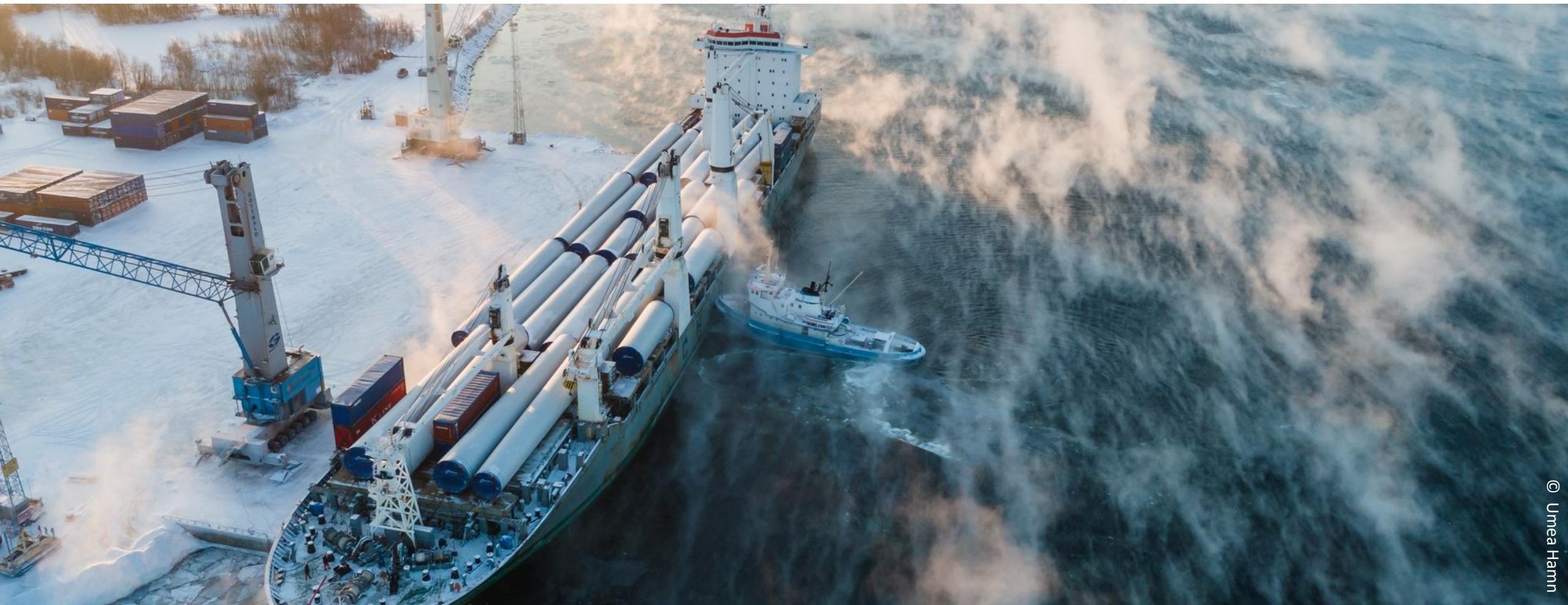


Blue Supply Chains – Supporting Port Authorities and Port Operators to Decarbonise Port Operations



© Umeå Hamn

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

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

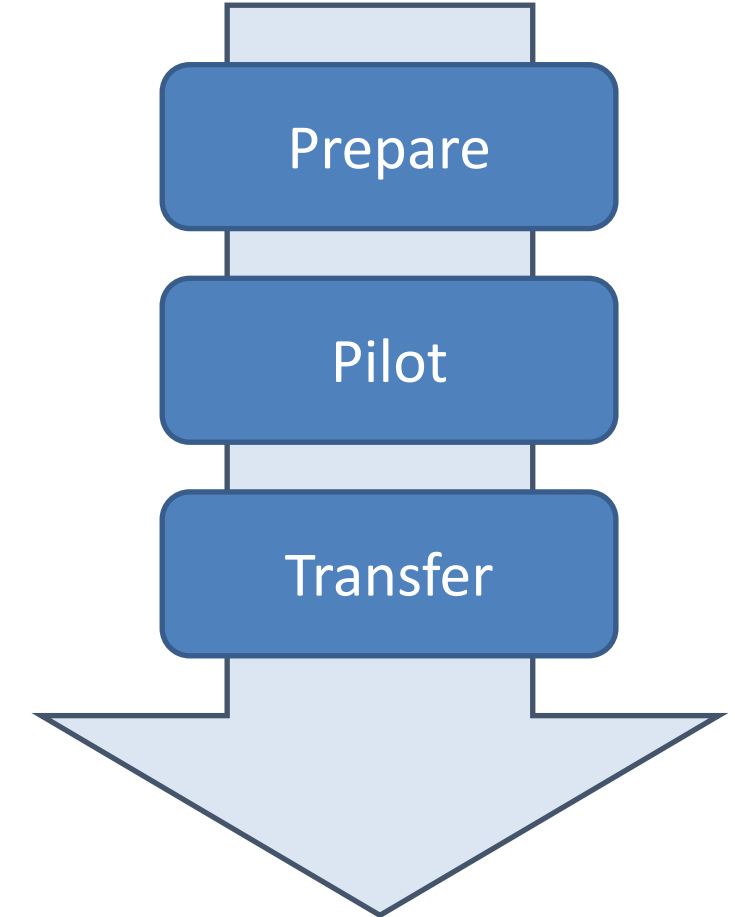
- Mobile on-shore power supply solution (DK)
- Retrofitting concept - diesel RTGs towards alternative fuel powered RTGs (PL)

...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 Bunkering and Charging Strategy for Ports & Local Green Hydrogen Fuels at Umeå Region

Goals

- ✓ Create an overview of alternative fuels and charging facilities for national bunker and charging strategy
- ✓ Strategic plan for local production of electro fuel in the Umeå Region with port and shipping industries as important actors that will contribute to a climate neutral municipality.



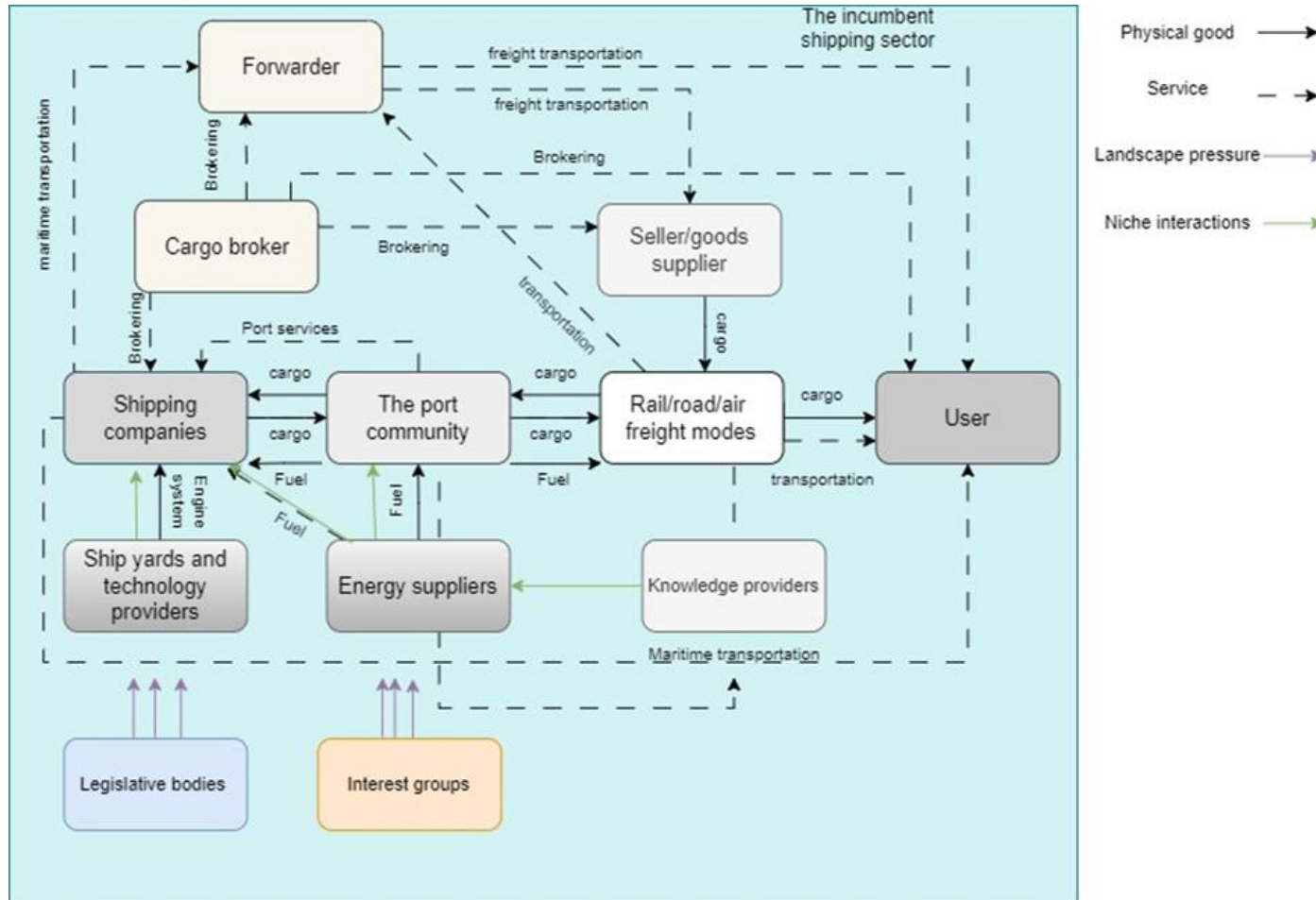
Green Bunkering and Charging Strategy for Ports

Methodology



Green Bunkering and Charging Strategy for Ports

Roles of Shipping Industries and their Interactions



Shipping sector is intricate, and multiple actors exchange physical goods and information

For energy transition, interactions with emerging energy and propulsion technologies will be important

Green Bunkering and Charging Strategy for Ports

Overview of Fuels and Measures to Reduce the Need of Energy

Renewable fuels and propulsion for ships

Electricity/Batteries

- Tested in marine applications
- Can be economically sound in under certain circumstances



Wind

- So far mainly as assisting power supply in marine applications
- Ongoing development for wind as the main propulsion



Hydrogen

- Tested in marine applications
- Low energy volumetric density

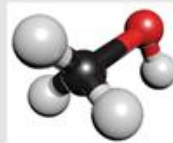


HVO

- Requires no specific adaptation
- Does not improve emissions of NOX and PM
- Dependence on imports

Methanol

- Tested in marine applications
- Planned production in Sweden



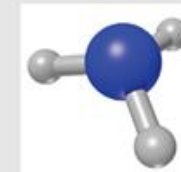
Biogas/LBM

- Good climate performance
- Does not require specific adaptation in LNG vessels



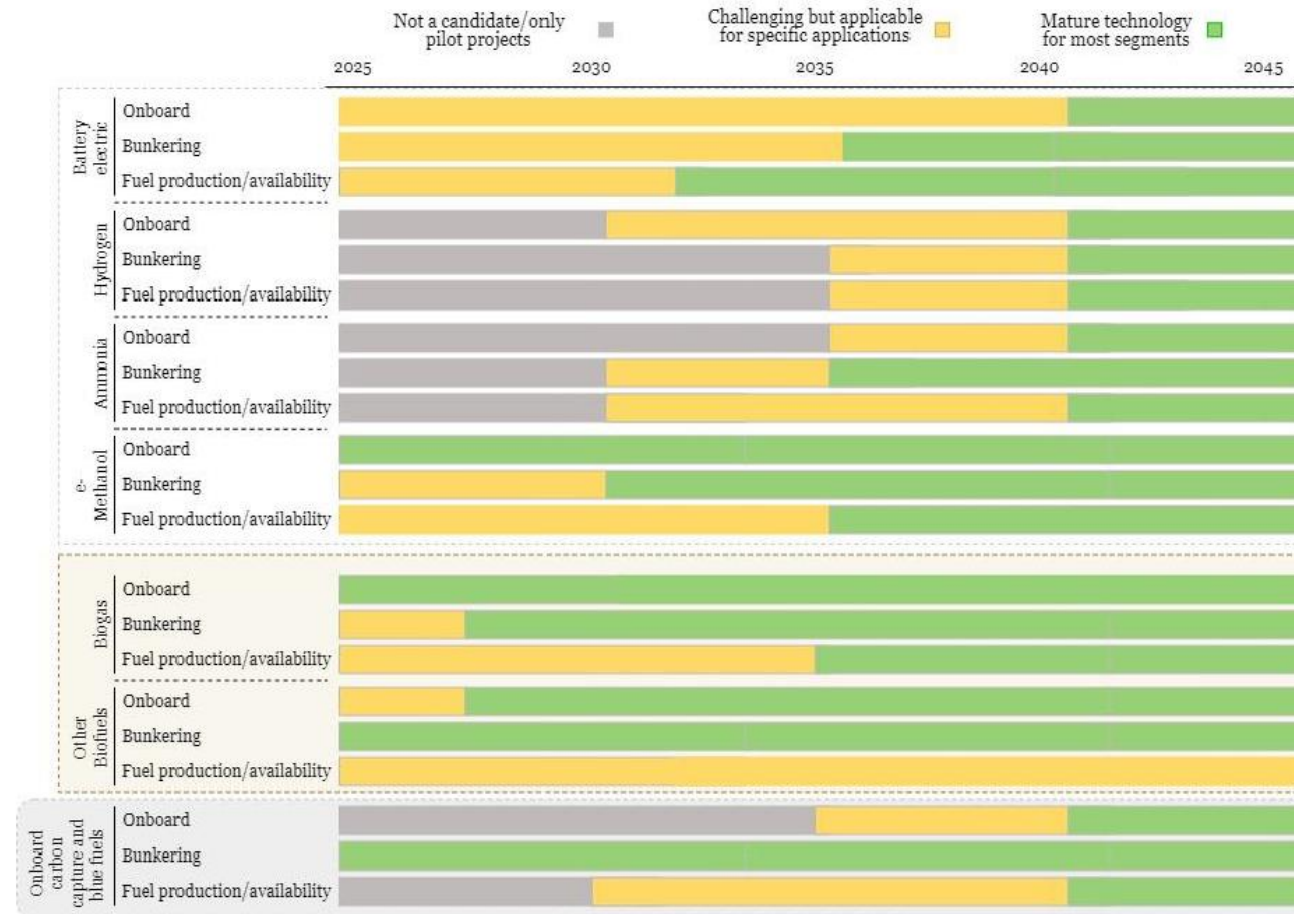
Ammonia

- Does not contain carbon
- Strongly toxic



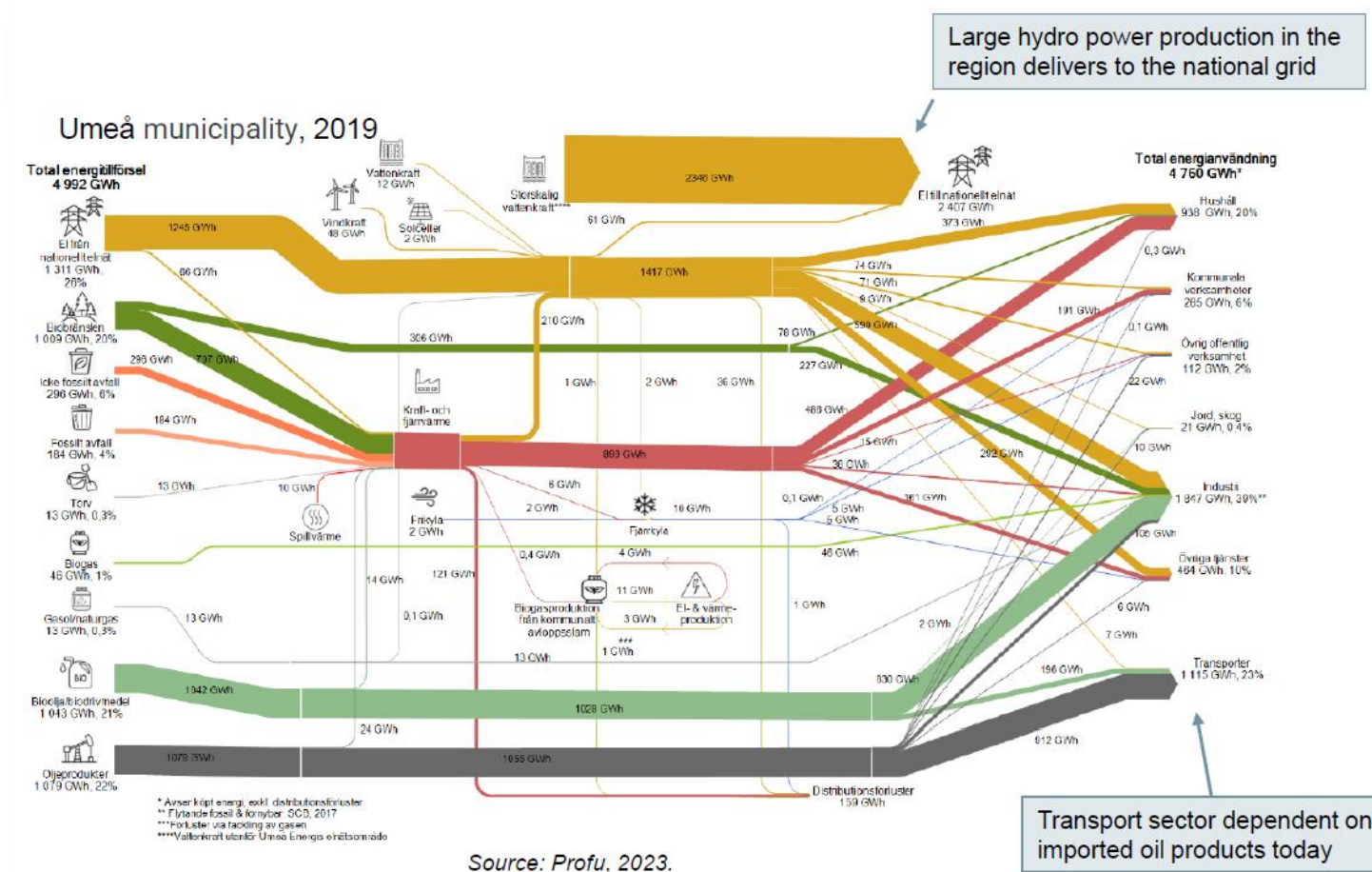
Green Bunkering and Charging Strategy for Ports

Possible Technological Development for Low-carbon Shipping



Local Green Hydrogen Fuels at Umeå Region

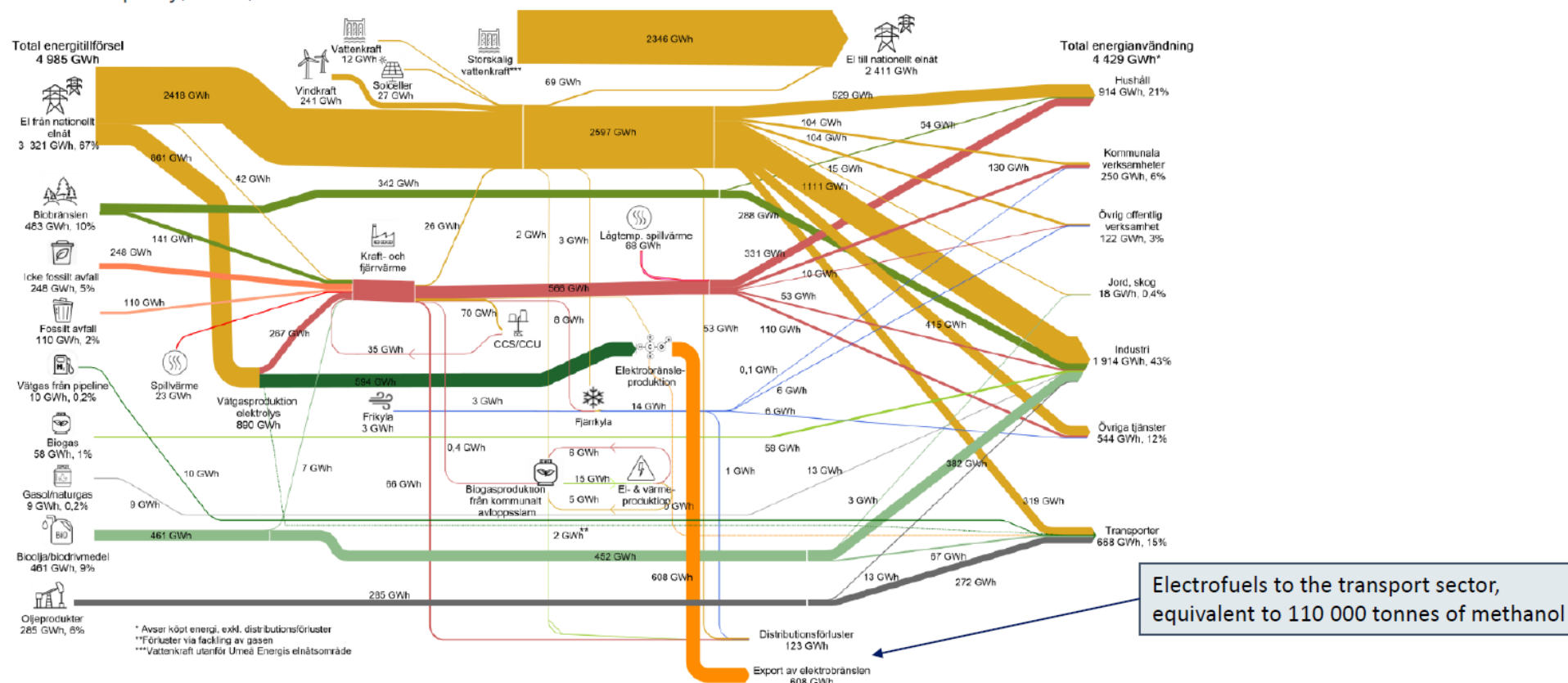
Current State



Local Green Hydrogen Fuels at Umeå Region

Future State

Umeå municipality, 2040, Ambitious Scenario



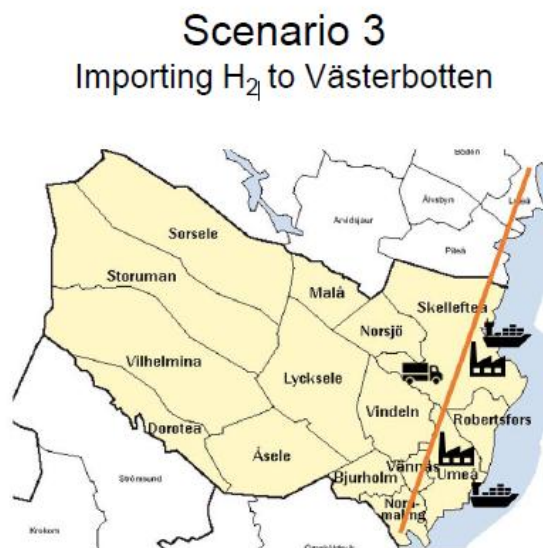
Source: Profu, 2023.

Local Green Hydrogen Fuels at Umeå Region

Future Scenarios for Fuel Production in the Västerbotten Region

The production of electrofuels in Dåva is expected to be 110 000 metric tonnes

Scenario 1 is the most likely scenario, as demand will be lower (at least initially) than the planned production of 110 000 metric tonnes of electromethanol.



Scenario 2
Self-sufficient and less H₂ production



Scenario 1
Exporter and large H₂ production

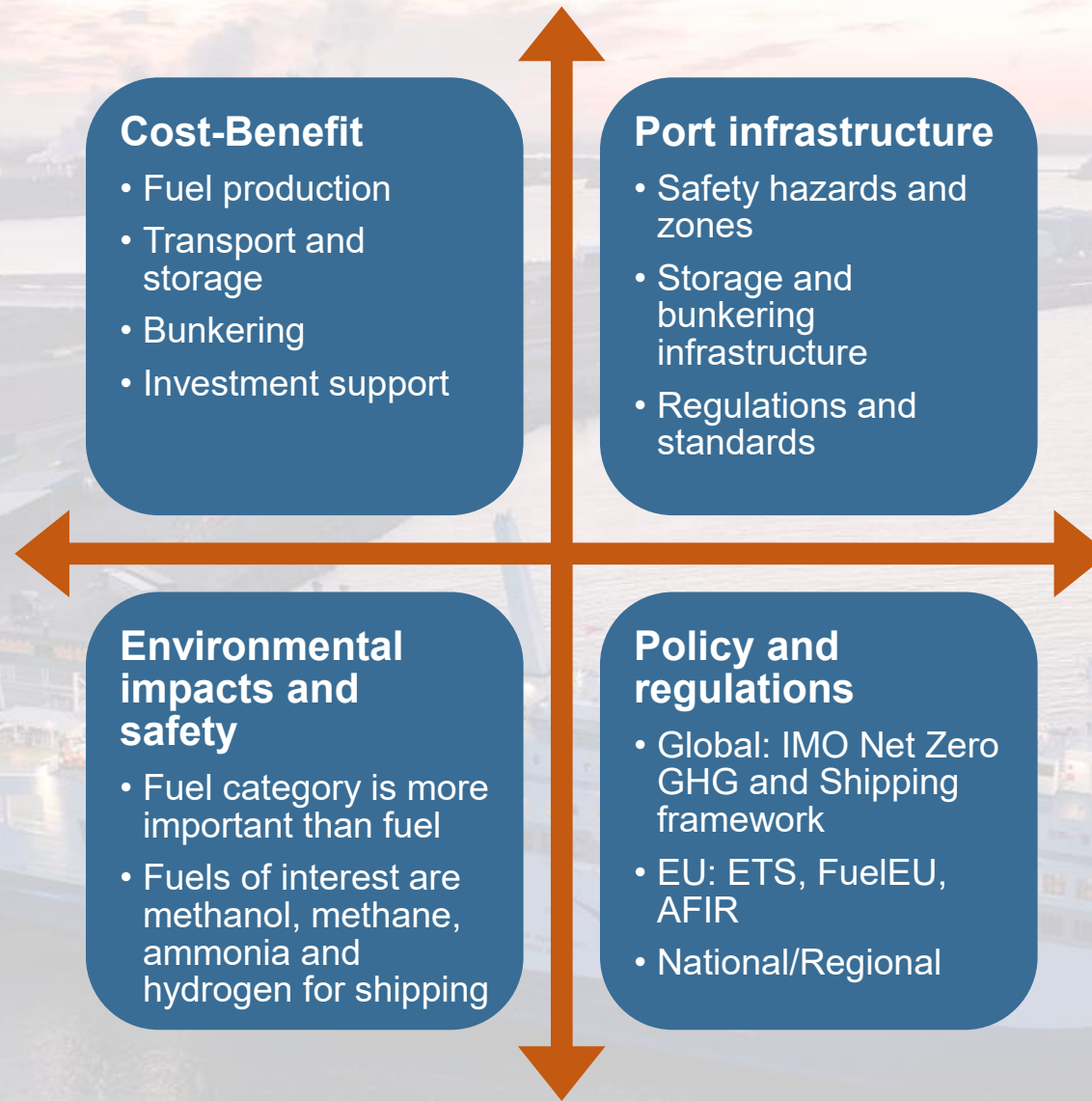


H₂-produktion

Scenarios developed in the [HOME-projektet](#)

Local Green Hydrogen Fuels at Umeå Region

Technological Developments



Green Energy Supply for Transport Chains

Methodology to Develop a Roadmap “Local Green Hydrogen-based Fuels”

1. Define objective and timeframe

2. Present production sites, bunkering and charging facilities in Umeå

- Present energy usage and ship calls
- Transport emissions in Port of Umeå
- Market development and actors in Umeå & the Västerbotten region

3. Future demand & supply production sites, bunkering, charging facilities

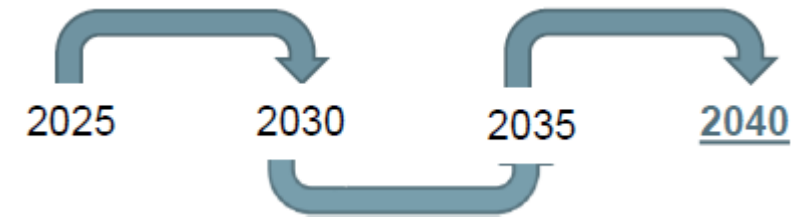
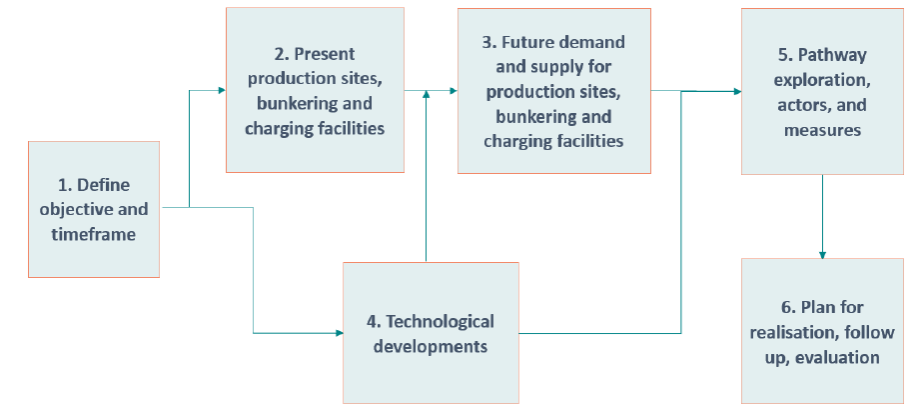
- Future energy usage, ship calls and usage of renewables
- Future market and actors in Umeå & the Västerbotten region

4. Technological developments

- Cost/benefit assessment (cost build-up, gap analyses, fuel volume vs. HFO, etc)
- Port infrastructure requirements (methanol, ammonia, hydrogen)
- Environmental impacts and safety
- Policy and regulations (ETS, FuelEU Marime, AFIR)

5. Pathways, exploration, actors and measures

6. Plan for realisation, follow up, evaluation



Local Green Hydrogen Fuels at Umeå Region

Pathways, Actors and Locations

Year	Objective	Main actor(s)	Location(s)
2025-2040	Facilitate and promote hydrogen in the Västerbotten region	Local and regional actors, as well as relevant national and international actors	Västerbotten
2025-2035	Electrification and emission reduction of the terminal and digitalisation of Port of Umeå	Port of Umeå, Kvarken Ports	Port, hinterland
2025-2035	Working on measures to reduce transport emissions for all transport modes calling at the port.	Kvarken Ports, Port of Umeå and Umeå municipality	Port, hinterland
2025-2027	Start-up of Umeå Northern Railway Terminal at Dåva	INAB	Dåva
2027	Railway between Dåva and port finalised	Trafikverket (Swedish Transport Administration)	Dåva
2029	Carbon capture facilities up and running	Umeå Energy and partners	Combined heat and power plant at Dåva
2029	Logistic supply chains ready (transport, storage, bunkering facilities, export routes, etc.)	Circle K, Kvarken Ports, Port of Umeå, INAB, bunkering companies, customers, and partners	Dåva, port, logistics infrastructure
2030	Production of e-methanol at Dåva starts	Umeå Energy, Umeå municipality, and partners	Dåva
2030	Aurora Botnia emission neutral by regularized bunkering of renewable fuels and additional energy savings	Wasaline and Umeå Hamn	Port
2032-2040	Bunkering and shore electricity connection for selected other vessels	Umeå Municipality, Umeå Energy, Port of Umeå, Kvarken Ports, bunkering companies, SCA and other ship owners.	Port
2040	Climate neutral municipality, including the port	Kvarken Ports, Port of Umeå and Umeå municipality	Municipality and Port

Green Bunkering and Charging Strategy for Ports & Local Green Hydrogen Fuels at Umeå Region

Lessons Learnt

- Several fuels and solutions will be available in the future and complement each other
- Ships' emissions need to be greatly reduced – now!
- From centralized to more local production and bunkering, with synergies/competition between shipping and land-based industries
- Policies and regulations are required for supporting development of renewable fuels and reducing ship emissions
- Pilot project and financial support needed to prepare for full scale transformation
- All costs in the complete supply chain need to be pushed down for renewable fuels to be competitive
- Cooperation among many actors is required and increased knowledge to grasp the quick development. Business opportunities ahead!



Green Bunkering and Charging Strategy for Ports & Local Green Hydrogen Fuels at Umeå Region

Outputs

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BLUE SUPPLY CHAINS FOR THE BALTIC SEA REGION

BLUE SUPPLY CHAINS

Home

Greening Supply Chains - Green Bunkering and Charging Strategy

27 June 2024

The way Towards a Green Bunkering Strategy

A Swedish Pilot Example for the Baltic Sea Region.

For the shipping industry and ports to deliver on the long-term target of net zero carbon emissions, a transition from today's fossil fuels towards fossil-free alternatives needs to be introduced together with energy efficiency and other measures to reduce the need for marine fuels (Malmgren et al., 2023). The quantities of fuels consumed on-board ships as well as within and connected to ports are significant (Winnes & Styhre, 2017). Today, ships consume approximately 280 million tonnes of fuel annually, and more than 99% of the world fleet runs on fossil-based conventional fuel or LNG (DNV, 2023a).

This report takes a deep dive into the Swedish shipping and port sector. In Sweden, some 30 TWh of fossil marine fuels are sold annually to domestic and international ships (Swedish Energy Agency, 2022), with fairly large variations in recent years, but with a steady rise since the 90s. In addition, terminals and ports also consume large quantities of diesel fuels (Winnes & Styhre, 2017). However, official statistics for international shipping are unreliable and the use of electricity in ports are missing (Vierth, 2023).

Interviews with ports and terminals (Chapter 5.1 Stakeholders' view on present and future development) show clearly that many port authorities are investigating the possibility to support the shipping companies that call their ports with the fuels they plan to use for their ships in the future. The ports need to do that on a commercial basis and understand financial and other risks, and make sure the investment will be long-term profitable. In addition, many ports and terminals have plans for their own operations to become net-zero carbon over time. Some ports also have targets for their customers' operations (shipping companies, freight forwarders, etc) to reduce their climate footprint. At the time of this study (2023–spring 2024), some shipping companies ordering new ships have taken steps towards alternative marine fuels with lower carbon impact (DNV, 2023a). This development means that ships in the order books today include methanol-ready ships, possible to fuel with either MGO (marine gas oil) or methanol, and LNG (liquefied natural gas) dual-fuel ships, possible to fuel with LNG, MGO, or LBG (liquefied biogas). However, approximately 50% of the ships in the order books still plan to use conventional fossil fuels. Further, an absolute majority of the existing ships are running on conventional fuels, and many have many years left in operation.

Driving forces for changes and market aspects

DETAILS

Homepage
Go to project page

Project type
[Core Project](#)

Implementation
January 2023 - December 2025

Status
[Ongoing](#)

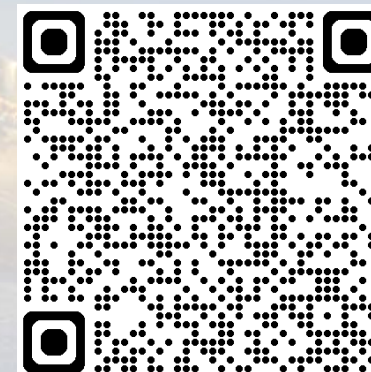
Contribution to EUSBSR
Policy Area Transport, Policy Area Ship

TARGET GROUPS

Business support organisation
Infrastructure and public service provider
National public authority

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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

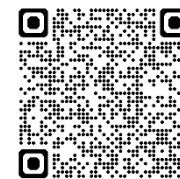
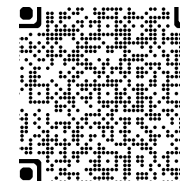
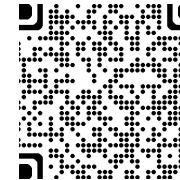
Best Practice from Lithuania

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

Reports
Manuals
Slide Decks



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