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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: 2021)

Note by the Secretariat

SUMMARY

Executive summary: This document provides a report of the fuel oil consumption data for 2021 submitted to the IMO Ship Fuel Oil Consumption Database in GISIS, in accordance with regulation 27 of the 2021 *Revised 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 17

Related documents: MEPC 70/18; MEPC 71/17; MEPC 76/6/1; MEPC 77/6/1; ISWG-GHG 12/2; resolution MEPC.278(70), resolution MEPC.346(78) and resolution MEPC.349(78)

Background

1 In accordance with regulation 27.3 of the 2021 Revised 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 2021 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 2021 reporting period can be noted:

- .1 Data was reported by 28,171 ships (27,723 for 2020) with a combined gross tonnage of 1,255 million gross tonnes (1,222 million gross tonnes for 2020) by 139 Administrations (compared to 135 for 2020). 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 28,171 ships out of a potential 32,998 ships (85.4%) 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 94.4% of the ships that fell under the scope of regulation 27 of MARPOL Annex VI (compared to 93.8% for 2020).
- .3 By 2 August 2022, the number of ships identified with potential errors was reduced to 203 ships. At the time of the report, these potential errors had not been modified by the Administration or recognized organization concerned; these ships with potential errors can have a large impact on the aggregated data and have not been included in the report for the 2021 reporting period, set out in the annex to this document.
- .4 212 million tonnes of fuel (203 million tonnes for 2020), on a quantity basis, was used by the aforementioned 28,171 ships; total fuel used was higher in 2021 compared to 2020; in particular, fuel used for Bulk carriers and Containerships increased when compared to 2020.

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- .5 99.89% of the fuel used for the 2021 reporting period was either Heavy Fuel Oil, Light Fuel Oil, Diesel/Gas Oil or Liquefied Natural Gas. Compared to 2020 the use of Liquefied Natural Gas increased significantly for Bulk carriers, Containerships and Cruise passenger ships.
 - .6 The majority of the reported fuel oil was consumed by the following three EEDI ship types: Containerships, Bulk carriers and Tankers.

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

9 MEPC 78 endorsed, in general, the suggestions and recommendations by the Secretariat, as set out in document ISWG-GHG 12/2 (Secretariat), by the Secretariat on improving the annual reporting and analysis of data submitted to the IMO Ship Fuel Oil Consumption Database (MEPC 78/17, paragraph 7.72).

10 Accordingly, the Secretariat is improving the reporting process, including:

- .1 allowing recognized organizations to easily remove duplicate reports in the Ship Fuel Oil Consumption module in GISIS; and
- .2 improving the annual lists of ships falling in the scope of regulation 27 of MARPOL Annex VI that is sent to each Administration, using the feedback received from Administrations.

11 The Secretariat is also updating the Ship Fuel Oil Consumption module in GISIS taking into account the updated 2022 Guidelines (adopted at MEPC 78) and the recent amendments to appendix IX of MARPOL Annex VI to update the information reported to the IMO Ship Fuel Oil Consumption Database (including adding reporting for EEXI and CII values). The amendments to appendix IX of MARPOL Annex VI, as approved by MEPC 78, are expected to be adopted at this session (see document MEPC 79/3/3).

12 The Secretariat improved the way the submitted data had been verified. Notwithstanding, submitters of data 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" 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 A small number of ships were in an incorrect EEDI ship type category; in particular, 100 ships were incorrectly categorized in the "Passenger ship" and in the "Others" category. While the ship categorization has significantly improved compared to the 2019 reporting period, Administrations and recognized organizations should continue to carefully check whether ships should be reported under the "Cruise passenger ship" or "Ro-ro passenger" ship category before reporting under the "Passenger ship" category, and ensure tankers are reported under the "Tankers" category.

13 As mentioned in document MEPC 76/6/1 (Secretariat), the Committee may also consider amending the *2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, as set out in resolution MEPC.308(73), to include ethane and biofuels to facilitate reporting these fuels to the GISIS module with the appropriate C_F values.

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

14 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):

"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"

15 In this regard and further to the Secretariat's suggestions, set out in document ISWG-GHG 12/2, paragraph 34.2, as endorsed by MEPC 78, table 3 in the annex includes AER and cgDIST, supply-based measurements of carbon intensity, which are calculated for each relevant ship type and size category. AER has been calculated for each ship type and size category by dividing the total CO₂ emissions for each category by the sum of the Deadweight multiplied by Distance Travelled (or Gross Tonnage multiplied by Distance Travelled for cgDIST).

16 As also explained in paragraphs 16 to 24 of document ISWG-GHG 12/2, the Secretariat is currently not in a position to calculate demand-based measurements of carbon intensity from the data available in IMO DCS. For this reason the Secretariat issued a tender for additional data to allow for demand-based measurements to be included in future reporting to the Committee.

Action requested of the Committee

17 The Committee is invited to consider the summary report of fuel oil consumption data submitted to the IMO Ship Fuel Oil Consumption Database for 2021 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 2021 as set out in the annex;
- .2 note the issues with the IMO Ship Fuel Oil Consumption Database module in GISIS and the ongoing improvements to the reporting process, set out in paragraphs 10 to 13;
- .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 the Secretariat is currently not in a position to calculate carbon intensity developments on the basis of demand-based measurements, and is in the process of procuring such data for future reporting; and
- .5 take action as appropriate.

ANNEX

SUMMARY REPORT OF FUEL OIL CONSUMPTION DATA SUBMITTED TO THE IMO SHIP FUEL OIL CONSUMPTION DATABASE FOR 2021

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 2021 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* ('MARPOL Annex VI'), totalling 32,998 ships (compared to 32,558 ships in January 2020) under 139 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 2021 until 31 December 2021 (the 2021 reporting period), by 2 August 2022 fuel consumption data had been reported to the Ship Fuel Oil Consumption module in GISIS from 109 Administrations, consisting of 76 Parties to MARPOL Annex VI and 33 non-Parties, for 28,171 ships (compared to 27,723 ships for 2020) in total out of a potential 32,998 ships (85.4%) 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 94.4% of the ships that fell under the scope of regulation 27 of MARPOL Annex VI in January 2021 (compared to 93.8% for 2020).

3 This summary report reflects the fuel consumption data in GISIS up until 2 August 2022; any changes made to the 2021 data in GISIS after this date are not reflected in this report. Additional reported data in GISIS or changes made to the data after 2 August 2022 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 2021, in accordance with section 5 of the 2022 Guidelines, in July 2022, 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 might be necessary.

6 This list of missing ships was created for each Administration by comparing the ships that had been reported by July 2022 to the list of ships under the scope of regulation 27 of MARPOL Annex VI that was sent to each Administration in January 2021. In July 2022, Administrations were requested to provide fuel consumption data for 6,506 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. Some Administrations also informed the Secretariat about the status

of missing ships for which no data had been reported. A number of the aforementioned missing ships were still expected to report fuel consumption data for 2021. For half of the aforementioned missing ships, Administrations stated that these ships were not falling under the scope of regulation 27 of MARPOL Annex VI. The reasons for this included ship's being operated only domestically and the ship type not covered by relevant MARPOL Annex VI requirements, such as due to having no propulsion.

8 The Secretariat has included data in GISIS up until 2 August 2022 in the report to allow time for Administrations and recognized organizations to update the data in GISIS, as discussed in the above paragraphs.

9 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

10 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 checking 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 Administrations and recognized organizations concerned.

11 During the analysis of the reported data, on 2 August 2022, 2,942 instances where a single ship reported data more than once during the reporting year were identified. 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 during the reporting period.

12 In July 2022, 313 ships with errors were identified. At this time, 173 ships had instances of duplicate reporting, where the same data fuel consumption data was reported more than once. The remaining errors were due to incorrect ship characteristics, this included 64 ships which had reported an "hours under way" which was more than the number of hours in a year.

13 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, 2 August 2022, the number of identified errors, that could potentially have a large impact on aggregated data was reduced to 203 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.

14 39 ships out of the aforementioned 203 ships were excluded because they had reported "hours under way" which were more than the total number of hours in a year. In addition, 103 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 15 ships that had an unrealistically large deadweight. The aggregated gross tonnage of those 203 ships represents 0.60% of all ships which reported fuel consumption data, in terms of gross tonnage.

15 In July 2022, approximately 100 ships in the "Other" and "Passenger ship" ship type categories were identified as possibly being categorized incorrectly according to regulation 2 of MARPOL Annex VI. These ships were identified as "Passenger/Cruise" and "Chemical/Products Tanker" according to data from IHS Markit. Less than 100 ships were identified in the 2020 reporting period that needed recategorizing. In the 2019 reporting period, over 600 ships were identified that needed recategorizing.

16 Overall, the number of errors and types of errors identified in the submitted data in the 2021 reporting period, including the number of ships categorized incorrectly, was similar to 2020 and significantly less than the 2019 reporting period.

Number of ships for which fuel consumption data has been reported

17 Table 1 shows a summary of the ships for which Administrations had reported fuel consumption data for the 2021 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 2021.

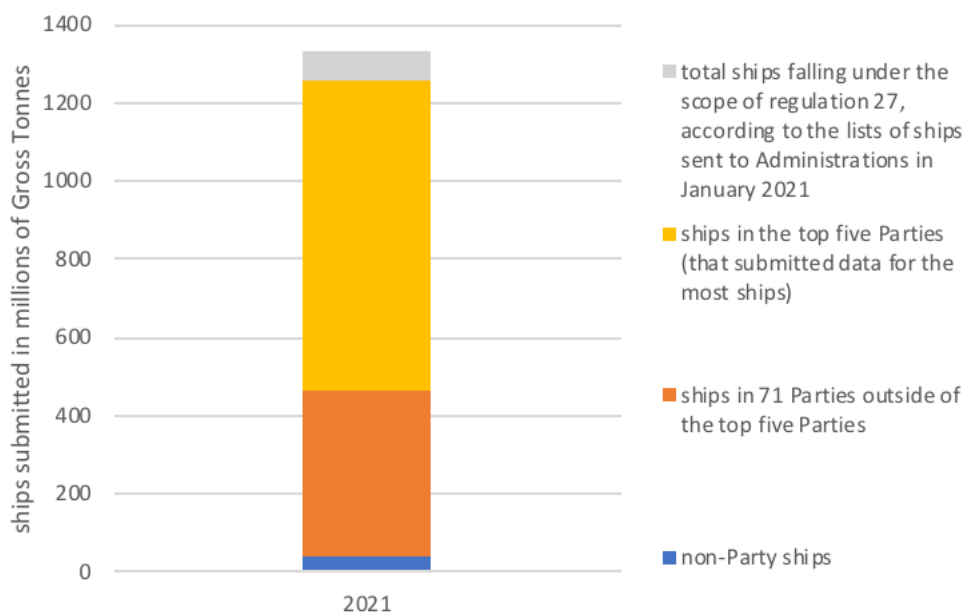
Table 1: Number of ships reported by Administrations in the reporting period

	Total	Party	non-Party
Ships contained in the lists of ships falling under the scope of regulation 27 as sent to Administrations in January 2021	32,998 ships estimated to fall under the scope of 139 Administrations	30,799 ships under the scope of 90 Administrations	2,199 ships under the scope of 49 Administrations
Total ships for which fuel consumption data was submitted	28,171 ships reported by 109 Administrations	27,196 ships reported by 76 Administrations	975 ships reported by 33 Administrations

18 Table 1 shows a high reporting rate; data was reported for 85.4% 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, 109 Administrations out of a potential 139 Administrations submitted data. The number of Administrations in table 1 also includes national registries or sub-registries through which data was submitted.

19 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

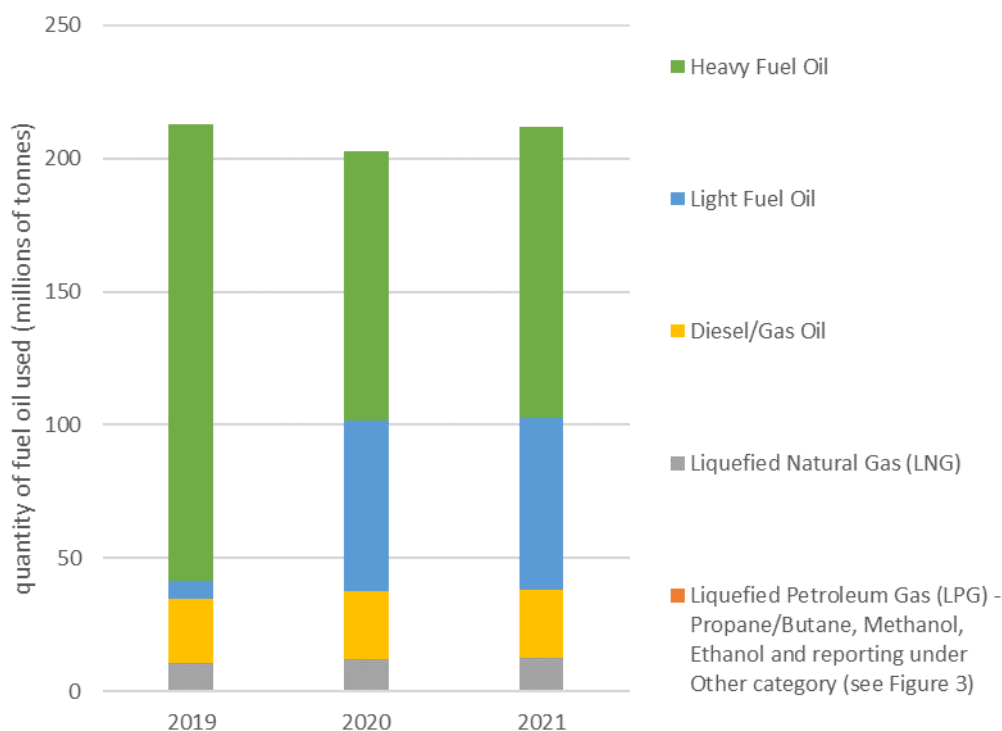


20 As shown in figure 1, the 32,998 ships that were estimated to fall under the scope of regulation 27 MARPOL Annex VI in January 2021 represent a total of 1,329 million gross tonnes. The 28,171 ships for which fuel consumption data was reported for the 2021 reporting period represent a combined gross tonnage of 1,255 million gross tonnes (this is 94.4% of 1,329 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, including the "Others" and "Passenger ship" categories for ships not subject to EEDI

21 In total, on a quantity basis, 212 million tonnes of fuel was used in the 2021 reporting period (203 million tonnes for 2020). Figure 2 shows that 93.95% of the fuel oil used during 2020 was either Heavy Fuel Oil, Light Fuel Oil or Diesel/Gas Oil. 99.89% of the fuel oil that was reported was either Heavy Fuel Oil, Light Fuel Oil, Diesel/Gas Oil or Liquefied Natural Gas; the remaining fuels outside of these four fuel types (reported under 'Other' fuels, see figure 3) amounted to 0.11% of the fuel used during the 2021 reporting period.

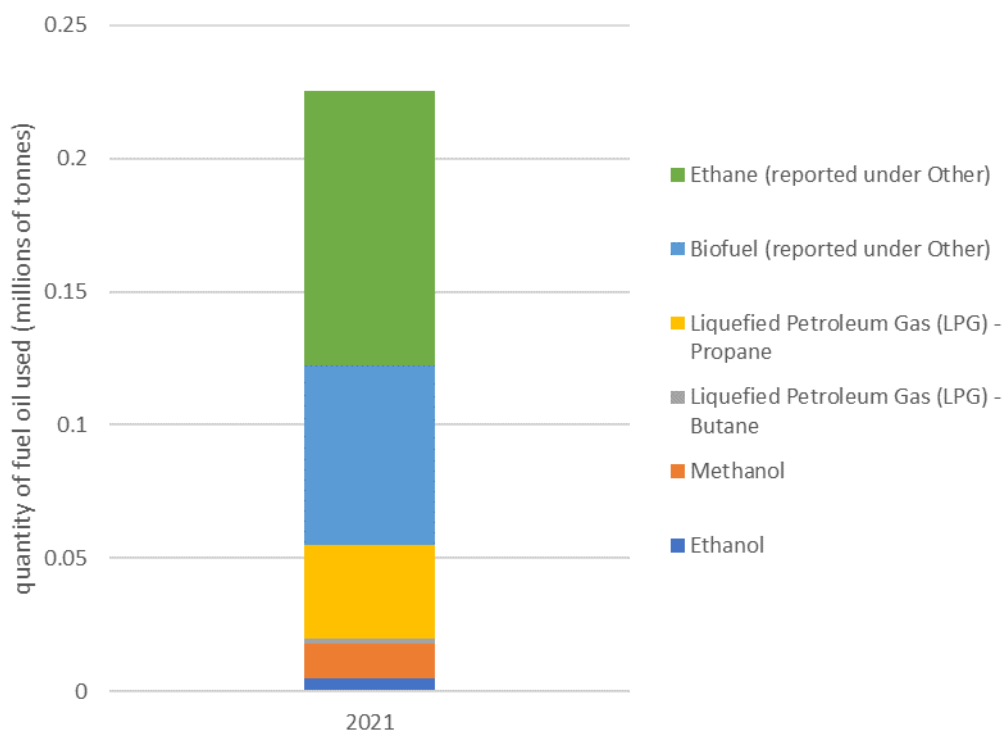
Figure 2: The aggregated annual amount of each type of fuel oil consumed by all ships of 5,000 GT and above



22 Total fuel used by the reported ships was higher during the 2021 reporting period when compared to the 2020 reporting period; fuel used for Bulk carriers and Containerships increased when compared to 2020. There were 12,623,121 tonnes of Liquefied Natural Gas in 2021 (5.95% of the reported fuel) compared to 11,974,761 tonnes of Liquefied Natural Gas in 2020. Compared to 2020, the use of Liquefied Natural Gas increased significantly, particularly for Bulk carriers, Containerships and Cruise passenger ships.

23 When analysing the 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.

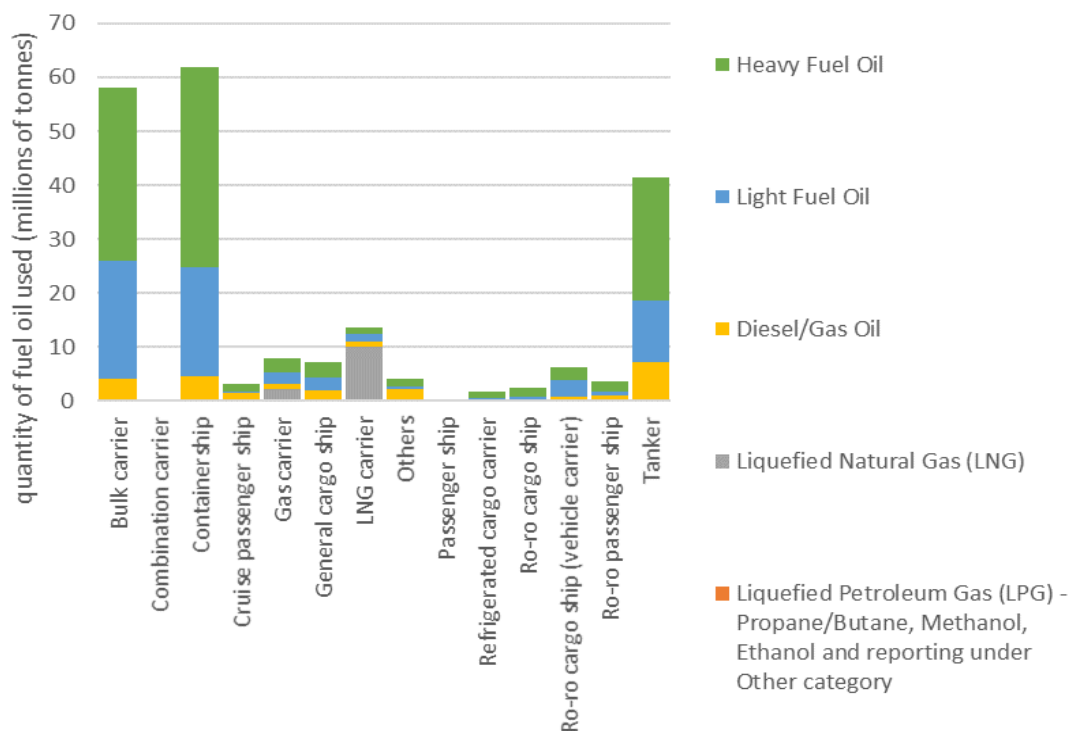
Figure 3: The aggregated annual amount of Liquefied Petroleum Gas (LPG), Methanol, Ethanol and other fuels (ethane and biofuel) reported under the “Other” category consumed by all ships of 5,000 GT and above



24 Figure 3 shows fuels, which were used during the 2021 reporting period that are not either Heavy Fuel Oil, Light Fuel Oil, Diesel/Gas Oil or Liquefied Natural Gas (LNG). In total the fuels in figure 3 represent 0.11% of the reported fuel oil in 2021. In 2021, 34,973 tonnes of Liquefied Petroleum Gas (LPG) - Propane, 2,028 tonnes of Liquefied Petroleum Gas (LPG) - Butane, 13,031 tonnes of Methanol and 4,849 tonnes of Ethanol were reported. The remaining fuel was reported under the "Other" fuel type category in GISIS. In the "Other" fuel type category, 102,921 tonnes of Ethane and 67,580 tonnes of biofuel (including B50 and B100 Biofuels, HVO and Used Cooking Oil) were reported.

25 There are many different types and mixtures of biofuels. As explained further in document MEPC 76/6/1 (Secretariat), given that the use of ethane and biofuel is very low, it is recommended that ships using ethane or biofuel as a fuel continue to report under the "Other" category, specifying a user-defined description and C_F value in GISIS for the time being; however, in the future the Committee may wish to consider amending the *2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, as set out in resolution MEPC.308(73), to include ethane and biofuel.

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 2021 reporting period



26 Figure 4 shows how different fuels were used by different ship types during the 2021 reporting period. During the reporting period the majority of fuel oil was consumed by three ship types: Containerships, Bulk carriers and Tankers. Compared to the 2020 reporting period, fuel used for Bulk carriers and Containerships increased, the fuel used for Tankers slightly decreased. The aggregated data used to create figure 4 is also in table 2.

27 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.

28 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)	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	4,193,671	0	32,078,201	21,670,927	36,773	0	1,783	0	874
Less than 10,000 DWT	40,641	0	36,828	62,420	0	0	0	0	0
10,000 ≤ DWT < 20,000	144,016	0	275,877	352,223	0	0	0	0	0
20,000 DWT and above	4,009,014	0	31,765,496	21,256,284	36,773	0	1,783	0	874
Combination carrier	7,393	0	94,530	20,324	0	0	0	0	0
20,000 DWT and above	7,393	0	94,530	20,324	0	0	0	0	0
Containership	4,400,519	0	37,047,611	20,273,555	163,707	0	8,477	0	48,038
Less than 10,000 DWT	196,895	0	359,549	292,091	0	0	0	0	0
10,000 ≤ DWT < 15,000	373,547	0	1,298,261	910,271	1,953	0	0	0	400
15,000 ≤ DWT < 40,000	719,654	0	6,777,328	3,395,829	22,835	0	8,477	0	1,168
40,000 ≤ DWT < 80,000	1,171,842	0	9,277,050	5,851,901	0	0	0	0	3,255
80,000 ≤ DWT < 120,000	1,011,433	0	8,942,275	5,987,457	24	0	0	0	12,706
120,000 ≤ DWT < 200,000	797,752	0	8,316,406	3,696,074	50,732	0	0	0	27,307
200,000 DWT and above	129,396	0	2,076,742	139,932	88,163	0	0	0	3,202
Cruise passenger ship	1,468,362	0	1,568,196	141,186	59,796	0	2,020	0	0
5,000 ≤ GT < 25,000	40,281	0	2,939	4,993	577	0	0	0	0
25,000 ≤ GT < 85,000	508,944	0	226,892	50,150	0	0	2,020	0	0
85,000 GT and above	919,137	0	1,338,365	86,043	59,219	0	0	0	0
Gas carrier	925,870	0	2,727,596	2,091,966	2,137,002	989	20,225	0	100,642
2,000 ≤ DWT < 10,000	183,738	0	216,919	78,641	3,761	0	0	0	0
10,000 DWT and above	742,132	0	2,510,677	2,013,325	2,133,241	989	20,225	0	100,642
General cargo ship	2,056,718	4,849	2,898,972	2,204,244	4,052	0	0	0	3,095
Less than 3,000 DWT	40,173	0	8,988	0	0	0	0	0	0
3,000 ≤ DWT < 15,000	1,236,880	1,595	999,263	817,364	1,692	0	0	0	816
15,000 DWT and above	779,665	3,254	1,890,721	1,386,880	2,360	0	0	0	2,279
LNG carrier	1,036,586	0	1,162,749	1,461,070	9,958,661	0	0	0	3
Less than 10,000 DWT	5,076	0	0	714	18,843	0	0	0	0

	Diesel / Gas Oil (MDO / MGO)	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
10,000 DWT and above	1,031,510	0	1,162,749	1,460,356	9,939,818	0	0	0	3
Others	2,087,923	0	1,306,781	668,038	40,203	0	2,121	0	3,973
5,000 GT and above	2,087,923	0	1,306,781	668,038	40,203	0	2,121	0	3,973
Passenger ship	168,640	0	223,277	23,053	3,551	0	0	0	0
5,000 GT and above	168,640	0	223,277	23,053	3,551	0	0	0	0
Refrigerated cargo carrier	200,056	0	1,117,759	340,342	0	0	0	0	0
3,000 ≤ DWT < 5,000	1,371	0	84	1,944	0	0	0	0	0
5,000 DWT and above	198,685	0	1,117,675	338,398	0	0	0	0	0
Ro-ro cargo ship	432,102	0	1,727,878	406,330	6,166	0	0	0	0
Less than 1,000 DWT	95	0	0	0	0	0	0	0	0
1,000 ≤ DWT < 2,000	1,190	0	0	0	0	0	0	0	0
2,000 DWT and above	430,817	0	1,727,878	406,330	6,166	0	0	0	0
Ro-ro cargo ship (vehicle carrier)	765,017	0	2,224,287	3,176,668	16,895	0	0	0	13,409
Less than 10,000 DWT	94,068	0	99,674	48,904	0	0	0	0	0
10,000 DWT and above	670,949	0	2,124,613	3,127,764	16,895	0	0	0	13,409
Ro-ro passenger ship	988,127	0	2,061,895	577,994	94,802	0	0	56	0
250 ≤ DWT < 1,000	175,880	0	4,326	0	5,173	0	0	0	0
1,000 DWT and above	812,247	0	2,057,569	577,994	89,629	0	0	56	0
Tanker	7,002,015	0	22,929,715	11,423,431	101,513	1,039	347	12,975	467
Less than 4,000 DWT	1,865	0	29,920	6,757	0	0	0	0	0
4,000 ≤ DWT < 20,000	1,364,435	0	1,561,964	1,304,905	26,100	0	0	0	0
20,000 DWT and above	5,635,715	0	21,337,831	10,111,769	75,413	1,039	347	12,975	467
Total (212,230,077)	25,732,999	4,849	109,169,447	64,479,128	12,623,121	2,028	34,973	13,031	170,501

Table 3: The number of ships that reported, including the aggregated gross tonnage, deadweight, annual amount of distance travelled and hours under way, AER and cgDIST 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	AER for each EEDI Ship Size	cgDIST for each EEDI Ship Size
Bulk carrier	10,232	461,226,658	843,177,129	500,209,242	44,417,985	4.03	-
Less than 10,000 DWT	80	685,137	642,910	2,820,000	294,730	19.56	-
10,000 ≤ DWT < 20,000	345	3,695,430	5,205,158	13,328,153	1,283,569	12.16	-
20,000 DWT and above	9,807	456,846,091	837,329,061	484,061,089	42,839,686	3.99	-
Combination carrier	22	934,388	1,565,846	1,248,524	111,731	4.34	-
20,000 DWT and above	22	934,388	1,565,846	1,248,524	111,731	4.34	-
Containership	4,645	250,898,991	280,693,031	324,073,727	23,431,955	8.83	-
Less than 10,000 DWT	229	1,711,396	1,897,566	11,681,419	976,848	27.55	-
10,000 ≤ DWT < 15,000	555	5,593,316	6,951,962	30,403,408	2,463,789	21.38	-
15,000 ≤ DWT < 40,000	1,459	32,498,868	39,993,661	89,133,382	6,751,047	13.81	-
40,000 ≤ DWT < 80,000	1,111	54,280,545	63,884,212	83,870,707	5,916,640	10.50	-
80,000 ≤ DWT < 120,000	681	62,029,745	69,067,646	58,298,139	3,862,404	8.44	-
120,000 ≤ DWT < 200,000	519	76,006,320	78,664,335	43,406,089	2,947,231	6.10	-
200,000 DWT and above	91	18,778,801	20,233,649	7,280,583	513,996	4.72	-
Cruise passenger ship	244	20,915,457	1,944,460	6,354,837	557,720	-	15.60
5,000 ≤ GT < 25,000	29	352,560	45,535	351,823	40,874	-	37.71
25,000 ≤ GT < 85,000	90	4,996,781	535,142	1,800,387	165,622	-	23.87
85,000 GT and above	125	15,566,116	1,363,783	4,202,627	351,224	-	13.85
Gas carrier	884	34,633,287	34,269,991	57,353,120	4,326,201	9.66	-
2,000 ≤ DWT < 10,000	173	1,172,759	1,276,824	7,459,522	657,333	27.31	-
10,000 DWT and above	711	33,460,528	32,993,167	49,893,598	3,668,868	9.26	-
General cargo ship	2,172	29,404,633	41,072,894	90,767,451	8,608,256	11.81	-
Less than 3,000 DWT	14	103,452	32,890	163,908	47,434	372.35	-
3,000 ≤ DWT < 15,000	1,350	10,134,894	13,058,238	51,648,561	5,222,352	18.73	-
15,000 DWT and above	808	19,166,287	27,981,766	38,954,982	3,338,470	9.15	-
LNG carrier	519	55,484,321	44,637,721	47,683,545	3,243,714	9.17	-
Less than 10,000 DWT	13	176,142	73,402	296,236	33,952	45.90	-
10,000 DWT and above	506	55,308,179	44,564,319	47,387,309	3,209,762	9.16	-

Others	976	17,117,861	17,262,715	28,661,582	4,176,754	-	-
5,000 GT and above	976	17,117,861	17,262,715	28,661,582	4,176,754	-	-
Passenger ship	64	2,385,520	308,723	1,753,706	172,574	-	-
5,000 GT and above	64	2,385,520	308,723	1,753,706	172,574	-	-
Refrigerated cargo carrier	276	2,799,319	2,972,669	15,720,355	1,106,753	27.42	-
3,000 ≤ DWT < 5,000	2	15,004	8,652	37,627	2,890	72.18	-
5,000 DWT and above	274	2,784,315	2,964,017	15,682,728	1,103,863	27.39	-
Ro-ro cargo ship	325	9,237,063	4,211,442	22,098,947	1,543,159	26.03	-
Less than 1,000 DWT	1	6,556	721	43,445	5,630	512.03	-
1,000 ≤ DWT < 2,000	1	5,462	1,626	825	98	54.01	-
2,000 DWT and above	323	9,225,045	4,209,095	22,054,677	1,537,431	26.03	-
Ro-ro cargo ship (vehicle carrier)	677	36,407,750	12,219,591	58,132,646	4,001,035	-	6.02
Less than 10,000 DWT	58	937,859	328,636	3,208,864	267,364	-	13.61
10,000 DWT and above	619	35,469,891	11,890,955	54,923,782	3,733,671	-	5.88
Ro-ro passenger ship	369	8,922,524	1,823,542	21,926,991	1,355,369	-	19.47
250 ≤ DWT < 1,000	40	258,835	26,249	1,544,358	81,037	-	59.10
1,000 DWT and above	329	8,663,689	1,797,293	20,382,633	1,274,332	-	18.80
Tanker	6,766	324,399,443	587,090,654	312,530,675	28,655,364	4.28	-
4,000 ≤ DWT < 20,000	1,609	14,126,646	21,122,265	61,746,249	5,902,594	15.93	-
20,000 DWT and above	5,157	310,272,797	565,968,389	250,784,426	22,752,770	3.95	-
Total	28,171	1,254,767,215	1,873,250,408	1,488,515,348	125,708,570	-	-

29 With regard to the ships that had been identified on the lists of ships to potentially fall under the scope of regulation 27 of MARPOL Annex VI, as submitted in January 2021, and for which no data had been reported, it was not possible to group those missing ships by EEDI ship type and EEDI size category, as requested in paragraphs 5.5 and 6.4 of the 2022 Guidelines. This is because it is not possible to determine whether those missing ships would indeed fall under the scope of regulation 27 and how these ships should be categorized. The EEDI ship type and EEDI size categories are only defined by Member States or recognized organizations acting on behalf of Member States when submitting fuel consumption data to the Fuel Oil Consumption Database module in GISIS. The Secretariat does not add or alter information by Member States, but can only suggest to Administrations that they review the data and amend, where appropriate.

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

30 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):

"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"

31 In this regard, table 3 includes AER and cgDIST, supply-based measurements of carbon intensity. AER (or cgDIST) are calculated for each relevant ship type and size category. by dividing the total CO₂ emissions for each category (paragraphs 34 and 35 explain the use of C_F, conversion factor for calculating CO₂ emissions) by the sum of the Deadweight multiplied by Distance Travelled (or Gross Tonnage multiplied by Distance Travelled for cgDIST).

32 As would be expected, both AER and cgDIST are much larger for smaller ship sizes; this can be observed in table 3. In table 3, a ship with less than 1,000 DWT in the Ro-ro cargo ship category has a particularly large AER; after investigation, this was found to be due to the ship being a high-speed craft.

33 It has not been possible to calculate demand-based measurements of carbon intensity from the data available in IMO DCS; for this reason the Secretariat issued a tender for additional data to allow for demand-based measurements to be included in future reporting to the Committee.

C_F, conversion factor between fuel consumption and CO₂ emissions

34 The IMO Ship 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 *2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships*, as set out in resolution MEPC.308(73). 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. CO₂ emissions are calculated by multiplying the quantity of fuel used by the corresponding carbon conversion factor (C_F).

Table 4: 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

35 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

36 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.