

## 【欧州】 【Common】

Common - EU decarbonization policy: Study on greening EU ports:  
Onshore Power Supply (OPS) and utilisation of alternative fuels  
in EU sea ports as examples of good practice for greening small  
and medium-sized EU ports

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### 【概要 : Summary】

The European Commission's study "Greening of European Sea Ports" examines the environmental effects of port activities, including seaside operations, terminal operations, and hinterland connection activities and the EU ports' efforts to manage and achieve a successful transition of sustainability related measures in ports operations. Overall, the European Commission's study serves as a comprehensive resource for port stakeholders, offering insights, strategies, and examples to guide the ports' efforts in enhancing their environmental sustainability.

The study identifies factors affecting the capacity for greening the European sea ports alongside their economic development. By presenting selected examples of seaports and their experiences gained by implementing green initiatives and measures for improving their sustainability in practice, the study "Greening of European Sea Ports" aims to provide guidance to other ports for improving their environmental performance.

It is the EU's ambition to make ports and maritime transport more sustainable by mandating the installation of alternative fuels

infrastructure or Onshore Power Supply (OPS) in EU ports, among other initiatives. Therefore, this report concentrates on good practice examples presented by the study, regarding examples of onshore power supply (OPS) implementation in three EU ports and the utilisation of alternative fuels in operations in three other EU ports as measures towards achieving the transition to more sustainability for EU ports.

### 【記事 : Article】

1. Background and main aspects of the EU's study on "greening European sea ports"

Sea ports are an essential part of the maritime transport system and function as crucial nodes in the EU's supply chains, linking maritime with land-based transport networks (European Commission 2024a, 2024b). Sea ports often also act as energy hubs and industry clusters, driving innovation and economic growth, mostly locally and regionally (European Commission 2024b).

However, due to a rapid increase in trade volumes, port operations, including cargo handling, vessel activities and the increasing vessel size, as well as the expansion and development of port infrastructure to meet growing demand have a

detrimental impact on the environment, including air and water pollution, land contamination, and biodiversity loss, among others (European Commission 2024a, 2024b). The impact on the environment highlights the importance of integrating environmental concerns into port management (European Commission 2024b).

While larger ports often have significant advantages regarding financial resources, risk tolerance and organisational capacity to tackle their environmental impact and improve their sustainability, smaller or medium-sized ports have limited resources and face challenges in adopting green practices and sustainability-oriented measures (European Commission 2024a). However, environmental sustainability is increasingly seen as an essential precondition for a port's future as a "license to operate" or "license to grow" (European Commission 2024b).

On 17 December 2024, the Directorate-General for Mobility and Transport (DG MOVE) of the European Commission published the study entitled "Greening of European Sea Ports", which aims to identify challenges and factors, that affect in particular the capacity for greening of European smaller and medium-sized ports and achieving environmental sustainability alongside economic development (informare 2024).

The study examines the environmental effects of port activities, including seaside operations, terminal operations, and hinterland connection activities, highlighting disparities between large ports, which have significant financial resources and organisational capacities, and small and medium-sized ports, which often face resource constraints and risk aversion that hinder them to implement sustainability measures (European Commission 2024b). To support small and medium-sized ports, the study showcases best practices for achieving sustainability goals and emphasizes the importance of knowledge-sharing and partnerships for smaller ports (European

Commission 2024b, 2024c). However, the study also points out that good practices vary in effectiveness, applicability, and cost depending on a port's characteristics. There is no "one-size-fits-all" solution, and the successful transfer of good practices depends on their scalability, adaptability, and relevance to a port's specific context (European Commission 2024a, informare 2024).

## 2. Environmental effects of port operations and port-related activities

Port-related activities and operations mainly include vessel handling, passenger and cargo handling, as well as infrastructure and equipment development, management, operation, and maintenance (European Commission 2024b).

Waterside operations at anchor or at berth primarily involve servicing vessels, with the type and size of vessels determining the services provided (European Commission 2024b). Intra-terminal operations vary depending on terminal scale for handling different types of cargo and passenger traffic, cargo processing levels, the number and functions of terminals, added-value activities within the port, and available hinterland transport infrastructure (European Commission 2024b).

Landside port operations include intermodal transport and logistics activities. Some ports also integrate industrial activities, renewable energy production, and logistics business development (European Commission 2024b). Therefore, according to the Commission's study, assessing a port's environmental footprint should consider the port's characteristics and key factors influencing a port's capacity for greening, including its handling capacity, financial and administrative resources, organisational structure, traffic mix, and geographic location, as well as the potential for hinterland expansion to access broader markets (European Commission 2024b).

Environmental aspects related to port activities include 1. those for which the port authority has a strict legal liability or responsibility, 2. those over which (as a landlord) a port may be able to have an influence, and 3. aspects that are deemed to be of local, national or regional importance (European Commission 2024b).

Typical environmental aspects related to port activities include emissions to air, releases to water, soil contamination, noise, waste production, resource consumption, and impacts on terrestrial and marine ecosystems (European Commission 2024b). These impacts arise from environmental impacts caused by the vessels calling at the port cargo and passenger handling, industrial activities within the port, vessel operations, and hinterland transport modes. Efforts to address these issues focus on the reduction of the port's overall environmental footprint (European Commission 2024a, 2024b).

### 3. Relevant legislation to improve ports' sustainability

The Commission's study examines how current and future policies, strategies and legislation influence the capacity and prospects of ports to effectively manage these environmental challenges (European Commission 2024b).

The European Green Deal of 2019 (COM (2019) 640 final) set a 2050 climate neutrality target, requiring a 90% GHG emission reduction also in the European transport sector, including maritime transport (COM (2019) 640 final). Achieving this target in maritime transport involves replacing fossil fuels like diesel and heavy fuel oil with alternative fuels such as LNG, liquefied biogas, green methanol, ethanol, electric propulsion, and hydrogen, tailored to ship types and transport distances (European Commission 2024b). Furthermore, the EU Climate Law (Regulation (EU) 2021/1119) introduced an intermediate step of reaching a 55% GHG emission reduction by 2030, supported by the "Fit for

55" legislative package. This package includes the FuelEU Maritime Regulation (Regulation (EU) 2023/1805), the EU-ETS for maritime transport (Directive (EU) 2023/959), and the Alternative Fuels Infrastructure Regulation (AFIR) (Regulation (EU) 2023/1804). This new legislation promotes sustainable practices in maritime transport and port sectors, covering CO<sub>2</sub> emissions and energy use within EU ports, and on intra-EU routes, among others (European Commission 2023, European Commission 2024b).

The FuelEU Maritime Regulation mandates the introduction of renewable and low-carbon fuels starting from January 2025 with a 2% reduction and targets an 80% reduction in GHG intensity by 2050 (EMSA n.d., Regulation (EU) 2023/1805). From 2030, container and passenger ships at EU ports must use OPS unless zero-emission alternatives are available (Regulation (EU) 2023/1805).

The AFIR requires TEN-T maritime ports to provide OPS for at least 90% of container and passenger ships by 2030 (Regulation (EU) 2023/1804). Favouring a technological neutral approach, the AFIR (Regulation (EU) 2023/1804) accommodates all renewable and low-carbon fuels in maritime transport, such as liquid biofuels, e-liquids, decarbonised gas (including bio-LNG and e-gas), decarbonised hydrogen and hydrogen-derived fuels including methanol, and ammonia, as well as electricity (Regulation (EU) 2023/1804, European Commission 2023). The AFIR is expected to mitigate the risk and provide certainty for investments in innovative low-GHG emission technology (Regulation (EU) 2023/1804). However, the extensive EU regulatory framework creates challenges for ports. To ensure compliance and effective implementation of green initiatives based on the relevant legislation, ports should involve legal advisors early to address challenges (European Commission 2024b).

#### 4. The greening capacity of ports: OPS initiatives and alternative fuels as key practices examples

Assessing the key factors affecting the greening capacity of ports give valuable insights into the ports' operation and ability to address sustainability challenges (European Commission 2024b). Two key green practices discussed in the Commission's study are port electrification, which includes onshore power supply (OPS) and alternative fuels, replacing the use of conventional fossil fuels in port operations. These key practices are analysed in three ports each. The regulatory framework for Onshore Power Supply (OPS) in EU ports is governed by the AFIR (Regulation 2023/1804) and Regulation 2023/1805 on fuel use in maritime transport, which mandates the use of OPS by ships starting from 1 January 2030 (European Commission 2024b, see also Antolini 2024). Furthermore, the Port Services Regulation (Regulation (EU) 2017/352 of 15 February 2017) establishes a framework for the provision of port services and common rules on the financial transparency of ports, including OPS, among others. OPS can reduce CO<sub>2</sub> and NO<sub>x</sub> emissions in ports by over 50%, eliminating 45kg of NO<sub>x</sub>, 32kg of SO<sub>x</sub>, and 7kg of other pollutants during a 24-hour stay of a typical container ship (European Commission 2024b).

The Commission's study presents three examples of OPS implementation in medium-sized ports, including the Port of Kiel, Germany; the Port of Aarhus, Denmark; and the Port of Gävle, Sweden. The three port examples highlight key strategies, such as Kiel's flexible systems and variable pricing to foster cooperation. The Aarhus' fee model also incentivises OPS use, while the Port of Gävle's safety trials address safety issues of OPS for tankers (European Commission 2024b). Regulatory support under the AFIR and FuelEU Maritime Regulation ensures the utilisation of OPS infrastructure, addressing previous uncertainties. In the case of the Port of Kiel,

the provision of OPS at many berths may lead to a flexible berthing slots strategy that will result in easing the peak grid capacity requirements. Key lessons include the importance of regulatory support, flexible infrastructure, stakeholder engagement, innovative pricing models, and substantial funding, all of which drive environmental and economic benefits (European Commission 2024b). Successful OPS implementation requires collaboration with multiple stakeholders, including government bodies, shipping companies, and local industries. Financial incentives and disincentives, such as in the Port of Aarhus' fee model may effectively assist the strengthening of cooperation with shipping companies towards OPS adoption (European Commission 2024b).

Furthermore, technical and safety challenges in hazardous environments need to be addressed, as a key risk lies in explosions when tankers are berthed at energy terminals and use OPS. At the Port in Gävle, innovative solutions were required to mitigate this risk, and unique safety measures were developed for the OPS connection of tankers at the dock in Gävle (European Commission 2024b).

Regarding the introduction of alternative fuels, ports traditionally rely on heavy-duty fuel consuming crafts and machinery, such as tugboats and port equipment, causing emissions of air pollutants from fossil fuels in port operations. The use of fossil fuels needs to be replaced with alternative fuels to make the ports operations more sustainable (European Commission 2024b).

The Commission's study presents three specific cases of ports introducing alternative fuels, including the ports of Klaipėda, Antwerp and Rotterdam, and their various approaches, activities, and challenges in implementing green practices (European Commission 2024b).

By 2026, the Port of Klaipėda will establish Lithuania's first hydrogen production facility with a public hydrogen fuelling station for

bunkering ships and the port authority's marine services fleet (European Commission 2024b). As part of the Economy Recovery and Resilience Plan "Next Generation Lithuania," the Port of Klaipėda's project is co-funded by the EU's NextGenerationEU (European Commission 2024b). The Port of Antwerp - Bruges uses hydrogen as fuel for service vessels and has announced that a hydrogen fuelled tugboat has been developed in partnership with Compagnie Maritime Belge (CMB) (European Commission 2024b). The Hydro tug has a storage capacity of 415kg of compressed hydrogen, which enables the vessel to operate continuously for up to 24 hours (European Commission 2024b). Finally, the port of Rotterdam has initiated bunkering operations with the first green methanol for container vessel owned by Maersk, with OCI HyFuels green methanol and OCI Global providing green bio methanol to power the maiden voyage of Maersk's first dual-fuelled container ship (European Commission 2024b). Although these cases are still in the planning phase or early stages of development or implementation, they are significant as they focus on sustainable alternative fuels in shipping, addressing the environmental impacts of conventional fossil fuels in European ports (European Commission 2024b).

## 5. Conclusion and considerations

Larger ports benefit from greater financial resources, risk tolerance, and organizational capacity, while small and medium-sized ports often face financial challenges, which limit their possible action to introduce more sustainable solutions in their port operations. To support smaller and medium-sized ports in adopting sustainable practices, the study "Greening of European Sea Ports" identifies key factors influencing the greening capacity of ports and offers examples of practical guidance and insights to find solutions to help ports to improve their environmental performance and to

achieve sustainability goals. This report has chosen two of the study's example areas, onshore power supply (OPS) and alternative fuels, with respective examples of implementing good practices for greening European sea ports.

Regarding OPS, it is expected to be widely adopted in the near future and some of the good practices have been developed and applied, that serve as examples to other ports.

Regarding the transition to alternative fuels, it will require substantial investment for the commercial application of related technologies. Whether small and medium-sized ports can deploy alternative fuels production and/or bunkering activities will depend on the potential to improve transferability and scalability relevant to these ports.

The study recommends to further support small and medium-sized ports in implementing sustainability initiatives and to provide targeted assistance and capacity-building programmes to help them overcome barriers to green practices implementation.

Moreover, the access to funding mechanisms needs to be enhanced for small and medium-sized ports and knowledge-sharing initiatives and partnerships between larger and smaller ports need to be improved to facilitate the introduction of green practices.

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