Policy Brief | 16.05.2024

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Maritime transport in the EU climate policy

Key issues for the EU 2040 and 2050 target

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This briefing provides an overview of the status quo (as of December 2023) and recent changes of EU legislation for the maritime transport sector and analyses whether the legislative situation after the Fit-for-55 package makes the maritime transport sector fit for a potential 2040 target and the 2050 target of the EU.

Key recommendations

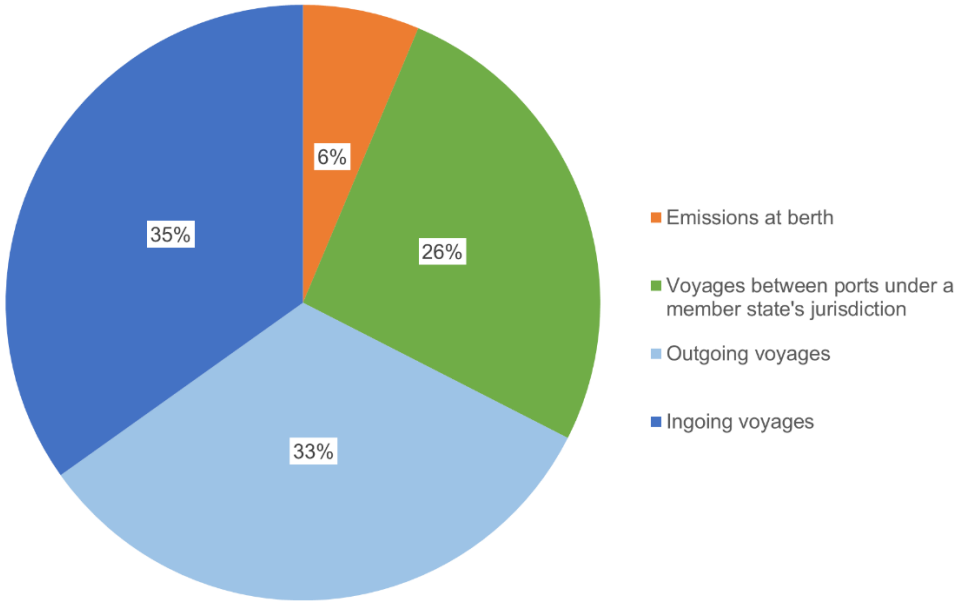
- The new EU climate policies adopted for maritime transport in the Fit-for-55 package are an important step to address a previously unregulated international sector.
- To keep up the newly gained policy momentum, the EU should include international transport in the scope of the EU 2040 climate target even if it means setting a lower absolute target.
- Although global policies are more suitable for a global sector, the EU cannot wait for the IMO which has been notoriously slow on climate action.
- Reviews scheduled for new maritime policies (EU ETS, FuelEU Maritime) are important to extend the coverage, increase ambition, further incentivise climate-neutral fuels and respond to potential policy implementations at the IMO.
- At least in the near term, the expected CO_2 price will be sufficient to incentivise some efficiency measures but not the uptake of climate-neutral fuels and the needed investments in the sector. Spending revenues from the ETS on decarbonization will be important to accelerate in-sector reductions.
- Exclusion of maritime fuels from energy taxes is an unresolved problem. While the revision of the ETD is still negotiated and the outcome uncertain, like-minded countries could and should go ahead by taxing (international) shipping fuels through bilateral agreements.
- Shipping emissions are highly dependent on economic growth and consumption patterns, stepping up the efforts to reduce the demand for fossil fuels and primary materials will also lead to emission reductions in the maritime transport sector.

1 Maritime transport and the EU's climate targets/governance

1.1 Emissions

Maritime transport contributes significantly to global emissions: its share of global greenhouse gas (GHG) emissions was approx. 2.9% in 2018 equalling 1 076 $MtCO_2eq$ (IMO 2020). For comparison, European maritime transport was responsible for 144.7 $MtCO_2$ in the same year. The largest share (approx. 70%) of these emissions can be attributed to international maritime transport. The CO_2 emissions per geographical scope for EU-related maritime transport are shown in Figure 1. International voyages, e.g. voyages in non-EU waters, are represented by the outgoing (light blue) and ingoing voyages (dark blue). International voyages cause the largest share of emissions from EU-related maritime transport with approx. 83 $MtCO_2$ (68%) of the total 124 $MtCO_2$ reported in 2021 (EC 2023).

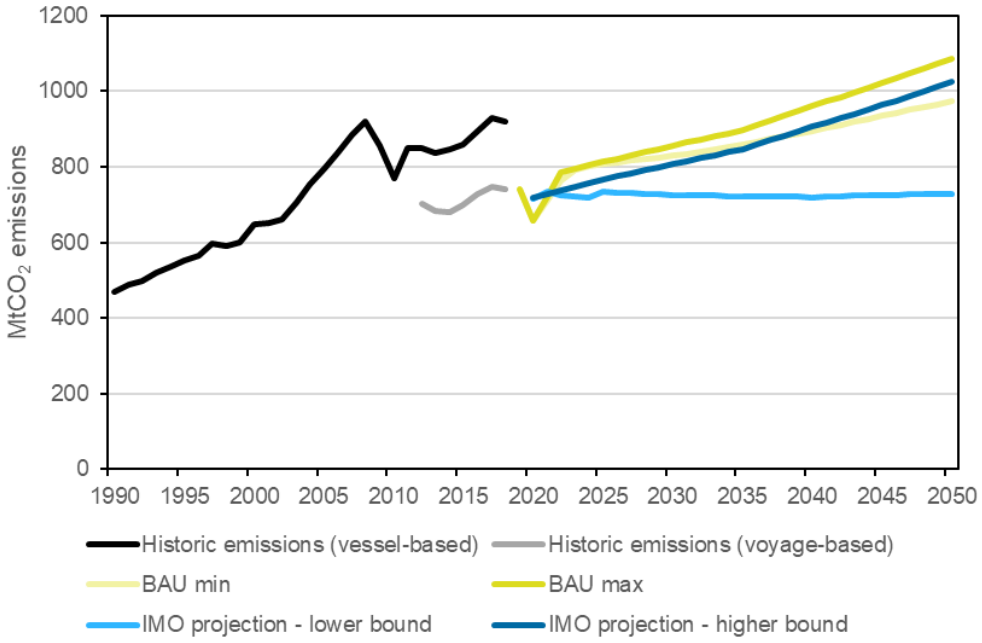
Figure 1: Share of EU emissions from international and national maritime transport from a total of 124 $MtCO_2$ in 2021



Source: THETIS-MRV; version 170 of the 2021 data.

Figure 2 provides an overview of historic and projected development of global CO_2 emissions from international maritime transport up to 2050. On average, annual emissions from international maritime transport have increased in recent decades despite energy efficiency gains (IMO 2020) and emissions are expected to further increase in coming decades in current scenario projections.

Figure 2: Historic and projected CO_2 emissions from international maritime transport



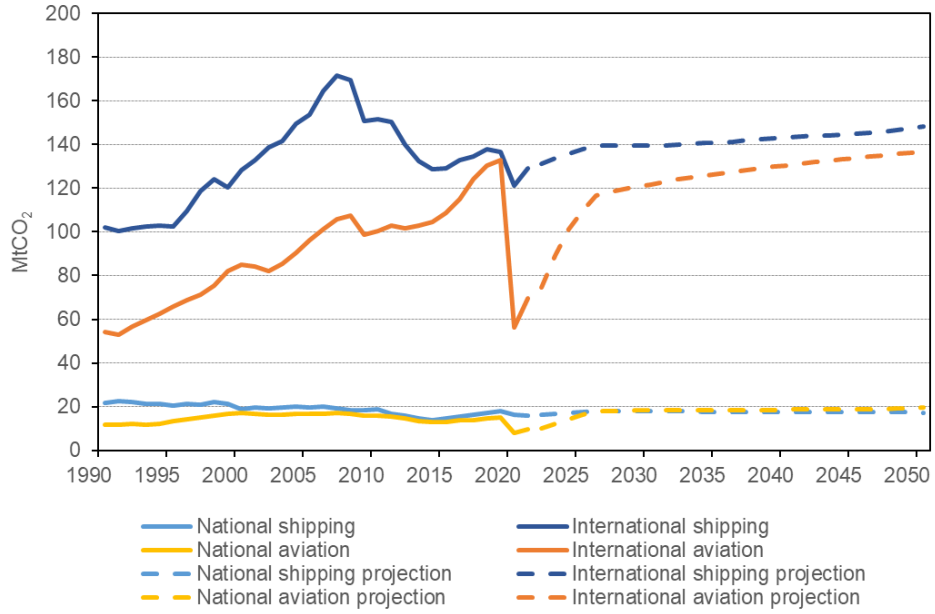
Note: Historic emissions are based on bottom-up data from the IMO of the activity of the global fleet. The latest IMO GHG study refines the methodology by using a voyage-based approach compared to the previous vessel-based approach which decreases the share of international maritime transport of the total maritime transport (IMO 2020). Projections are based on business-as-usual data from the IMO and an analysis of the impact of COVID-19 from CAT (2021).

Source: Authors' own compilation based on IMO (2009), IMO (2015), IMO (2020), CAT (2021).

A similar development can be seen in emissions from EU-related international shipping as shown in Figure 3. In the last decades, emissions from international shipping have increased. Emissions from international shipping have increased steeply between 1990 and 2007 with a drop afterwards due to the economic crisis. Today emissions stand approx. 195% above 1990 levels. However, emissions from national shipping including inland and national maritime transport) slightly decreased. In terms of future emissions, Member States project stable national shipping emissions and increasing international shipping's emissions in their biennial projection reports on future GHG emissions (EEA 2023).[1]

[1] It should be note that the figures are based on different data sources. Figure 2 is based on bottom-up data by the International Maritime Organization (IMO). Figure 1 and Figure 4 are based on reported emissions through the EU monitoring, reporting and verification (MRV) system THETIS. GHG inventories (Figure 3) are an alternative data source where emissions are estimated based on fuel sales.

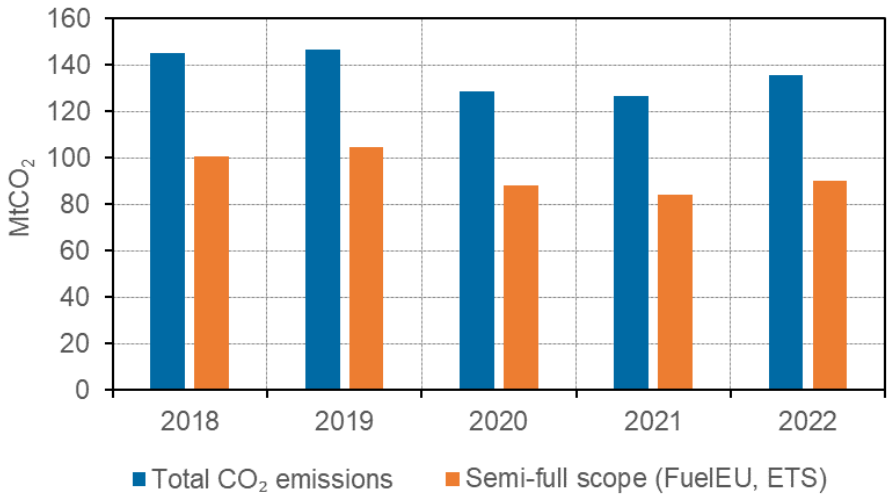
Figure 3: Historic and projected CO_2 emissions from EU-related aviation and shipping



Source: EEA (2023). Projections only include existing measures (business-as-usual).

International maritime transport emissions were less impacted by the COVID-19 pandemic than aviation, with passenger traffic being impacted the most (Millefiori et al. 2021; Roland Berger 2023). The difference in the decrease in emissions in 2020 can be clearly seen in Figure 3. The relatively small decrease in shipping emissions between 2019 and 2020 also visible in the EU MRV data shown in Figure 4. Blue bars show the total CO_2 emissions covered by the EU MRV and orange bars represent emissions of the semi-full scope (100% at berth, 100% between ports member states, only 50% of ingoing and outgoing voyages) which is the scope applied in the maritime EU ETS and FuelEU Maritime.

Figure 4: CO_2 emissions within the maritime EU MRV, the maritime EU ETS and FuelEU Maritime scope over the last years



Source: THETIS-MRV; v.76 for 2022, v.170 for 2021, v.191 for 2020, v.215 for 2019, v.238 for 2018

In business-as-usual (BAU) scenarios, emissions from maritime transport are expected to increase in the next decades as the emissions are strongly dependent on economic growth. However, even without additional policies and mitigation measures certain shipping emissions might decrease in the long term. This will partly be due the developments in other sectors. Cargo ships transporting fossil fuels make up a large share of current maritime transport (international and national) emissions: for example, oil tankers, bulk carriers and gas carriers emitted 433 $MtCO_2eq$ globally (i.e. approx. 40% of total maritime transport related emissions) in 2018 (IMO 2020).[2] For EU-related shipping, the same ship types emitted approx. 49 $MtCO_2$ – which is about 36% of EU-related maritime transport emissions.[3] A reduction in fossil fuel transport demand is, however, already considered in the BAU projections shown in Figure 2 for global maritime transport emissions. Also, emission reductions can be expected as the energy efficiency of the global fleet will increase due to more efficient newbuilds entering the market and increasing pressure from existing energy efficiency policy measures (section 1.4). However, efficiency gains in the past were not able to offset the absolute emissions growth in the sector due to globalisation and economic growth (DNV GL 2019).

1.2 Mitigation options

There are several mitigation measures which can reduce emissions in the shipping sector:

- technical energy efficiency measures (such as air lubrication technologies, wind assistance, ship design),
- operational energy efficiency measures (like slow steaming),
- use of batteries / electrification (mainly short-sea shipping and hybrid solutions) and
- the switch to alternative fuels (like e-methanol) and propulsion techniques (fuel cells).

Among these the switch to post-fossil or climate-neutral fuels is the main lever to reduce GHG emissions from (deep-sea) maritime transport (DNV 2023). For comparison: while climate-neutral fuels could offer emissions reductions of up to 100% on a vessel, energy efficiency measures can contribute only up to 20% of a vessel's emission reductions (DNV 2023).

T&E (2021) modelled emission reduction pathways for European shipping with the aim to decarbonize the sector by 2050. Besides technical energy efficiency measures, slow steaming and zero emission at berth, the use of renewable fuels of non-biological origin (RFNBOs) contributed about half of the emission reduction achieved in 2050. In their scenarios, the exemplarily chosen RFNBO e-ammonia starts to gain substantial shares in the fuel mix around the mid-2030s.

DNV (2023) also modelled multiple scenarios which show how decarbonization can be reached by 2050 and in the most ambitious scenarios even by 2040. All decarbonization by 2050 or earlier scenarios assume high carbon prices and very strict design and operational requirements for ships. While the fuel mix varies across scenarios

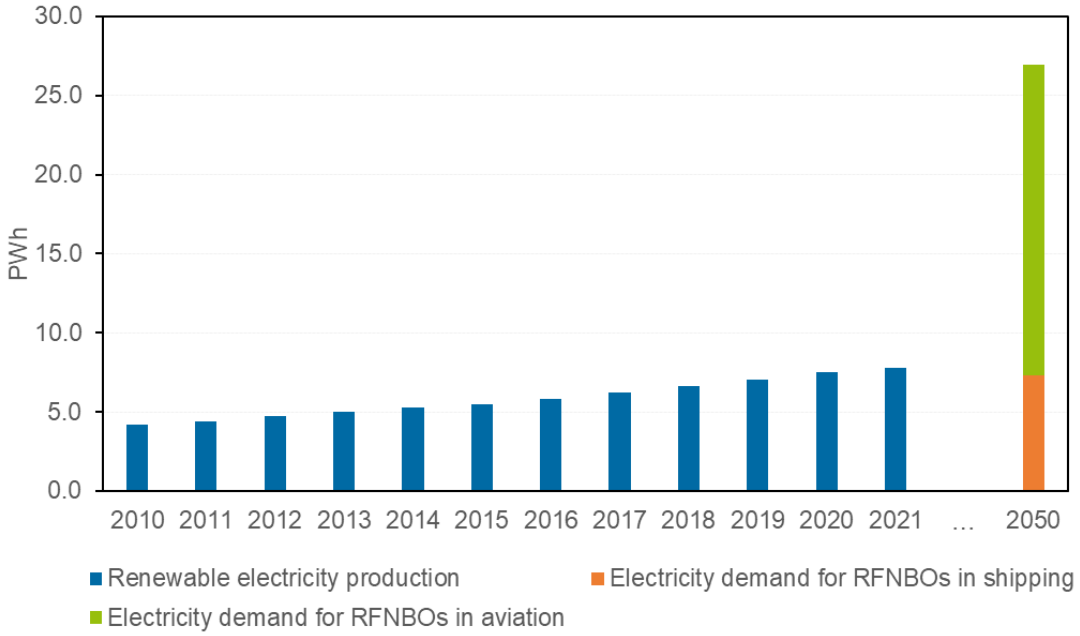
2 Note that this also includes non-coal dry bulk.
3 THETIS-MRV; v.76 for 2022

depending on the assumptions (electricity prices, progress in carbon capture storage, biofuel prices and availability), alternative fuels start being deployed by 2030.

Advanced biofuels will likely play a minor role in decarbonizing deep-sea shipping because the global production capacities for truly sustainable biofuels are limited compared to the global fuel consumption of shipping. Additionally, the competition among various sectors for advanced biofuels is high. The sustainable biomass potential in the EU is estimated to be between 7.3-18 EJ/year in 2030 and between 7.1-20 EJ/year in 2050 (JRC; EC 2019; Material Economics 2021). The impact assessment accompanying the FuelEU Maritime Initiative estimates a demand for biofuels of 32 Mtoe or 1.3 EJ in 2050, assuming a very high share of biofuels in the total maritime fuel mix (EC 2021a). This represents 6-18% of the sustainable biomass potential in the EU in 2050 mentioned above. However, there will be competition for biomass energy between sectors as already today the EU biomass consumption for materials and energy is estimated at 10-12 EJ/year (Cames et al. 2023b).This indicates that there is probably little room for the growth of EU biomass use to cover an (increasing) demand from various sectors in order to reduce emissions - unless biomass/biofuels are imported on a large scale. The deployment of RFNBOs will hence be essential.

The production capacities of RFNBOs are very small today and would need to be scaled up rapidly until 2050 to ensure the necessary supply for maritime transport. This in turn requires a massive increase in renewable energy production capacities and also the infrastructure to produce, transport and supply RFNBOs. For example, Cames et al. (2023a) estimate an annual energy demand of global shipping of 10.2-16.0 EJ in 2050. In their study, they assumed a conversion efficiency (Well-to-Tank) of approx. 50% to produce an RFNBO, resulting in an electricity demand of 5.7-8.9 PWh in 2050. Global renewable electricity generation was approx. 7.5 PWh in 2020 (IRENA 2022). Thus, meeting shipping’s energy demand in 2050 would require all of the global renewable electricity generation of 2020. Additionally, other sectors will also have an increasing demand for green hydrogen and hydrogen-derived fuels (e.g. the steel or chemical industry). The scale of the necessary increase in renewable energy production is shown in Figure 5. Looking at the EU, Neuling and Berks (2023) calculated that fulfilling the potential RFNBO-quota of FuelEU Maritime (section 2.2) in 2034 with e-methanol only, would require more than half of the globally announced e-methanol production capacities.

Figure 5: Comparison renewable electricity production today versus demand from shipping



Source: Mean values for electricity demand for RFNBOS from Cames et al. (2023a), historic renewable energy production from IRENA statistics time series: https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Statistics-Time-Series

So overall, while the shipping sector has many energy efficiency measures at hand, ambitious emission reductions can only be reached in combination with a fuel and propulsion switch. However, RFNBOs and advanced biofuels have no significant share in the global fuel mix today and there is still a lot of uncertainty which fuel is the most promising candidate for deep-sea shipping, what alternative fuel prices can be expected and whether these fuels will be readily available in different ports across the globe. From an onboard/technical perspective, the know-how is there to use various alternative fuels in deep-sea shipping. For example, there are over 100 methanol-fuelled ships in operation or on order[4] and the ammonia engine is expected to be available in 2025 (Wissner and Cames 2023c). Moreover, while not every fuel can be easily combusted in every engine – some dual-fuel engines (e.g. methanol-diesel) offer flexibility in the transition to new fuels. From the production perspective, most alternative fuel pathways have a relatively high technological readiness, but require further upscaling of the production processes (Wissner and Cames 2023b). As ships have a long lifespan (of potentially more than 30 years), investment decisions are necessary in the next years on whether existing ships shall be retrofitted and with which fuels newbuilds shall be compatible with.

1.3 EU regulations and targets

Since 2018, shipping companies on EU-related voyages have to report their CO_2 emissions according to the EU MRV Regulation (2015/757) (EU 2015). However, before 2023 and within the EU, shipping was not subject to any significant sector-specific policy instruments regulating emissions. While national emissions from shipping

[4] https://www.offshore-energy.biz/methanol-momentum-25-ships-in-operation-81-more-on-the-way

previously fall within the scope of the Effort Sharing Regulation, they represent only a minor share of EU-related shipping emissions (Figure 1). At the same time, there was no dedicated EU decarbonization funding available for shipping; and shipping is currently not subject to energy taxes. By contrast, with the recently agreed Fit-for-55 amendments and new regulations, several new regulations will apply to not only national maritime transport emissions but also international maritime transport emissions (section 2).

Under the Paris Agreement, the vast majority of anthropogenic GHG emissions are included in the scope of Nationally Determined Contributions (NDCs). This includes emissions from shipping, but only within the respective jurisdiction (e.g. domestic maritime transport and inland navigation). However, most NDCs do not include GHG emissions from international maritime transport despite its major share in absolute shipping emissions. Mitigation of emissions from international maritime transport is addressed by an organisation outside the UNFCCC process – the International Maritime Organization (IMO) which is discussed further below. The 2020 EU NDC only included domestic aviation which was though "*subject to revision in light of the enhanced target*" (EU 2020, p. 9) as the NDC was published before the new EU 2050 target and the corresponding Fit-for-55 package. Published in May 2023, Recital 5 of Directive (EU) 2023/959[5] amending the EU ETS Directive states that the EU ETS with its scope represents an essential element of the Fit-for-55 package to be considered for the NDC update. However, the recently updated EU NDC[6] includes only emissions (CO_2, methane and nitrous oxide) from voyages within the EU for the 2030 target – which is a much smaller scope than what is covered by the EU ETS (Figure 4, Table 1). It is thus unclear how the reference emissions in 1990 will be calculated.

By contrast, the 2050 target is an absolute target and must include international transport as the EU climate law states that "*[u]nion-wide greenhouse gas emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050, thus reducing emissions to net zero by that date*" (EP; EC 2021, Article 2). The EU's 2050 goal thus covers all emissions or sectors which are regulated by EU legislation. Maritime transport will have to reduce its emissions to zero or the remaining emissions will have to be compensated by sinks. As the sink capacity is limited, other sectors might have to increase their reduction efforts if maritime transport (and aviation) do not reduce the emissions to zero by 2050.Also, the European Court of Auditors argued that international aviation and maritime transport are within the responsibility of the EU and should thus be included in the scope of the 2050 target.[7]

Table 1 provides an overview of the coverage / scope of EU policies (more details in section 2) and the NDC. It can be seen that the EU already regulates international maritime transport which makes up the largest share of EU-related shipping emissions (Figure 1).

5 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023L0959
6 https://data.consilium.europa.eu/doc/document/ST-14286-2023-INIT/en/pdf
7 https://www.eca.europa.eu/en/news/news-sr-2023-18

Table 1: Geographic coverage of EU policies and the NDC

	Domestic maritime emissions	Intra-EU international	Extra-EU international
Maritime EU MRV	100%	100%	100%
Shipping EU ETS	100%	100%	50%
FuelEU Maritime	100%	100%	50%
EU NDC	100%	100%	0%

Source: Overview compiled by Oeko-Institut

In June 2023, the European Scientific Advisory Board on Climate Change (ESABCC) published a report recommending a 2040 target and GHG budget up to 2050 for the EU (ESABCC 2023). The ESABCC recommends including (at least intra-EU) aviation and shipping in setting a 2040 target based on fairness and environmental integrity. Including international aviation and shipping would increase the remaining GHG budget between 2030 and 2050 from 11-14.4 $GtCO_2eq$ to 13.7-16.5 $GtCO_2eq$. This highlights the relative significance of the sectors, especially towards 2050 when other sectors have already reduced their emissions substantially (ESABCC 2023, p. 50). This also means that including international shipping and aviation in an EU 2040 target scope decreases the relative emissions reduction that can be expected to be achieved by 2040, e.g. 88-92% (incl. international and domestic aviation and shipping) versus 90-95% (only domestic aviation and shipping) (Table 2). This is because international transport emissions are expected to decline at a slower pace than other sectors. However, it also underlines the need for efforts to decarbonize these sectors to avoid even higher remaining emissions in 2040 (and 2050).

Table 2: Overview of exemplary scenarios of EU 2040 targets

Scenario	Unit	2040 target incl. international transport	2040 target excl. international transport (intra-EU only)
ESABCC	%[8]	-88.3 to -92	-90.2 to -94.7
Strategic Perspectives, Scenario 1 -95% net	%	-95.5	-96.6
	$MtCO_2$[9]	210	111
Strategic Perspectives, Scenario 2 -90% net	%	-90.2	-92.8
	$MtCO_2$	462	278
Strategic Perspectives, Scenario 3 – 85% net	%	-85.4	-88.3
	$MtCO_2$	691	484

Sources: ESABCC (2023), Kalcher et al. (2023)

8 Reduction compared to 1990
9 Remaining (net) emissions in 2040

For this reason, international transport needs to be included in the 2040 climate target because it is very likely that it would otherwise not be or less ambitiously regulated. While 2040 targets excluding international transport may seem more ambitious when looking at the percentage reduction, this goes at the price of not covering a substantial share of residual emissions. Extending the target scope to international transport could thus benefit the climate overall – even though the reductions in 2040 in percent are lower.

1.4 IMO regulations and targets

IMO member states adopted a revised GHG Strategy at MEPC 80[10] in July 2023 (IMO 2023). It provides an update to the Initial Greenhouse Gas Strategy from 2018, which has been the main framework for shipping's climate targets so far (IMO 2018). The revised strategy includes the new long-term goal "*to peak GHG emissions from international shipping as soon as possible and to reach net-zero GHG emissions by or around, i.e. close to 2050*" (IMO 2023, p. 6). The reduction pathway is underpinned by indicative (i.e. non-binding) checkpoints of reducing the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030, and by at least 70%, striving for 80%, by 2040, compared to 2008. Next to this absolute goal, there is a 2030 target of reducing the average carbon intensity (CO_2 emissions per transport work) by at least 40% compared to 2008. Further, the revised strategy foresees the uptake of 'zero or near-zero GHG emission technologies, fuels and/or energy sources' which shall represent at least 5%, striving for 10%, of the energy used by international shipping by 2030. The GHG strategy will be revised every five years – next time in 2028.

Overall, the revised IMO Strategy might enable a Paris-compatible reduction pathway (2°C but not 1.5°C aligned pathway) in contrast to the Initial Strategy which lacked ambition.[11] However, achieving revised IMO goals will also depend on additional efforts by individual member states (like EU countries) and the implementation of further IMO policies. So far, the IMO has adopted several policies (so-called short-term measures within IMO) targeting the energy efficiency of ships: the Energy Efficiency Design Index (EEDI), the Energy Efficiency Index for Existing Ships (EEXI), the Carbon Intensity Indicator (CII), and the Ship Energy Efficiency Management Plan (SEEMP) (Lloyd's Register 2020). These have hitherto not been able to reverse the trend of increasing emissions in the sector and will not be sufficient to reach the 2050 goal. In addition, it is planned that a basket of mid-term measures shall be finalized and agreed by IMO member states in 2025, and enter into force in 2027 (Figure 6). At MEPC80, it was agreed that the basket of measure shall consist of a technical element (e.g. a goal-based marine fuel standard, similar to FuelEU Maritime Regulation as described below) and an economic element (e.g. carbon pricing like a levy). It remains unclear whether IMO member states will agree on measures within the foreseen time plan and whether these will be ambitious and enforceable enough to achieve the necessary emission reductions and fuel switch.

[10] MEPC stands for Marine Environment Protection Committee.
[11] https://theicct.org/marine-imo-updated-ghg-strategy-jul23/

Figure 6: IMO timeline for next meetings and milestones

Target dates	Milestones		
	Comprehensive Impact Assessment (CIA) of the basket of candidate mid-term measures	Development of candidate mid-term measures	Other milestones
MEPC 80 (Summer 2023)	Initiation of CIA	Initiate Phase III of the Work Plan on the development of mid-term measures	
MEPC 81 (Spring 2024)	Interim report	Finalization of basket of measures	
MEPC 82 (Autumn 2024)	Finalized report		
MEPC 83 (Spring 2025)		Approval of mid-term measures	Review of the short-term measure to be completed by 1 January 2026
Extraordinary 1 or 2-day MEPC (six months after MEPC 83)		Adoption of mid-term measures	
MEPC 84 (Spring 2026)			
MEPC 85 (Autumn 2026)			
16 months after adoption (2027)		Entry into force of mid-term measures	
MEPC 86 (Summer 2027)			Initiate the review of the 2023 IMO GHG Strategy
MEPC 87 (Spring 2028)			
MEPC 88 (Autumn 2028)			Finalization of the review of the 2023 IMO GHG Strategy with a view to adoption of the 2028 IMO GHG Strategy

Source: ABS (2023)

As the agreement on and implementation of measures at the IMO take time (which is very limited in face of an increasing climate crisis), the EU moved ahead by addressing international maritime transport within several new/amended legislation as part of the Fit-for-55 package. Although global policies are more suitable for a global sector, the EU cannot wait for the IMO and can review its policies in case a global measure is adopted (similar to the aviation EU emission trading system (ETS) and CORSIA). In the period up to 2027, an ambitious implementation and review of EU policies can also be seen as a guidance for stakeholders discussing the new policies at IMO (Smith et al. 2023).

2 Main policy instruments

2.1 Inclusion of shipping in the EU ETS

Scope

After the introduction of EU MRV system for maritime transport in 2018, the maritime sector will now be integrated into the existing EU ETS from 2024 onwards (EU 2023b). The maritime ETS covers only voyages for the purposes of transporting cargo or passengers for commercial purposes. The following ship types are excluded: warships, naval auxiliaries, vessels used to catch or process fish, timber vessels of simple design, vessels not propelled by machinery or state-owned vessels used for non-commercial purposes. At first, only CO_2 emissions from ships with a gross tonnage (GT) of 5,000 and above will be covered by the EU ETS on the following routes:

- 100% in the ports of Member States,
- 100% between EU states,
- 50% on routes to/from EU ports.

The EU ETS hence has a smaller scope than the EU MRV which covers also 100% of emissions from international voyages. The difference in the covered in emissions is shown in Figure 4. The scope applied in the EU ETS is also called semi-full scope.

The geographical scope of the maritime ETS is based on the concept of a "port of call" as a starting and end point for voyages - which is a port where a ship (un)loads cargo and/or (dis)embarks passengers or the crew in case of offshore ships. Non-Union ports within 300 nautical miles of a member state port, where the transhipment of containers accounts for a significant share of the total container traffic, are excluded from the port of call definition to reduce the risk of evasion. There will be a regularly updated list of such neighbouring container transhipment ports. The following table provides an overview of the coverage of the EU MRV Regulation and the maritime EU ETS in the years up to 2030.

Table 3: Overview scope EU MRV vs. maritime EU ETS

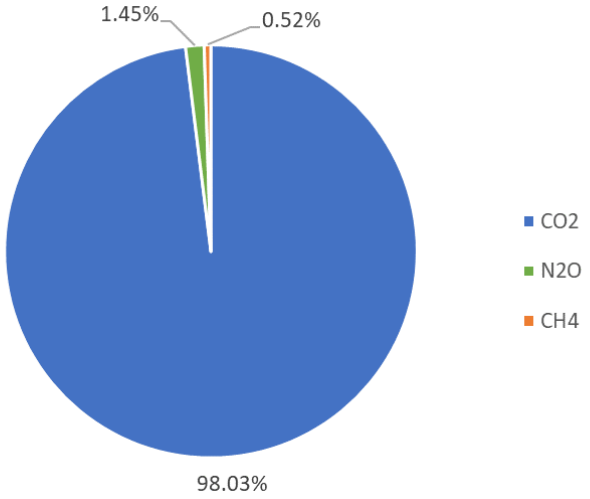
Scope	2024	2025	2026	2027
EU MRV				
GHGs	CO_2, methane, nitrous oxide			
Ship types	Commercial cargo and passenger transport			
		+ offshore ships		
Ship sizes	5,000 GT and above			
		+ 400 GT and above of general cargo and offshore ships		
EU ETS maritime				
GHGs	CO_2			
			+ methane, nitrous oxide	
Ship types	Commercial cargo and passenger transport			
				+ offshore ships
Ship sizes	5,000 GT and above			
				Potential extension to 400 GT and above

Source: Wissner and Cames (forthcoming) – Extension of the EU ETS to maritime transport.

CH_4 and N_2O emissions will be included in the ETS from 2026 onwards after these emissions have first been included in the EU MRV from 2024 onwards. Over 90% of climate-relevant emissions from maritime transport are CO_2 emissions based on CO_2equivalents – besides smaller quantities of methane (CH_4), nitrous oxide (N_2O) and black carbon emissions (IMO 2020). If black carbon emissions are excluded, CO_2 emissions make up 98%, N_2O emissions 1.45% and CH_4 emissions 0.52% of total GHG emissions in 2018 (Figure 7). Based on the latter, it can be assumed that the absolute emissions covered will increase only slightly through the inclusion of more GHGs. At the same time, CH_4 emissions covered by the ETS are likely to increase in future. This is because the number of vessels fuelled with liquefied natural gas (LNG)

has increased and will increase over the next years[12]. CH_4 emissions from international maritime transport have already increased by 151% in between 2010 and 2018 as reported in the 4th IMO GHG study (IMO 2020). This is of concern as CH_4 emissions have a much higher global warming potential than CO_2 emissions.

Figure 7: Contribution of individual greenhouse gases based on CO_2eq to international shipping emissions in 2018



Source: IMO (2020). Excluding the climate impact of black carbon.

Starting in 2027, the scope of the ETS will be extended to offshore vessels. At the same time, the ETS might be extended to smaller ships (only offshore and commercial goods transport) above 400 GT based on a feasibility report by the European Commission due by the end of 2026. The EU ETS would thereby cover an additional 4.3 $MtCO_2$ through the extension to offshore ships of 5,000 GT and above, and an additional 13.4 $MtCO_2$ through the extension to ships of 400 GT and above[13] based on 2019 data (Armstrong and Simon 2022). If the initial ETS scope is applied to the same year of the MRV data, these extensions equal an increase in emissions by 4% and 12.7% respectively of the basic scope of 105 $MtCO_2$ in 2019. For the EU MRV, these extensions will already be implemented from 2025 onwards.

Allocation and cap

There is no separate EU ETS cap for the maritime sector nor specific shipping allowances. The joint cap together with the stationary sector is increased in 2024 by 78.4 million to reflect the inclusion of the maritime sector (EU 2023a). The quantity of allowances will be further increased in 2026 and 2027 to reflect the inclusion of CH_4 and N_2O emissions as well as offshore ships in the scope of the maritime ETS. A uniform linear reduction factor (LRF) is applied to all ETS sectors: from 2024 onwards the cap will be reduced by 4.3% per year and from 2028 onwards by 4.4%. Due to the first-time application of the linear reduction factor to the cap for maritime transport in 2024, the cap in that year corresponds effectively to 74.5 million EUAs. The amounts

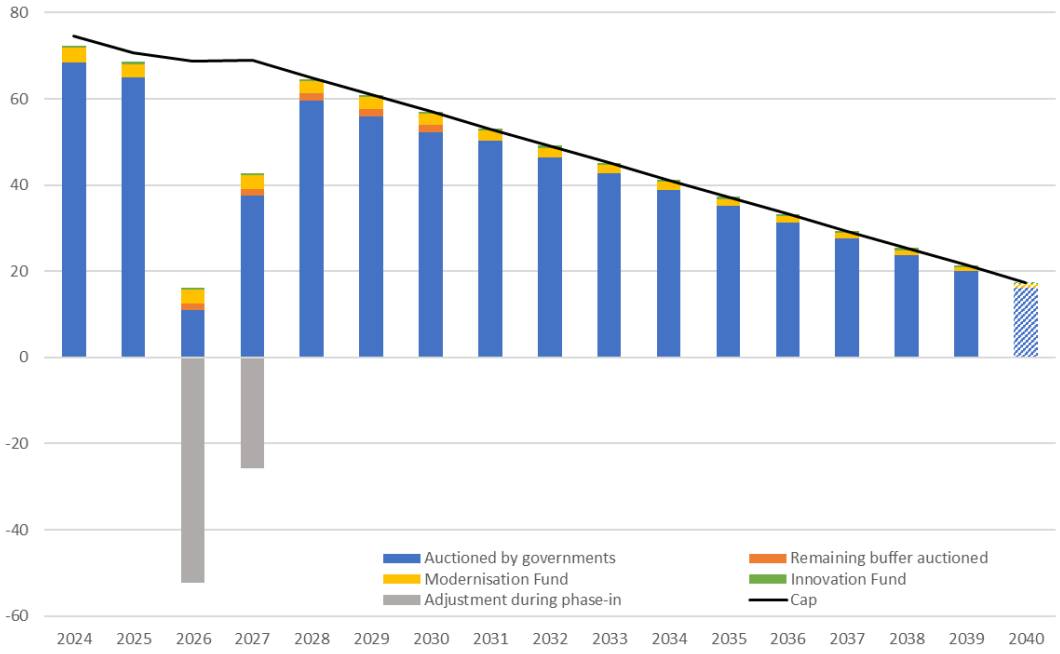
[12] Based on order numbers; in 2022 there were 355 LNG ships in operation, by 2028 there will be 438 in operation and 540 on order; https://afi.dnv.com

[13] This assumes an extension to ships of 400 GT and above of the already covered ship types in the ETS. This, however, omits that the size extension will not apply to passenger ships between 400 Gt and above and below 5,000 GT as shown in the table below.

auctioned are expected to be slightly lower due to the allocation buffer – in order to avoid a cross-sectoral correction factor for free allocation in the stationary sector, the auctioning amounts are reduced and those allowances from the buffer not allocated for free auctioned in later years.

Shipping companies receive no free allocation, they have to buy allowances at auctions or from other market participants. In the transition phase the share of verified emissions for which emission allowances must be surrendered by shipping companies will gradually increase: 40% in 2024, 70% in 2025 and 100% in 2026 and thereafter. The amount auctioned that can be attributed to maritime transport is reduced accordingly – the difference between emissions and surrendering requirements in the first two years translate into a reduction of the auctioning amounts in 2026 and 2027 (Figure 8). Ice-class ships may surrender 5% fewer allowances than their verified emissions until the end of 2030.

Figure 8: Auctioning amount attributed to the maritime sector



Note: The adjustment during phase in is estimated by Oeko-Institut based on emission projections and the inclusion of additional activities based on historic emission shares. The allowances corresponding to the adjustment are shown for illustration purposes only, they are not auctioned. It is assumed that the funds continue to be fed also after 2030 while the allocation buffer is limited to 2030. The increase of the innovation fund due to the inclusion of additional gases and ships is not represented fully in the graph (it is attributed to the overall amount as detailed amounts are unclear to date).

Source: Estimate by Oeko-Institut based on EU (2023b) and EU (2023a).

The number of allowances available for auctioning are shown in the figure above.[14] The cap increases due to the inclusion of CH_4 and N_2O emissions and offshore ships is estimated by Oeko-Institut to be 2 and 4 Mio. EUAs (own estimate); it will be determined based on actual monitoring data to be collected in the coming years. In 2040, the joint cap together with the stationary sector will drop to zero unless the EU ETS directive is changed – this implies that no more auctioning will take place.

[14] The figures shown are before the application of the market stability reserve (MSR).

A share of the auctioning amounts is attributed to feed funds: 4.5% of the cap are attributed to the modernisation fund and 0.5 Mio. EUAs are auctioned every year on behalf of the innovation fund. The remaining auctioning proceeds from the inclusion of maritime transport in 2024 go to the member states. 50% shall be distributed among the relevant member states based on the share of shipping companies. 3.5% shall be allocated to countries with a large number of shipping companies compared to the number of inhabitants (as an indication of national dependency on maritime transport). The remainder will be distributed equally between the member states. When additional GHG and offshore ships enter the EU ETS, the proceeds will go to the innovation fund. From 2024 to 2038, the amount auctioned on behalf of Member States will add up to 640 Mio. EUAs and the amount earmarked for the innovation fund is estimated at 31 Mio. EUAs. At current ETS prices of 85 EUR/tCO_2 the latter equal approx. 52.5 billion EUR and 2.6 billion EUR respectively.

Exemptions / derogations

There are several derogations from the general allocation principal explained above until 2030. Shipping companies are exempted from the surrender obligation concerning their emissions on:

- Voyages between a port of MS and its outermost region port, including ports within and between outermost regions of the same MS and from port activities related to such voyages; and
- Voyages for passenger transport between a MS with no land connection and other closest MS in the context of a transnational public service contract/obligation and from port activities related to such voyages; and
- Voyages for passenger transport between (small) island ports of a MS with no road or rail link with the mainland and with less than 200,000 permanent residents and that MS as well as from port activities related to such voyages.

These exemptions likely represent only a small share of emissions compared to the total maritime ETS scope. The emissions of maritime transport under the ETS (approx. 90 MtCO_2 in 2022) are small compared to the emissions of the stationary sector (1,200 MtCO_2 in 2022)[15] but their relative importance is expected to increase as emissions in the stationary sector are likely to decline at faster pace,

Use of revenues

Countries with a large number of shipping companies receive an extra share of allowances until 2030 (see above). According to the ETS Directive, the revenue generated from the auctioning of this share of allowances is required to be used for the decarbonisation of maritime transport. This extra allocation of allowances beyond 2030 shall be reassessed by the EU Commission via a report due end of September 2028.

There is no specific new fund to promote decarbonisation in the maritime transport sector within the ETS. However, the existing European Innovation Fund now also covers the maritime sector by supporting breakthrough innovative technologies and infrastructure, including production of low- and zero-carbon fuels, to decarbonise the

[15] EEA ETS data viewer: https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1

sector.[16] The European Commission will provide specific calls for proposals for dedicated maritime topics in the Innovation Fund (20 million allowances up to 2030), including the electrification of maritime transport and the mitigation of impacts from black carbon emissions.[17] The allowances dedicated for these specific calls would represent 1.8 billion EUR at an allowance price of 85 EUR/tCO_2.

Article 10 of the ETS Directive determines for what purposes member states shall use their revenues. This list includes a range of climate change mitigation and social purposes, including measures to decarbonise maritime transport (such as energy efficiency measures and alternative fuels). Assuming an ETS price of 85 EUR/tCO_2 the auctioning of allowances attributed to the maritime transport sector would result in 57 billion EUR up to 2040 (see cap section above).[18] Generally, costs and investments on land (for fuel infrastructure and production) will outpace the costs onboard or within the maritime sector (DNV 2022). For example, investment costs to decarbonize international shipping with e-ammonia until 2050 sum up to 1.65 trillion USD with 87% needed for the infrastructure alone (production, transport and land-based supply) (Raucci et al. 2020).

The expansion to a full MRV scope would raise the revenues by a third.[19] It is, however, not clear that member states will spend all of this revenue for the maritime sector or to increase the production of RFNBOs. The dedicated 20 million allowances (equalling 1.7 billion EUR at an allowance price of 85 EUR/tCO_2) through the Innovation Fund could thus support some first-movers in building/operating their vessels, but other funding would need to support the land-based infrastructure and supply to the maritime sector.

Review

Several reviews are planned in relation to the maritime EU ETS (Table 4). The EU MRV Regulation will be reviewed by the end of 2024. A review of the maritime ETS is scheduled for 2026 on a potential extension of the ETS to include smaller ships between 5,000 and 400 GT (instead of 5,000 GT and above). End of 2028, the above mentioned rule will be reassessed whereby countries with a large number of shipping companies receive an extra share of allowances.

16 The innovation fund combines proceeds from the auctions that can be attributed to the cap share of the stationary sector as well as the additional GHG and offshore ships in the maritime sector. It is not affected by the MSR.

17 Rec. 54 in https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023L0959; and Annex to the ETS Directive's resolution:https://www.europarl.europa.eu/doceo/document/TA-9-2023-0098_EN.pdf; and EU Commission FAQ: https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-shipping-sector/faq-maritime-transport-eu-emissions-trading-system-ets_en

18 Increasing ETS prices will increase revenues as well, nevertheless higher proceeds are expected in the first years as the cap declines faster than prices are expected to increase in most scenarios.

19 Estimate based on the current coverage of the EU ETS for maritime transport compared to MRV data (compare also the shares in Figure 1).

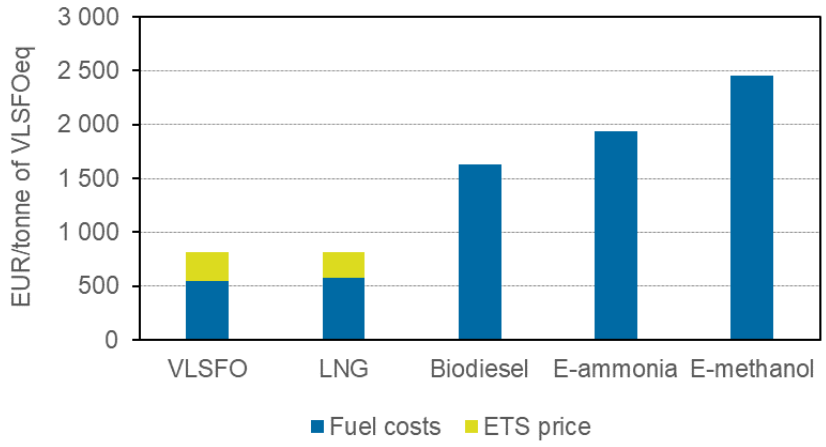
Table 4: Scheduled reviews

Subject of review	Year
EU MRV regulation	End of 2024
Maritime EU ETS extension	2026
EU ETS extra allocation of allowances to specific countries	End of 2028

Impact

The maritime EU ETS puts a price on EU-related shipping emissions for the first time. According to IMO (2020), the marginal abatement costs for a complete decarbonisation of maritime transport are above 400 EUR/tCO_2 mainly due to the high prices for RFNBOs. There is thus a considerable price difference between fossil and climate-neutral fuels. The price gap is depicted in the figure below showing the fuel costs in very low sulphur fuel oil (VLSFO) equivalents for two fossil fuels, biodiesel, and two RFNBOs. Also the additional costs due to the ETS are unlikely to be sufficient to bridge that gap and to stimulate a fuel switch to climate-neutral fuels.

Figure 9: Fuel prices with ETS price



Source: Prices for VLSFO and LNG as of 10/2023, biodiesel (HVO) for 2020 from Horton et al. (2022), e-ammonia and -methanol for 2025 from MMKMC (2021). Biodiesel and RNFBOs assumed to be accounted with zero emissions within the ETS. ETS price top-up (85 EUR/tCO_2 as of August 2023) based on CO_2 emission factors for VLSFO and LNG.

In the short term, it is thus very likely that the ETS prices are not high enough in the short term to induce the significant in-sector emission reductions through deploying climate-neutral fuels (up to 100%), but that smaller emission cuts through energy efficiency measures are incentivised (up to 20%, section 1.1). In addition, the revenue generated from the maritime ETS will only partly be used in the maritime sector with certainty, but could facilitate the transition of first-movers (see above). Increasing ETS allowance prices and decreasing costs for producing climate-neutral fuels can thus only partially close the fossil-clean fuel price gap. Complementary policies are also clearly still needed to induce further emission reductions and to accelerate the reduction of the fuel price gap.

In the medium to long term towards 2050, ETS prices – together with the FuelEU Maritime Regulation (see discussion in section 2.2) – will have a greater impact. Besides increasing demand for ETS allowances and thus increasing carbon prices for all ETS sectors, the overall ETS cap gets more stringent over time as well and could decrease to zero before 2050.

Interaction between IMO and ETS / EU targets

Shipping is a truly globalized and internationalized sector with the majority of emissions stemming from international voyages. While a carbon pricing policy instrument is still missing at global level, the EU moved ahead by including emissions from international voyages. However, as soon as the IMO adopts a global market-based measure, the maritime EU ETS shall be reviewed. Within 18 months of the adoption of such a measure, the European Commission must submit a report. This report shall examine the IMO measure regarding its ambition in light of the objectives of the Paris Agreement, its environmental integrity, and the coherence between the EU ETS and that measure. If appropriate, the Commission may propose amendments to the Emissions Trading Directive (2003/87/EC) in a manner that is consistent with the EU climate targets and that ensures environmental integrity and effectiveness of the EU ETS. Acknowledging that emissions from international transport are part of the EU's responsibility and targets (section 1) means that any IMO policy covering these emission (for example instead of the ETS for international voyages) would need to achieve similar emission reductions to not undermine the EU target.

In face of the urgency to address emissions from international maritime transport, the EU agreed on a procedure in case the IMO does not adopt a global market-based measure which is in line with the ambitions of the Paris Agreement by 2028: the EU Commission shall then provide a report which examines the need to extend the geographical scope of the maritime EU ETS to more than 50% of incoming and outgoing voyages. Where appropriate, the report shall be accompanied by a legislative proposal. The timeline for this report is likely to coincide with the EU's deliberations on a post-2030 climate target architecture in the next European Commission.

2.2 FuelEU Maritime Regulation

Scope and goals

The EU recently adopted the FuelEU Maritime Regulation (FEUM).[20] Its purpose is to accelerate the use of renewable and low-carbon alternative fuels in the maritime sector by setting a GHG emission intensity standard from 2025 onwards. It was agreed that the average GHG intensity of energy used (gCO_2eq/MJ) on ships must decrease every 5 years: by 2% in 2025, 6% in 2030, 14.5% in 2035, 31% in 2040, 62% in 2045, and by 80% in 2050 compared to reference value of 91.16 gCO_2eq/MJ.

The EU ETS and the FEUM address the same point of regulation (shipping companies) and cover the same scope (geographical, ship type/size, GHG emission types). FEUM uses though a well-to-wake approach whereas the EU ETS is set up with a tank-to-wake perspective (as the other ETS sectors).

[20] https://www.europarl.europa.eu/doceo/document/TA-9-2023-0262_EN.html

RFNBO sub-targets & fuel sustainability criteria

FEUM is a fuel-neutral standard. Emission factors (well-to-tank and tank-to-wake) are defined in FEUM and are partially drawn from the Renewable Energy Directive (RED). Generally, biofuels, RFNBOs and recycled-carbon fuels which do not comply with the sustainability and GHG emission savings criteria from RED are considered to have the same emission factors as the least favourable fossil fuel pathway for that type of fuel. The same applies to biofuels produced from food and feed crops as defined in RED. In contrast to the compliance with RED targets (section 2.3) or ReFuelEU Aviation (see corresponding aviation briefing), FEUM does not exclude, disadvantage or cap other risky or high-emissions biofuels such as waste oils and fats as well as palm fatty acid distillates (Baldino and Mukhopadhaya 2022).

Between 2025 and 2033, the use of RFNBOs is rewarded with a multiplier of two for counting towards the GHG intensity limit. There is also a conditional RFNBO quota: if the share of RFNBOs in the fuel mix within the scope of FEUM is less than 1% in 2031, a RFNBO quota of 2% shall apply from 2034 onwards. However, announcements from Maersk and other industry stakeholders on fuel partnerships might already fulfil this quota.[21] This indicates that the conditional RFNBO quota might not be implemented and could thus not create additional incentives for RFNBO use.

Also, fossil fuels or conventional biofuels are not completely excluded but are thus compliant as long as their emission factor does not exceed the limit set. The incentives for scaling up RFNBOs and truly sustainable biofuels are thus small.

Flexibilities

Ships can be pooled in groups of two ships or more to comply with FEUM. Further, there is banking and borrowing mechanism which allows for using overcompliance for following reporting period and for balancing out a current deficit with advance compliance from the following report period.

On-shore power supply

Further, container and passenger ships (with exceptions) will be obliged to use on-shore power supply or zero-emission technology (like fuel cells) in port from 2030 onwards. This applies to ships at berth for more than two hours in a Trans-European Transport Network (TEN-T) port. From 2035, the requirement applies to all ports where on-shore power is available.

Penalties

If a shipping company fails to comply with the FEUM provisions on GHG intensity, there is a penalty corresponding to its compliance deficit measured as the difference between the required and actual GHG intensity, multiplied by energy use. The penalty progressively increases if the ship has a compliance deficit for two or more

[21] Assuming fuel consumption in EU-related ships stays constant until 2031 based on the fairly constant reported fuel consumption and deriving a fuel consumption of 26.48 Mt for 2021 based on EC (2023). A 1% RFNBO quota within this scope would translate to 0.265 Mt of RFNBOs. Maersk has stated to have secured about 0.93 Mt of e-methanol through fuel partnerships in the 2020s (p.25 in sustainability report 2022: https://www.maersk.com/~/media_sc9/maersk/corporate/sustainability/files/resources/2022/maersk-sustainability-yearly-report_2022.pdf).

consecutive reporting periods. The level of the penalty is 2,400 EUR per tonne of non-compliant very low sulphur fuel oil (VLSFO) energy equivalent. There is also a penalty in case of non-compliance with the onshore power supply. If a ship fails to pay the penalty, member states can refuse entry of the ship which is subject to the expulsion order into any of its ports until the company fulfils its obligation. Member states shall endeavour to ensure that revenues from the penalties are used to support the production, distribution and use of renewable and low-carbon fuels and onshore power supply in the maritime sector as well as the development and deployment of innovative emission reduction technologies. Member states are also required to report on the use of revenues every five years.

Monitoring & review

One year after the publication of FEUM, the European Commission shall provide a report on the alignment of FEUM with the EU MRV Regulation (2015/575) which may be accompanied by a legislative proposal. Starting December 2027, a report by the European Commission shall be conducted every five years to review FEUM including potential market distortion, developments in the alternative fuel market/shares etc. The report shall consider possible changes to FEUM regarding *inter alia* the scope (ship type, sizes, black carbon), the ambition of the GHG intensity limits and more mechanisms to promote sustainable fuel technologies. The report may be accompanied by legislative proposals.

The maritime EU ETS and FEUM are complementary. While the ETS introduces the polluter-pays-principle to the sector by pricing GHG emissions, FEUM provides a clear, long-term signal how much emissions need to be reduced on a ship. FEUM incentivises a fuel switch by regulating the GHG intensity of a fuel or an energy source used onboard. To reduce surrender obligations under the ETS, other efficiency measures such as air lubrication and slow steaming can also be of use.

Impact

As mentioned above, the current price level of the EU ETS is unlikely to be sufficiently high enough to stimulate a fuel switch to climate-neutral fuels given the high prices (and current limited availability) of these fuels. Liquefied natural gas (LNG) and other fossil fuels will be compliant with the GHG intensity limit well beyond 2030 and even 2040, so FEUM does not provide an immediate incentive to switch to climate-neutral fuels. In the short to mid-term, the ETS will likely be a main incentive to reduce emissions (for example via energy efficiency measures) if ETS prices continue to increase – and unless the ambition of FEUM is not strengthened during the next review. According to an analysis by Springer et al. (2023), FEUM provides little incentives to use RFNBOs before 2035 due to the high GHG intensity limit. Also Llyod's Register[22] estimates that compliance cost for the ETS will be higher than for FEUM until 2035 or 2040.

FEUM will create a stronger steering effect in the long-term as the ambition increases towards 2050 and might already impact investment decisions in the shorter term as ships build today will still be in operation in 2050. The overall stronger impact of FEUM

[22] LR (2023) - EU carbon pricing brings new pressures – and new plays – to maritime: https://www.lr.org/en/knowledge/technical-articles/eu-carbon-pricing-brings-new-pressures-and-new-plays-to-maritime/

on the use of RFNBOs until 2050 compared to (increasing) ETS prices is also shown in the previous mentioned analysis by Springer et al. (2023).

Furthermore, a mechanism needs to be considered to ensure that climate-neutral fuels are available in EU ports. This could, for example, be a design which obliges fuel suppliers to provide low-carbon fuels similar to ReFuelEU Aviation (where fuel suppliers and airlines have mandates). In case of a shortage of RFNBOs, suppliers serving both sectors could give priority to the aviation sector (as they have a quota to fulfill under ReFuelEU) over the maritime sector. Another approach could also be to ensure the supply of RFNBOs to shipping through carbon contracts for differences or other similar schemes.

2.3 Interaction with other Fit-for-55 elements

The **Alternative Fuel Infrastructure Regulation** (AFIR) prescribes that shore-side electricity must be available for seagoing container, ro-ro passenger[23] and passenger ships (above 5,000 GT when moored at the quayside) at TEN-T[24] core and comprehensive maritime ports by 2030. The requirement relates only to ports which fulfil certain activity requirements (e.g. number of port calls depending on ship type). The timing of the infrastructure requirements matches with the FEUM obligation to use on-shore power supply from 2030 onwards (section 2.2). Additionally, an “appropriate number” of refuelling points for liquefied methane must be in place at TEN-T core maritime ports by 2025. Although liquefied methane equals fossil LNG today and in the foreseeable future, the reasoning given in the AFIR is that fossil methane needs to be phased out soon and infrastructure can also be used for bio- or e-methane. However, the extent to which bio- and e methane will play a role in the future maritime fuel mix is questionable because there will likely be a high demand for bio- and e-methane from other sectors and there remains the issue of methane slip from marine engines (Pavlenko et al. 2020; Searle et al. 2018). In respect to other alternative fuels (such as hydrogen or ammonia), there are no binding targets set out in the AFIR. In short, the AFIR plays an important, but limited role in increasing the availability of alternative fuels infrastructure in the EU, thus facilitating the mitigation of emissions within the sector (reducing the need to buy emission allowances) under the maritime ETS. Moreover, with the exception of (potentially fossil based) LNG it is not a major driver of alternative fuel infrastructure to help deliver on the objectives of the FEUM.

The EU Commission has proposed to revise the **Energy Taxation Directive** (ETD) as part of the Fit-for-55 package, but no agreement has been reached to date (EC 2021b). Marine fuels are to date not subject to energy taxes at EU- and national level due to the ETD. The proposal by the European Commission foresees that the ETD should be amended so that the exemption of fuels used in intra-EU maritime transport (and also in inland navigation) would be phased out. Alternative fuels such as RFNBOs will be exempted from the tax for 10 years. Member States should be authorised to exempt on-shore power supply in ports from tax. The full proposed

[23] Defined in AFIR as ships with facilities to enable road or rail vehicles to roll on and roll off the vessel which carry more than 12 passengers.

[24] TEN-T = Trans-European transport network, consisting of two layers - the core and the comprehensive network. The core network includes the most important connections linking major cities/nodes and must be completed by 2030. The comprehensive network connects all regions of the EU to the core network and needs to be completed by 2050. More information here: https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en

minimum tax rate for heavy fuel oil is 0.9 EUR/GJ which corresponds to approx. 3 EURct/litre. The impact assessment accompanying the ETD proposal anticipates no significant additional revenues compared to other new revenues (e.g. from aviation). Ships can namely avoid the taxation by bunkering outside of the EU. A study by Faber et al. (2021) suggests that the taxation of marine fuels (on the supply-side in contrast to the pricing through the ETS) would create an unlevel playing field compared to non-EU bunkering ports, potentially leading to a shift of bunkering to non-EU ports and making the proposal less effective. The price signal from the proposed ETD amendments is also likely to be lower than the one from the maritime ETS as the ETD would only tax intra-EU maritime transport – although the majority of emissions (and thus fuels combusted) occurs on international voyages (Figure 1). A unanimous decision is required in tax matters in the European Council impeding an agreement on the ETD. However, like-minded countries could go ahead by taxing (international) shipping fuels through bilateral agreements.

In October 2023, an amendment to **Renewable Energy Directive** (RED) was adopted.[25] Every member state shall contribute to raise the share of renewable energy in the EU's overall energy consumption to 42.5% by 2030 with an additional 2.5% indicative top up that would allow to reach 45%. There are sector-specific sub-targets, also for transport. Member states can choose between fulfilling a binding target of 14.5% reduction of GHG intensity from the use of renewables in transport by 2030 or a binding share of at least 29% of renewables within the final consumption of energy in the transport sector by 2030. The RED also prescribes a combined sub-target of 1% and 5.5% in 2025 and 2030 respectively for advanced biofuels and RFNBOs in the share of renewable energies supplied to the transport sector. Within the 2030 5.5% target, there shall be a minimum share of 1% of RFNBOs. Member States with maritime ports shall additionally endeavour to ensure that as of 2030 the share of RFNBOs in the total amount of energy supplied to the maritime sector is at least 1.2%. For the 29% transport energy target and the 5.5% sub-target for advanced biofuels and RFNBOs, multipliers for the use of certain fuels apply (e.g. RFNBOs count twice). Advanced biofuels and RFNBOs used in aviation and maritime transport will be counted 1.2x and 1.5x towards the target to incentivise the use of these fuels in the sectors. While multipliers generate this incentive, they effectively reduce the actual amount of alternative fuels needed to fulfil the targets. Generally, the amended RED fuel targets have to be achieved by the transport sector as a whole.[26] Alternative fuels counting towards the target hence do not necessarily have to be deployed in maritime transport – especially as the willingness to pay for expensive advanced biofuels and RFNBOs is higher in road transport. There is also a new requirement in the RED that the amount of renewable energy to be supplied to the maritime sector can only contribute up to 13% of the total energy consumption of the member state to the transport sector target. For Cyprus and Malta, this threshold is at 5%. This limitation of maritime transport's contribution to the target shall apply until 2030. As RED is a directive, it has to be transposed into national legislation. In Germany, RED was implemented via the greenhouse gas quota which so far only refers to road transport and fuels in rail transport. This will need to be amended now.

[25] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413

[26] There is no differentiation anymore between the sectors contributing to the denominator and to the numerator of the renewable share targets, deleting the optional contribution of maritime transport and aviation.

3 Conclusions

The adoption of several EU policies targeting maritime emissions as part of the Fit-for-55 package is an important step as the maritime transport sector has not been targeted by a lot of climate policies in the past. Although global policies are more suitable for a global sector, the EU cannot wait for the IMO which has been notoriously slow on climate action.

International transport should be included in the EU 2040 climate target because it is very likely that it would otherwise not be or less ambitiously regulated. 2040 targets excluding international transport seem more ambitious when looking at the percentage reduction. However, this goes at the price of not covering a substantial share of residual emissions. International transport emissions are expected to decline at a slower pace than emissions of other sectors. Extending the target scope to international transport could thus benefit the climate overall – even though the percentage reductions in 2040 are lower.

The EU has adopted several policies: Maritime transport is included into the EU ETS to put a price on emissions and the adopted FuelEU Maritime regulation (FEUM) aims to accelerate the use of renewable and low-carbon alternative fuels by setting a GHG emission intensity standard from 2025 onwards. These two main policies targeting the sector are complemented by the Alternative Fuel Infrastructure Regulation (AFIR) requiring large ports to provide on-shore power supply and a number of refuelling points for liquefied methane and the revised renewable energy directive (RED), which foresees targets for emissions intensity and renewables in transport. The EU Commission also proposed to stop exempting intra-EU maritime fuels under the energy taxation directive (ETD), but the proposal is still under negotiation and unlikely to be adopted as unanimity is required to change the directive.

The **EU ETS for maritime transport** is an important economic incentive to reduce emissions in the maritime sector by putting a price on carbon. At least in the near term, the expected CO_2 price will be sufficient to incentivise some efficiency measures but not the uptake of alternative fuels and the needed investments in ship technology. Therefore, spending revenues from the ETS on decarbonization will be important to accelerate in-sector reductions. Member States are called upon to use ETS revenues to fund mitigation measures. Ensuring that this indeed is done and that the shipping sector does receive a share is important in the long run. Several reviews scheduled for the ETS will also be important to increase the scope of the system to include smaller ships and all international emissions - in order to capture the EU's responsibility and as the IMO measures will take time and it is unclear if they are ambitious enough. If the IMO does adopt ambitious policies, the EU ETS for maritime transport will be reviewed to reflect those developments.

The **FuelEU Maritime regulation** sets emission intensity reduction targets but needs to the strengthened to speed up the uptake of alternative fuels. The current incentives for RFNBOs are likely not ambitious enough. A more ambitious sub-quota for RFNBOs is recommended. Additionally, a mechanism needs to be considered to ensure that climate-neutral fuels are available in EU ports – either a design similar to ReFuelEU Aviation which obliges fuel suppliers or through carbon contracts for differences or other schemes. As the EU ETS is expanded to other ship types the FEUM should be amended, too, to align coverage.

The **Alternative Fuel Infrastructure Regulation** currently does not require infrastructure for RFNBOs, but supports (fossil) LNG infrastructure – a notable imbalance.. It should be amended to ensure that the needed infrastructure for RFNBOs is available as this is an important prerequisite to full decarbonization of the sector.

Shipping will be in **competition for (advanced) biofuels and RFNBOs** with other (hard-to-abate) sectors to achieve the necessary emission reductions until 2040 and 2050. Limited availability of climate-neutral fuels might increase fuel costs and require timely and large-scale investments in advanced biofuel and RFNBO (and thus renewable energy) production capacities.

The exclusion of maritime fuels from **energy taxes** is an unresolved problem. While the outcome of the revision of the energy taxation directive is still uncertain, like-minded countries could and should go ahead by taxing (international) shipping fuels through bilateral agreements.

The above mentioned policies indirectly influence **demand** through a cost / price incentive. Shipping emissions are highly dependent on economic growth and consumption patterns, stepping up the efforts to reduce the demand for fossil fuels through decarbonization and primary materials through circular economy will also lead to emission reductions in the maritime transport sector.

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This publication was commissioned by Agora Energiewende.

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