



Emissions, Shipping Costs, and the **EU ETS**:

A COMPREHENSIVE GUIDE FOR
THE MARITIME SECTOR



Produced by Bearing AI Research

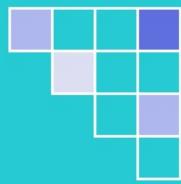


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Introduction



This guide explores the impact of the European Union Emissions Trading System (EU ETS) on the maritime shipping industry. It focuses on the challenge of balancing environmental responsibility and cost-effectiveness for shipping companies.

Here, AI is examined as an innovative technology solution for meeting regulatory requirements and remaining competitive.

The European Union's determined strides to mitigate maritime emissions are marked by the introduction of the EU ETS.

Described as a cornerstone of the EU's policy to combat climate change, it:

- Represents the world's first and most extensive system for trading greenhouse gas emission allowances.
- Significantly limits greenhouse gas emissions from more than 11,000 heavy energy-using installations and airlines operating between the European Economic Area (EEA) countries. The EEA includes EU countries, Iceland, Liechtenstein, and Norway.
- Covers all vessels, irrespective of flag state, and applies to voyages to, from, and between EU ports.
- Includes emissions from ships at berth or moving within an EU port.

According to a study from the International Maritime Organization (IMO), including maritime transport emissions in the EU ETS could reduce the EU's total emissions by more than 180 million tonnes by 2030.

Financial & Operational Impacts

Financial impacts will likely vary by vessel type, with larger vessels — accounting for a significant proportion of maritime emissions — being most affected. For instance, [a study by CE Delft](#) found that large container ships would see an increase in operating costs of up to 6%, with tankers and bulk carriers up to 3% and 5%, respectively.

For shipping owners and operators, the implications of the EU ETS are substantial. The system drives transformation towards a more energy-efficient maritime sector by promoting energy-saving and zero-emission technologies investments. This incentive will be especially significant considering the [IMO's revised goal to reach net-zero greenhouse gas emissions from international shipping by or around 2050](#).

EU ETS implementation helps to poised the industry for a substantial contribution to this global objective. Additionally, revenues from auctioning emission allowances can be invested in further measures for maritime emissions reduction, such as research and development for alternative fuels.

Background on EU ETS



What is the EU ETS?

The EU Emissions Trading System (ETS) is a regulatory framework established by the European Union to address CO₂ and other greenhouse gas emissions from various industries, including maritime. The main goal is to bring emissions in line with the EU's commitments to combat climate change.

The EU ETS, which has been in effect since 2005, extends its scope to the maritime shipping industry starting in 2024, presenting unprecedented operational and financial challenges within the European Economic Area (EEA). By mandating every vessel to purchase carbon offset credits proportional to their carbon emissions, the ETS is set to significantly increase costs for all voyages to, from, and within EEA ports. However, amidst these challenges lies an opportunity for maritime shipping companies to gain a competitive edge. Better emissions performance can equal significant cost savings on carbon allowances — positioning carbon-compliant companies to offer more competitive pricing.

Artificial Intelligence (AI) can be a key tool in navigating EU ETS, helping vessels efficiently predict and optimize emissions — a data-driven approach that could significantly curb unnecessary EU ETS expenses. By harnessing precise AI-powered emissions forecasts, shipping stakeholders can make informed decisions that balance operational efficiency, financial management, and environmental responsibility.



How Does EU ETS Work?

The EU's Emissions Trading System (EU ETS) is the world's first and largest carbon market, aimed at combating climate change through cost-effective emission reduction.

The EU ETS will be extended to cover GHG emissions from all ships of 5,000 gross tonnage and above arriving into, within, and departing from EEA ports, regardless of the flag they fly. EU ETS will apply to:

50%
of emissions from voyages to or from a port in an EEA member state that starts or ends outside of the EEA (allowing the departure or arrival country outside of the EU to decide on appropriate action for the remaining share of emissions);

100%
of emissions that occur between two ports in EEA member states and within ports in EEA member states.

Ship owners must purchase carbon offset credits to offset these emissions.

 The EU ETS covers CO₂ (carbon dioxide), CH₄ (methane), and N₂O (nitrous oxide) emissions, but the two latter only as from 2026.

According to the [European Commission](#), to ensure a smooth transition, shipping companies only have to surrender allowances for a portion of their emissions during an initial phase-in period:



Purchasing Carbon Credits:

A New Reality for Maritime Vessel
Owners and Operators



Purchasing carbon credits under the EU ETS will necessitate a new strategic approach to operations for maritime vessel owners and operators. These carbon credits, known as EU Allowances (EUAs) under the EU ETS, must be purchased for a portion of a vessel's emissions, as outlined above. **From 2026 onward, carbon credits must be purchased to cover 100% of a vessel's carbon emissions.**



These EUAs will be traded on the [EU's carbon market](#), priced by supply and demand dynamics.

To purchase these credits, responsible parties must participate in auctions conducted by the **European Energy Exchange (EEX)** or trade on secondary markets. The auctions will occur throughout the year, allowing companies to purchase additional credits as needed.

Companies must develop robust strategies to predict their emissions accurately and secure sufficient credits without overspending. This process will require an understanding of the carbon market and a keen insight into vessel operations, achievable with AI-powered emissions prediction systems.



Impact on Maritime Shipping

Today, owners and operators are required to track and report their emissions per the [EU-MRV](#). They will now be charged for the emissions they report through the EU ETS.

The maritime shipping industry will be tasked with determining how to accurately predict their emissions to ensure they're making strategic financial and operational decisions.

The financial implications are equally significant. For instance, a cargo vessel sailing within the EEA from 2025 and beyond that emits 15,000 tonnes of CO₂ and faces a carbon price of [€83 per tonne](#) would have to bear an added cost of **€1,245,000 annually**. For a shipping company operating ten such vessels, this would amount to an additional expense of €12.5 million per year.

If these vessels could reduce their emissions by a mere 10%, the company could save €1,245,000 annually. However, if companies under predict their annual carbon spend, the unforeseen costs can be significant.

The EU ETS will have a profound impact on the budgeting and planning practices of maritime companies. It will necessitate accurate forecasting of emissions and associated costs, as well as consideration of the potential volatility in the price of EUAs due to market dynamics.

These changes introduce a level of uncertainty that companies must effectively navigate and manage.



Elements Impacting Maritime Operations:

Several elements of the EU ETS regulation will impact maritime shipping operations:



Emissions Monitoring and Reporting:

Ship owners and operators must monitor and report CO₂ emissions from covered voyages. This includes collecting data on fuel use, distance traveled, and other relevant factors.



Free Allowances Allocation:

Currently, most sectors covered by the EU ETS are granted significant free allowances. This will change by 2026 as these phase out. The shipping sector will not receive any free allocation.



Allowance Auctions:

Instead, the EU ETS will be gradually implemented to only certain CO₂ emissions.

By 2024, 40% of emissions will be included, 70% by 2025, and from 2026 onwards, shipping companies will bear the total cost of their reported emissions.



Compliance Costs:

Some EUAs will be auctioned by member states.

If a company exceeds its allocated EUAs, it must purchase additional EUAs via the secondary market.

EEX is the standard European Commission auction platform.



Fuel Choice

Depending on emissions, a company might need to purchase EUAs, which could become a significant operational cost.

Risk management here might involve using cleaner fuels and improving the energy efficiency of their ships.



Risk Management:

Fluctuating allowance prices can impact operating costs. Managing this risk might involve strategies such as hedging.



Long-Term Planning:

As emission reduction targets tighten over time, long-term investment and operational decisions should align with these goals.



Innovation and Technology:

Exploring low-carbon technologies and practices can position a company well for future regulations and consumer demands.



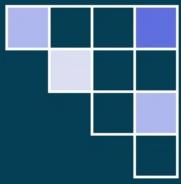
Third-Party Services:

Companies can use third-party services like [Bearing AI's Decision Engine](#) to monitor their carbon footprint.

[Bearing](#)'s prediction, monitoring, and optimizing capabilities can help ensure data is collected accurately and efficiently — considering the variables listed here and beyond. These insights empower users to achieve their defined goals effectively and efficiently.



Keeping track of the changing EU ETS regulations and seeking advice from legal and industry professionals to customize your strategies according to your operations and compliance needs is crucial.



Context:

The Problem and Solution



The EU ETS Emissions Regulation presents operational and financial challenges for maritime shipping companies. Achieving success in this new era requires innovation and adaptability to sustainable practices.

Bearing AI, believes that actionable data will be a powerful and critical tool for shipping companies to navigate these environmental regulations. Compliance with the EU ETS is mandatory, but rich with opportunity for competitive advantage.

For instance, shipping companies investing in AI will reduce overall operation costs — allowing for more competitive pricing against companies that need to hedge for unexpected expenses from EUAs and potentially other regulatory regimes in the future.

Using AI to predict better EU ETS emissions cost obligations will result in better profit margins and more competitive quotations.

Using Bearing AI's Decision Engine, users can:

- › Accurately predict carbon emissions with up to 98% accuracy
 - compared to 80% with leading physics-based models
- › Forecast carbon credit costs and allocation more precisely
- › Remain competitive with lower operational costs
- › Maintain environmental compliance under the EU ETS

Considering different factors such as weather conditions, vessel speed, cargo load, fuel type, and more, AI-driven models offer predictions using the the vessel's speed or route to avoid costly penalties, and cut environmental impacts with optimized operations.

Contract negotiations can also benefit from AI's predictive capabilities. Better emission forecasts provide more accurate cost estimates, which can be used in contractual discussions.



For example, a shipping company could use its AI-driven emission forecasts to negotiate fuel surcharge adjustments in its contracts, making them more competitive by offering more certainty and less risk to customers — and fewer surprise costs at the close of a contract.

The demand for environmentally-friendly shipping is increasing as shareholders and market forces push for a more sustainable supply chain. By reducing emissions, vessels can not only lower costs but also gain a competitive edge in securing contracts from sustainability-focused clients.

The Future of Maritime Shipping and AI



As the maritime shipping industry tackles challenges presented by EU ETS regulations, AI offers a powerful solution for innovation, emissions management, and competitiveness.

Technology like AI will remain a primary driver in achieving sustainability goals, with predictive analytics, forecasting and proactive emissions management.

Efforts aimed at reducing the industry's estimated 3% contribution to global carbon emissions can play a vital role in forging a sustainable future for all of us.



Appendix:

EU ETS Regulations in Detail



This appendix provides an overview of the current **European Union Emission Trading System** regulations, which limit greenhouse gas (GHG) emissions from ships entering, leaving, or operating within EU waters.

The EU ETS will include maritime shipping, effective January 1, 2024. This alteration also brought revisions to the (Monitoring, Reporting, and Verification) EU-MRV regulation, which deals with the monitoring, reporting, and verification requirements to support the EU ETS.

Identifying Your Administering Authority (AA) and Meeting Compliance Duties

There are three strategic routes shipping companies may take to fulfill the obligations relating to the EU-MRV and EU ETS:



1 The ship's registered owner accepts MRV and ETS compliance responsibilities and formulates their unique monitoring mechanism

The owner's organization must provide a list of ships to their Administering Authority (AA), indicating accountability, develop a Monitoring Plan, have it inspected by a verifier, and present it to the AA before April 1, 2024.



2 The ship's registered owner accepts responsibilities but delegates the actual monitoring to the ISM company

The owner's organization supplies a ship list to their AA, accepting responsibility for MRV and ETS obligations. The ISM company continues with existing monitoring and reporting measures; however, the Monitoring Plan must be modified to present the owner as the responsible entity. The ISM company then follows the Monitoring Plan and provides emissions reports. It remains under discussion whether the ISM company will be allowed to submit plans and reports on behalf of the owner through MRV.



3 The ship's registered owner assigns MRV and ETS compliance duties to the ISM manager

A contractual agreement must exist between the registered owner's organization and the ISM company, indicating the ISM company's assignment to comply with MRV and ETS regulations. The ISM company may have multiple owner organizations but is responsible for the combined fleet under MRV and ETS. The current Monitoring Plan can continue if the updated document template's additional elements are incorporated.

Your Administering Authority

Every company, whether the registered owner or ISM company, will be allocated an AA from an EU/EEA member state. For companies registered in the EU/EEA, their AA will be from their registered country. For companies registered outside the EU/EEA, their AA will be from the country where their vessels made the most port calls over the previous four years. **The EC will release a list of companies and their corresponding AA by February 1, 2024.**

Any shipping company controlling one or more ships under ETS must create a Maritime Operator Holding Account with its AA within 40 days after the EC publishes the list. **The AA is required to set up the account within an additional 40 working days.** The specifics related to this will differ among different AAs.

The documentation required to open an account is consistent for all AAs and includes:

- **Information about the legal entity** (e.g., name, address, contact person)
- **If the company is the registered owner:** a list of ships the company controls
- **If the account holder is part of a group:** a document clearly defining the group structure.

Further documentation may be requested:

- **Proof of the legal entity's registration**, its bank account details, and confirmation of VAT registration
- **Details of the legal entity's beneficial owner**, including name, date of birth, nationality, and ownership or control details
- **Copies of the legal documents** establishing the legal entity
- **Copy of the annual report** or latest audited financial statements. If no audited financial statements are available, a copy of the financial statements is stamped by the tax office or the financial director.

For more resources on determining your Administering Authority, visit the [European Commission's Emission Trading System User Manual](#) and the [European Commission's Maritime Emissions Portal](#) for comprehensive information and guidance.

Guidelines for Company Change and Monitoring Plan Updates

**A**

Adjustment due to Company Change and Required Emissions Reports

For cases where there is a shift in the company (i.e. either the registered owner or the ISM company), MRV regulation mandates the verification and submission of a partial emissions report. This process should be completed via the Thetis MRV system within three months after the change. This precautionary measure allows both preceding and succeeding companies to submit a company-level emissions report that covers the emissions they were each accountable for under the ETS in the given reporting period. The responsible company determines whether the registered owner or the ISM company needs a partial emissions report.

For comprehensive insights into MRV and ETS regulations and their application to company transitions, refer to the [European Commission's Emission Trading System User Manual](#).

**B**

Update on the Monitoring Plan

A Monitoring Plan, verified to comply, must be submitted to the AA by April 1, 2024. Monitoring Plans and emissions reports are submitted through Thetis MRV, irrespective of the allocated AA. The Monitoring Plan now includes additional obligations in line with the MRV and ETS. The revised template includes the following elements:

- Emission factors for CH₄, N₂O, and CO₂
- Methods for determining the emission factors for biofuels, RFNBOs, and RCFs
- Emission source class and slippage coefficient values for LNG-fuelled ships
- Detailed information about the shipping company
- Information on the application of carbon capture and storage technologies
- Processes related to data flow activities and risk assessment.

For an in-depth understanding of developing a Monitoring Plan in alignment with the new MRV and ETS regulations, visit the [European Commission's Maritime Emissions Portal](#).

Emissions Limitations Under the EU ETS

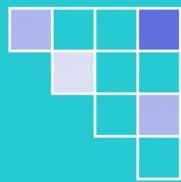
The European Union's Emission Trading Scheme (EU ETS) has set forth stringent maritime emissions limitations.

- **Carbon Dioxide (CO₂):** Regular monitoring and reporting of CO₂ emissions is mandated. CO₂ is the primary greenhouse gas emitted through human activities, and burning fossil fuels for electricity, heat, and transportation is the largest contributor. Specific limitations and guidelines for CO₂ emissions from shipping vessels are prescribed.
- **Methane (CH₄) and Nitrous Oxide (N₂O):** The updated Monitoring Plan now includes emission factors for CH₄ and N₂O. Methane is emitted while producing and transporting coal, oil, and natural gas. Methane's lifetime in the atmosphere is much shorter than that of carbon dioxide. Still, methane is more efficient at trapping radiation, making its impact over 20 years more than 25 times greater than carbon dioxide. Nitrous oxide is released during agricultural and industrial activities and the combustion of fossil fuels and solid waste.
- **Biofuels, RFNBOs, and RCFs:** Procedures for determining the emission factors for biofuels, renewable fuels of non-biological origin (RFNBOs), and recycled carbon fuels (RCFs) are also included. These fuels are a more sustainable alternative to fossil fuels.
- **LNG-fuelled Ships:** The Monitoring Plan includes emission source class and slippage coefficient values for Liquefied natural gas (LNG) fueled ships. LNG has lower sulfur emissions than conventional ship fuels, but releases methane – a potent greenhouse gas.

Emission limits are defined based on vessel type and propulsion system, with the most stringent rules applied to large vessels with diesel engines. In addition to GHG emissions, ships must comply with reporting requirements and verification procedures monitored by the European Maritime Safety Agency (EMSA).

These initiatives aim in totality to incentivize greener fuels and technologies, thus contributing to the larger goal of adoption of climate change mitigation and sustainable development.

For more details on these regulations, please refer to the [European Commission's Emission Trading System User Manual](#) and the [European Commission's Maritime Emissions Portal](#).



About Bearing AI Research

Leveraging a unique blend of data science, naval architectural knowledge, and deep expertise in the global maritime industry, Bearing AI has introduced an innovative initiative: **Bearing AI Research**.

This initiative is supported by an **expansive and untapped** global maritime vessel dataset, providing deep insights and fueling change and growth within the industry. It is a **critical resource** for shipping organizations, policy experts, investors, academic researchers, and media outlets.

Bearing AI Research is an instrumental guide for maritime organizations striving to comply with environmental regulations and adopt sustainable practices.

Learn more about how Bearing AI is **spearheading the shift** to a greener shipping industry, helping shipping companies chart through the noise in data to **optimize commercial and operational decision-making** at <https://bearing.ai>.

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