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ENERGY EFFICIENCY OF SHIPS

Report of fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database in GISIS (Reporting year: 2022)

Note by the Secretariat

SUMMARY

Executive summary:	This document provides a report of the fuel oil consumption data for 2022 submitted to the IMO Ship Fuel Oil Consumption Database in GISIS, in accordance with regulation 27 of MARPOL Annex VI and the *2022 Guidelines for the development and management of the IMO Ship fuel oil consumption database* (resolution MEPC.349(78)).
Strategic direction, if applicable:	3
Output:	3.7
Action to be taken:	Paragraph 14
Related documents:	MEPC 68/INF.24/Rev.1; MEPC 70/18; MEPC 71/17; MEPC 76/6/1; MEPC 77/6/1; MEPC 79/6/1; MEPC 81/6; resolutions MEPC.278(70); MEPC.346(78) and MEPC.349(78)

Background

1 In accordance with regulation 27.3 of MARPOL Annex VI, except as provided for in paragraphs 4, 5 and 6 of the same regulation, within three months after the end of each calendar year, a ship in the scope of regulation 27 shall report to its Administration or any organization duly authorized by it, the aggregated values for the data specified in appendix IX of MARPOL Annex VI, via electronic communication using the standardized format set out in appendix 3 of resolution MEPC.346(78) on *2022 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)*.

2 Upon receipt of the reported fuel consumption data, and in accordance with regulation 6.6 of MARPOL Annex VI, the Administration or any organization duly authorized by it shall determine whether the data has been reported in accordance with regulation 27 of MARPOL Annex VI, and, if so, issue a Statement of Compliance not later than five months from the beginning of the calendar year.

3 In accordance with regulation 27.9 of MARPOL Annex VI, not later than one month after issuing the Statement of Compliance, by 30 June at the latest, the Administration shall ensure that the reported fuel consumption data by its registered ships of 5,000 GT and above and in the scope of regulation 27 of MARPOL Annex VI are transferred to the IMO Ship Fuel Oil Consumption Database in GISIS.

4 Regulation 27.10 of MARPOL Annex VI requires the Secretary-General to produce an annual report to the Committee summarizing the data collected, the status of missing data, and such other relevant information as may be requested by the Committee.

Report on the fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database in GISIS

5 In accordance with regulation 27.10 of MARPOL Annex VI and section 6 of the *2022 Guidelines for the development and management of the IMO Ship Fuel Oil Consumption Database* (MEPC.349(78)), hereinafter referred to as the "2022 Guidelines", the Secretariat has prepared a summary report of the fuel oil consumption data for the 2022 reporting period, as set out in the annex to this document.

6 The Secretariat carried out a quality control and verification process of the data submitted to GISIS to identify missing ships and obvious errors in the submitted data.

7 Administrations can download non-anonymized data for the ships flying its flag for which data has been submitted to GISIS by that Administration or on their behalf. In accordance with regulation 27.12 of MARPOL Annex VI, Parties to MARPOL Annex VI also have access to the data of all ships submitted to GISIS in an anonymized format.

8 The following general findings with regard to the fuel consumption data for the 2022 reporting period can be noted:

.1 Data was reported by 28,834 ships (28,171 for 2021) with a combined gross tonnage of 1,289 million gross tonnes (1,255 million gross tonnes for 2021) by 108 Administrations out of a possible 135 Administrations (compared to 109/139 Administrations for 2021). The aforementioned total number of ships and total gross tonnage is given in terms of the number of different ships which reported data, not the number of reports in GISIS. Ships that contained obvious errors in the submitted data were also removed from these totals.

.2 28,834 ships out of a potential 33,991 ships (84.8%) that were estimated to fall under the scope of regulation 27 of MARPOL Annex VI, submitted data. On the basis of gross tonnage, the reported data represents 93.1% of the ships that are estimated to fall under the scope of regulation 27 of MARPOL Annex VI (compared to 94.4% for 2021).

.3 By 10 August 2023, the number of ships identified with potential errors was reduced to 176 ships. At the time of the report, these potential errors had not been modified by the concerned Administration or recognized organization. These ships with potential errors can have a relatively large impact on the aggregated data and have not been included in the report for the 2022 reporting period, set out in the annex to this document.

.4 213 million tonnes of fuel (212 million tonnes for 2021), on a quantity basis, was used by the aforementioned 28,834 ships. Total fuel used was slightly higher in 2022 compared to 2021 as shown in figure 1.

.5 94.65% of the fuel used for the 2022 reporting period was either Heavy Fuel Oil, Light Fuel Oil or Diesel/Gas Oil. Fuels that are not in the categories Heavy Fuel Oil, Light Fuel Oil or Diesel/Gas Oil are 5.35% of the fuel used in 2022.

.6 The majority of the reported fuel oil was consumed by the following three EEDI ship types; containerships, bulk carriers and tankers.

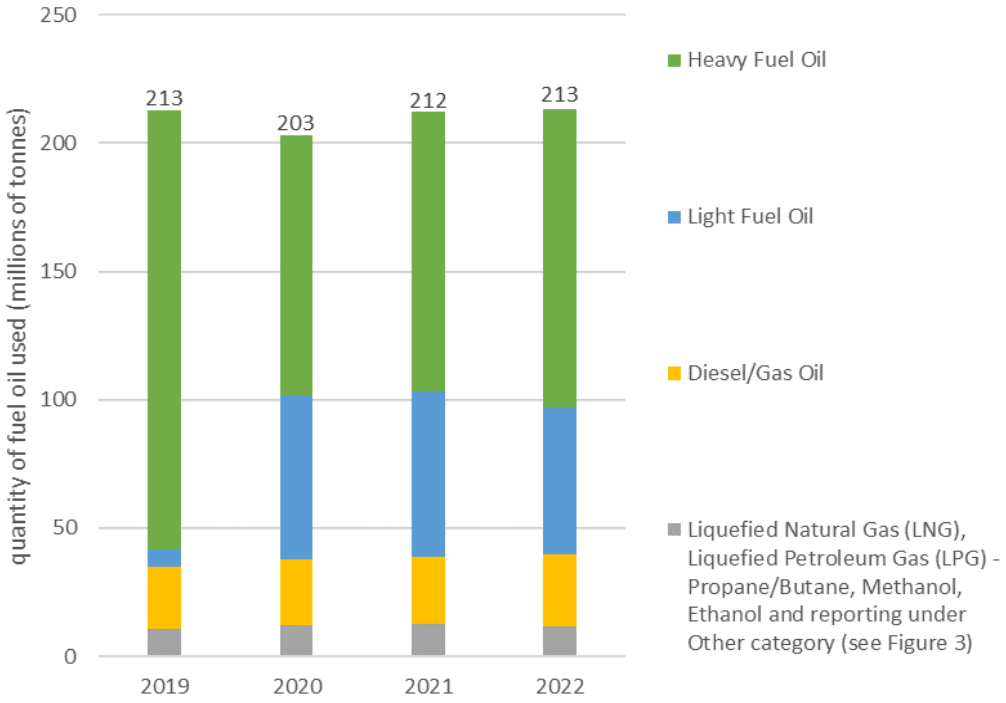

Figure 1: The aggregated annual amount of each type of fuel oil consumed by all ships of 5,000 GT and above from 2019 to 2022

Recommended improvements to the IMO Ship Fuel Oil Consumption Database module in GISIS

9 MEPC 79 adopted resolution MEPC.362(79) containing amendments to the information reported to be submitted to the IMO Ship Fuel Oil Consumption Database in appendix IX of MARPOL Annex VI.

10 Accordingly, the Secretariat is updating the IMO Ship Fuel Oil Consumption Database module in GISIS, to include reporting CII, EEXI, and other parameters, and to include "Ethane" as a fuel type, for the 2023 reporting period (1 January 2023 to 31 December 2023).

11 The GISIS module has also been updated to improve the data downloading process and to allow recognized organizations to delete records in the user interface.

12 The Secretariat is also continuing to explore further enhancements to the GISIS module taking into account the 2022 Guidelines adopted by MEPC 78 and considering the recommendations endorsed by MEPC 78 in document ISWG-GHG 12/2, which are dependent on future resource.

13 The Secretariat has continued to improve the verification of submitted data and data submitters have also significantly improved their verification. Notwithstanding, data submitters are invited to pay attention to the following:

.1 It was found that some fuel oil was reported incorrectly, such as VLSFO and LFO, under the "Other" fuels category. This issue was rectified by moving these fuels to be under the Heavy Fuel Oil fuel category in-line with the *Fourth IMO GHG Study 2020* in that the Low Sulphur Heavy Fuel Oil has the same emission factors as conventional HFO.

.2 Biofuel was reported using 32 different names. However, the overall amount of biofuel reported is small so this could still continue to be reported with a user defined name and C_F factor under the "Other" fuels category pending future policy decisions concerning the application of the *Guidelines on life cycle GHG intensity of marine fuels* (LCA Guidelines) (resolution MEPC.376(80)).

Action requested of the Committee

14 The Committee is invited to consider the summary report of the fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database for 2022 and relevant information in this document, and in particular to:

.1 approve, in principle, the summary of the fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database for 2022 as set out in the annex;

.2 note the issues with the IMO Ship Fuel Oil Consumption Database module in GISIS, the ongoing improvements to the reporting process, including the modifications to GISIS to allow CII and other parameters to be reported during the 2023 reporting period as set out in paragraphs 13 to 17;

.3 approve, in principle the reporting on carbon intensity developments on the basis of supply-based measurements, using AER and cgDIST indicators, as set out in table 3 in the annex;

.4 note that in the absence of cargo-related data and, in particular, transport work the Secretariat intends to submit a separate document reporting on the demand-based carbon intensity of international shipping for the period from 2019 to 2022; and

.5 take action as appropriate.

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ANNEX

SUMMARY REPORT OF FUEL OIL CONSUMPTION DATA SUBMITTED TO THE IMO SHIP FUEL OIL CONSUMPTION DATABASE FOR 2022

Total number of ships for which fuel consumption data was reported

1 In accordance with paragraph 5.1 of the *2022 Guidelines for the development and management of the IMO Ship Fuel Oil Consumption Database* (MEPC.349(78)), hereinafter referred to as the "2022 Guidelines", in January 2022 every Administration that had designated a contact person in the Ship Fuel Oil Consumption module in GISIS was sent an indicative list of ships in their Administration falling under the scope of regulation 27 of the 2021 revised MARPOL Annex VI, totalling 33,991 ships (compared to 32,998 ships in January 2021) under 135 Administrations. The aforementioned lists of ships were produced by cross-referencing with data from the Ship and Company Particulars module in GISIS.

2 For the period from 1 January 2022 until 31 December 2022 (the 2022 reporting period), by 10 August 2023 fuel consumption data had been reported to the Ship Fuel Oil Consumption module in GISIS from 108 Administrations, consisting of 77 Parties to MARPOL Annex VI and 31 non-Parties, for 28,834 ships (compared to 28,171 ships for 2021) in total out of a potential 33,991 ships (84.8%) that were estimated to fall under the scope of regulation 27 of MARPOL Annex VI. On the basis of gross tonnage, the reported data represents 93.1% of the ships that fell under the scope of regulation 27 of MARPOL Annex VI in January 2022 (compared to 94.4% for 2021).

3 This summary report reflects the fuel consumption data in GISIS up until 10 August 2023, any changes made to the 2022 data in GISIS after this date are not reflected in this report. Additional reported data in GISIS or changes made to the data after 10 August 2023 are not included in the report, but will be available in the data directly downloadable from GISIS.

Measures to ensure the completeness of the database

4 In addition to the indicative list of ships falling under the scope of regulation 27 of MARPOL Annex VI, sent to every Administration in January 2022, in accordance with section 5 of the 2022 Guidelines, in July 2023, the Secretariat sent each Administration that had designated a contact person a list of ships identifying those missing ships for which data had not yet been submitted to the Ship Fuel Oil Consumption Database in GISIS. Where applicable, Administrations were also sent a list of ships for which the analysis of the reported fuel consumption data pointed to potential errors.

5 The Secretariat did not modify any of the reported data in GISIS itself, but in the case of any identified missing ships or potential errors contacted the relevant Administrations and recognized organizations so that they could correct and update the data in GISIS and provide further feedback in case of any discrepancies, as may be necessary.

6 This list of missing ships was created for each Administration by comparing the ships that had been reported by July 2023 to the list of ships under the scope of regulation 27 of MARPOL Annex VI that were sent to each Administration in January 2022. In July 2023, Administrations were requested to provide fuel consumption data for 7,569 missing ships.

7 In response to the aforementioned lists of missing ships and ships with potential errors, a number of Administrations and recognized organizations corrected and updated the reported data in GISIS. The number of potential errors was significantly reduced when compared to previous reporting years.

8 Some Administrations also informed the Secretariat on the status of missing ships, for which no data had been reported. A number of the missing ships were still expected to report fuel consumption data for 2022. Administrations stated that some missing ships were not falling under the scope of regulation 27 of MARPOL Annex VI. The reasons for this included ship's operating domestically, the ship type and type of propulsion being not relevant and not being operated during the 2022 reporting period.

9 The Secretariat has included data in GISIS up until 10 August 2023 in the report to allow time for Administrations and recognized organizations to update the data in GISIS, as discussed in the above paragraphs.

10 The feedback received from Administrations, indicating the ships not relevant to regulation 27 of MARPOL Annex VI, such as due to having no propulsion, can be used to assist the Secretariat in further updating the process of cross-referencing with the Ship and Company Particulars module in GISIS to produce the indicative lists of ships falling under the scope of regulation 27 of MARPOL Annex VI.

Verification of the submitted data in GISIS

11 While not specified in the 2022 Guidelines, the Secretariat carried out a quality control and verification process of the data submitted to GISIS to verify the accuracy of the data, to identify missing ships, for which no data had been reported, but also to identify obvious errors in the submitted data. An automated process identified ships with obvious errors in the submitted data, this included identifying ships with unrealistic characteristics, that were not technically possible, checking for duplicate reporting and for ships that may have been categorized under an incorrect ship type, as defined by regulation 2 of MARPOL Annex VI, in the reported data. Ships with errors that were identified using this process were further examined to determine the cause of any errors, this information can then be provided to the concerned Administrations and recognized organizations.

12 During the analysis of the reported data, on 10 August 2023, 2,838 instances of multiple reporting entries for a single ship were found, this does not include errors in reporting, including instances of duplicate reporting, which were removed (see paragraph below). The multiple reporting is mostly due to ships changing between different Administrations and recognized organizations.

13 In July 2023, 283 ships with errors were identified. At this time, 159 ships had instances of duplicate reporting, where the same data was reported more than once. The remaining errors were due to incorrect ship characteristics, this included 57 ships which had reported an "hours under way" which was more than the number of hours in a year.

14 Following the correction of data in GISIS by Administrations and recognized organizations, the number of errors in the submitted data was reduced. At the time of this report, 10 August 2023, the number of identified errors, that could potentially have a large impact on aggregated data was reduced to 176 ships. These ships contain errors that have not been corrected by the responsible Administrations or recognized organizations and have not been included in the data analysis process in this report.

15 50 ships out of the aforementioned 176 ships were excluded because they had reported "hours under way" which were more than the total number of hours in a year. In addition, 74 ships were removed as they were duplicate reports. The remaining ships were excluded for reporting unrealistic ship parameters which had not been corrected by the submitters, this includes 9 ships that had an unrealistically large deadweight. The aggregated gross tonnage of those 176 ships represents 0.54% of all ships which reported fuel consumption data, in terms of gross tonnage.

16 Compared to previous reporting years, ships did not need recategorizing, in particular, in 2019, over 600 ships were identified as being categorized incorrectly in the "Other" and "Passenger ship" ship type categories.

17 Overall, the number of errors identified in the submitted data in the 2022 reporting period, including the number of ships categorized incorrectly, was slightly less than 2021 and 2020 and significantly less than the 2019 reporting period.

Number of ships for which fuel consumption data has been reported

18 Table 1 shows a summary of the ships for which Administrations had reported fuel consumption data for the 2022 reporting period. Table 1 compares the total number of ships for which data had been reported to the indicative lists of ships falling under the scope of regulation 27 of MARPOL Annex VI, as sent to each Administration in January 2022.

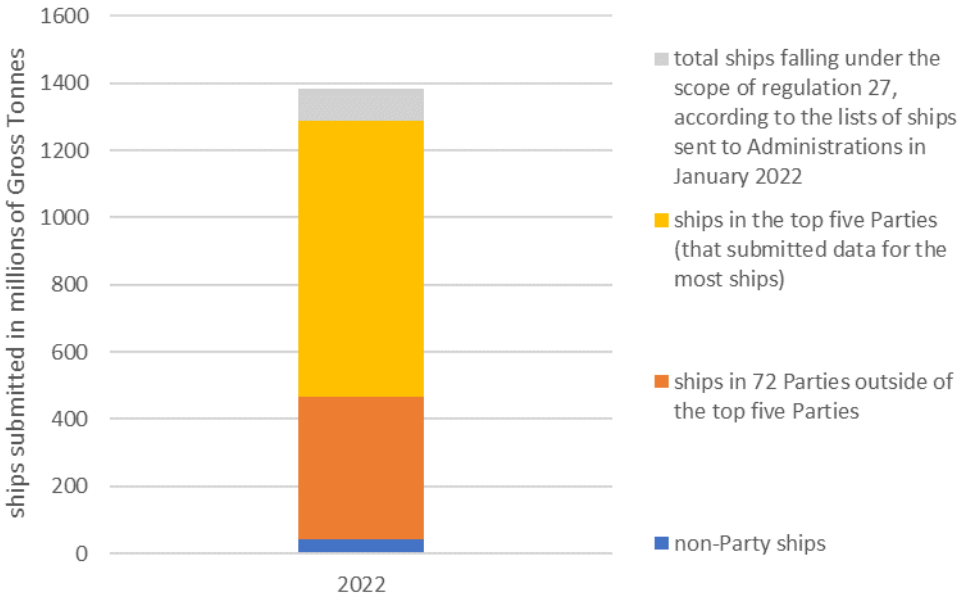
Table 1: Number of Ships reported by Administrations in the reporting period

	Total	**Party**	**non-Party**
Ships contained in the lists of ships falling under the scope of regulation 27 as sent to Administrations in January 2022	33,991 ships estimated to fall under the scope of 135 Administrations	31,669 ships under the scope of 90 Administrations	2,322 ships under the scope of 45 Administrations
Total ships for which fuel consumption data was submitted	28,834 ships reported by 108 Administrations	27,828 ships reported by 77 Administrations	1,006 ships reported by 31 Administrations

19 Table 1 shows a high reporting rate, data was reported for 84.8% of the total number of ships that were estimated to fall under the scope of regulation 27 of MARPOL Annex VI. The reporting rate is also high in terms of the number of Administrations, both Parties and non-Parties to MARPOL Annex VI, that reported data for their ships; in total, 108 Administrations out of a potential 135 Administrations submitted data. The number of Administrations in table 1 also includes national registries or sub-registries through which data was submitted.

20 Figure 1 compares the total number of ships for which data had been reported to the lists of ships falling under the scope of regulation 27 MARPOL Annex VI, in terms of gross tonnage.

Figure 1: Gross Tonnage of ships reported by Administrations

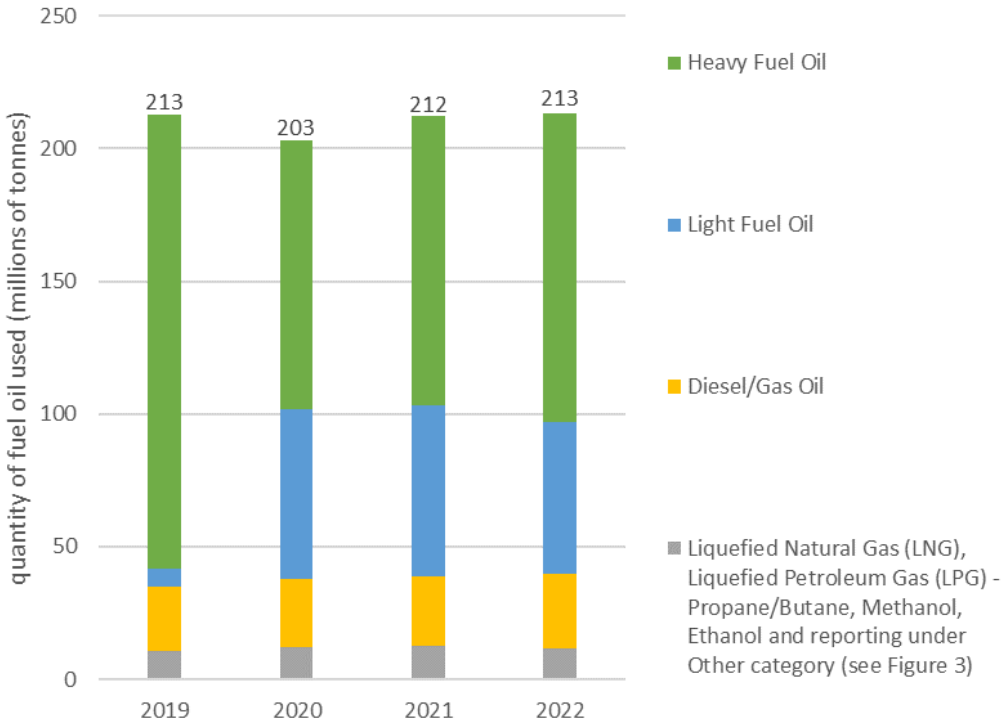


21 As shown in figure 1, the 33,991 ships that were estimated to fall under the scope of regulation 27 of MARPOL Annex VI in January 2022 represent a total of 1,385 million gross tonnes. The 28,834 ships for which fuel consumption data was reported for the 2022 reporting period represent a combined gross tonnage of 1,289 million gross tonnes (this is 93.1% of 1,385 million gross tonnes).

The aggregated annual amount of each type of fuel oil consumed, distance travelled and hours under way for ships of 5,000 GT and above, by EEDI ship type and EEDI size category, "Others" and "Passenger ship" categories for ships not subject to EEDI

22 In total, on a quantity basis, 213 million tonnes of fuel was used in the 2022 reporting period (212 million tonnes for 2021). Figure 2 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 2022 reporting period.

Figure 2: The aggregated annual amount of each type of fuel oil consumed by all ships of 5,000 GT and above

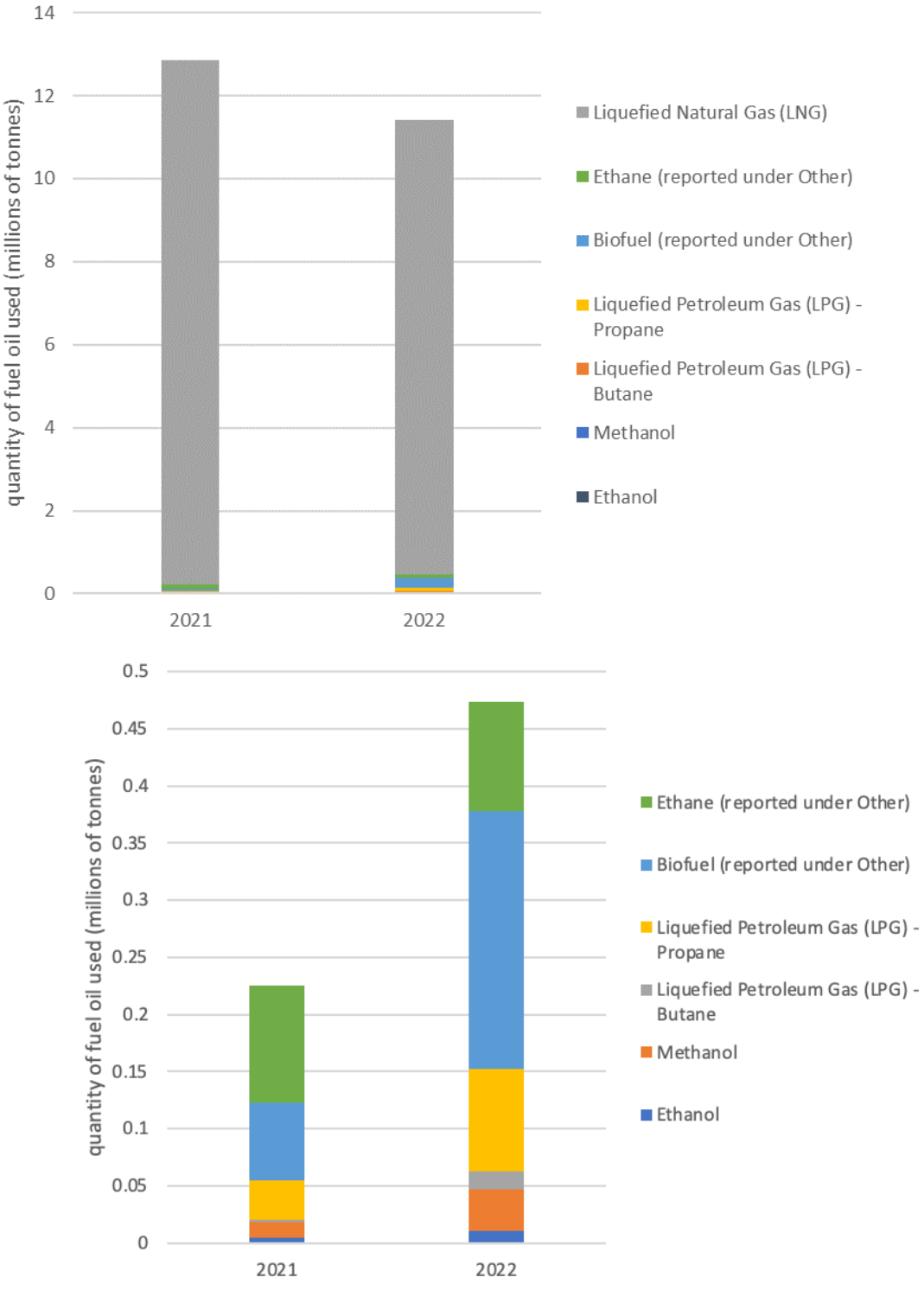


23 Total fuel used by the reported ships was slightly higher during the 2022 reporting period when compared to the 2021 reporting period. The use of Liquefied Natural Gas decreased slightly when compared to 2021. There were 10,950,408 tonnes of Liquefied Natural Gas in 2022 (5.13% of the reported fuel) compared to 12,623,121 tonnes of Liquefied Natural Gas in 2021.

24 When analysing the submitted data it was also found some fuel oil was reported incorrectly, such as VLSFO and LFO, under the "Other" fuel category. This issue was rectified by moving these ships to be under the Heavy Fuel Oil fuel category in-line with the *Fourth IMO GHG Study 2020* in that the Low Sulphur Heavy Fuel Oil has the same emission factors as conventional HFO.

Figure 3: (Upper) The aggregated annual amount of Liquefied Natural Gas (LNG), 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.

(Lower) The 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.



25 Figure 3 shows fuels, which were used during the 2022 reporting period that are not either Heavy Fuel Oil, Light Fuel Oil or Diesel/Gas Oil. In total the fuels in figure 3 represent 5.35% of the reported fuel oil in 2022. This is compared to 6.05% of the reported fuel oil in 2021. The reported amounts for 2022 can be broken down as follows:

.1 10,950,408 tonnes of Liquefied Natural Gas (LNG) (12,623,121 tonnes in 2021);

.2 88,774 tonnes of Liquefied Petroleum Gas (LPG) – Propane (34,973 tonnes in 2021);

.3 16,673 tonnes of Liquefied Petroleum Gas (LPG) – Butane (2,028 tonnes in 2021);

.4 35,523 tonnes of Methanol (13,031 tonnes in 2021); and

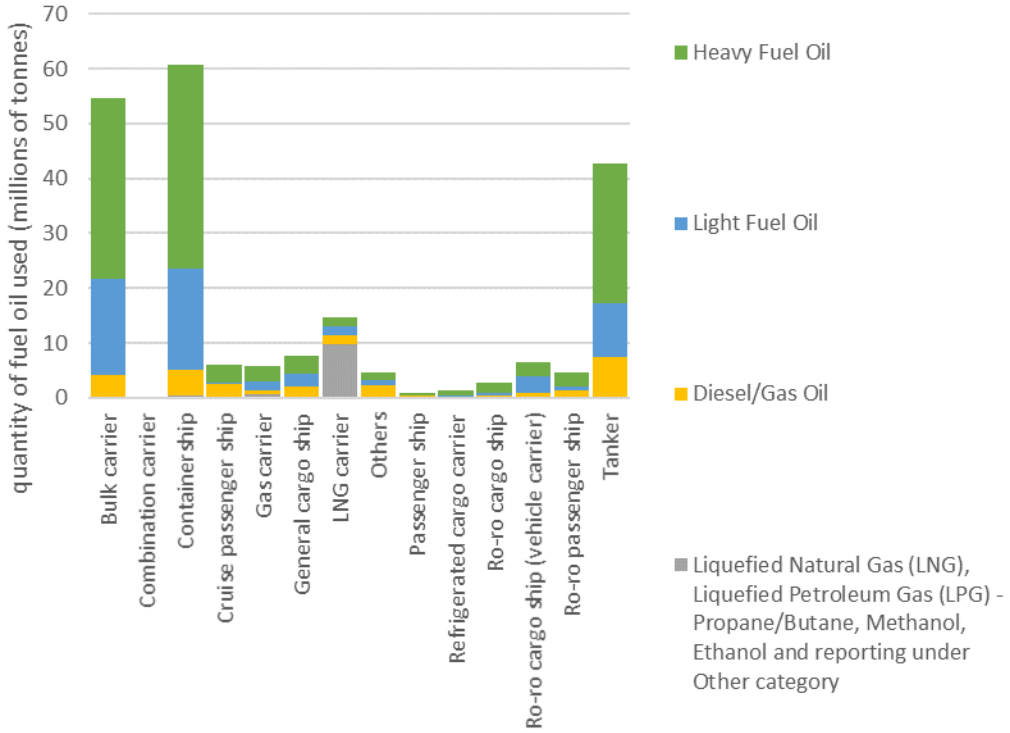
.5 10,890 tonnes of Ethanol were reported.

26 The remaining fuel was reported under the "Other" fuel type category in GISIS. In the "Other" fuel type category, 95,204 tonnes of Ethane and 226,378 tonnes of biofuel were reported (67,580 tonnes in 2021). In this regard, biofuel was reported using a total of 32 different names of biofuel and biofuel blends (including B10MGO, B25HFO, B100MGO, Biofuel, HVO and Used Cooking Oil, etc.)

27 Following the adoption of the *2022 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships* (MEPC.364(79)), adding Ethane and an associated C_F value in section 2.2.11, Ethane and its associated C_F value are also being added as fuel to the Ship Fuel Oil Consumption module in GISIS for reporting for 2023.

28 Considering that biofuels are reported in small amounts, it may be better to continue the current reporting process by users reporting biofuels under the "Other" fuel category, which allows for users to submit a custom name and associated C_F value.

Figure 4: The aggregated annual amount of each type of fuel oil consumed for ships of 5,000 GT and above by EEDI ship type, including the "Others" and "Passenger ship" categories for ships not subject to EEDI for the 2022 reporting period



29 Figure 4 shows how different fuels were used by different ship types during the 2022 reporting period. During the reporting period the majority of fuel oil was consumed by three ship types; containerships, bulk carriers and tankers. The aggregated data used to create figure 4 is also in table 2.

30 In accordance with paragraph 6.2 of the 2022 Guidelines, table 2 contains the aggregated annual amount of each type of fuel oil consumed for ships of 5,000 GT and above by EEDI ship type and EEDI size category, including the "Others" and "Passenger ship" categories for ships not subject to EEDI. Note that while Ethane has been added as a column in table 2, during the 2022 reporting year Ethane was reported under the "Other" fuel category

31 In accordance with paragraphs 6.2 and 6.3 of the 2022 Guidelines, table 3 contains the number of ships that reported, including the aggregated gross tonnage, aggregated Deadweight, and the aggregated annual amount of distance travelled and hours under way for ships of 5,000 GT and above by EEDI ship type and EEDI size category, including the "Others" and "Passenger ship" categories for ships not subject to EEDI.

Table 2: The aggregated annual amount of each type of fuel oil consumed for ships of 5,000 GT and above by EEDI ship type and EEDI size category, including the "Others" and "Passenger ship" categories for ships not subject to EEDI

	Diesel / Gas Oil (MDO / MGO)	Ethane (under Other)	Ethanol	Heavy Fuel Oil (HFO)	Light Fuel Oil (LFO)	Liquefied Natural Gas (LNG)	Liquefied Petroleum Gas (LPG) - Butane	Liquefied Petroleum Gas (LPG) - Propane	Methanol	Other
Bulk carrier	**4,251,269**	**0**	**0**	**32,960,295**	**17,511,604**	**12,310**	**0**	**557**	**0**	**2,613**
Less than 10,000 DWT	44,568	0	0	24,786	65,361	0	0	0	0	0
10,000 ≤ DWT < 20,000	121,123	0	0	183,101	253,969	0	0	0	0	0
20,000 DWT and above	4,085,578	0	0	32,752,408	17,192,274	12,310	0	557	0	2,613
Combination carrier	**6,279**	**0**	**0**	**97,179**	**13,469**	**0**	**0**	**0**	**0**	**0**
20,000 DWT and above	6,279	0	0	97,179	13,469	0	0	0	0	0
Containership	**4,683,075**	**0**	**0**	**37,154,793**	**18,401,235**	**312,536**	**0**	**1,392**	**0**	**194,823**
Less than 10,000 DWT	229,431	0	0	395,112	190,046	0	0	0	0	0
10,000 ≤ DWT < 15,000	372,272	0	0	1,559,914	708,413	0	0	0	0	0
15,000 ≤ DWT < 40,000	815,215	0	0	7,195,986	3,521,771	32,634	0	0	0	415
40,000 ≤ DWT < 80,000	1,225,949	0	0	9,321,307	5,927,904	0	0	0	0	37,244
80,000 ≤ DWT < 120,000	1,037,918	0	0	8,663,108	4,962,184	0	0	0	0	81,913
120,000 ≤ DWT < 200,000	874,200	0	0	7,923,622	2,962,833	138,360	0	0	0	75,251
200,000 DWT and above	128,090	0	0	2,095,744	128,084	141,542	0	1,392	0	0
Cruise passenger ship	**2,564,644**	**0**	**0**	**3,213,238**	**182,753**	**67,263**	**0**	**0**	**0**	**0**
5,000 ≤ GT < 25,000	123,413	0	0	4,407	8,232	0	0	0	0	0
25,000 ≤ GT < 85,000	849,455	0	0	505,946	83,835	0	0	0	0	0
85,000 GT and above	1,591,776	0	0	2,702,885	90,686	67,263	0	0	0	0
Gas carrier	**695,737**	**95,204**	**772**	**2,898,004**	**1,620,317**	**482,347**	**15,463**	**76,513**	**0**	**1,501**
2,000 ≤ DWT < 10,000	167,512	0	0	201,571	75,471	5,105	0	0	0	0
10,000 DWT and above	528,225	95,204	772	2,696,433	1,544,846	477,242	15,463	76,513	0	1,501
General cargo ship	**1,996,902**	**0**	**10,118**	**3,245,171**	**2,402,672**	**5,112**	**0**	**0**	**0**	**8,555**
Less than 3,000 DWT	45,158	0	0	11,062	2,327	0	0	0	0	0
3,000 ≤ DWT < 15,000	1,118,992	0	0	982,938	826,103	3,488	0	0	0	1,545
15,000 DWT and above	832,752	0	10,118	2,251,171	1,574,242	1,624	0	0	0	7,010
LNG carrier	**1,679,872**	**0**	**0**	**1,561,671**	**1,648,197**	**9,775,012**	**0**	**0**	**0**	**0**

	Diesel / Gas Oil (MDO / MGO)	Ethane (under Other)	Ethanol	Heavy Fuel Oil (HFO)	Light Fuel Oil (LFO)	Liquefied Natural Gas (LNG)	Liquefied Petroleum Gas (LPG) - Butane	Liquefied Petroleum Gas (LPG) - Propane	Methanol	Other
Less than 10,000 DWT	8,826	0	0	1,958	888	23,711	0	0	0	0
10,000 DWT and above	1,671,046	0	0	1,559,713	1,647,309	9,751,301	0	0	0	0
Others	**2,333,701**	**0**	**0**	**1,521,064**	**857,232**	**7,288**	**0**	**5,156**	**0**	**5,377**
5,000 GT and above	2,333,701	0	0	1,521,064	857,232	7,288	0	5,156	0	5,377
Passenger ship	**296,598**	**0**	**0**	**427,984**	**49,348**	**8,055**	**0**	**0**	**0**	**0**
5,000 GT and above	296,598	0	0	427,984	49,348	8,055	0	0	0	0
Refrigerated cargo carrier	**167,091**	**0**	**0**	**902,265**	**237,465**	**0**	**0**	**0**	**0**	**0**
Less than 3,000 DWT	971	0	0	1,160	0	0	0	0	0	0
3,000 ≤ DWT < 5,000	662	0	0	4,963	0	0	0	0	0	0
5,000 DWT and above	165,458	0	0	896,142	237,465	0	0	0	0	0
Ro-ro cargo ship	**428,726**	**0**	**0**	**1,942,113**	**370,123**	**7,357**	**0**	**0**	**0**	**186**
Less than 1,000 DWT	0	0	0	0	0	0	0	0	0	0
1,000 ≤ DWT < 2,000	0	0	0	0	0	0	0	0	0	0
2,000 DWT and above	428,726	0	0	1,942,113	370,123	7,357	0	0	0	186
Ro-ro cargo ship (vehicle carrier)	**741,019**	**0**	**0**	**2,524,273**	**3,251,456**	**19,973**	**0**	**0**	**0**	**7,420**
Less than 10,000 DWT	79,093	0	0	116,367	36,215	0	0	0	0	0
10,000 DWT and above	661,926	0	0	2,407,906	3,215,241	19,973	0	0	0	7,420
Ro-ro passenger ship	**1,263,718**	**0**	**0**	**2,564,006**	**755,297**	**65,122**	**0**	**0**	**1**	**654**
250 ≤ DWT < 1,000	270,880	0	0	4,224	0	1,245	0	0	0	0
1,000 DWT and above	992,838	0	0	2,559,782	755,297	63,877	0	0	1	654
Tanker	**7,177,171**	**0**	**0**	**25,564,227**	**9,776,667**	**188,033**	**1,210**	**5,156**	**35,522**	**5,610**
Less than 4,000 DWT	745	0	0	416	0	0	0	0	0	0
4,000 ≤ DWT < 20,000	1,353,021	0	0	1,742,058	1,138,225	14,472	0	0	0	3,263
20,000 DWT and above	5,823,405	0	0	23,821,753	8,638,442	173,561	1,210	5,156	35,522	2,347
Total (213,364,131)	**28,285,802**	**95,204**	**10,890**	**116,576,283**	**57,077,835**	**10,950,408**	**16,673**	**88,774**	**35,523**	**226,739**

Table 3: The number of ships that reported, including the aggregated gross tonnage and aggregated deadweight, and the aggregated annual amount of distance travelled and hours under way for ships of 5,000 GT and above by EEDI ship type and EEDI size category, including the "Others" and "Passenger ship" categories for ships not subject to EEDI

	Number of Ships	Gross Tonnage	Deadweight Tonnage	Distance Travelled	Hours Under way	CO_2 Emissions	AER for each EEDI Ship Size	cgDIST for each EEDI Ship Size
Bulk carrier	**10,190**	**467,228,099**	**855,733,176**	**486,563,381**	**44,316,963**	**171,489,125**	**3.78**	**-**
Less than 10,000 DWT	75	630,587	592,659	2,538,718	260,895	426,021	21.10	-
10,000 ≤ DWT < 20,000	292	3,068,488	4,461,240	9,791,505	976,623	1,758,753	11.75	-
20,000 DWT and above	9,823	463,529,024	850,679,277	474,233,158	43,079,445	169,304,350	3.75	-
Combination carrier	**22**	**936,740**	**1,569,636**	**1,174,353**	**104,505**	**365,187**	**4.44**	**-**
20,000 DWT and above	22	936,740	1,569,636	1,174,353	104,505	365,187	4.44	-
Containership	**4,824**	**259,185,543**	**290,222,793**	**336,307,630**	**24,878,517**	**189,610,226**	**8.55**	**-**
Less than 10,000 DWT	237	1,717,529	1,992,063	11,699,991	1,003,159	2,564,770	25.97	-
10,000 ≤ DWT < 15,000	590	5,832,708	7,400,792	33,640,995	2,734,478	8,283,286	19.67	-
15,000 ≤ DWT < 40,000	1,534	33,946,612	42,068,705	97,013,529	7,416,704	36,208,724	13.43	-
40,000 ≤ DWT < 80,000	1,140	55,426,008	65,319,031	88,307,462	6,302,308	51,638,873	10.12	-
80,000 ≤ DWT < 120,000	678	61,776,109	69,094,974	54,951,349	3,777,606	45,986,122	8.16	-
120,000 ≤ DWT < 200,000	550	80,297,043	83,537,877	43,079,787	3,096,958	37,194,640	5.67	-
200,000 DWT and above	95	20,189,534	20,809,351	7,614,517	547,304	7,733,813	4.67	-
Cruise passenger ship	**264**	**22,361,748**	**2,080,266**	**17,717,994**	**1,282,393**	**18,989,100**	**-**	**11.14**
5,000 ≤ GT < 25,000	38	469,616	65,449	1,374,369	137,261	435,325	-	23.89
25,000 ≤ GT < 85,000	93	5,082,934	547,774	5,614,650	418,715	4,563,033	-	14.39
85,000 GT and above	133	16,809,198	1,467,043	10,728,975	726,417	13,990,743	-	10.21
Gas carrier	**805**	**25,762,126**	**28,037,779**	**50,409,805**	**3,796,552**	**18,248,469**	**9.04**	**-**
2,000 ≤ DWT < 10,000	174	1,162,128	1,262,579	7,054,161	622,083	1,416,583	27.45	-
10,000 DWT and above	631	24,599,998	26,775,200	43,355,644	3,174,469	16,831,886	8.55	-
General cargo ship	**2,400**	**34,419,151**	**49,099,495**	**98,330,209**	**9,312,831**	**24,123,370**	**10.77**	**-**
Less than 3,000 DWT	14	106,984	33,320	201,414	38,471	186,556	357.29	-
3,000 ≤ DWT < 15,000	1,360	10,384,539	13,467,091	49,826,901	5,024,081	9,262,618	18.24	-
15,000 DWT and above	1,026	23,927,628	35,599,084	48,301,894	4,250,279	14,674,195	8.48	-
LNG carrier	**604**	**64,803,585**	**51,267,661**	**51,572,581**	**3,731,386**	**42,323,465**	**9.27**	**-**
Less than 10,000 DWT	17	143,575	89,861	387,129	48,444	102,397	51.82	-
10,000 DWT and above	587	64,660,010	51,177,800	51,185,452	3,682,942	42,221,068	9.25	-

	Number of Ships	Gross Tonnage	Deadweight Tonnage	Distance Travelled	Hours Under way	CO_2 Emissions	AER for each EEDI Ship Size	cgDIST for each EEDI Ship Size
Others	**1,059**	**17,896,936**	**16,934,499**	**33,089,611**	**4,549,406**	**14,970,678**	**-**	**-**
5,000 GT and above	1,059	17,896,936	16,934,499	33,089,611	4,549,406	14,970,678	-	-
Passenger ship	**84**	**3,259,257**	**411,438**	**3,311,138**	**297,191**	**2,461,282**	**-**	**-**
5,000 GT and above	84	3,259,257	411,438	3,311,138	297,191	2,461,282	-	-
Refrigerated cargo carrier	**251**	**2,453,337**	**2,663,100**	**14,205,030**	**1,005,296**	**4,093,599**	**24.01**	**-**
Less than 3,000 DWT	1	5,100	2,972	34,840	2,955	6,725	64.95	-
3,000 ≤ DWT < 5,000	2	12,869	9,496	80,437	5,338	17,577	45.74	-
5,000 DWT and above	248	2,435,368	2,650,632	14,089,753	997,003	4,069,297	23.93	-
Ro-ro cargo ship	**336**	**10,055,245**	**4,767,603**	**23,410,920**	**1,644,199**	**8,609,135**	**24.67**	**-**
Less than 1,000 DWT	0	0	0	0	0	0	-	-
1,000 ≤ DWT < 2,000	0	0	0	0	0	0	-	-
2,000 DWT and above	336	10,055,245	4,767,603	23,410,920	1,644,199	8,609,135	24.67	-
Ro-ro cargo ship (vehicle carrier)	**687**	**36,728,432**	**12,341,920**	**58,914,950**	**3,983,932**	**20,536,557**	**-**	**6.30**
Less than 10,000 DWT	53	860,346	311,176	3,001,713	232,444	730,052	-	14.61
10,000 DWT and above	634	35,868,086	12,030,744	55,913,237	3,751,488	19,806,504	-	6.17
Ro-ro passenger ship	**418**	**10,406,292**	**2,075,998**	**26,982,751**	**1,662,075**	**14,596,290**	**-**	**19.67**
250 ≤ DWT < 1,000	46	314,644	31,105	2,188,299	114,796	885,019	-	56.53
1,000 DWT and above	372	10,091,648	2,044,893	24,794,452	1,547,279	13,711,271	-	18.87
Tanker	**6,890**	**333,837,510**	**603,337,050**	**319,391,629**	**29,262,978**	**134,016,427**	**4.22**	**-**
Less than 4,000 DWT	1	159,911	307	1,631	169	3,684	7357.24	-
4,000 ≤ DWT < 20,000	1,597	13,891,867	20,957,798	61,512,969	5,934,458	13,390,086	15.97	-
20,000 DWT and above	5,292	319,785,732	582,378,945	257,877,029	23,328,351	120,622,657	3.90	-
Total	**28,834**	**1,289,334,001**	**1,920,542,414**	**1,521,381,982**	**129,828,224**	**664,432,909**	**-**	**-**

Annual development in operational carbon intensity for each ship type and international shipping

32 In accordance with paragraph 6.5 of the 2022 Guidelines, as stated in paragraph 1.5 of the *2021 Guidelines on the operational carbon intensity reduction factors relative to reference lines* (CII reduction factors guidelines, G3) (resolution MEPC.338(76)):

> "The Organization should continue to monitor development in annual carbon intensity improvement using both demand-based and supply-based measurement in parallel to the annual analysis of the fuel consumption data reported to the IMO DCS"

33 In this regard, table 3 includes AER and cgDIST, supply-based measurements of carbon intensity. Either AER or cgDIST is calculated for each relevant ship type and size category. This has been calculated for each ship type and size category by dividing the total CO_2 emissions (paragraphs 35, 36 and 37 explain the use of C_F, conversion factor for calculating CO_2 emissions) by the sum of the Deadweight multiplied by Distance Travelled (or Gross Tonnage multiplied by Distance Travelled for cgDIST).

34 It has not been possible to calculate demand-based measurements of carbon intensity from the data available in IMO DCS. In response to the request in the 2021 Guidelines (resolution MEPC.338(76)) to continue to monitor development in annual carbon intensity improvement using both demand-based and supply-based measurements, and in the absence of cargo-related or actual transport work related data reported in the IMO DCS, the Secretariat has procured data to estimate the demand-based measurements of carbon intensity and is in the process of preparing a separate report to the Committee.

C_F, conversion factor between fuel consumption and CO_2 emissions

35 The IMO Fuel Oil Consumption Database in GISIS automatically assigns a value for the carbon conversion factor (C_F) for each fuel that is submitted for each ship according to the type of fuel that has been entered by the user. The C_F values are consistent with the *2022 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, as set out in resolution MEPC.364(79).

36 Note that, following updated attained EEDI Guidelines, the list of fuels shown in table 6 is being updated in the GISIS module to include Ethane as an option from the 2023 reporting year. A user can also select "Other" for fuel types that are not on the list, this allows a user to enter a user defined fuel name and C_F value. CO_2 emissions are calculated by multiplying the quantity of fuel used by the corresponding carbon conversion factor (C_F).

Table 6: Types of fuels and C_F factors selectable in the IMO Ship Fuel Oil Consumption Database

Type of fuel	Carbon conversion factor (C_F)
Diesel/Gas Oil	3.206
Light Fuel Oil (LFO)	3.151
Heavy Fuel Oil (HFO)	3.114
Liquefied Petroleum Gas (LPG) - Propane	3.000
Liquefied Petroleum Gas (LPG) - Butane	3.030
Liquefied Natural Gas (LNG)	2.750
Methanol	1.375
Ethanol	1.913

37 The C_F value of each fuel that is used for each ship is available in both the anonymized and non-anonymized data that can be downloaded from the IMO Ship Fuel Oil Consumption Database in GISIS. Ships reporting the use of Low Sulphur Heavy Fuel Oil may also report under the Heavy Fuel Oil fuel category in-line with the *Fourth IMO GHG Study 2020* in that the emission factors for Low Sulphur Heavy Fuel Oil are the same as for conventional HFO.

Downloading the data from the Ship Fuel Oil Consumption module in GISIS

38 Administrations can download non-anonymized data for ships flying its flag, this is data that has been submitted to GISIS by the Administration or on their behalf. In accordance with regulation 27.12 of MARPOL Annex VI, Parties to MARPOL Annex VI also have access to the data of all ships submitted to GISIS in an anonymized format, ship-related data is rounded to two significant figures.