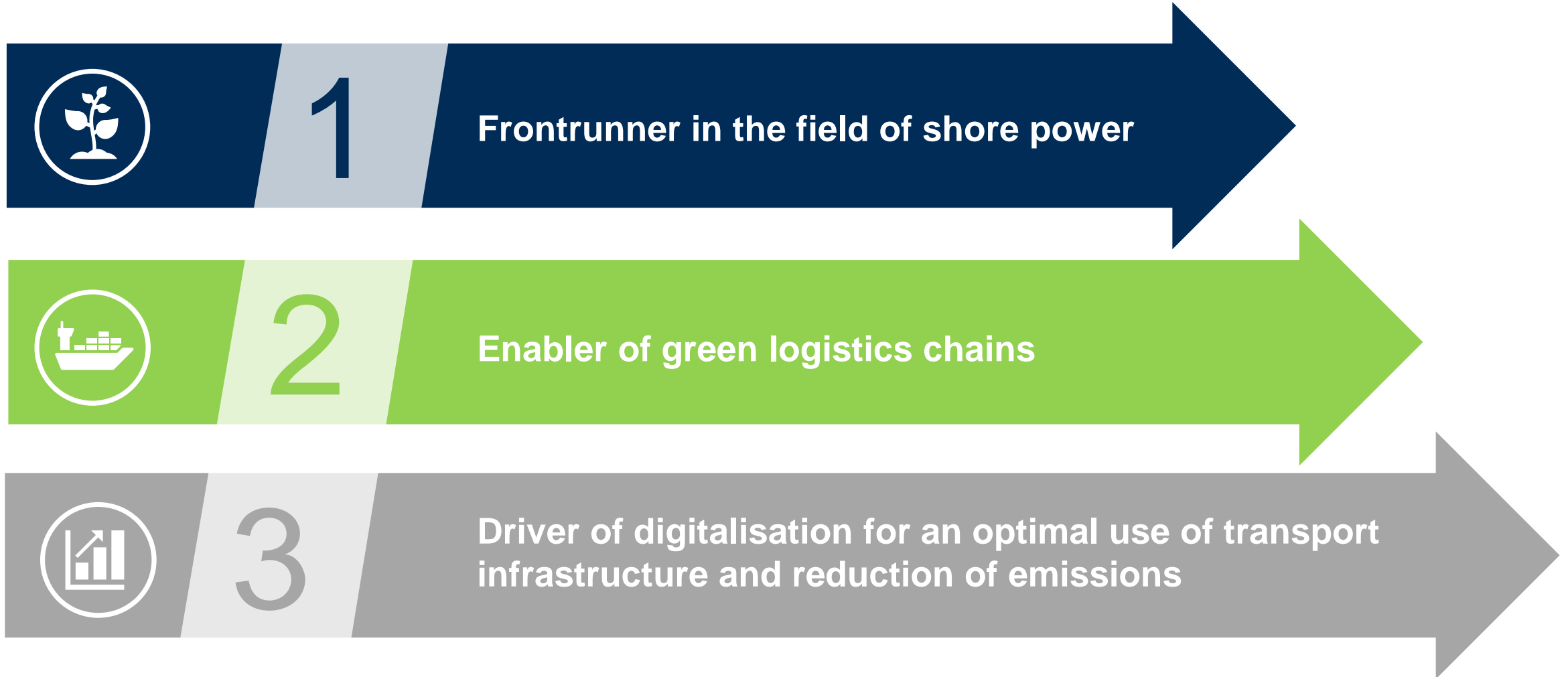
- The world's first real-time road network
- Predictive & optimised traffic light control in real time through quantum-inspired algorithms
- Increased plannability in port logistics by a steady traffic flow
- Emission reduction by reducing waiting times in port traffic

Summary

05



05 Summary



Thank you for your attention



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