Maritime shipping – full steam towards an inclusion in the EU ETS?
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Executive summary

• European Economic Area (EEA)-related maritime emissions have decreased significantly after peaking in 2007 and amounted to 138m tonnes in 2018. Emissions are projected to increase significantly in the absence of additional measures. The EU is considering acting on maritime transport emissions. Parliament voted to fast-track an inclusion of shipping into the EU Emissions Trading System (ETS) as of 2022, and the European Commission is expected to propose measures for the sector in June 2021.

• Our analysis shows that abatement potentials in the sector are limited even in high technology-penetration scenarios, and abatement potentials through alternative fuels will not become relevant with carbon prices below €200/tCO2e by 2030. Depending on technology penetration and the level of carbon prices, 1.5m-46m tonnes (1-29%) of the projected yearly maritime emissions could be abated by 2030.

• Implementing a standalone maritime ETS could therefore lead to a high-price environment, depending on the level of ambition targeted by lawmakers. High ambition in the maritime sector could be supported through a linkage of a maritime ETS with the existing stationary EU ETS by allowing for an exchange of certificates between the systems. Such a linkage would be highly likely to shift a part of the emission reduction burden into the EU ETS – our modelling shows up to 66m tonnes of emission reductions could be shifted to the stationary sectors in a high-ambition scenario.

• At the same time, if a lower level of ambition would be chosen, allowing for full flexibility between the two systems bears the risk of diluting ambition in the stationary ETS. The EU will have to carefully consider the level of ambition chosen in a potential maritime ETS and ensure that flexibilities granted do not lead to adverse effects.

• Setting up an ETS rather than opting for efficiency standards or a carbon levy would provide the advantage of certainty around actual emission reductions – something EU lawmakers have called for and the reason why the EU is planning to act on its own rather than relying on the International Maritime Organization (IMO) to advance climate action.

• In all these considerations, the question of scope will play an important role. While we focused on a full-scope implementation, reducing to a semi-full or intra-EEA scope is expected to not alter general results, but the scale of the measure and thus the potential impact on the EU ETS.
Introduction

In September 2020, the European Commission published its proposal for a European Climate Law, aiming to increase the EU’s emission reduction target to 55% net compared with 1990 emissions, up from the current 40% gross target. Along with the bill, the Commission presented an impact assessment (IA), pointing towards the instruments it intends to use to achieve this target.

While extra-EU shipping emissions do not count towards the EU’s emission budget, tackling emissions from maritime transport by subjecting the sector to a form of carbon pricing is part of every scenario assessed in the IA. The Commission did not specify how exactly it would design such a carbon pricing scheme.

One of the options discussed is an extension of the EU ETS to the maritime sector. This was also the case with the aviation sector that got added to the EU ETS in 2012, and now co-exists as a separate, but fully linked trading scheme.

Independently from the Climate Law, but only a few days after the Commission’s presentation, the European Parliament voted to fast-track the inclusion of shipping into the EU ETS as early as 2022. While this is unlikely to happen given the required legislative process, it underlines the political willingness to act on emissions from the sector quickly. This is especially true since European Parliamentarians pointed out during the debate that in their view the International Maritime Organization (IMO) is not ambitious enough to reduce absolute emissions. The IMO had in 2018 adopted its Initial Strategy, setting out targets to cut emission intensity by 40% by 2030, and reduce overall ambitions by 50% by 2050 compared with 2008.

The European Commission is currently preparing a legislative package due to be presented in June 2021, which will include a proposal for tackling emissions from the maritime sector. In this paper, we assess different implementation options for a carbon pricing scheme for international maritime emissions and discuss the interplay with the EU ETS and the functioning of such a market.

Tackling emissions from the maritime sector

Emissions in the maritime sector

EU-related maritime emissions amounted to 138m tonnes in 2018, according to United Nations Framework Convention on Climate Change (UNFCCC) data. The data suggests that maritime emissions have fallen from 153m tonnes in 2005, dipping in the aftermath of the financial crisis, but have lately risen again.

Projections by the European Environment Agency suggest that emissions in the maritime sector could further increase to 160m tonnes by 2030 in the absence of additional emission reduction efforts, as Figure 1 shows.

Target setting

Emissions from the maritime sector are somewhat separate from other sectors within the EU, as emission targets currently do not apply to international maritime shipping. However, given the lack of progress on tackling emissions on a global level, the EU legislators look increasingly prepared to take matters into their own hands.
In this context, two important questions remain unclear at this point:

- **Scope:** The EU could opt to include either
  1. intra-EEA shipping into the carbon pricing scheme
  2. a full scope, under which all incoming and outgoing voyages to and from EEA ports would be covered, or
  3. a semi-full scope, under which only half of the emissions of incoming and outgoing voyages to extra-EEA ports would be covered

- **Ambition:** Given that maritime emissions do not count towards the intra-EU emissions target, it is possible that the EU would aim for a lower ambition level than the ambition applied to sectors currently covered by the EU ETS

In this paper, we assess the full-scope implementation, as this would be the option with potentially the biggest impact on the EU ETS market balance. However, limiting the scope to either a semi-full or intra-EEA scope would not significantly alter the results, but only reduce the scale of the impact. With regards to the level of ambition, we assess different implementation options, and results are a function of the chosen level of ambition.

### Abatement options

The IMO in July 2020 adopted a report on the [Fourth IMO GHG Study](#). In the study, a wide range of emission abatement options is assessed, and marginal abatement costs identified. The report identifies potential technology penetration levels as a function of an early-applied carbon price. It segments the technologies depending on the possibilities to apply them during operation, requiring a retrofit or being available only with new-built vessels.

Applying the European Environment Agency’s emission projections to the marginal abatement costs given in the IMO study yields the marginal abatement cost curves by 2030 given in Figure 2.

In a maximum scenario, ie with high technology penetration and a CO2 price of €213/tCO2e, 46.1m tonnes or 29% of projected total emissions could be abated by 2030. On the other hand, without a CO2 price and with little technological diffusion, only 1% of the projected emissions would be abated in the low-abatement scenario 1.

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1 The IMO’s technology-penetration scenarios are based on the uptake of abatement technologies in new-built ships and the application of retrofits. In the high-penetration scenario, ships built after 2019 are assumed to use available abatement technologies to a full extent. There are examples for an early uptake of abatement technologies, such as the announcement of ship operator Maersk to have a first carbon-neutral vessel operational as of 2023.
This is despite some low-hanging operational fruits, such as propeller and hull maintenance (-€84 and -€76/tCO2e) and slow steaming (€14/tCO2e) being available, with the latter providing significant abatement potential even in a low technology-diffusion scenario, since this a completely operational measure and assumed to be implemented in all ships by 2030.

An important aspect in this regard is the availability of alternative fuels. These include fuels with carbon content (LNG, methanol, ethanol) and those without (hydrogen, ammonia, synthetic methane, methanol and ethanol, and biomass-based fuels). Even in the high-penetration scenario, usage of fuels with zero-carbon content is assumed to be only 0.1% of the entire fuel consumption by 2030, while the share of alternative fuels with reduced carbon content, mainly LNG, is expected to be around 54-55% by the end of the decade.

Except for methanol and LNG, the study classifies all these fuels to be evolving technologies, which are not currently available in the market. Notably, the study argues that by 2050 all ships could be powered by alternative fuels without carbon content. This would, however, require a significant R&D effort, in addition to the necessary investment by ship operators to build up fleets using these fuels.

Implementation scenarios
We assess six implementation scenarios for carbon pricing in the maritime sector:

1. **Standalone ETS**: Set-up of a separate trading scheme for the maritime sector, capping emissions at the 2018 baseline

2. **Linked ETS**:
   2.1 **High ambition**: Extension of the EU ETS to the maritime sector, applying the same linear reduction factor (LRF) as under the stationary ETS to maritime emissions (as is the case for aviation since 2021)
   2.2 **Moderate ambition**: Extension of the EU ETS to the maritime sector, reducing overall emissions by 50% by 2050 compared with 2008 as set out in the IMO’s Initial Strategy (2018), assuming a linear trajectory between 2021 and 2050
   2.3 **Low ambition**: Extension of the EU ETS to the maritime sector, keeping overall emissions on the level of a historical baseline (here: 2018) to avoid further increase of emissions in the maritime sector

3. **Efficiency standards + EUAs**: This option is in line with the Parliament proposal for an extension of the EU ETS, calling for emission intensity (as measured by transport work\(^2\)) to be reduced by 40% by 2030 compared with 2008, thus not capping overall emissions\(^3\). Ships that do not fulfil the efficiency standard for a given year would have to offset their additional emissions with EUAs, thus making the maritime sector a buyer in the EU ETS.

4. **CO2 levy**: Introduction of fixed carbon price in the sector, no emission cap

Depending on ambition levels and drawing from the ICIS 2030 EUA price forecast, we project carbon prices applying in the maritime sector in 2030. These depend on whether a linkage is implemented or not. In case of a linkage, CO2 prices in effect in the maritime sector would converge with prices in the EU ETS.

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\(^2\) Transport work is usually measured in CO2 emissions per tonne-nautic mile, person-nautic mile, or volume-nautic mile, depending on the ship type. For the sake of simplicity, we limited the analysis to a more general emissions per nautic mile.

\(^3\) To arrive at an overall target, we assume an activity increase of 1% per annum in this scenario.
In the case of a standalone ETS, we assume a CO2 price of €100/tCO2e which would achieve the targeted emission reductions assuming average technology penetration. We further distinguish between the ambition levels, assuming that higher ambition in the maritime sector would go along with higher ambition in the EU ETS and thus draw from an ambitious 2030 EUA price forecast.

Finally, we assume that abatement options that are economically viable in 2030 are implemented at that point and are reflecting the two technology-diffusion scenarios outlined by Figure 2 above.

Figure 3 shows the expected emission levels in 2030 (grey and yellow lines), compared with the 2030 target for that specific scenario (blue bar) and the expected carbon price applying in the maritime sector in 2030 (orange dot).

Scenarios 1 and 2.3, which represent low ambition capping emissions at 2018 levels, are the most likely to achieve the desired emission reductions. However, neither of the two scenarios results in emissions being pushed below 120m tonnes even in the high abatement case.

Scenario 2.1, representing a linked ETS with high ambition, falls significantly short of delivering desired emission reductions and would thus bring an additional annual short position of 44m-66m tonnes to the stationary ETS by 2030.

Similarly, scenario 2.2 would see an additional short position coming to the EU ETS, but to a more moderate extent (6m-46m tonnes by 2030), while at the same time delivering similar emission reductions as a higher-ambition scenario. In other words, higher ambition in the maritime sector is likely to mainly increase the emission reduction burden in the stationary sector in case of a linked ETS.

A scenario of no cap and offsets, as suggested by Parliament and reflected in scenario 3, is likely to achieve similar emission reductions as the moderate-ambition ETS scenario, but with a higher burden for the stationary ETS.

While emissions in the lower abatement case hardly change, with the price differences assumed in the scenarios, ranging from €50/tCO2e to €100/tCO2e in 2030, emissions in the high abatement case are still relatively stable – due to only a few abatement technologies being available in this price range, as Figure 2 showed.

The higher the ambition, the less likely is the sector therefore to achieve the necessary emission reductions, and ambition would likely shift to the stationary ETS.

Figure 4 shows the development of emissions as a function of the assumed CO2 price for the high- and low-abatement potential case. As suggested by the above results, emissions are only slightly reduced in the range between €50/tCO2e and €100/tCO2e, even in the higher-abatement scenario.
The lower-abatement case shows almost no sensitivity to the applied CO2 price. This picture, at the same time, reflects the expectations for the CO2 levy scenario, which would not cap overall emissions.

Implications for policy options

Our modelling suggests that covering maritime emissions with a standalone ETS is not ideal, especially if ambition would be set at a higher level than a stable baseline. In a situation where all short-term abatement potentials such as slow steaming are utilised while the market remains short in allowances, ships could avoid coming to the EEA area or stop at a port close to the region, to not have to account for the full emissions of the trip. Notably, the absence of an obvious abatement technology such as the fuel switch from coal to gas in the power sector could hamper the emergence of an efficient short-term price signal.

The linked ETS scenarios allow for more flexibility, as the maritime sector would have the option to buy allowances from the EU ETS. However, depending on the level of ambition chosen for the maritime sector, lawmakers could consider allowing only for a one-way or limited two-way flow of allowances, like what had been in place for the aviation sector until 2021.

This would allow ship operators to use stationary allowances for compliance, but not vice versa. This would ensure the stationary ETS is not diluted by un-ambitious target setting in the maritime sector. However, our analysis shows that even with only a moderate ambition it seems highly unlikely that the sector would achieve the necessary emission reductions, and thus a two-way fungibility would likely not bear the risk of diluting the existing scheme.

The CO2 levy scenario in our view would allow for a stable price signal and thus certainty for fleet operators assessing investing in abatement options. On the international level, trading house Trafigura recently called for the introduction of a carbon levy of around $250-300/tCO2e to tackle maritime emissions.

In addition, two small island states submitted a proposal for a carbon price levy of $100/tCO2e to the IMO. However, from a political view, the EU has been criticising the IMO for not setting overall emission limits. As such, it seems unlikely that the EU would introduce a local scheme that itself would not at least cap emissions on a constant level, and reduce them in the mid-to-long term.

Finally, the efficiency standards + EUAs scenario reflects the report adopted by Parliament and as such could reflect Parliament’s position in future discussions after the Commission publishes its proposal.

That said, setting efficiency targets that are in line with the IMO’s proposal does not create an extra level of ambition (assuming that IMO would enforce the efficiency rules), as well as falling short of capping overall emissions. From an ambition point of view, the introduction of a cap could therefore be preferable.

Implications for the stationary ETS

Since there are only few abatement options available in the maritime sector at price levels that are expected for the EU ETS until 2030, a full linkage of a maritime ETS to the EU ETS would likely result in the maritime sector becoming a net buyer in the existing stationary ETS.
In a high-ambition scenario, this could mean an additional short position of 44m-77m tonnes annually by 2030, or 500m tonnes over the whole fourth trading phase if implemented as early as 2022.

However, given that this is an absolute maximum scenario for a full-scope implementation, it seems unlikely that the European Commission would aim for such a scenario. If the EU should indeed decide for a full-scope approach, a less ambitious scenario seems likely – eg by applying the IMO’s own 2050 target of a 50% reduction in emissions vs 2008, and linearly interpolating to 2030.

This could yield an additional short position of 6m-26m tonnes annually (or 37m-159m tonnes between 2022 and 2030) in the stationary ETS in case of a full linkage, and thus seems politically more reasonable and defensible.

Limiting the exchange of allowances between the sectors could provide further certainty concerning the maximum amount of allowances drawn away from the stationary ETS. Such a measure would, however, bear the risk of leaving the maritime sector with an uncovered short position and extreme prices, which could result in adverse behaviour, such as stopping at ports close to the EU when on long journeys, in order not to have to cover the emissions for the full voyage.

**Discussion and perspectives**

The introduction of a separate ETS for the maritime sector following the example of aviation seems the most likely option. Depending on the level of effort chosen, lawmakers would have to consider introducing only limited flexibilities to an exchange of emission permits between the sectors.

This is to either avoid diluting the ambition in the stationary ETS when aiming for lower ambition in the maritime sector, or avoid introducing a significant new short position into the stationary system when opting for higher ambition.

While a CO2 levy or efficiency standards using allowances from the EU ETS to offset non-compliance as suggested by the Parliament could provide a stable price signal, they would fail to put a limit to overall emissions in the sector – the exact reason for which the EU is discussing acting on its own in the first place.

With regards to the timeline, an introduction of a carbon pricing scheme in any form seems unlikely before 2023, as the legislative process will not be concluded within 2021. Further, a CO2 levy would be a tax-like instrument, requiring unanimity in the European Council. This could further prolong the necessary legislative process.

In conclusion, it seems highly likely that the EU is going to act on maritime emissions, potentially as soon as 2023. While the introduction of a separate ETS with limited flexibilities to the stationary ETS appears to be the most sensible option, lawmakers will have to consider the level of ambition desired for the sector and inform their decision with that given level of ambition.