SPATIAL PLANNING TOOLBOX FOR IMPLEMENTING GREEN SOLUTIONS IN NODES

Challenges – Instruments - Solutions June 2022

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Future role of intermodal nodes: high ambitions and high expectations

© Rostock Port, Nordlicht

As intermodal hubs, ports and intermodal terminals are faced with the societal expectation to contribute to decarbonisation of the transport system. Thus, they are putting a lot of efforts to decarbonise their operations and to supply alternative energy for long-haul transport as well as for the first and the last mile.

This implies a change in strategic port development: production, bunkering and distribution of renewable energy for transport as well as for port-affine industry becomes more and more important.

As cases investigated within the InterGreen-Nodes project indicate, for this development, additional spatial and infrastructure requirements need to be met. A comprehensive summary of the needs identified within the nodes, covered by the InterGreen-Nodes projects is provided within the publication “Transnational summary report on spatial/regional needs implementing green solutions” available from the project library.

To address development comprehensively, including spatial planning, land-use conflicts as well as business development in a dynamically developing technological environment, innovative, collaborative processes are needed that involve relevant stakeholders from different levels and sectors.

The spatial planning toolbox for implementing green solutions in nodes highlights the challenges, ports and terminals collaborating in the InterGreen-Nodes project are faced with. It provides concrete solutions, intermodal nodes have been and are developing as well as challenges, the nodes were faced with.

In addition, the toolbox provides useful information on European instruments supporting the transition to green nodes, referencing to relevant European legislation as well as financial support schemes.

Thus, the toolbox shall help planners, intermodal node operators to identify useful experiences. By giving further reference to contact persons, the transfer of knowledge shall be enhanced.

European support for greening nodes

European Green Deal and “Fit-for-55”

In 2019, the European Commission announced the European Green Deal as a reaction to climate change and environmental degradation at European level and globally. To overcome these challenges, the European Green Deal is thought to transform the EU into a modern, resource-efficient and competitive economy, ensuring:

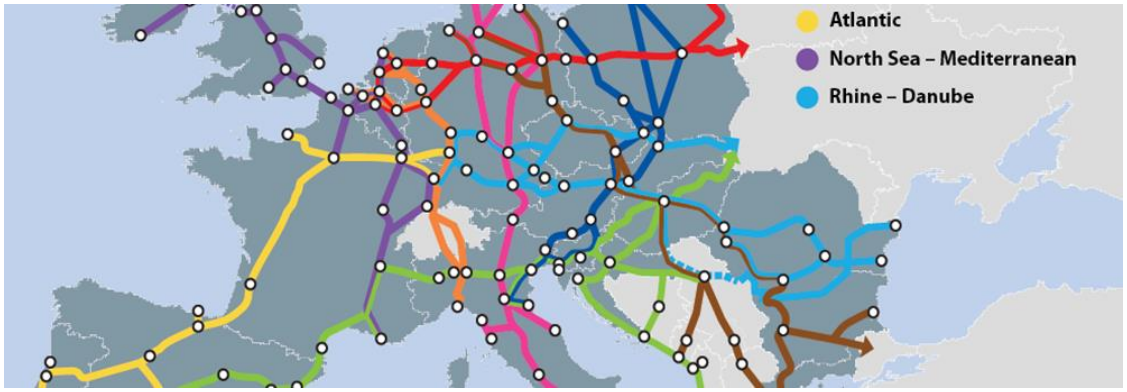
- no net emissions of greenhouse gases by 2050
- economic growth decoupled from resource use
- no person and no place left behind

The European Green Deal will be support investments amounting to €1.8 trillion from the NextGenerationEU Recovery Plan, and the EU’s seven-year budget.

Policy instruments in all sectors got strengthened to achieve the EU climate targets. In 2020, the Sustainable and Smart Mobility Strategy was adopted, a key strategic document for the transport and mobility sector.

In July 2021, the European Commission presented the Fit-for-55-package. It consists of 14 proposals for new / amended regulations, tackling different policy areas, like land-use management, emission trading, renewable energy, alternative fuels and others. It aims to reduce net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Accordingly, the Alternative Fuels Infrastructure Directive, proposed as part of the Fit-for 55 package in July 2021 and the proposal for a revised TEN-T regulation from December 2021, strengthen their focus to decarbonization.



Alternative Fuels Infrastructure

In July 2021, the European Commission proposed a Regulation on the deployment of alternative fuels infrastructure, repealing the Directive from 2014. The proposal requires member states to establish alternative fuel infrastructure complying to minimum targets until 2025 / 2030 / 2035 in the TEN-T core and comprehensive network.

Alternative fuel infrastructure includes mainly electric recharging and hydrogen refuelling infrastructure; however, the proposal also refers to LNG for road and maritime transport, shore-side electricity in ports and electricity in aviation.

It is expected that the regulation will be adopted in autumn 2022.

LINK

Trans-European Transport Network

In December 2021, the European Commission proposed a revised Regulation on Union guidelines for the development of the trans-European transport network that would repeal the regulation from 2013.

Continuing the efforts towards an integrated and multimodal trans-European network it puts sustainability in the first place.

Partly extending the network, it defines requirements for transport infrastructure for railway, road, inland waterway, maritime and air transport as well as for multimodal freight terminals, urban nodes and smart and resilient transport.

The provisions on decarbonizing transport have been strengthened and are closely linked to the proposed Regulation on Alternative Fuels Infrastructure.

LINK

Instruments

To support member states in implementing the provisions of the Fit-for-55-package and the TEN-T regulation, the European Commission provides several instruments. Most relevant ones in terms of decarbonizing ports and terminals are the Connecting Europe Facility, the Horizon Europe Programme and the EU Structural Funds including INTERREG.

Connecting Europe Facility

The Connecting Europe Facility (CEF) aims to "enable projects of common interest […] within the framework of the trans-European networks". Projects are required to contribute to at least two TEN-T objectives, concern the core or comprehensive network, be economically viable and demonstrate European added value.

Whereas studies can receive up to 50% support, the co-financing for works varies between 20% and 40%.

The Connecting Europe Facility for the period 2021-2027 is capable of supporting transport projects with a total budget of €25.81 billion.

LINK

European Regional Development Fund and Cohesion Fund

Future cohesion policy of the EU is expected to strongly contribute to climate change mitigation and decarbonisation. According to Regulation (EU) 2021/1060 laying down common provisions for EU structural policy funds, the funds are required to contribute at least 30% of their budget for climate objectives. Decarbonisation measures are funding priorities in Regulation (EU) 2021/1058 on the European Regional Development Fund and on the Cohesion Fund. The policy objective "A more connected Europe" is dedicated to climate resilient, intelligent, secure, sustainable and intermodal transport. In addition, a focus shall be on sustainable multimodal urban mobility, as part of transition to a net zero carbon economy.

LINK

Horizon Europe

Horizon is a funding program to support research and innovation activities within the EU. For the period 2021-2027 the Horizon Europe Programme is equipped with €94.100 million.

The funds are distributed between three pillars: 'open science' pillar (€25.800 million), 'global challenges and industrial competitiveness' pillar (€52.700 million) and 'open innovation' pillar (€13.500 million).

Within the global challenges and industrial competitiveness' pillar, the Climate, Energy and Mobility cluster will be most relevant to research activities on decarbonizing transport nodes.

LINK

Interreg

The European Union promotes cooperation between regions and countries. This European Territorial Cooperation (Interreg) is organised under multiple strands: cross-border, transnational, interregional, outermost regions' cooperation.

Almost €10 billion are shared between more than 100 Interreg programmes which will contribute to implement EU's cohesion policy main priorities: A more competitive and smarter Europe; A greener, low-carbon transitioning towards a net zero carbon economy and resilient Europe; A more connected Europe; A more social and inclusive Europe; A Europe closer to citizens. In 2021-2027 Interreg has 2 new specific objectives: A better Cooperation governance and A safer and more secure Europe.

LINK

How to use the toolbox?

The toolbox presents solutions developed at eight different multimodal nodes in Central Europe and the Baltic Sea Region.

Using the map on the next page or the table, listing all solutions presented, you will be able to navigate to the solutions, you are most interested in.

Using the side bar, you may navigate back to previous chapters as well as to the map and the overview table.

Each solution is marked by the action fields it mostly contributes to, visualised by the respective icons.

The action fields

Renewable energy

To decarbonize port / terminal operations as well as long-haul and first / last-mile transport, terminals have to provide for alternative fuel infrastructure. Depending on the range of offered services this may include alternative fuel stations for fuelling LDV / HDV, recharging stations for charging port vehicles and machinery, onshore-power supply, renewable energy production facilities and may require additional space or permissions.

First & last mile

Decarbonization of first and last mile cannot be influenced directly by the port / terminal operators. However, port / terminal operators can facilitate zero-emission first & last mile logistics by providing alternative fuels, by designing logistics processes collaboratively with industry, logistic service providers, academia and administration. Thus, ports and terminals can provide the platform to develop competitive and sustainable logistics services.

Spatial Planning

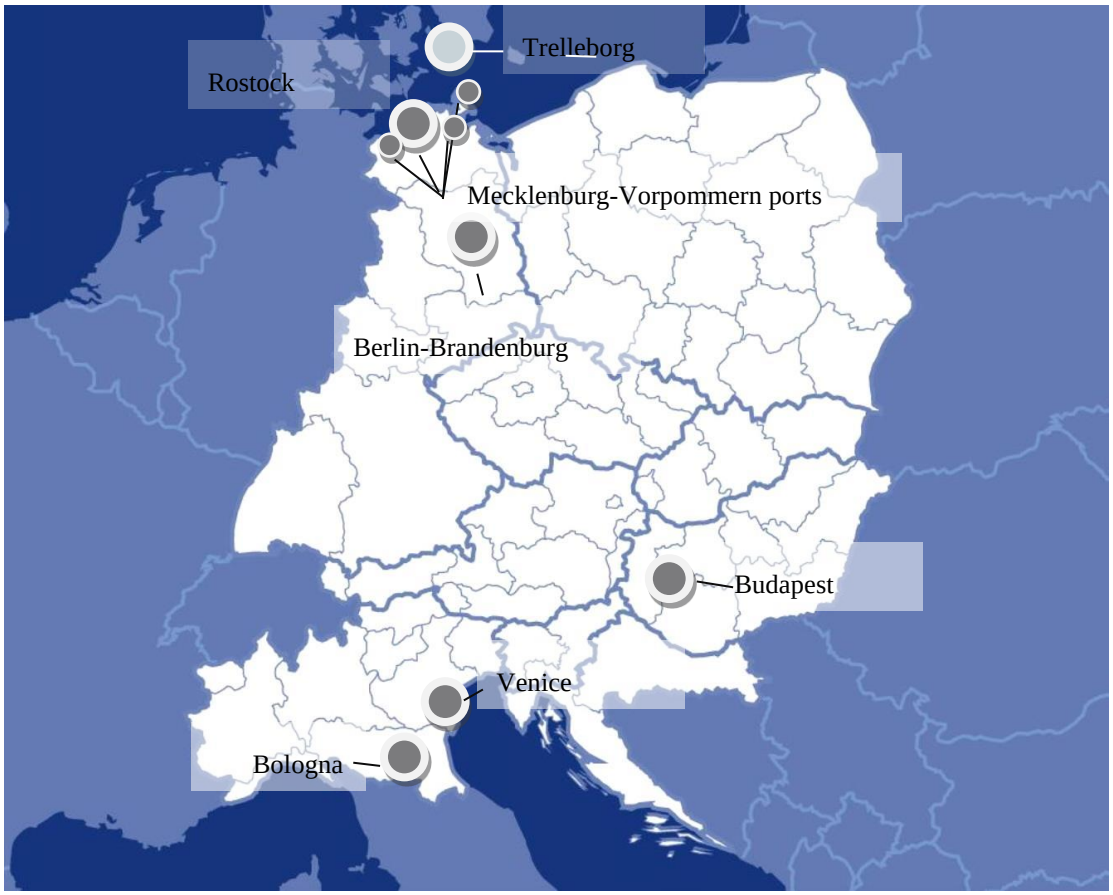
Decarbonization of transport as well as the potential of port / terminal areas for renewable energy production in some cases require additional space and permissions. Especially large renewable energy infrastructure, as bunkering facilities for LNG or production and storage of hydrogen need to comply with safety and other regulations.

Governance

Owing to its complexity, decarbonization of ports / terminals needs to align different interests: the economic interests of industry, logistics service providers; the societal interests in an intact environment; political interests in achieving decarbonization goals.

Therefore, participative, forward-looking approaches are needed to reach a consensus. Being too specific for spatial planning, the terminals / ports are in a role to moderate respective processes.

Map of ports and terminals investigated



Please klick on the map to navigate!

Table: Solution overview

Node	Solutions				
Berlin-Brandenburg	ELEKTRA - First hydrogen driven pushboat	☑	☑		
	A-Swarm: Autonomous electric shipping on waterways in metropolitan regions		☑		
	Berlin-Brandenburg regional inland waterway action plan			☑	☑
Mecklenburg-Vorpommern	Action plan future-oriented, green, port-affine commercial and industrial zones in Mecklenburg-Vorpommern	☑		☑	☑
Budapest	E-cargo mobility	☑	☑		
	Heat barge	☑			
	LNG terminal	☑			
	Stakeholder forum for low-carbon city logistics				☑
Bologna	Alternative fuels	☑			
Venice	Venice LNG facility and maritime bunkering	☑	☑		
	Onshore Power Supply	☑			
	Electricity and hydrogen	☑			
Rostock	Strategic Communication around future port development				☑
Trelleborg	Wind power plants	☑		☑	
	Renewable electricity for port vehicles and ferries	☑			

Solutions

Berlin-Brandenburg: Inland ports reaching out for new horizons

ELEKTRA-The first hydrogen driven pushboat. © BEHALA

Location Berlin-Brandenburg inland ports in and around Berlin: Westhafen, Südhafen, Hafen Neukölln, Wustermark and Königs-Wusterhausen

Action Fields

- Green energy production & operations
- First and last mile
- Spatial Development
- Governance

Challenges

The inland ports in Berlin-Brandenburg region are faced by a functional transition as well as by insufficiencies of inland waterway infrastructure. Traditional markets, such as bulky goods, mainly coal, are shrinking due to transition of energy supply to renewable fuels. At the same time, the ports have the possibility to re-position within the urban logistics system, providing for more sustainable goods distribution by barges. This requires new business concepts focusing on sustainable, zero carbon concepts.

These need sufficient space in close vicinity to final customers, where goods can be loaded and unloaded from barges; sustainable last mile delivery services as well as innovative approaches, increasing efficiency of the logistic chain.

Solutions

Thus, a focus in Berlin-Brandenburg is to develop and test innovative solutions that decarbonize and automate inland water navigation but also strengthen stakeholders around inland water navigation, as port or fleet operators.

ELEKTRA - First hydrogen driven pushboat

To decarbonize inland navigation, in collaboration with Berlin Technical University, the operator of Berlin inland ports, BEHALA constructed a fuel-cell powered push-boat prototype ("ELEKTRA").

During the last two years, the prototype was constructed and successfully watered. Three fuel cells provide a power of 300 kW, propelling two electric engines with 210 kW each. The vessels is equipped with batteries storing 2.350 kWh for propelling the vessel and on-board supply. The vessel will have a range of 400 km. Currently, ELEKTRA is tested under real-life conditions to investigate operational aspects.

A-Swarm: Autonomous electric shipping on waterways in metropolitan regions

To address the growing overload of the Berlin transport system by last mile delivery, mainly realized by heavy and light duty vehicles, the SVA Potsdam together with BEHALA and other partners from science and industry, developed an autonomous barge. Using LIDAR technology, A-Swarm investigates technological requirements to be met both by the vessel and the infrastructure, i.e. for loading and unloading. A-Swarm shall enable autonomous, decarbonized inland navigation and will be tested under laboratory as well as real-life conditions. So far, technological feasibility was demonstrated, however, most challenging will be regulatory framework as well as economically organising transhipment from the quay wall to the final destination. This requires a larger number of smaller transhipment points close to the end-customer.

Berlin-Brandenburg regional inland waterway action plan

As one of the results of InterGreen-Nodes project, the Joint Spatial Planning Department Berlin-Brandenburg elaborated an informal action plan inland ports in the Berlin urban node. In a round table process, relevant stakeholders from five selected inland ports, a regional inland waterway action plan was developed.

The plan includes topics such as digitalization, automating, increase in environmental sensitivity as well as job opportunities and value creation.

There is an urgent need to rethink goods traffic on the waterway in order to position the ports in the Urban Node more strongly than before as drivers of innovation and to open up new market segments for inland waterway transport.

Further info

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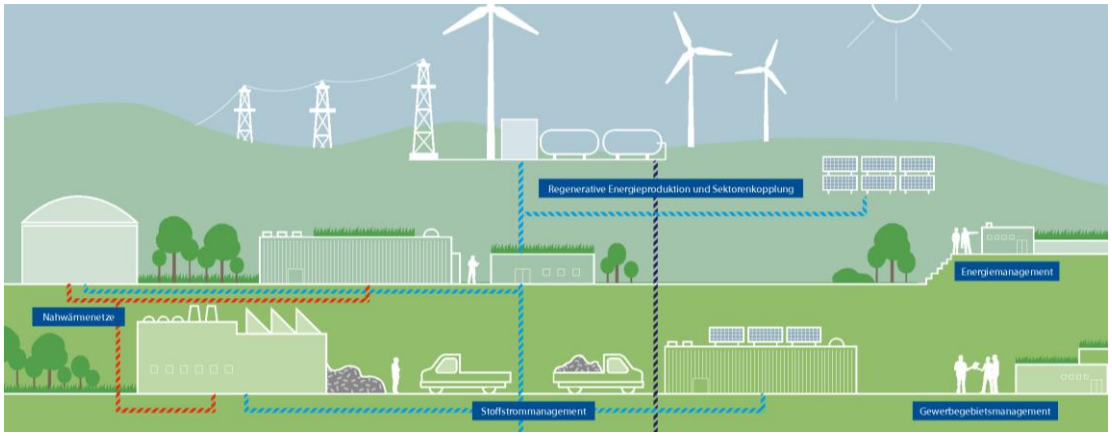
Mecklenburg-Vorpommern: Green perspectives for port areas



Green industrial site prototype. © Ministry for Economy, Infrastructure, Tourism and Labour Mecklenburg-Vorpommern

Location Mecklenburg-Vorpommern, ports of Rostock, Sassnitz-Mukran, Stralsund and Wismar

Action Fields

- Green energy production & operations
- Spatial Development
- Governance

Challenges

Transition processes especially in the field of energy policy as well as maritime transport, call for a new strategic orientation regarding the development of industrial areas in and around ports in Mecklenburg-Vorpommern.

Whilst traditional port functions are less important in future, new functions must be provided, especially related to climate neutral energy production.

Already today, Mecklenburg-Vorpommern ports play an important role for off-shore energy projects and as production facility.

In future, storing renewable energy will become more and more important, with a focus on hydrogen. Production, storage, and dissemination of renewable energy require space and are competing with other uses, like housing or tourism.

Solutions

To facilitate the development of industrial areas in and around ports in Mecklenburg-Vorpommern, the Ministry of Energy, Infrastructure and Digitalization Mecklenburg-Vorpommern elaborated an action plan identifying spatial needs and involving stakeholders from the port environment.

Action plan future-oriented, green, port-affine commercial and industrial zones in Mecklenburg-Vorpommern

The action plan comprises an analysis of development potentials for industrial and commercial areas in and around the seaports of Wismar, Rostock, Sassnitz-Mukran and Stralsund in Mecklenburg-Vorpommern based on recent developments in international maritime transport accounting for the needs posed by climate protection. During the compilation of the action plan, a dialogue with relevant stakeholders was initiated including administrations, regional / local planning authorities, major customers like ferry line operators. It was recommended, to continue the dialogue-based process.

Further info

Ministry of Economics, Infrastructure, Tourism and Labour Mecklenburg-Vorpommern

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Freeport of Budapest: Modernised into a greener future

The Freeport of Budapest. © Freeport of Budapest Logistics Ltd.

Location Budapest, Hungary

Action Fields

- Green energy production & operations
- First and last mile
- Governance

Challenges

The Freeport of Budapest is a major trimodal transport hub with over 90 years of history, that suffered de-investment in socialist and early post-socialist era, before in late 1990-ies it got re-organised and modernised.

Whereas road and rail transport – especially containers – are growing rapidly, waterway transport is lagging behind and counts less than 5% of the total cargo volume of the port.

Solutions

As the costs for the last mile as well as transhipment costs are crucial for its competitiveness, the Freeport of Budapest invests into e-city logistics as well as into using loss heat generated in the factories and industrial facilities on the Danube. To facilitate environmentally friendly inland navigation, the Freeport of Budapest has also invested into LNG bunkering infrastructure able to supply barges, navigating the Danube as well as other users.

E-cargo mobility

To decarbonize last mile delivery and transhipment processes as well as to make them more cost efficient, the Freeport of Budapest is investing into e-city logistics.

The port already has installed sun-collectors for heating and a 50 kW_p solar power plant on warehouse rooftops.

To charge port vehicles and electric trucks for last mile delivery, the installation of solar panels, the construction of energy storage and charging capacity as well as the integration into a smart grid system is planned. The Freeport of Budapest also plans a volume procurement of electric trucks for haulage companies. To generate major impact, at least 100 EV trucks should be deployed.

Heat barge

To reduce heat losses and to facilitate inland waterway transport, the Freeport of Budapest is investigating an innovative "heat barge" concept.

The "heat barge" absorbs access heat generated in factories and industrial facilities and utilizes the energy for district heating in Budapest.

Implementation involves the construction of a barge capable of absorbing and storing heat at production sites and then dissipating it at the destination.

LNG terminal

In the scope of the PAN-LNG-4-DANUBE project, funded by the Connecting Europe Facility, an LNG terminal is being built in Freeport of Budapest. The goal is primarily to serve LNG-powered vessels, but in addition, any need can be met at the terminal. The propulsion of port equipment with this environmentally friendly fuel, from which it can be realized in port cranes, is at hand. The aim is to convert suitable cranes into LNG powered and to purchase new ones based on demand. This can be applied not only for cranes, but for other equipment as well like reachstackers, forklifts, etc.

PAN-LNG-4-DANUBE project:
www.panlng.eu/english

Stakeholder forum for low-carbon city logistics

The Freeport of Budapest developed a format for better involving stakeholders under the Interreg Central Europe TalkNET project. The forums aims to provide a platform to discuss the Freeport's development from a traditional inland port to become a green city logistics park in Budapest. Furthermore, the forum shall address stakeholder communication identified as one of the problems associated with green city logistics. The Freeport of Budapest plans to hold the stakeholder forum annually and to publish a summary to present the most important findings.

TalkNET project:
www.interreg-central.eu/Content.Node/TalkNET.html

Further info

Freeport of Budapest

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Interporto Bologna: Greening its services

Interporto Bologna. © Interporto Bologna S.p.A.

Location Bologna, Italy

Action Fields Green energy production & operations

Challenges

Interporto Bologna is one of the most important Italian freight villages, comprising a total area of 4.200.000 sq. m, incl. 665.000 for rail. In the last years, Interporto Bologna S.p.a. began to redesign its position, fostering B2B services, especially related to value networks, telematics, intermodal connections, but also personal services, logistics clusters.

Additionally, Interporto Bologna S.p.a. pays special attention to environmental issues. In this regard, Interporto Bologna concluded a new cooperation agreement with the ENI group, to expand the fuel station and to adapt it to supply LNG.

Solutions

To lower carbon footprint of logistics operations based at Interporto Bologna, the provision of alternative fuels for logistics companies is leveraged.

Alternative fuels

Interporto Bologna is strongly committed to implementing and building alternative fuels stations through partnership with industrial players. The new LNG station opened in 2022 inside the Bologna Freight village enlarges the existing petrol station and widens the offer for the truck companies operating within the node but also in the surrounding area, favouring and encouraging the road transport companies to shift from diesel to LNG.

Furthermore, electric recharging points will be installed within the Freight Village infrastructure and feasibility studies on Hydrogen stations will be performed in near future.

Further info

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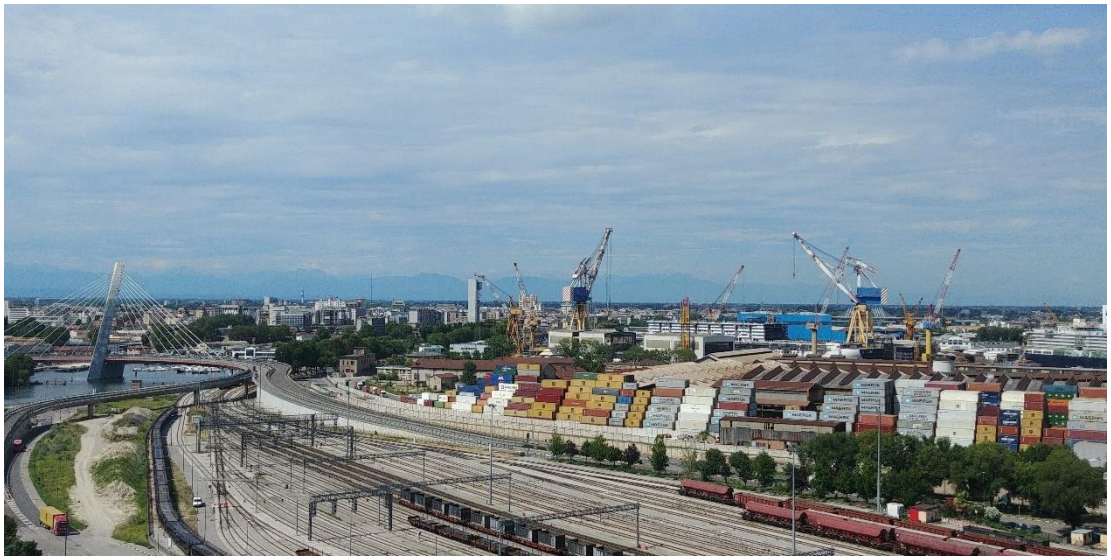
Port of Venice: Decarbonizing the Northern Adriatic



Port of Venice © Port of Venice

Location	Venice, Italy	
Action Fields		Green energy production & operations
		First and last mile

Challenges

The North Adriatic Sea port system, constituted by Venice and Chioggia, boasts a strategic position at the top of the Adriatic Sea, crossed by 2 European Transport Corridors - the Mediterranean and the Baltic-Adriatic. It allows sea-river intermodality and as a truly multifunctional port, different supply chains and sectors are equally balanced.

The sustainable development of the port system of the Veneto Region is a strategic goal of the North Adriatic Sea Port Authority. Thus, the port system is committed to be a sustainable green port, focusing on air quality, protection of the Venetian Lagoon, requalification of port areas, alternative fuels (electric, LNG, hybrid, hydrogen) and reduction of energy consumption.

Solutions

Within the focus of a sustainable port development, the port of Venice puts strong focus on reducing its carbon footprint, i.e., by implementing onshore power supply or the development of the LNG logistics chain. Amongst others, an LNG terminal will be constructed and a barge prototype for transport and LNG refuelling to ships was developed.

Venice LNG facility and maritime bunkering

As a strategic project, the port of Venice envisages to accelerate the deployment of the alternative fuels network in the Northeast of Italy. This involves the construction of an LNG multimodal facility in the core port of Venice with a storage capacity at 32,000 m^3. The new LNG port storage facility in Venice aims to supply the road, maritime and inland waterways transport modes.

To enhance LNG supply in maritime transport, in the Port of Venice, Rimorchiatori Riuniti Panfido builds the first highly innovative prototype of a bunkering vessel for the transport and bunkering of LNG to ships, in order to complete the LNG supply chain in Venice and the North-Adriatic area. Co-financed by the Connecting Europe Facility within the project "Poseidon Med II", a prototype of a Semi Ballastable Barge Transporter (SBBT) is designed and constructed. The bunker barge will be the first vessel of this type to be employed in the whole Mediterranean.

www.poseidonmedii.eu

Onshore Power Supply

"Ealing" (European Flagship Action for cold ironing in ports) is a European project funded by the Connecting Europe Facility CEF Program in which the North Adriatic Sea Port Authority, ports of Venice and Chioggia, is a partner with the aim to carry out concrete actions to reduce carbon emissions through the implementation of Onshore Power Supply (OPS) solutions. The North Adriatic Sea Port Authority develops preliminary technical studies on the infrastructures necessary in the ports of Venice and Chioggia in order to supply electricity to the ships. According to these, the reduction of CO_2 emissions with cold ironing, is estimated to be around 30%.

https://ealingproject.eu/

Electricity and hydrogen

Step-by-step, the port of Venice is replacing old vehicles with electric and hybrid cars and machineries. This results into a CO_2 emissions reduction of 15,52 tons/year, with respect to petrol and diesel cars. The replacement of rubber tyre gantry cranes (RTG) by E-RTGs would result in an annual reduction of approximately 120,400 kg of CO_2 for each replaced RTG.

Moreover, it is foreseen to develop a Master plan "Hydrogen" with milestones for 2030 and estimations of possible emissions reduction.

In 2025 the port of Venice will run 2 hydrogen-powered shunting locomotives and a green hydrogen production facility. Using solar power, it will provide a hydrogen refuelling station near the tracks with green hydrogen.

Further info

North Adriatic Sea Port Authority - Ports of Venice and Chioggia

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Rostock Port: Communicating the future energy port

Rostock Port © Rostock Port/nordlicht

Location Rostock, Mecklenburg-Vorpommern, Germany

Action Fields Governance

Challenges

For a successful strategic development, a priority of Rostock Port is to become a green energy port, providing infrastructure, area and services that foster the location of low-carbon industries.

To be able to provide infrastructure for a low carbon economy, like alternative fuel production facilities, Rostock Port has analysed, that the port area needs to get expanded.

This collides with the interests of inhabitants of neighbouring living areas and nature protection and provoked resistance towards the port's development plans, seriously hampering their implementation.

Solutions

Thus, within InterGreen-Nodes project, a strategic communication process was launched.

Strategic Communication around future port development

Having analysed the general problem, a communication strategy was developed. Starting from an analysis of past communication, it became clear, that strategic port development was not really on the public agenda and the image of the port was rather negatively connoted. By analysing experiences made by other ports during transition towards more sustainability and green business models, dos and don'ts could be identified.

The analysis clearly recommends, to develop a vision, that is shared by a majority of stakeholders providing a joint narrative in a strategic communication process. The process should involve local politics, inhabitants, nature protection organisations and further stakeholders like port-affine industries. It was highlighted that such a communication strategy needs to be open and transparent, treating all participants on a level playing field.

Further info

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www.rostock-port.de

Port of Trelleborg: On the way to zero-emission

Solar panels at the new quay © Port of Trelleborg

Location Trelleborg, Region Scania, Sweden

Action Fields

- Green energy production & operations
- Spatial Development
- Governance

Challenges

Port of Trelleborg is now realizing Vision 2025 and the expansion and the relocation of the port towards southeast is in an expansive phase.

The expansion of the port follows the plan, which means that everything will be completed in 2025 when Port of Trelleborg will make room for urban development in the Municipality of Trelleborg.

Solutions

Thus, the port has started transition to 100% renewable electricity, replacing energy-efficient lighting, converting to biogas as the primary energy source for heating, setting-up charging infrastructure for electric vehicles and building a new solar park that will meet at least a quarter of the new port's energy needs.

The port also invested into onshore power supply and plans to build wind power plants to fully decarbonize operations.

Wind power plants

To become 100% carbon neutral in operations, the port of Trelleborg intends to install wind power plants in the new port area with a power production of 12-15 GW. 50% of generated power would be used by the port and 50 % by the municipality.

After military permission was granted, a dialogue with citizens / policy makers has been initiated to obtain final decisions.

Renewable electricity for port vehicles and ferries

To supply renewable energy for the ports' own use and for customers, the port of Trelleborg installed solar panels with a power output of 5 MW_e.

All port vehicles run either on HVO or are full or half electric. All berths are equipped with onshore power supply.

Further info

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