



GREENPORT
Alliances



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Sustainable Maritime Operations and Green Port Technologies

Module number 2

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Lecturer contact info

Fostering Understanding of Emission Reduction Theory And Regulations

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Module objectives



Understand the link between energy efficiency and emission reduction.



Identify the main EU and IMO regulatory frameworks (Green Deal, Fit for 55, FuelEU, EU ETS, IMO NZF).



Recognize the indirect effects of regulations on port service operations.

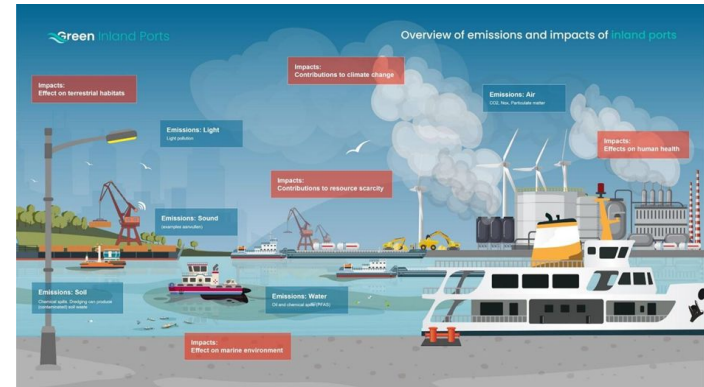


Describe proactive measures to align operations with sustainability goals.

Why emission reduction matters

ENVIRONMENTAL IMPACT OF MARITIME TRANSPORT AND PORTS

- **Global emissions:** Maritime transport contributes 2–3% of global greenhouse gas (GHG) emissions, influencing climate change and ocean health.
- **Environmental impacts:**
 - ❑ *Climate:* Sea level rise and extreme weather events.
 - ❑ *Ocean:* Acidification and ecosystem disruption.
- **Port-specific pollution:** Port areas contribute to air, water, soil, noise, and light pollution, affecting local environments and communities.
- **Operational influence:** Port service operations — including tug assistance, pilotage, and vessel handling — have a direct effect on ships' overall fuel consumption and emissions.



Sustainability measures in ports

- ☐ Low-/zero-emission service vessels (hybrid, electric, LNG, methanol).
- ☐ Onshore Power Supply (OPS).
- ☐ Emission capture and treatment systems.

TECHNICAL

- ☐ Tidal window planning and optimized vessel speeds.
- ☐ Minimum tug deployment without compromising safety.
- ☐ Digital solutions to reduce waiting times and fuel use.

OPERATIONAL

- ☐ Fee reductions and incentives for greener ships.
- ☐ Mandatory emission reporting.
- ☐ Integration with IMO and EU frameworks.

REGULATORY

Examples of best practices

ACROSS THE WORLD, PORTS ARE ADOPTING INNOVATIVE SOLUTIONS THAT COMBINE TECHNOLOGY, DIGITALISATION, AND INCENTIVES TO REDUCE EMISSIONS AND IMPROVE EFFICIENCY.

- ❑ **Rotterdam:** Hybrid tugs and OPS → lower CO₂ and particulate matter.
- ❑ **Gothenburg:** Digital Port Call → -6,000 tons CO₂ per year.
- ❑ **Los Angeles:** Differentiated fees + electric tugboats.
- ❑ **Amsterdam:** Next-gen tug design → 15% fuel savings.
- ❑ **Auckland:** Hybrid-electric tugs → 30% less fuel per operation.



Being proactive & future-proof

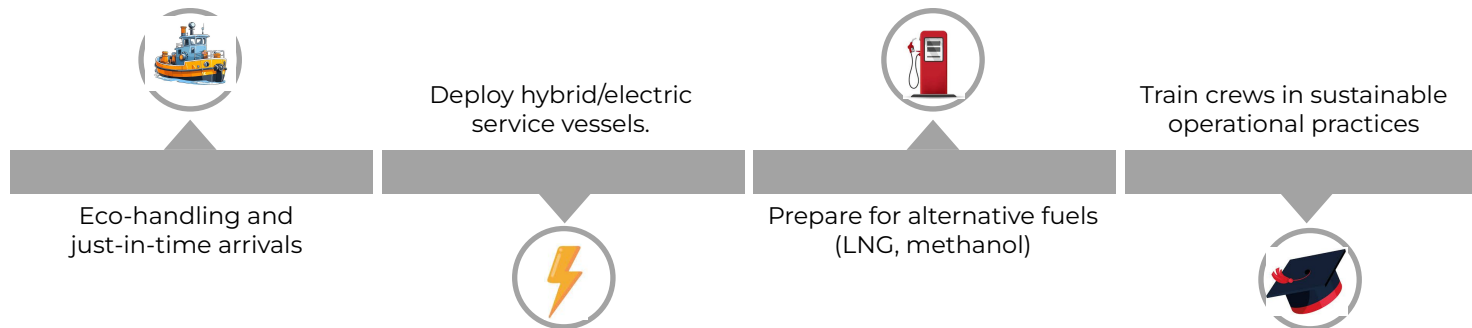
WAITING FOR REGULATION IS NOT A COMPETITIVE OPTION. PORTS AND OPERATORS MUST ACT NOW TO MEET ENVIRONMENTAL AND MARKET DEMANDS

GUIDING PRINCIPLES

- Achieve IMO and EU climate targets.
- Support greener supply chains.
- Maintain competitiveness against “greener” rivals.
- Enhance operational resilience through energy-efficient and adaptive practices.



KEY ACTIONS



Key takeaways & next steps

- ❑ Reducing emissions in maritime operations is not only a **regulatory requirement** but also a **business opportunity** that enhances competitiveness and reputation.
- ❑ **Port service providers play a strategic role** in this transition, as their choices in equipment, vessel operations, and coordination practices directly influence environmental performance.
- ❑ The **early adoption of innovative technologies** — such as hybrid and electric vessels, Onshore Power Supply (OPS), and digital optimisation tools — **allows operators to stay ahead of regulatory demands while improving efficiency and market positioning**.
- ❑ **Continuous training and awareness are critical to ensure that sustainable practices** become part of daily operations, embedding a culture of long-term excellence and responsibility



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