The Financial Consequences of bringing Shipping under ETS: a preliminary review

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Summary

EU legislators have agreed to include maritime transport in the EU's Emissions Trading Scheme. By 2027 all emissions will be subject to ETS thus introducing a clear carbon price tag on shipping emissions. This document provides insight on what will be measured for ETS and estimates that the total cost to the industry will be around EUR 7 billion annually, while the operating expenses–depending on ship type–may increase up to twenty-five-thousand euros per day. Overall, the introduction of ETS in the Maritime industry is considered a relevant step towards decarbonization of the maritime transport sector and will put a premium on cleaner vessels going forward.

1. Introduction

Shipping, like aviation was not included in the Paris climate accord as such there is no broadly accepted way to decarbonize the shipping industry. Decarbonization can be achieved through a variety of means, including the use of cleaner-burning fuels, implementing energy-efficient technologies, and alternative propulsion systems.

It's worth noting that the reduction of carbon emissions from shipping is a complex task as the sector is highly globalized and the involvement of multiple actors is needed for a successful decarbonization pathway.

The International Maritime Organization (IMO) has set a target to reduce the total annual GHG emissions from international shipping by at least 50% by 2050, compared to 2008 levels. Although it provides guidance, this pathway is almost universally acknowledged as lacking in ambition. This may have contributed to regional initiatives to help accelerate the decarbonization of shipping.

The European Union with its Green Deal and Fit for 55 agenda are a clear example hereof. Included in these policies are programs to introduce a price on the externalities caused by shipping with the idea that this will support the business case for (further) decarbonization. As such, the announcement last November that the shipping industry would also become subject to the EU's Emission Trading System (EU-ETS) is a really important step forward.

The Emission Trading System

The EU Emissions Trading System (EU ETS) was established by the European Union and designed as a cap-and-trade system for greenhouse gas emissions. Such a system entails that a cap is set on the total amount of greenhouse gases that can be emitted by covered facilities, and emitters are required to hold allowances (EU Allowances also known as EUAs or permits to emit) equivalent to their emissions. The cap is gradually reduced over time, so as to decrease total emissions. Companies that emit less than their allotted amount can sell or bank their excess allowances, while those that emit more than their allotted amount must purchase additional allowances. This creates a financial incentive for emitters to reduce their emissions.

Since its inception well over a decade ago ETS has seen various adjustments to its operations. For the scope of this paper, two are of the utmost importance. Firstly, the number of industries covered and thus subject to ETS is on the increase, the addition of shipping bears this out. Secondly, the way the system works is also changing, moving away from a cap-and-trade towards a system whereby all emissions are subject to ETS. This in effect means that the system becomes more comparable to a carbon tax than a cap-and-trade.

Shipping under ETS

For the time being it has been decided that only ships of a certain size will be included in the European Emission Trading System. As it stands, only vessels of 5,000GT and up will be subject to ETS. It will include vessels performing voyages in order to transport cargo for commercial purposes (including ballast voyages) or passengers.[1]

[1] Note that voyages for search and rescue and humanitarian purposes are thus excluded. In addition, small islands, with a permanent population of less than 200 000 permanent residents and with no road or rail link with the mainland, will also be exempted. Special conditions are provided for ice-class vessels. There is a derogation for voyages by passenger or ro-pax ships performed in the framework of a transnational public service contract or a transnational public service obligation, as well as for outermost regions. (see Maritime Cyprus, 2022)

As mentioned earlier, shipping is a global activity and as such more difficult to regulate, especially when it comes to the introduction of levies such as those associated with ETS. The EU will have jurisdiction of the activities – and thus emissions at its own ports but beyond that their influence is limited. This is also something that becomes clear when reviewing which emissions are considered in scope under the current proposals, namely:

- All emissions at berth in an EU port
- All emissions from vessels performing voyages between EU ports
- Half of the emissions of voyages arriving at an EU port from a non-EU port, and
- Half of the emissions of voyages departing from an EU port to a non-EU port

The current plan is that shipping will incrementally be included in ETS. In 2025 the permits for 40% of all relevant emissions reported for 2024 will have to be submitted (i.e. acquired). This percentage will rise by 30% in 2026, meaning that in 2026 allowances for 70% of the emissions reported for 2025 will have to be submitted. As of 2027, allowances for all emissions reported in the previous year will have to be submitted. Important to note is that a failure to surrender the required allowances will lead to heavy fines and may even result in expulsion from EU ports.

The basis for the emission reporting is the EU Monitoring, Report and Validate (MRV) template. As of January 1st, 2018, large ships over 5,000 GT loading or unloading cargo or passengers at ports in the European Economic Area (EEA) are required to monitor and report their CO_2 emissions as well as other relevant information.[2] This information is publicly disclosed via the website of EMSA Thetis-MRV.[3] This reporting mechanism will be utilized in the determination of the total allowances needed for individual vessels.

2. The financial consequences for shipping of its inclusion in ETS

The overall financial impact of ETS for shipping rests on two variables. First, the actual CO_2 emissions and secondly the price for CO_2, here expressed in euros per ton CO_2. With regard to the latter, it is important that to note that the focus here is on the price set within the ETS. Before turning to this element, the text below discusses the actual emissions in scope.

Emissions subject to ETS

The MRV output allows to identity where the reported CO_2 emissions occurred. This is of importance - as discussed in the previous section – as the location determines if the emissions are considered to be subject to ETS. Figure 1 below offers an overview of the actual total emissions per ship type reported for the year 2021 and resulting by way of application of the different regimes (e.g. all or only half of emissions are included) the total reported emissions that are subject to ETS.

For the year 2021 the MRV data show a total of 124 million tons CO_2 as having been emitted. Application of the ETS rules yields the outcome that 66% of the 124 million ton of CO_2 is subject to ETS, or 82 million tons CO_2.[4] Figure 1 also shows that the category

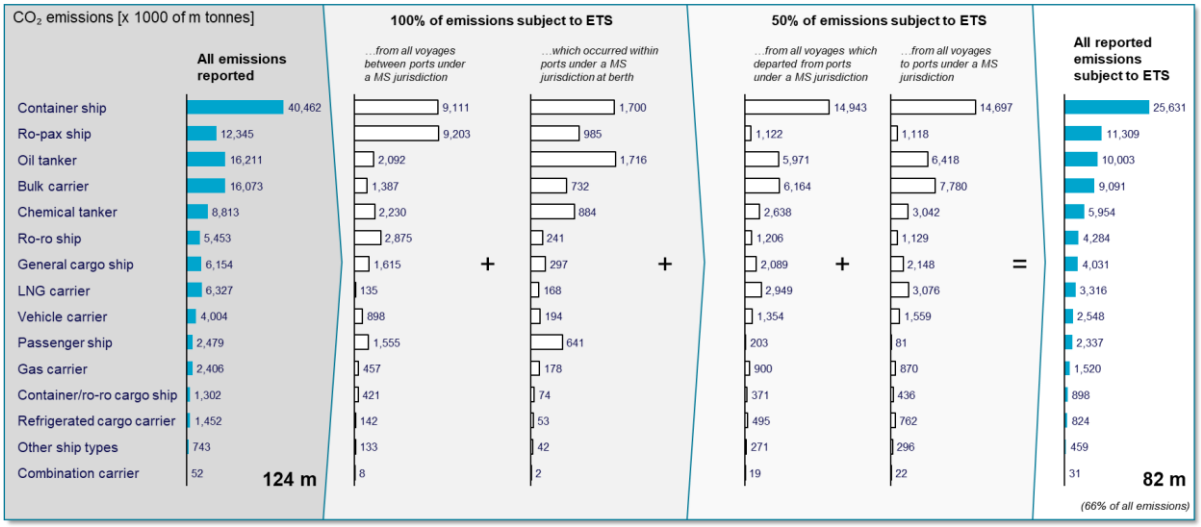
[2] The artificial cut-off point of 5,000GT potentially creates a two-tier market, an moreover excludes a significant part of the short sea shipping market from ETS. Please note that there are plans to expand the application of MRV reporting to certain vessels of smaller size, e.g. 400 gross tonnes as of 2027, which in turn may impact the application of ETS. (see Maritime Cyprus, 2022)

[3] See https://mrv.emsa.europa.eu

[4] For comparison, the total CO_2 emissions in the European Union in 2021 amounted to 2,728 $GtCO_2$ meaning that the reported emissions subject to ETS equal 3% of all EU total.

“Container Ships” was the single largest contributor in 2021 among the 15 types deployed in MRV reporting.[5]

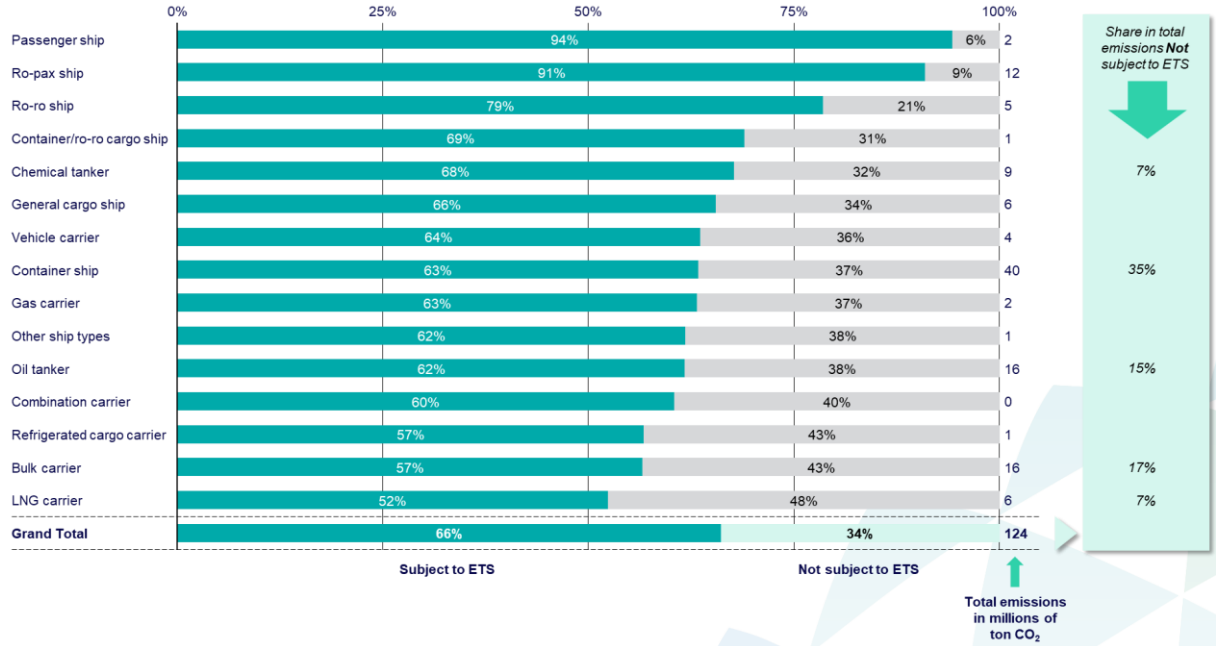
Figure 1 - Overview which of the MRV-reported CO_2 emissions are subject to ETS per ship type



Source: PROW Capital/ based on MRV data for 2021

From the results presented in figure 1 it is possible to provide an overview to what extent ETS has different consequences for the different ship types. More specifically, it is possible to identify to what extent the overall emissions are subject to ETS in terms of a percentage of overall emissions. This is done in figure 2 below.

Figure 2 – Breakdown of CO_2 emissions (not) subject to ETS per ship type



Source: PROW Capital/ based on MRV data for 2021

Of all ship types shown in figure 2, Passenger and Ro-pax ships would seem to be most impacted by ETS, in the sense that for both more than 90% of all their emissions (as reported via MRV) are subject to ETS, which is a reflection of their more local trading pattern.

[5] Please note that no correction is applied for the number of ships involved.

LNG carriers have the lowest percentage of emissions subject to ETS, which is no doubt the result of the fact that these ships tend to arrive from outside the EU. In short, the impact of ETS is not evenly distributed across the different ship types and some will feel the financial impact a lot more than others.

Looking at the total emissions that are not subject to ETS (34% of the total) it is noteworthy that Container ships account for 35% of these emissions, which might be indicative of the impact of big containerships active in deep sea trades have on emissions. When Chemical and Oil tankers, as well as Bulk- and LNG Carriers are added, 80% of the emissions not subject to ETS are accounted for.

With all of these calculations it is important to bear in mind that MRV data (currently) only covers vessels of 5,000 GT and up. This means that a significant part of all European maritime emissions (up to 5%) are currently not included in the analysis. (see also Transport & Environment, 2022)

The price of Carbon

Figure 3 below provides an overview of the historic development of the price for one ton of CO_2 in the form of an EUA. What is most striking of the development of the CO_2 price are the large fluctuations that occurred during 2022. During the past twelve months the price for a EUA fluctuated between 58 (just after the Russian invasion of Ukraine) to nearly EUR 100 in August while settling in the 80's towards the end of 2022 and first weeks of 2023

Figure 3 Price of CO_2 emissions/ EUAs (spot price € per ton)

Source: Prow Capital

With the identification of the carbon emissions to be subjected to ETS as well as the price of an EUA the next step is to identify the potential overall financial impact of ETS.

As noted above the way by which shipping will brought under ETS is with incremental steps starting 2025 with full implementation by 2027. According to the adopted methodology in 2025 rights will need to be acquired for 40% of the CO_2 emitted in 2024, while in 2026 there is a requirement to pay for 70% of the CO_2 emitted in 2025 and lastly in 2027, 100% of the CO_2 emitted in 2026 will be subject to payments.

In order to identify what this might look like, the MRV data for the year 2021 are utilized. Table 1 below displays the analysis what the cost of ETS for shipping might look like. Two scenarios are discussed. Important to note is that these scenarios are only constructed to assist with identifying the possible financial impact of ETS for shipping.

In the first, the Steady State scenario, the main assumption is that there is no change in the size of the CO_2 emissions subject to ETS over time. For each year, the emissions are equal to those identified in the 2021 MRV data. The lack of change in emissions can be the result of a lack of increase in logistic activity with no change to vessels or operations. The lack of change in emissions may also be the result of cleaner vessels and more efficient operations, mitigating the impact of increased activity.

Under the second scenario, dubbed the Moderate growth scenario in the table below, CO_2 emissions are assumed to increase by 2% per annum. This means that the emissions identified in 2021 will have grown to 87 million ton CO_2 by 2024 due to the year-on-year growth. The increase can be the result of increased maritime activity and/or operational changes.

Table 1 The overall financial impact of ETS

Scenario	Price CO_2	2025	2026	2027
		40%	*70%*	*100%*
Steady State		**82 million ton CO_2**	**82 million ton CO_2**	**82 million ton CO_2**
Adjusted value		*33 million ton*	*58 million ton*	*82 million ton*
	€ 80	€ 2.6 b	€ 4.6 b	€ 6.6 b
	Δ € 10	Δ € 329 million	Δ € 576 million	Δ € 822 million
Moderate growth (2% y-o-y)		**87 million ton CO_2**	**89 million ton CO_2**	**91 million ton CO_2**
Adjusted value		*35 million ton*	*62 million ton*	*91 million ton*
	€ 80	€ 2.8 b	5.0 b	€ 7.3 b
	Δ € 10	Δ € 349 million	Δ € 623 million	Δ € 908 million

Source: PROW Capital/ based on MRV data for 2021

Under the first scenario, in which the overall emissions do not change, the overall costs associated with the inclusion of shipping under ETS will increase from EUR 2.6 billion in 2025 to ultimately EUR 6.6 billion in 2027. This estimate is done based on the assumption that the price for carbon is (and stays at) EUR 80 per ton. Sensitivity to changes in the price for one ton of CO_2 is calculated as well. A change in the EUA price of ten euros will impact the overall ETS related costs with EUR 329 million in 2025, EUR 576 million in 2026 and ultimately with EUR 822 million by 2027.

The second scenario shows a very similar picture with the exception that over the years the overall emissions are assumed to grow. Taking 2021 as point of departure and applying an annual growth rate of 2%, the emissions for 2024 (of which 40% is subject to payments in 2025) will have grown to 87 million tons CO_2. Under this scenario the cost of ETS thus also increases from EUR 2.8 billion in 2025 to EUR 7.3 billion in 2027. In that same year, a ten euro change of the carbon price will result in a total impact of nearly a billion euros.

The daily cost of ETS

For shipowners, it is interesting to calculate the potential financial impact of ETS on the average cost per day at sea per ship. Again, MRV data is utilized as this dataset also includes the number of hours at sea. For presentation purposes, in table 2 the hours at sea are recalculated to show total days at sea.

Table 2 Projected costs of ETS per day per Ship Type

	All emissions subject to ETS per ship type in ton CO_2	Sum of days at sea per ship type*	Emissions subject to ETS per day at sea (ton CO_2)	Cost of ETS per day at sea with a CO_2 price of € 80 per ton	Δ € 10 per ton
Bulk carrier	9,090,904	202,223	45	€ 3,596	€ 450
Chemical tanker	5,954,203	134,182	44	€ 3,550	€ 444
Combination carrier	31,463	812	39	€ 3,098	€ 387
Container ship	25,600,000	206,268	124	€ 9,929	€ 1,241
Container/ro-ro cargo ship	898,340	8,923	101	€ 8,054	€ 1,007
Gas carrier	1,519,930	30,286	50	€ 4,015	€ 502
General cargo ship	4,030,701	124,696	32	€ 2,586	€ 323
LNG carrier	3,316,045	24,401	136	€ 10,872	€ 1,359
Oil tanker	10,000,000	166,666	60	€ 4,800	€ 600
Other ship types	459,214	11,579	40	€ 3,173	€ 397
Passenger ship	2,337,356	9,346	250	€ 20,008	€ 2,501
Refrigerated cargo carrier	823,560	13,521	61	€ 4,873	€ 609
Ro-pax ship	11,300,000	57,788	196	€ 15,643	€ 1,955
Ro-ro ship	4,284,174	42,054	102	€ 8,150	€ 1,019
Vehicle carrier	2,547,575	38,851	66	€ 5,246	€ 656
Overall	**82,193,465**	**1,071,596**	**77**	**€ 6,136**	**€ 767**

Source: PROW Capital/ based on MRV data for 2021

Please note that the data presented in table 2 reflect the fact that some ship types have a higher % of emissions covered under ETS than others, reflecting their actual trading pattern.[6] As a consequence, the impact of ETS is highest for the Passenger ships and Ro-pax segments with twenty thousand euros per sailing day for a passenger ship and fifteen thousand euros per sailing day on average for a Ro-pax ship. For Container ships, the increase of daily costs is slightly less than EUR 10,000 per day on average.

3. Conclusion

As of 2025 the shipping industry in Europe will start to feel the financial consequences of its carbon emissions due to the introduction of ETS. To an extent, shipowners will be able to pass on the increased cost to their customers, as all vessels will be confronted by the ETS cost at the same time. At the same time, ETS puts a penalty on more polluting vessels and a relative cost benefit for cleaner (i.e. less polluting) vessels. The analysis provided in these pages indicates that the total ETS cost per vessel–assuming more than 100 sailing days combined with a daily ETS cost of 10k–can be north of a million per annum per vessel.

The introduction of the ETS in the Maritime industry will have a significant impact on the demand for cleaner vessels and accelerate retrofits on existing ones. This in combination with operational improvements means that the introduction of ETS will help in speeding up the decarbonization of the sector.

[6] In addition, one should also note that it is assumed that all ships within a ship type segment have an equal emissions profile which may not applicable for individual vessels.

4. Literature

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Colophon

The PROW Capital white papers aim to contribute to the debate on advancing the decarbonisation of the economy and furthering the integration of non-financial factors in the way companies operate. This white paper was prepared by Maarten Biermans (maarten.biermans@prow-capital.com) and Maarten van der Klip (both PROW Capital), January 2023, Amsterdam

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