

**Note by the International Maritime Organization (IMO) to the sixtieth session of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA 60) Bonn, Germany, 3-13 June 2023**

**Agenda item 14(b)**

**“Emissions from fuel used for international aviation and maritime transport”**

**UPDATE ON IMO’S WORK TO ADDRESS GHG EMISSIONS FROM INTERNATIONAL SHIPPING**

**SUMMARY**

The International Maritime Organization (IMO) contributes to international action to address climate change by regulating GHG emissions from international shipping.

Since SBSTA 59 in November 2023, IMO’s Marine Environment Protection Committee (MEPC) and the Intersessional Working Group on Reduction of GHG Emissions from Ships (ISWG-GHG) held one session each (MEPC 81 and ISWG-GHG 16).

This note is an update of the IMO submission to SBSTA 59 and focusses on the latest developments on the various GHG-related workstreams at IMO aiming to transpose the commitments of the *2023 IMO Strategy on reduction of GHG emissions from ships* into mandatory requirements for ships, in line with the agreed timelines.

An illustrative timeline of IMO regulatory action to address GHG emissions from international shipping is set out in the annex.

**Context**

1 As presented in the IMO submission to SBSTA 59, IMO Member States unanimously adopted, in July 2023, resolution MEPC.377(80) on the [2023 IMO Strategy on reduction of GHG emissions from ships](#) (2023 IMO GHG Strategy), enhancing IMO's contribution to global efforts by addressing GHG emissions from international shipping.

2 The 2023 IMO GHG Strategy contains, inter alia, the following elements:

- .1 the **vision** states that IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible, while promoting, in the context of this Strategy, a just and equitable transition;
- .2 enhanced **levels of ambition** include:
  - .1 confirmation of the ambition to reduce **CO<sub>2</sub> emissions per transport work**, as an average across international shipping, by at least 40% by 2030, compared to 2008;

- .2 to reach at least 5%, striving for 10%, of the **energy used** by international shipping to be zero or near-zero GHG emission technologies, fuels and/or energy sources by 2030; and
- .3 to reach net-zero GHG emissions by or around, i.e., close to, 2050, taking into account different national circumstances, whilst pursuing efforts towards phasing them out as called for in the Vision consistent with the long-term temperature goal set out in Article 2 of the Paris Agreement;
- .3 new **indicative checkpoints** to reach net-zero GHG emissions are identified as follows: reduce 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;
- .4 the levels of ambition and indicative checkpoints should take into account the **well-to-wake GHG emissions of marine fuels** as addressed in the Guidelines on lifecycle GHG intensity of marine fuels (LCA guidelines) developed by IMO with the overall objective of reducing GHG emissions within the boundaries of the energy system of international shipping and preventing a shift of emissions to other sectors;
- .5 a **basket of mid-term measures** delivering on the reduction targets, comprised of both a technical element (namely a goal-based marine fuel standard regulating the phased reduction of the marine fuel's GHG intensity) and an economic element (on the basis of a maritime GHG emissions pricing mechanism) should be finalized and adopted in 2025 following a comprehensive impact assessment process and enter into force in 2027;
- .6 the Strategy also identifies IMO's framework on **barriers and supportive actions, capacity-building and technical cooperation, R&D**. It highlights important issues that should continue to be addressed by IMO such as: the special needs of developing countries, in particular SIDS and LDCs with regard to capacity-building and technical cooperation; the need for a broad approach to regulating safety of ships using alternative technologies and fuels; the important role of seafarers and other maritime professionals; and the importance of information sharing, technology transfer, etc; and
- .7 the IMO GHG Strategy will be subject to a **five-yearly review**, with the first review due in 2028.

3 IMO is actively working, through important parallel tracks, on transposing these commitments into mandatory requirements under the MARPOL Convention that apply to individual ships from all flags to ensure that the levels of ambition of the 2023 IMO GHG Strategy are effectively achieved in line with the agreed timelines. As such, IMO's commitments do not just remain aspirational targets but will result in a binding regulatory framework that applies to the world fleet and is enforced globally, both by ships' flag States as well as any port States a ship may visit.

#### **Development of a basket of candidate mid- and long-term GHG reduction measures: the "IMO net-zero framework"**

4 As presented in previous IMO submissions to SBSTA, the MEPC and the ISWG-GHG have been developing a basket of mid-term measures aimed at delivering on the reduction targets of the 2023 IMO GHG Strategy, in line with a work plan approved by MEPC 76 in June

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2021. The mid-term measures should effectively promote the energy transition of shipping and provide the world fleet with a needed incentive, while contributing to a level playing field and a just and equitable transition. Several different proposals of what these measures should entail are currently being considered by MEPC.

5 Having further considered how to advance the development of the basket of measures, MEPC 81 agreed on an illustration of a possible draft outline of an “IMO net-zero framework” for cutting GHG emissions from international shipping, with the understanding that this outline could be used as a starting point for interested Member States and international organizations to consolidate the different proposals into a possible common structure, for further development, taking into account the deliberations of the ISWG-GHG, while noting that this would not prejudice any possible future changes to it.

6 The draft outline of a possible “IMO net-zero framework” lists regulations under MARPOL Annex VI which may be adopted or amended, including a potential new Chapter 5, to establish a marine fuel standard regulating the phased reduction of marine fuels’ GHG intensity and economic mechanism(s) to incentivize the transition to net-zero.

7 The 2023 IMO GHG Strategy provides that the impacts on States of a measure or a combination of measures should be assessed and taken into account as appropriate before adoption of the measure(s), in accordance with the *Revised procedure for assessing impacts on States of candidate measures*. In this regard, MEPC 80 established a Steering Committee consisting of 32 Member States to oversee a comprehensive impact assessment (CIA) of the candidate mid-term GHG reduction measures. Its interim report was considered by MEPC 81, and the final report on the CIA will be submitted to MEPC 82 (September/October 2024). The Steering Committee has been meeting seven times thus far.

8 A two-day fifth GHG Expert Workshop on the further development of the basket of mid-term measures (GHG-EW 5) has been scheduled to take place on 4 and 5 September 2024, to facilitate the understanding of the preliminary findings of the CIA.

### **Life cycle GHG intensity assessment (LCA) of marine fuels**

9 As sustainable marine fuels have diverse feedstock sources and production pathways entailing significant differences in their overall environmental footprints, the effective transition to zero- and near-zero GHG emission marine fuels requires the development of a robust international framework to assess their GHG intensity in a scientific and holistic manner.

10 The 2023 IMO GHG Strategy specifies that the levels of ambition and indicative checkpoints in terms of GHG reductions from international shipping should take into account the well-to-wake GHG emissions of marine fuels as addressed in the [Guidelines on Life cycle GHG intensity of marine fuels \(LCA Guidelines\)](#), developed by IMO with the overall objective of reducing GHG emissions within the boundaries of the energy system of international shipping and preventing a shift of emissions to other sectors.

11 MEPC 80 adopted the first set of LCA Guidelines (resolution MEPC.376(80)), which allow for well-to-wake calculation, including well-to-tank and tank-to-wake emission factors, of total GHG emissions related to the production and use of marine fuels. Updated 2024 LCA Guidelines (resolution MEPC.391(81)) were adopted by MEPC 81.

12 To review scientific and technical issues related to the implementation of the LCA Guidelines, MEPC 81 agreed to the establishment of a Working Group on Life Cycle GHG Intensity of Marine Fuels under the UN’s Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP), a unique mechanism for inter-agency cooperation and coordination among UN organizations. The Committee requested the GESAMP-LCA WG to

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provide scientific and technical input on specific issues for the Committee's future consideration on the further development of the LCA framework, making it more scientifically and technically robust and accurate.

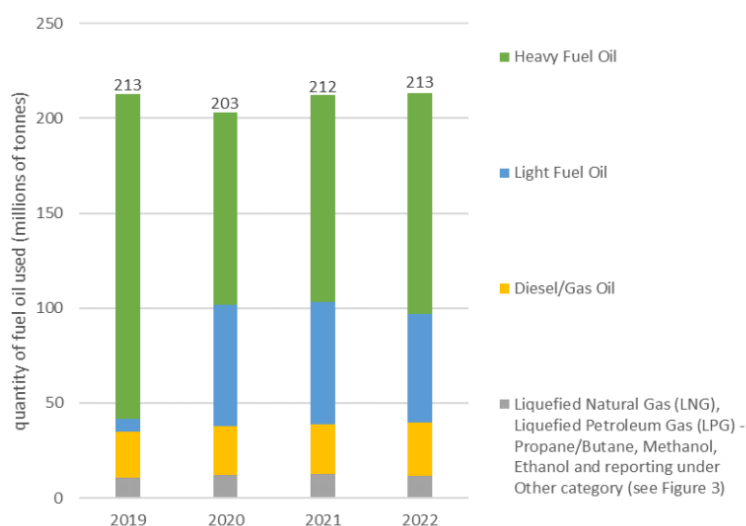
13 MEPC 81 also established two correspondence groups on LCA-related matters which will report to MEPC 83 (April 2025): the first group was tasked to look into tank-to-wake methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions and to develop a work plan for the development of a regulatory framework for the use of onboard carbon capture systems (OCCS); the second group will look into social and economic sustainability themes and aspects of marine fuels, for possible inclusion in the LCA Guidelines.

### Update on ship fuel oil consumption reporting and annual carbon intensity developments

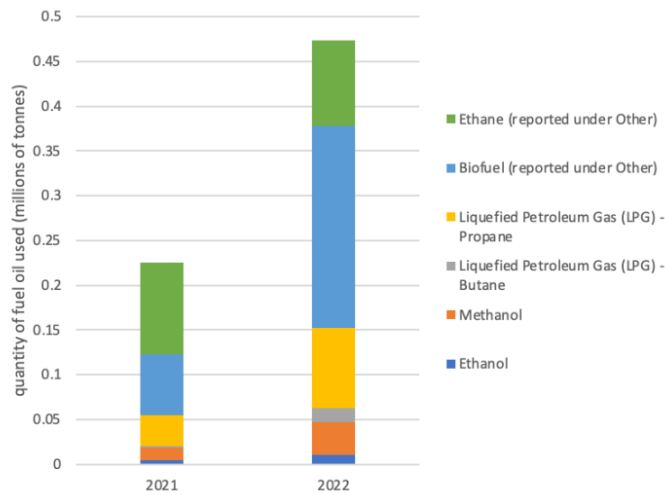
14 MEPC 81 (March 2024) approved in principle the summary of mandatory ship fuel oil consumption data to the IMO ship fuel oil consumption system ([IMO DCS](#)) for 2022, covering 28,834 ships representing a combined gross tonnage (GT) of 1,289 million gross tonnes.

15 In total, on a quantity basis, 213 million tonnes of fuel were used in the 2022 reporting period (212 million tonnes for 2021). Figure 1 shows that 94.65% of the fuel oil used during 2022 was either Heavy Fuel Oil, Light Fuel Oil or Diesel/Gas Oil, the remaining fuels outside of these three fuel types amounted to 5.35% of the fuel used during the reporting period. The use of Liquefied Natural Gas (LNG) decreased slightly compared to 2021, while the reported use of alternative fuels other than LNG (ethane, biofuels, methanol, etc.) doubled between 2021 and 2022 (see Figure 2).

**Figure 1: Aggregated annual amount of each type of fuel oil consumed by all ships of 5,000 GT and above in years 2019 to 2022**

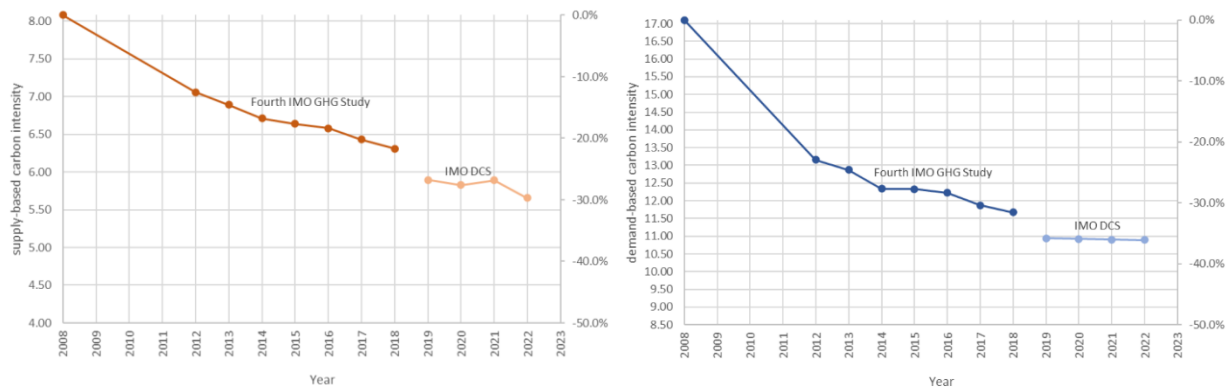


**Figure 2: Aggregated annual amount of Liquefied Petroleum Gas (LPG), Methanol, Ethanol and other fuels (ethane and biofuel) reported under the "Other" category consumed by all ship of 5,000 GT and above in years 2021 and 2022**



16 The carbon intensity of the fleet can be estimated using two different measurement methods: the "supply-based measurement" indicating the CO<sub>2</sub> emissions per transport work proxy and the "demand-based measurement" indicating the CO<sub>2</sub> emissions per actual transport work (cargo carried) of international shipping. Figure 3 provides the results of the first reporting on carbon intensity developments for international shipping covering the period 2019-2022, using the "supply-based" and "demand-based" carbon intensity measurement methods.

**Figure 3: "supply-based" and "demand-based" estimates of carbon intensity (2019-2023)**



17 For the period 2019 to 2022, as an average across the fleet, "supply-based" carbon intensity demonstrated an overall decrease of up to 4.6% relative to 2019, but with yearly fluctuations, whilst "demand-based" carbon intensity has only very gradually changed between years to just below 0.5% in 2022, relative to 2019, but also demonstrating a more consistent value when comparing between reporting years.

18 MEPC 81 adopted amendments to appendix IX of MARPOL Annex VI on the additional reporting requirements in the IMO DCS, including on actual transport work (i.e. cargo carried). These amendments are expected to enter into force in 2025. MEPC 81 also requested the IMO Secretariat to conduct a review of the suitability of the IMO DCS for the implementation and enforcement of current and future IMO GHG reduction measures.

## **Implementation and review of the short-term GHG reduction measure**

19 MEPC 76 (June 2021) [adopted amendments to MARPOL Annex VI on reducing the carbon intensity of the global fleet](#). This 'short-term GHG reduction measure', composed of mandatory technical and operational requirements, was designed to reach the goal of reducing the carbon intensity of international shipping in 2030 by at least 40%, compared to 2008 levels.

20 The various elements of the short-term measure are as follows: Energy Efficiency Existing Ship Index (EEXI), enhanced Ship Energy Efficiency Management Plan (SEEMP), and Carbon Intensity Indicator (CII) rating scheme. The regulatory framework was completed in June 2022, with the finalization of a set of 12 guidelines supporting the consistent implementation of the measure, and entered into effect on 1 January 2023.

21 MEPC 80 (July 2023) approved a *Review plan of the short-term GHG reduction measure*, to be completed at the latest by 1 January 2026. The plan foresees the timeline for the review of the short-term measure described as follows: 1) *Data gathering stage*: from MEPC 80 to MEPC 82 (autumn 2024); 2) *Data analysis stage*: working group at MEPC 82 to be continued by a correspondence group; and 3) *Convention and Guidelines review stage*: an intersessional working group between MEPC 82 (September/October 2024) and MEPC 83 (spring 2025), as well as a working group at MEPC 83.

22 The Review will address various aspects such as: effectiveness of the short-term measure in reducing the carbon intensity of international shipping; need for reinforced corrective actions or other means of remedy, enhancement of the enforcement mechanism and enhancement of the data collection system; revision of the reduction requirements, etc. Work is also ongoing within the Review process to understand and consider different metrics for measuring the carbon intensity of international shipping.

23 Improving energy efficiency will continue to be an important element of IMO's instruments and policies to reduce GHG emissions from international shipping, and the Energy Efficiency Design Index (EEDI) for new ships, IMO DCS, EEXI, CII rating and SEEMP frameworks are important global measures that can assist in increased awareness, transparency and involvement of the maritime value chain in the energy efficiency performance of shipping.

## **Development of the necessary safety regulatory framework allowing safe handling of future marine fuels on board of ships**

24 IMO's Maritime Safety Committee (MSC), at its 107th session (June 2023), included in its agenda a continuous output on "Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels" and established a correspondence group to progress the work intersessionally. The group developed a list of alternative fuels and new technologies to support the reduction of GHG emissions from ships and is assessing the technical obstacles and regulatory gaps to be covered to enable their safe use on board ships. Based on the information gathered, MSC 108 (May 2024) established a correspondence group on GHG safety matters to develop recommendations to address each of the identified barriers and gaps in current IMO instruments that impede the safe use of alternative fuels or new technology.

25 IMO's Sub-Committee on Carriage of Cargoes and Containers (CCC), at its ninth session in September 2023, made significant progress on the development of draft interim guidelines for the safety of ships using hydrogen and ammonia as fuel. According to an agreed work plan, the guidelines are expected to be approved by MSC 109 (December 2024). The

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work plan also envisages the development of guidelines for low flash-point fuels and mandatory instruments for methyl/ethyl alcohols and fuel cells.

### **Capacity-building, technical cooperation and other supporting activities**

26 IMO is continuing its efforts to assist developing countries, in particular SIDS and LDCs, in addressing GHG emissions from international shipping through the Integrated Technical Cooperation Programme (ITCP) and the wide portfolio of projects and partnerships dedicated to climate action, implemented by the newly re-structured Technical Cooperation and Implementation Division (TCID) of the Secretariat, such as: GreenVoyage2050, GHG-SMART, Maritime Technology Cooperation Centres (MTCC), IMO CARES, FIN-SMART initiative, Innovation Forum, Blue Solutions, etc. An overview of these projects and partnerships is available [on the IMO website](#).

27 Developing countries participation in IMO's work is supported by a Voluntary Multi-Donor Trust Fund (VMDTF), providing financial assistance to representatives of developing countries, in particular SIDS and LDCs, which are IMO Member States, in attending the meetings of MEPC and other meetings related to GHG matters. Contributions to the Fund since MEPC 80 funded the in-person attendance of a total of 41 representatives from 34 countries at ISWG-GHG 16 and MEPC 81.

28 IMO regularly holds regional conferences involving a diverse range of stakeholders in developing countries to discuss the challenges and opportunities arising from shipping decarbonization.

29 The IMO Future Fuels and Technology project (FFT), funded by the Republic of Korea and implemented by the IMO Secretariat, was launched in 2022 to support regulatory decision-making at MEPC and its subsidiary bodies, notably on GHG relevant issues. It conducted so far studies on readiness and availability of low- and zero-carbon ship technology and marine fuels (Spring 2023) and on existing practices on sustainability issues for marine fuels (Autumn 2023). The IMO Future Fuels Portal was launched in March 2024 to provide user-friendly access to up-to-date data on shipping decarbonization. <https://futurefuels.imo.org/> (see overview of the homepage below).

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About the Project ▾

Latest Information ▾

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News and Events ▾

Training and Cooperation ▾



## A gateway to the latest information on future fuels and technology promoting a just and equitable transition

The website has been developed by Future Fuels and Technology Project (FFT Project) supporting the implementation of the 2023 IMO GHG Strategy by facilitating relevant information sharing.

### Navigation



Latest Information

#### Fuel Uptake

Statistics by fuel/technology type

#### Fuel Supply

Infrastructure map by region

#### Fuel Price

Fuel premium/price trend chart

#### Fuel Consumption (DCS)

Annual consumption, carbon intensity trends



Future Insight

#### Alternative Fuels

Readiness level, scalability and sustainability

#### Technology

Readiness levels and FAQ

#### Fuel Price Forecast

Fuels premium by fuel type

#### Innovation

Ports, industry and shipbuilding



News and Events

#### Resources

Summaries and updates on recent papers/reports

#### News

News by topic and fuel/energy type

#### Events

IMO climate events and meetings



Training and Cooperation

#### Useful Tools

Software, video, glossary and inventory

#### Learning Resources

E-learning, training materials and workshop packages

#### Cooperation and Support

IMO technical cooperation projects and funds

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ANNEX



# Addressing climate change

## Timeline of IMO regulatory action to cut GHG emissions from shipping

