BRIEFING

Decarbonising maritime transport: The EU perspective

SUMMARY

International maritime transport is the backbone of the global economy. However, vessels release emissions that pollute the air and contribute significantly to global warming. As shipping is forecast to grow, reducing these emissions is urgent, in order not to undermine emissions-reducing efforts in other areas, to keep humans healthy, preserve the environment and limit climate change. Although international shipping was not explicitly mentioned in the 2015 Paris Climate Agreement, efforts to make shipping cleaner and greener have since progressed.

International rules to reduce air-polluting emissions from ships have been agreed in the International Maritime Organization (IMO). Their impact, in particular the application of stricter limits for sulphur content in marine fuels since 1 January 2020, is yet to be evaluated. Parallel efforts to reduce greenhouse gas (GHG) emissions from maritime shipping have resulted in the setting of rules on collecting data on fuel oil consumption and the first collected data becoming available. In 2018, the IMO adopted an initial strategy for reducing GHG emissions, aimed at cutting shipping GHG emissions by at least 50 % by 2050, compared to 2008 levels. While concrete steps are yet to be agreed, achieving this goal will require both short-term emission-reducing measures and longer-term measures to make shipping switch to alternative fuels. Short-term guidance from the IMO is expected in 2020.

On the EU front, the European Commission announced in the European Green Deal that GHG from EU transport should be cut by 90 % by 2050 and outlined how this would involve shipping. Initial measures are to be proposed by the end of 2020.

This briefing reviews the existing international and EU rules on shipping emissions and their application, looks into the short-term measures under discussion and maps the landscape of marine fuels and technologies that could help decarbonise shipping in the long term.

In this Briefing

EPRS | European Parliamentary Research Service

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PE 659.296 – October 2020

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Introduction

Transporting more than 80 % of the world's goods, maritime shipping is essential to the world economy and our wellbeing. Like all other forms of transportation that burn hydrocarbon fuels for energy, it releases significant volumes of emissions as by-products. Of the two types, air polluting sulphur and nitrogen oxides and particulate matter[1] are dangerous for the environment and human health, while greenhouse gas emissions, such as CO_2 and methane, contribute to climate change.

International maritime transport is responsible for around 2-3 % of global GHG emissions. According to the fourth IMO GHG Study 2020, these emissions increased nearly 10 % between 2012 and 2018, as the growth in shipping activity was larger than efficiency gains. The study also notes a sharp increase in short-lived climate pollutants, mainly methane and black carbon. Shipping is projected to grow further and, without sustained action, its GHG emissions are expected to increase by up to 50 % by 2050. While the impacts of the Covid-19 pandemic may bring emissions down in 2020 and 2021, they are unlikely to affect the growth projections for the coming decades. In the EU, maritime shipping accounted for 13 % of the GHG emissions from the transport sector in 2015.

The IMO regulates international shipping through conventions agreed and applied by its 174 member states. While adopting or adapting IMO rules is a lengthy procedure, the outcome, once ratified by an agreed number of its member states, becomes a new global standard. For its part, the EU has mostly transposed IMO rules into its legislation, to make them legally enforceable in EU waters. At times, such as in the aftermath of large shipping accidents, the EU went ahead and adopted stricter safety regulations before the IMO, remaining open to later harmonisation of the two sets of rules. The EU rules (which, by IMO standards, are regional rules) apply to ships registered in EU countries, as well as to all ships in their waters and ports. In addition, local regulations apply in many areas.

The maritime sector involves a broad range of industries, subsectors and stakeholders with different interests and multiple interconnections. This can give rise to 'split incentives'. For instance, when considering decarbonisation, ship owners tend to prefer solutions offering low development, construction and maintenance costs, while ship operators and charterers prefer those that reduce fuel costs. An intervention in one area impacts on others, for example the continuous increase in ship size due to efficiency concerns has forced ports to adapt their infrastructure and face higher peak cargo loads. While there is strong competition within the international maritime sector, on a regional scale shipping also competes with other modes of transport. So, if regulatory changes were to make short sea shipping uncompetitive, the regional demand could shift to land-based transport.

International and EU policies

International rules

As of 2010, the IMO tightened regulations on **air pollution** (also termed 'local pollution') from ships with the revised International Convention for the Prevention of Pollution from Ships (MARPOL, Annex VI), aimed at a progressive global reduction in emissions of sulphur, nitrogen and particular matter (PM). It also introduced special emission control areas (ECAs) with strict emissions limits for those pollutants. Two ECAs were established in European waters, covering the Baltic Sea and the North Sea.

Reduction of **sulphur oxides** (SOx) emissions is achieved by limiting sulphur content in marine **fuels**. The revised MARPOL planned for a reduction in the limit for SOx and PM in ECAs to 0.1 % from 1 January 2015. In areas outside the ECAs, the sulphur limit was to be lowered from the previous 3.5 % to 0.5 %. Once the availability of compliant fuels was confirmed in 2016, the IMO announced a global 'sulphur cap' of 0.5 % in all waters, apart from ECAs, from 1 January 2020. Later, it banned even the carriage of non-compliant fuels on board for ships without an exhaust cleaning system ('scrubber', see box on p.4), from 1 March 2020.

The IMO also introduced progressive reductions of **nitrogen oxides** (NOx), by setting increasingly stringent limits for marine diesel **engines** on new-built ships, structured in three levels ('tiers'). The currently strictest 'Tier III' applies to engines installed on ships constructed in 2016 or later, operating in ECAs controlling NOx. From January 2021, all ships in these areas must use the mandatory engine standards or equivalent NOx emission reduction technologies to respect the NOx emission levels. In 2016, the IMO added the Baltic Sea and the North Sea to the existing NOx Emission Control Areas.

While shipping was not included in the Paris Agreement, the IMO had already introduced global energy efficiency standards for ships (see box). In 2016, the IMO adopted a mandatory fuel data collection system ('**IMO DCS**') and, after mounting international pressure, an initial strategy on the reduction of GHG emissions from ships in 2018. The strategy aims to cut shipping emissions by at least 50 % by 2050, compared to 2008 levels, before phasing them out entirely. In parallel, the average carbon intensity (CO_2 per tonne-mile) should be reduced by at least 40 % by 2030 and by 70 % in 2050. To be reviewed in 2023, the strategy outlines candidate short, medium and long-term reduction measures, to be agreed by the IMO Marine Environment Protection Committee (MEPC). The short-term measures should achieve a peak in emissions as soon as possible and set them on a descending path. Clearly, measures to reduce air polluting emissions should not undermine efforts to reduce GHG emissions, and vice versa.

IMO energy efficiency measures

The **Energy Efficiency Design Index** (EEDI), applied since 2013, requires that a ship's designed fuel efficiency score is better than a reference value, which depends on the ship type and size. Applying to new ships only, it becomes more stringent over time. Studies suggest that the target values were set too low, with many new ships in 2014 exceeding even 2025 targets. A proposal to bring the 2025 stringency levels forward to 2022 has been discussed in the IMO.

While ships must carry a **Ship Energy Efficiency Management Plan** (SEEMP), no emission reduction goals or periodic efficiency assessments are required.

The IMO 2030 GHG target can be globally met worldwide with available technology through operational measures, improvements in operational efficiency, limited use of low-carbon fuels and enhanced energy efficient designs. However, to achieve the 2050 targets, alternative fuels and energy sources will be needed, while all alternative fuels and technologies known at this time have limitations and no truly 'zero-carbon' fuels are available on a larger scale. Although markets are powerful, they cannot, on their own, make the transition happen: regulation is needed to set goals and push innovation. With the current state of IMO regulation, the 2050 targets will not be met.

Corresponding EU developments

The EU transposed the IMO **SOx limits** into law (now Directive EU/2016/802). Use of marine fuels with a maximum 0.1 % sulphur content is mandatory in the EU ECAs from 2015. The EU also set the same limit for ships calling at EU ports and a 0.5 % limit for all other EU waters from 1 January 2020. The **NOx emissions** limits for EU countries are established within EU air quality standards for air pollutants in ambient air and there is no EU shipping-specific legislation.

Anticipating an IMO move, the EU adopted a system for monitoring, reporting and verification of CO2 emissions from maritime transport in 2015 (the '**MRV Regulation**' 2015/757/EU), as a first step towards reducing shipping GHG emissions in EU waters. It obliges ships of all flags above 5 000 tonnes calling at ports in the European Economic Area (EEA) to collect and report their CO_2 emission data, based on their fuel consumption. The system covers intra-EEA voyages, as well as the incoming voyage into the EEA and the outgoing voyage to a non-EEA port, with data collection starting in 2018. The system envisaged setting GHG reduction targets for the maritime transport sector and, in the medium to long term, introducing further measures including market-based ones. It was to be modified once IMO adopted comparable measures. However, since data collection under the global IMO DCS – which is slightly different and less stringent than the EU MRV – started in 2019, companies have been obliged to report similar data twice. EU legislators are now adapting the EU system to facilitate data reporting without weakening its usefulness in gathering transparent data per ship and voyage.

Pathways to compliance

To comply with the low **sulphur limits**, ships can either continue using high-sulphur heavy fuel oil (HFO) but need to install an exhaust gas cleaning system (EGCS, or '**scrubber**', see text box), or have to switch to a low-sulphur fuel, which is more expensive. Both options increase well-to-wake CO_2 emissions, but scrubbers less so. Ships can also use an alternative fuel, such as liquefied natural gas (LNG, see p.5).[2] The uptake of scrubbers has been slow and only really took off in 2018, as the cheapest way to comply with the IMO 2020 sulphur limit.

Exhaust gas cleaning systems (scrubbers)

The open-loop system uses alkalinity in seawater. Exhaust gas is sprayed with seawater, SOx reacts with water and forms sulphuric acid. After treatment, the washwater is discharged into the sea. The acidity of the washwater is neutralised by seawater, but where seawater alkalinity is low, more water is needed to reach a pH where the washwater can be discharged. Instead of using seawater, closed-loop systems carry a tank of alkaline-dosed freshwater. Once sprayed into the exhaust, the water is filtered and recirculated, with only a small amount of concentrated 'bleed-off' water discharged. Hybrid systems can operate in closed- or open-loop mode; the latter being more frequent, as it limits the scrubber sludge to be stored on board and discharged in port, for a fee. While not all ports accept scrubber waste at present, EU Directive 2019/883 obliges all EU ports to provide such facilities from mid-2021. Among the more than 4 000 ships with a scrubber, 80 % are open-loop, 17 % hybrid, and 2 % closed-loop.

Source: ICCT, 2020, unless specified otherwise.

Concerns with the **environmental impact of scrubbers** led a number of coastal states and ports to ban discharges from open-loop systems. Ships with open-loop scrubbers docking or sailing through these areas have to store scrubber waste in tanks and discharge it elsewhere, or use a closed-loop scrubber. The IMO is reviewing its 2015 scrubber guidelines and assessing the impact of discharges. Meanwhile environmental organisations call for a scrubber ban, to stop 'turning air pollution into water pollution', which has a cumulative impact on seawater, sediments and wildlife. The impact on port water and sediment has been analysed as small by CE Delft, an independent research and consultancy organisation. According to the bunker (fuel supply) industry, the impact of washwater discharges depends on local factors and – while local authorities can adopt a stricter approach – a global discharge ban seems unlikely as long as scrubbers are key to ensuring compliance with the IMO sulphur cap.[3]

Reduced shipping speed ('**slow steaming**')

When a ship reduces speed, its energy consumption decreases more than proportionally. Other factors also come in to play: weather conditions and, at a fleet level, the additional ships required to provide the same transport work. Increased travel times raise concerns around competitiveness, however. The benefits of speed reduction diminish at very low speeds: ships may be operating outside intended design parameters, potentially affecting engine and propeller function and consumption of lubrication oil. One issue to decide is whether to regulate maximum or average speed and how to implement this. Slow steaming has been used in times of fleet overcapacity.

Source: CE Delft, 2017.

Shipping companies already use a range of **means to reduce their fuel consumption and emissions**, which target both the ship design and operation. The 'design' means include engine modifications, more efficient hull, propeller and rudder, as well as further exhaust cleaning methods. Among operational means, the most common are **speed reduction** (see box) and speed optimisation (using tide and current conditions to reduce propulsion demand), which effectively reduce fuel consumption. Other means include a hull coating deterring the build-up of live organisms on ship's underwater sections, which reduces the ship's resistance in water, as well as digital optimisation of the ship's route, port calls, and cargo loading and distribution.

As regards the **regulatory measures under consideration**, the IMO Initial strategy lists 13 candidate short-term GHG-reducing measures that can be agreed before 2023. Research affirms that the 2030 target can only met with measures that change operational practices, such as **operational efficiency standards**[4] and **mandatory speed reduction** (see box), applied globally. While both offer equivalent CO_2 reduction outcomes, they differ in that operational efficiency standards allow ships more ways to comply than by speed reduction alone. IMO member states have since proposed a number of other measures, which the MEPC is considering.

When calling at a port, seagoing vessels need **electric power**. Most often, this is provided by auxiliary engines, generating emissions and noise pollution. These can be decreased by shutting down the vessel's auxiliary engines and providing it with external, shore-side power. Shore power reduces local emissions and noise while the ship is at berth and can also reduce CO_2 emissions, provided that the electricity is generated from clean sources. Currently, electricity produced from the combustion of marine fuel on board ships is tax-exempt. However, when ships at berth plug in to the shore-side electricity system, they are liable for local electricity taxes.[5]

Alternative shipping fuels and technologies

Most seagoing ships today use heavy fuel oil (HFO) or marine gas oil (MGO) as their engine ('bunker') fuel, burned in a diesel engine. Introducing alternative fuels is linked to a number of challenges. The energy content relative to volume of the fuel is usually lower than that of oil-based fuels, thus the ship needs bigger fuel tanks. As many alternative fuels have a low flashpoint, safety aspects linked to storage and on-board use need to be addressed, such as high flammability for hydrogen or toxicity for ammonia. Risk mitigation measures vary, and are designed according to the application. While less than 1 % of the world fleet runs on alternative fuels today, the key candidate fuels appear to be liquefied natural gas (LNG), liquefied petroleum gas (LPG), methanol, biofuels and hydrogen (see Table 1, for more detail, see box on p.6).

Table 1 – A comparison of marine fuel performance, state of play in 2019

Fuel	HFO + scrubber	Low sulphur fuels	LNG	Methanol	LPG	HVO (advanced biodiesel)	Ammonia	Hydrogen	Fully electric
Parameters	Fossil (without CCS)					Bio	Renewable		
Energy density	dark green	dark green	light green	light green	light green	dark green	yellow	orange	red
Technological maturity	light green	light green	light green	yellow	yellow	dark green	orange	orange	yellow
Local emissions	orange	orange	light green	light green	light green	orange	yellow	dark green	dark green
GHG emissions	red	red	orange	orange	orange	light green	dark green	dark green	dark green
Bunkering availability	dark green	dark green	light green	yellow	yellow	red	orange	red	orange
Commercial readiness	dark green	dark green	dark green	light green	light green	yellow	orange	red	red/yellow/green

Source: DNV GL, Comparison of Alternative Marine Fuels, SEA\LNG Ltd, 2019. Commercial readiness takes maturity and availability of technology and fuel into account. For 'fully electric' ships, this needs to be evaluated case-by-case. GHG impacts for LNG, methanol and LPG improve with the fraction of corresponding bio or synthetic drop-in fuel. Results for ammonia, hydrogen and fully-electric are shown only for renewable energy sources, as solutions with the potential for decarbonising shipping. Production from fossil energy sources without carbon caption and storage (mainly the case today) will impact results.

Alternative fuels for shipping: Key candidates

Reference fuels and engines: HFO consists mainly of residual products from crude oil refining processes, blended with a distillate diluent to the desired viscosity. As no standards for the blend exist, HFO properties vary. The maximum sulphur limit is 3.5 % for HFO and 0.1 % for low-sulphur **MGO**. Very low-sulphur oil (VLSFO) can also be used for compliance with IMO sulphur regulations.

For large bulk carrier ships, three **engine and fuel systems** are commercially available today. A mono-fuel diesel engine running on HFO and fitted with a scrubber, a mono-fuel diesel engine running on VLSFO or MGO, and a dual-fuel LNG engine that can use LNG or VLSFO/MGO. Once alternative fuels become available, other engines are likely to become relevant, such as dual-fuel methanol or a dual-fuel ammonia engines.

LNG's main component is methane. With a boiling point at -162°C, LNG must be stored in insulated tanks, which occupy three to four times the volume of fuel oil to provide equivalent amounts of energy. As a shipping fuel, LNG generates no SOx and low NOx emissions, but the potential methane release ('slip') must be controlled. Used since the early 2000s, there are 400 LNG-powered ships today, with a further 144 vessels to be converted.

LPG is any mixture of propane and butane in liquid form. The main safety concern stems from the density of LPG vapours, heavier than air, requiring leak detectors and ventilation. Due to the lower density of the fuel, LPG tanks are larger than oil tanks. LPG eliminates SOx and reduces PM, while NOx emissions depend on the technology used. Compared to HFO, CO_2 savings (on full life-cycle) are about 17 %, but propane and butane have global warming potential three to four times higher than CO_2. There are 34 LPG-powered ships.

Methanol, widely used in industry, can be produced from natural gas or coal, as well as from renewable sources (hydrogen and CO_2), which impacts on the resulting emissions. Using methanol eliminates SOx emissions and reduces PM, while NOx emissions depend on the technology used. It can be stored in standard fuel tanks for liquid fuels, adapted to its low flashpoint properties. There are 24 methanol fuelled ships.

Biofuels, produced from primary biomass or biomass residues; can have liquid or gaseous form. The most promising for shipping are hydrogenated vegetable oil (HVO), fatty acid methyl ester (FAME) and liquefied biogas (LBG). The associated GHG emission reductions vary (19 %-88 %), depending on the feedstock and production process used, while additional controversies arise, related to land use and socio-economic issues. Global infrastructure and bunkering facilities are lacking, although HVO can be distributed through existing HFO/MGO systems. The use of biofuels in shipping is very limited today, but there is potential for blending with fossil fuels. While standards exist, specific standards for the maritime industry are missing.

Hydrogen (H_2) can be produced by electrolysis of water with renewable electricity (currently about 5 % of production), or from fossil fuels (about 68 % from natural gas, 16 % oil, 11 % coal). If produced using renewable energy, nuclear power or natural gas with carbon capture and storage, zero-emission ships are possible. As a shipping fuel, H_2 can be used in several ways: in fuel cells, in a dual fuel mixture with HFO or as a replacement to HFO in combustion machinery. H_2 fuel cells electrochemically combine hydrogen and oxygen from ambient air to create electricity, with heat and water as by-products. If used as a replacement fuel, five times the volume of liquefied H_2 is needed to provide the same energy as HFO, or 10-15 times the volume if stored as compressed gas. Today, three H_2 fuelled ships exist and bunkering infrastructure is not available.

Ammonia (NH_3), a traded commodity used as a fertiliser, can be used as a fuel for direct combustion or in fuel cells. It is produced by the conversion of hydrogen and nitrogen, using high temperature and a catalyst. Today, 90 % of production relies on fossil fuels (natural gas) and 'green' production would require abundant renewable sources. Already tested in land-based installations, its use as a marine fuel requires further research and development.

Sources: DNV GL, 2019, and ITF/OECD, 2018. Numbers of ships include ships in operation and ships on order, as retrieved from DNV GL Alternative Fuels Insight platform website on 24 September 2020.

While oil-based fuels are widely available, alternative fuels are much less so. Bunkering infrastructure is costly and it takes time to build new fuel supply infrastructure or to adapt existing facilities to a new fuel.

On LNG, industry and environmental organisations' views diverge. To environmental organisations, LNG is problematic. Transport&Environment claim that the switch to LNG may only lower GHG emissions by 6-10 %, but an uncontrolled methane slip could actually increase them.[6] In their view, the continued EU support for LNG hampers investments in the advancement of more sustainable fuels. The International Council on Clean Transportation (ICCT) believes that, given the global warming potential of methane, using LNG brings no climate benefits, regardless of the engine technology used.

In contrast, for industry, LNG is the cleanest fossil fuel that is readily available for use at scale and with infrastructure in place. While it cannot contribute much to shipping's decarbonisation, it can help improve air quality in ports and lower shipping's impact on environment and human health. In their view, gas engines and LNG distribution systems could be used at a later stage with other alternative fuels having similar material properties as LNG.

When considering the uptake of various fuels, a differentiation between **short sea shipping** and deep **ocean-going ships** is necessary. Short sea vessels operate on relatively short routes with frequent port calls and may spend most of their time in areas under strong environmental control within local and regional regulation. Coastal routes are a good place to try out new technologies requiring frequent recharging or specialised infrastructure and regulatory support. Biofuels and methanol are available in some ports and fully electrical or hybrid ships are appearing in the short-sea, offshore and passenger segments. Norway, for instance, is already electrifying its ferry sector and is developing a hydrogen-powered ferry as well as a hydrogen fuel cell powered cruise ship, while the Belgian port of Antwerp has ordered a hydrogen-powered tugboat. Currently, there are about 450 battery-powered ships in operation or on order, mostly ferries and offshore ships.

By comparison, **deep-sea** large vessels cover long routes and need a fuel that is globally available. Moreover, the source of energy they carry on board must not excessively limit the available cargo space. For this fleet, LNG may be an option, as well as sustainable biofuels, methanol and LPG, if they become globally available. In contrast, batteries are currently not seen as a viable option. While nuclear propulsion is technically feasible, societal barriers exist. Various wind propulsion solutions, such as rotor sails, wingsails and towing kites, have been developed and tested, showing a significant fuel saving potential of 5-50 %, depending on the technology and ship type involved. When scaled up, however, practical issues of deck layout, visibility and loading procedures need consideration, as well as increased heeling (tipping from side to side). Once full-scale seagoing pilot projects have demonstrated the commercial viability of wind propulsion as a complementary power and provided that there is sufficient regulatory pressure, these technologies could reach the market.

Another promising technology, fuel cells, convert electrochemical energy directly into electric power and heat, with no combustion involved. While different types of fuels can be used in fuel cells, the most frequent choice is hydrogen, the only exhaust product of which is water. Hydrogen fuel cell systems for ships are being developed, but will designs are insufficiently mature to substitute for main engines. Fuel cells are being tested on smaller ships where the storage of compressed hydrogen is feasible, however there is also potential for larger cruise or container ships. Specific solutions are likely to emerge for different shipping segments.

Supporting decarbonisation

Across the maritime industry, a number of initiatives support shipping decarbonisation. Among these, the United Nations-IMO backed Global Industry Alliance (GIA) supports a transition towards an energy efficient and low carbon future for shipping. The Getting to Zero Coalition, a broad alliance of companies from the maritime, energy, infrastructure and finance sectors, is seeking to put commercially viable deep sea zero emission vessels powered by zero emission fuels into operation by 2030. The International Windship Association, with broad a membership of industry and research actors promotes wind propulsion for commercial shipping. Global shipping banks have developed Poseidon Principles, framework rules for promoting climate considerations in banking in the maritime sector. Following the banks, many large cargo owners have committed to reducing emissions across their supply chains. Jointly, they could stimulate low-carbon transoceanic shipping as part of their responsible corporate policies, appealing to consumers. Recent initiatives include the Cargo Owners Zero Emission Vessel Initiative (coZEV) platform, bringing enough cargo together to fill the first zero-emission shipping route for an agreed time period; and the Sea Cargo Charter, a framework allowing bulk charterers to assess and disclose the climate alignment of their ship chartering activities. In parallel, a growing number of ports already apply differentiated port fees, based on ships' environmental impact.

The EU has promoted the introduction of LNG infrastructure in its ports, both with regulation and project financing, mostly under the Connecting Europe Facility programme. It has also supported research and development initiatives advancing alternative fuels and innovative energy and transport solutions, mainly under the Horizon 2020 programme. These included a fully electric ferry, a ferry fuelled by hydrogen from local renewable sources, wind assisted ship propulsion, as well as a full-scale demonstration combining seven new technologies.

In December 2019, the European Commission published the European Green Deal, its flagship programme to make Europe the first climate-neutral continent by 2050, boost its industrial competitiveness and ensure a just transition for the regions and workers affected. The programme seeks to reduce GHG emissions from transport by 90 % across all transport modes. With respect to shipping, the Commission proposes to include maritime CO_2 emissions in the EU carbon market (EU Emissions Trading Scheme (ETS)) and examine the existing tax exemptions for (aviation and) maritime fuels. In parallel, it wants to ramp up the production and deployment of sustainable alternative fuels to accelerate, among other things, the deployment of zero- and low-emission vessels. It also intends to regulate access for the most polluting ships to EU ports and oblige docked ships to use shore-side electricity.

European Parliament positions

In 2016, Parliament called for common technical specifications for LNG refuelling points for seagoing ships. Parliament also sought to ensure adequate research and development financing for improved technologies for these ships, with the aim of swiftly shifting to a lower-carbon fleet. It called on the Commission and the Member States to create incentives for the development of LNG-powered ships, or retrofitting those using conventional fuels to LNG.

In a 2018 own-initiative report, Parliament called on the Commission to revise and properly implement the Alternative Fuels Infrastructure Directive. It also asked Member States to review their energy taxation to facilitate the uptake of carbon-free alternative fuels and electricity used for shore-side supply for ships.

On 28 November 2019, Parliament declared a climate and environmental emergency. In a parallel resolution on the UN Climate Change Conference in Madrid (COP25), underlining the slow and insufficient IMO action, Parliament called for further EU measures to reduce maritime GHG emissions. It urged the Commission to propose the inclusion of the maritime sector in the EU ETS and the introduction of a ship efficiency standard and a ship label.

In its resolution of 15 January 2020 on the European Green Deal, Parliament endorsed the Commission's intentions concerning initiatives on maritime emissions, ending fuel tax exemptions and regulating pollution in ports. It defended a high level of ambition for GHG reductions, while reminding that EU measures should not undermine the international competitiveness of EU-flagged ships. Agreeing that EU and international measures should go hand in hand to avoid creating double regulations, Parliament also affirmed that any action, or lack of action, at global level should not hinder the EU's ability to take more ambitious action within the EU. Parliament also called for a move away from the use of HFO and for investments in new decarbonising technologies and the development of zero-emission and green ships while advocating the reduction of shipping speed.

On 16 September 2020, when adopting its position on the Commission's proposal to align the EU MRV Regulation with the IMO DCS, Parliament requested that shipping companies reduce their annual average CO_2 emissions per transport unit for all their ships by at least 40 % by 2030 (as in the IMO initial strategy), or face penalties. In addition, it also voted to include CO_2 emissions from the maritime sector in the EU ETS from 2022. This approach has yet to be endorsed by the Council.

Reactions and outlook

The EU move towards including maritime emissions in its carbon market has been praised by environmental NGOs and criticised by many shipping companies. Among the former, Transport&Environment welcomed that shipping operators would have to pay for their pollution. However, shipping companies regret that the measures proposed are being taken without an impact assessment, undermining IMO efforts, as expressed by the European Community Shipowners' Association (ECSA). The World Shipping Council (WSC), a United States-based container-shipping group, warned that forcing shipping companies to buy permits for their emissions, not only concerning voyages within Europe, but also from international trips starting or finishing in an EEA port,[7] could create trade tensions and raise legal and diplomatic concerns.[8] Other parties, pointing to the considerable fluctuations in the EU ETS, would prefer a global, predictable carbon levy. The key argument voiced has been that applying a market-based measure without ready-to-be-used alternative fuels only amounts to a carbon-offsetting scheme, with companies paying for the right to emit, rather than advancing decarbonisation.

On 16 September 2020, in her first State of the Union address, European Commission President Ursula von der Leyen proposed to raise the level of EU ambition and reduce GHG emissions by 55 % by 2030. On 7 October, in its position on the proposed European Climate Law, the European Parliament voted to raise the 2030 target to a 60 % reduction.

In terms of shipping, the Commission has already announced a forthcoming initiative to support maritime fuels. In parallel, it intends to review legislation that could impact the take-up of LNG and onshore electricity supply to ships in ports (Alternative Fuels Infrastructure Directive, Energy Taxation Directive and the guidelines on the trans-European transport network 'TEN-T Regulation').

On the IMO side, the 75th MEPC meeting is to be held remotely in November 2020. It is expected to approve the strengthening of the existing design standards (EEDI) for some categories of ships, by bringing forward 'phase 3' from 2025 to 2022.[9] Concrete proposals to improve the operational energy efficiency of existing ships are also on the agenda. On scrubber discharges, no dramatic developments are expected, given the recommendations of the IMO Pollution Prevention and Response Sub-Committee (PPR 7) that any future changes to scrubber rules should not apply to vessels with previously installed scrubbers. If maritime CO_2 emissions are included in the EU ETS, pressure may build on the IMO to develop an international carbon-pricing mechanism, which could require a new convention to be adopted and ratified by enough flag states, and take several years.

The theme chosen for World Maritime Day 2020, Sustainable shipping for a sustainable planet, reflects the expectations that the IMO should make a genuine contribution to improving the environmental performance of international shipping, as part of the global race against the climate clock.

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ENDNOTES

1. Particulate matter (PM) is a combination of solid and liquid particles formed during fuel combustion. Apart from adverse effects on human health, these form 'black carbon', the second largest contributor to climate change after CO_2.
2. A conversion to LNG is costly, as it requires extensive modifications to the engine room and the addition of cryogenic tanks. Thus, LNG-fuelled vessels tend to be new builds, with only a small number of conversions.
3. In the context of scrubbers, the International Energy Agency (IEA) points out the risk of locked-in investments in fossil fuel technologies that may delay the transition to carbon-neutral fuels.
4. It has not yet been resolved how to measure operational efficiency to obtain comparable and robust results for different ship types. Several possible metrics have been discussed in the IMO, each having some strengths and weaknesses.
5. In the EU, Sweden, Germany, Denmark, Spain and France asked for the possibility to temporarily apply a reduced rate of taxation to shore-side electricity under the Energy Taxation Directive, removing the biggest barrier to shore-power use.
6. The fourth IMO GHG study links the strong increase in methane emissions over the 2021-2018 period to the rising consumption of LNG as a marine fuel and the need to include methane in future phases of the EEDI (now covers only CO_2).
7. According to the Fourth IMO GHG study, emissions allocated to international shipping correspond to 20-40 % for smaller ship sizes and 70-100 % for the largest ships, depending on ship type.
8. This was the case with CO_2 emissions from international aviation, which the EU included in the EU ETS in 2012. After strong international opposition, it scaled back the scope: the EU ETS applies to intra-EEA flights, while the application to extra-EEA flights has been suspended until 31 December 2023. In 2016, the International Civil Aviation Organization (ICAO) adopted the market-based carbon-offsetting scheme CORSIA, designed to allow the international aviation sector to achieve carbon-neutral growth after 2020. Weak by design, it has been further weakened by coronavirus-related adaptations.
9. To environmental organisations, ship design standards are unlikely to decarbonise the sector, as a large 'performance gap' exists between these and the real-world emissions from maritime operations, which are the ones to be regulated.

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