

## Annual Fuel Consumption Report for 2019 and 2020



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**Directorate General of Shipping  
(Indian Maritime Administration)**

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## **Director General of Shipping's Message**

I am happy to release this first report detailing Greenhouse gas emissions from Indian Ships for the calendar years 2019 and 2020. The report details the CO<sub>2</sub> emissions from all Indian registered ships irrespective of type or tonnage, enabling the policy makers, ship owners and other stakeholders to take targeted measures to reduce the emissions from ships.



The 6<sup>th</sup> assessment report of the Intergovernmental Panel on Climate Change (IPCC) released in 2021 has raised a worldwide alarm by their finding that under all emission scenarios, the earth surface warming is projected to reach 1.5°C or 1.6°C in next two decades and for any chance of meeting the temperature goals to ensure the survival of affected communities and vulnerable ecosystems, would need drastic reductions in CO<sub>2</sub> emissions by all sectors in this decade itself.

India's on its part in the recent Conference of Parties (COP-26) held in Glasgow, declared its enhanced ambitions to reduce the carbon intensity of its economy to less than 45 per cent from 2005 level by 2030 and has also set an ambitious target of net zero emissions by 2070, among two other targets.

Shipping being hard to abate sector, the Directorate General of shipping has already started efforts to reduce greenhouse gas emissions from Indian ships and also from foreign ships visiting Indian ports, by identifying and working on key energy efficiency measures in Maritime Vision 2030. Whether it is to supply shore power to all ships at Indian ports by 2030 or to enhance port efficiencies by reducing ship stay in ports and the turn-around time including at anchorages, it is expected that the series of measures from the Government of India would help the shipping sector to achieve considerable reduction in emissions by this decade itself.

For Indian shipping, the Directorate with the help of Norway is conducting a study to determine the ways to achieve decarbonisation by identifying the suitable alternate fuels & technologies and policy changes that can enable a transition of various ship types operating on Indian coast.

The Directorate has already conducted pilot projects on bio-fuel blends on Indian ships and submitted two papers at Marine Environmental Protection Committee (MEPC) of the IMO focusing on the results of the trials, in its efforts to

remove regulatory barriers in the use of such blends on merchant ships. I am happy to state that with the Unified Interpretation (UI) adopted at MEPC 78 has paved the way for adoption of bio-fuel blends by ships internationally.

India is also working on Green Corridor with QUAD members and several of such meetings defining the Green Corridor and its elements have been undertaken. India is also being part of IMO Green Voyage 2050 projects which aims to start green shipping pilots in India which can be scaled up for adoption by other stakeholders. I am happy to state that at-least three pilots have been selected and the work is under progress to demonstrate the same.

A Letter of Intent (LoI) has been signed between Ministry of Ports, Shipping & Waterways, Government of India and the Ministry of Industry, Business and Financial Affairs, Government of the Kingdom of Denmark for developing one or more Centre of Excellence related to Green Shipping, Regulatory Partnership, Digital Solutions and Ship Recycling and the first of such centres is proposed to be opened at TERI (The Energy and Resource Institute), New Delhi.

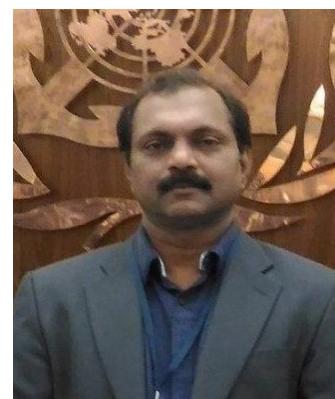
A significant milestone for closer Research & Development collaboration between India and Norway was reached with the signing of an MoU aiming to establish a Maritime Knowledge Cluster – India. The Cluster will tie Indian and Norwegian ocean and maritime collaborations closer together, providing a common platform for researchers, research facilitators and sponsors and other maritime industry partners to interact, forge partnerships and business alliances, and thereby augmenting future innovation in mercantile marine.

I congratulate the officers and staff of the Directorate General of Shipping for their assiduous work in bringing out this exhaustive and informative report about the fuel data collection for the year 2019 and 2020.

Amitabh Kumar  
Director General of Shipping  
cum Additional Secretary to Govt.

## **Foreword from the Chief Surveyor**

The amendments to MARPOL Annex VI on Data Collection System (DCS) for fuel oil consumption of ships was adopted by Resolution MEPC 278 (70), which entered into force on 1 March 2018. Under the amendments, ships of 5000 gross tonnage and above are required to collect consumption data for each type of fuel oil they use, as well as other, additional, specified data including proxies for transport work.



The aggregated data is reported to the flag State after the end of each calendar year and the flag State, having determined that the data has been reported in accordance with the requirements, issues a Statement of Compliance to the ship. Flag States are required to subsequently transfer this data to an IMO Ship Fuel Oil Consumption Database.

In order to ensure that complete data is available with the Directorate for policy decisions related to greenhouse gas emissions from Indian ships, the Directorate issued Engineering Circular 02 of 2018, permitting only IRS to submit the data to IMO database while the verification and issuance of Statement of Compliance was allowed to be issued by any Recognized Organization to Government of India. The circular also required all ships to report fuel consumption data irrespective of gross tonnage and operational profile, that is, coastal or international. The same has facilitated collection of complete fuel consumption data from Indian shipping.

The COVID-19 pandemic had restrained the Directorate from publicising the data in the previous years, but, now it has been decided to make the fuel consumption data available to public for the calendar year 2019 and 2020 through a combined report.

The data has helped directorate to devise various regulatory mechanisms to reduce greenhouse gas emissions from ships in many ways, including permission to operate ships on bio-fuel blends, shore power supply to visiting ships at Indian ports and also make to make submissions at the IMO, in a more informed manner.

Some of the developments being now being considered at the Directorate based on the study of annual fuel oil consumption data are

- Creation of an on-line system to capture complete operational profile of Indian ships and foreign ships conducting domestic voyages in India. This will help us further to assess the inefficient operations and create mechanisms to mitigate the same in consultation with stake holders. This will help us to calculate the emissions which are to be counted under National Inventories.
- Order to permit usage of biofuel blends by Indian ships.

- An on-line system to issue digitized bunker receipt, apart from facilitating the ships, the data will help us assess the ports and types of international ships buying bunkers in India. This is necessary to develop bunkering infrastructure for alternate fuels based on developments internationally and also as it is envisaged to be different for different ship types.
- A study being conducted to operationally profile Indian coastal shipping and find solutions which can be implemented in short, medium and long term to achieve decarbonisation goals. The study is envisaged to be converted to a policy mechanism detailing the financial incentives and regulatory mechanism to achieve the required decarbonisation goals.

I hope this report will help all stakeholders to take additional measures to enhance energy efficiencies and reduce emissions from ships, so that Indian shipping achieve the ambitious status of Green shipping, sooner than later.

(Ajithkumar Sukumaran)  
Chief Surveyor (I/c)  
with the Govt of India

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## Executive Summary

The seventieth session of United Nation General Assembly held on 25th September 2015 adopted Resolution “Transforming our world: the 2030 Agenda for Sustainable Development” requiring a plan of action for people, planet and prosperity. This resolution contains 17 Sustainable Development Goals (SDG) and 169 target areas of critical importance for humanity and the planet to be achieved by 2030. The Goal 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) has set targets for significant reduction of marine pollution of all kinds by 2025 and it aims to minimize and address the impacts of ocean acidification.

In 2018, IMO's Marine Environment Protection Committee (MEPC) adopted an initial strategy in on the reduction of greenhouse gas emissions from ships, setting out a vision to reduce GHG emissions from international shipping and phase them out, as soon as possible in this century. IMO Data collection system for fuel oil consumption of ships, adopted by resolution MEPC.278(70), entered into force on 1 March 2018. Based on these amendments, ships of 5,000 gross tonnage and above are required to collect consumption data for each type of fuel oil they use, as well as other, additional, specified data including proxies for transport work. The aggregated data is reported to the flag State after the end of each calendar year

India is committed to take efforts to reduce GHG emissions. DG Shipping Engineering Circular 2 of 2018 stipulates the requirements for data collection from Indian Flag vessels. Although IMO DCS requirements are applicable to international ships of 5000 GT and above, DG shipping, with a view to have a national maritime emissions inventory prescribed the data collection requirements for all Indian Flag vessels registered under MS Act.

Fuel oil consumption data collection is the first step of a three-step approach developed by IMO of a three-step approach: data collection, data analysis, followed by decision-making on what further measures, if any, are required for further reduction of GHG emission.

This report provides the findings based on the data collection for 2019 and 2021,

As stipulated in the DGS Engineering Circular 2 of 2018, the ships have been divided into 3 categories as below:

- Category 1: Ships of 5000 GT and above certified for international voyages
- Category 2: Ships of 5000 GT and above certified in accordance with RSV Notification or Indian Coastal Vessel Notification.
- Category 3: Ships of Less than 5000 GT

## Overall Consumption Summary

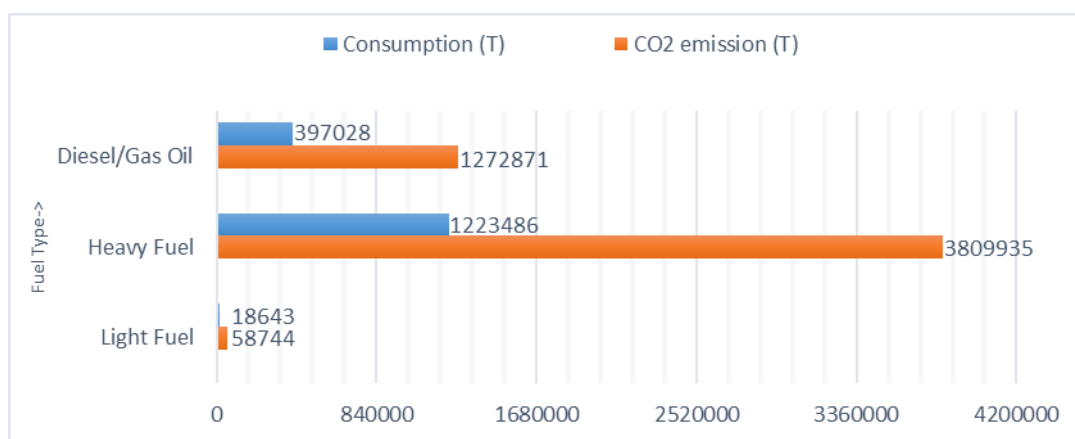
Total CO<sub>2</sub> emissions from Indian Flag ships of all 3 categories is approximately **5.1 million tonnes and 4.62 million tonnes** for 2019 and 2020 respectively

Majority of the vessels (667 out of 920) in 2019 and (631 out of 876) in 2020 fall in category 3 i.e. ships of less than 5000 GT and their area of operation is along the coast of India. However, owing to the large size and long distances travelled by category 1 vessels, the majority of the contribution to CO<sub>2</sub> emissions is from category 1 vessels i.e. Ships of 5000 GT and above on international voyages

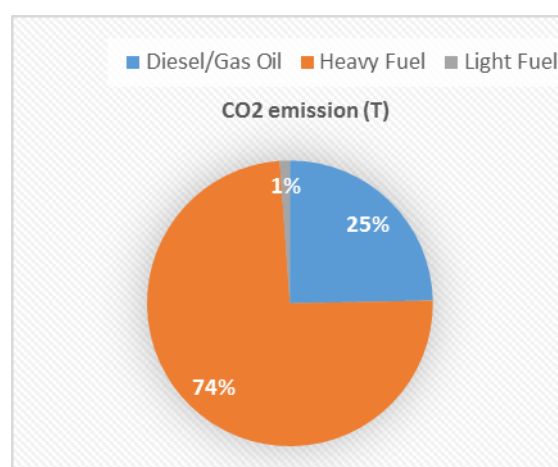
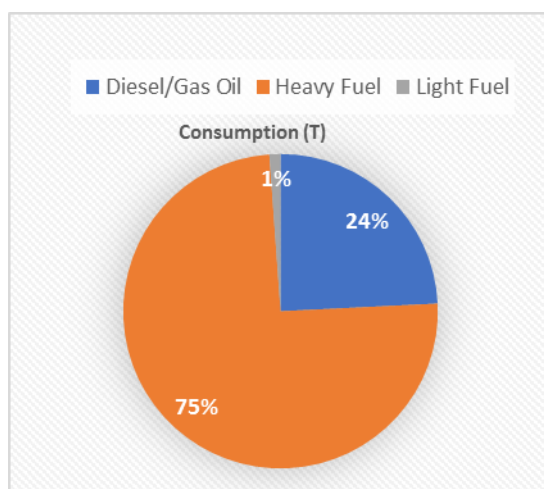


Fuel Type	Consumption (MT) 2019	CO2 emission (Tonne)2019	Consumption (MT) 2020	CO2 emission (Tonne)2020
Diesel/Gas Oil	397028	1272871	369078	1183263
Heavy Fuel	1223486	3809935	459483	1430829
Light Fuel	18643	58744	631508	1989881
LNG			6358	17485
<b>Total</b>	<b>1639157</b>	<b>5141551</b>	<b>1466427</b>	<b>4621455</b>

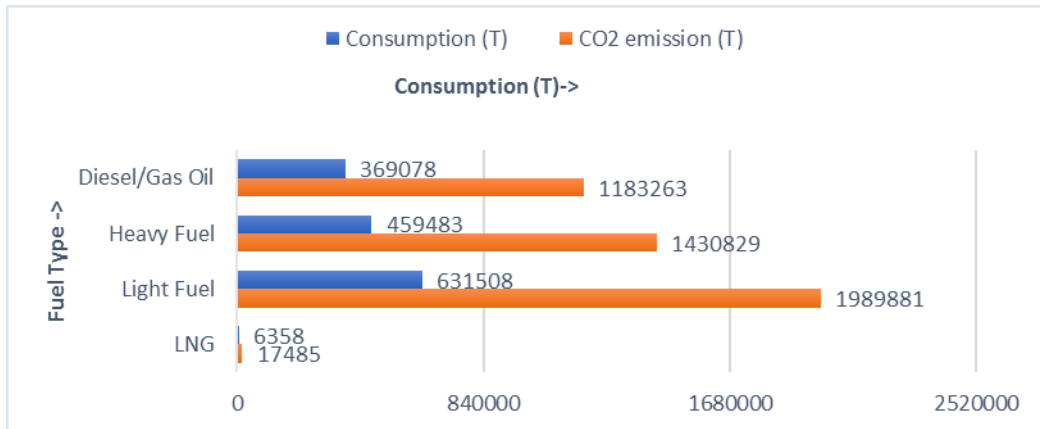
## 2019



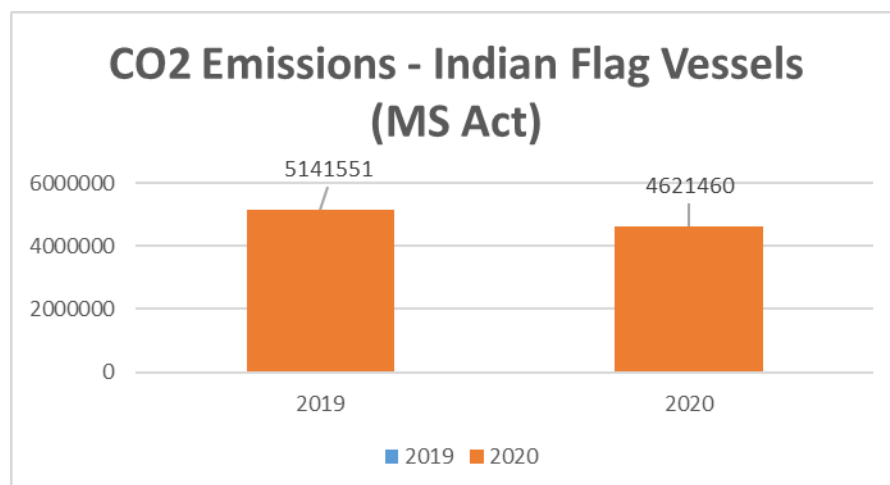
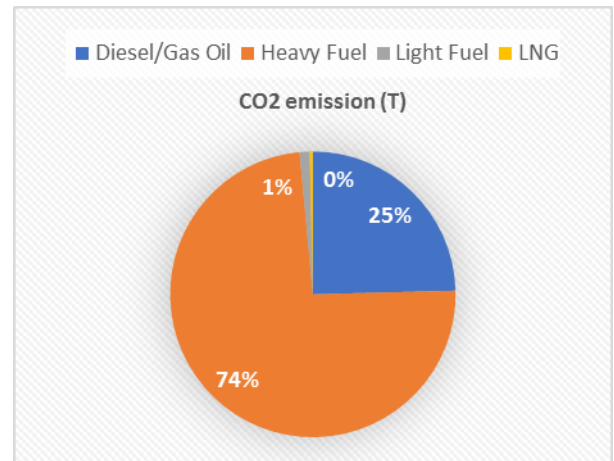
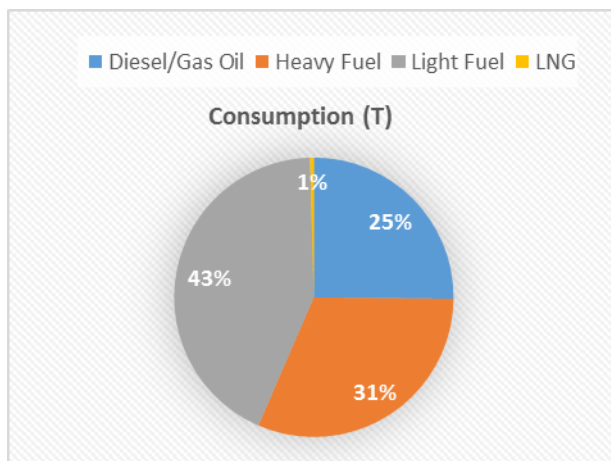
## 2019



2020



2020



The total CO2 emissions from all 3 categories for 2019 were approximately 5.1 million tonnes. Thus, compared to the total CO2 emissions from Indian Flag Ships in 2019, a reduction of 10.1% has been observed in 2020.

The reasons could be attributed to the reduction in number of applicable ships, reduced cargo movement due to COVID-19 pandemic and to a certain extent to the awareness amongst the shipping community to reduce emissions owing to the regulatory requirements.

### 1. Data from ships of 5000 GT and above certified for international voyages

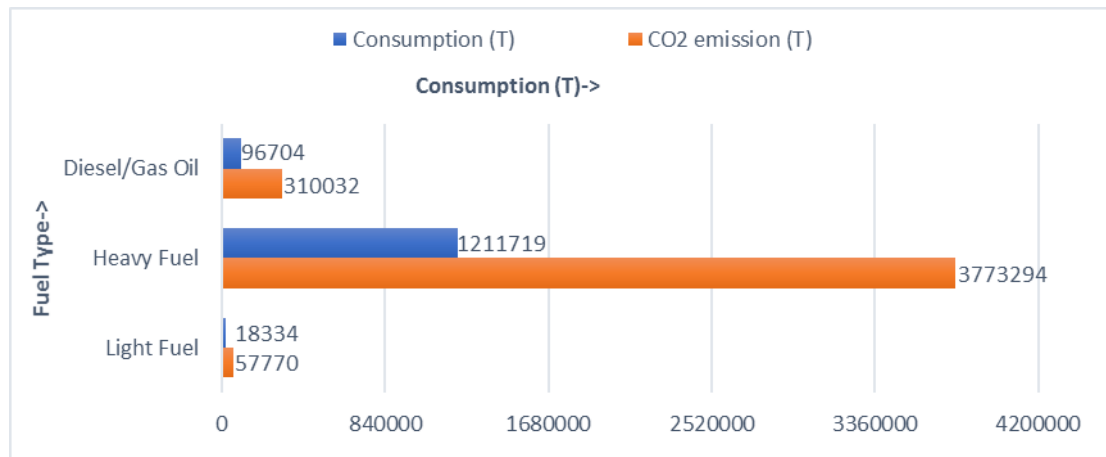
In 2019 there were total 243 ships in this category and they accounted for 4.141 million tonnes of CO2 emissions

However in 2020 there were total 233 ships in this category and they accounted for 3.715 million tonnes of CO2 emissions

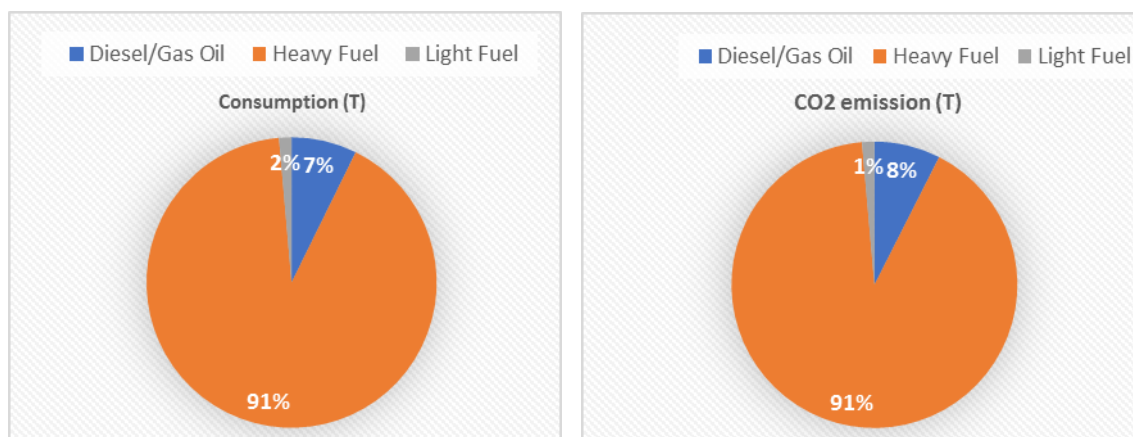
Major consumption of fuel in this category ships was light fuel oil. In the previous year, HFO was the major type of fuel consumed. However, owing to the entry into force of requirement of 0.5% m/m sulphur limit on fuel oil from 1<sup>st</sup> Jan 2020, the major consumed fuel this year is light fuel oil (LFO)

Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	96704	310032
Heavy Fuel	1211719	3773294
Light Fuel	18334	57770
Total	1326757	4141096

2019

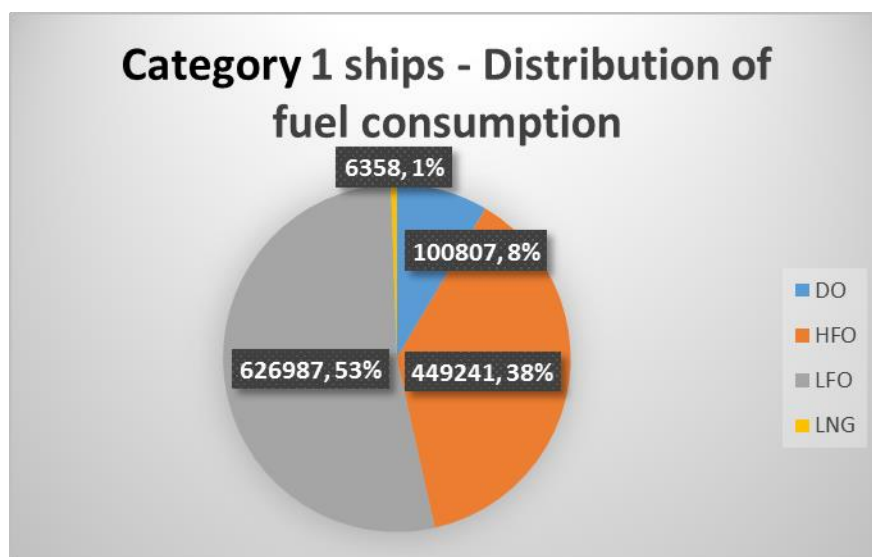


2019



2020

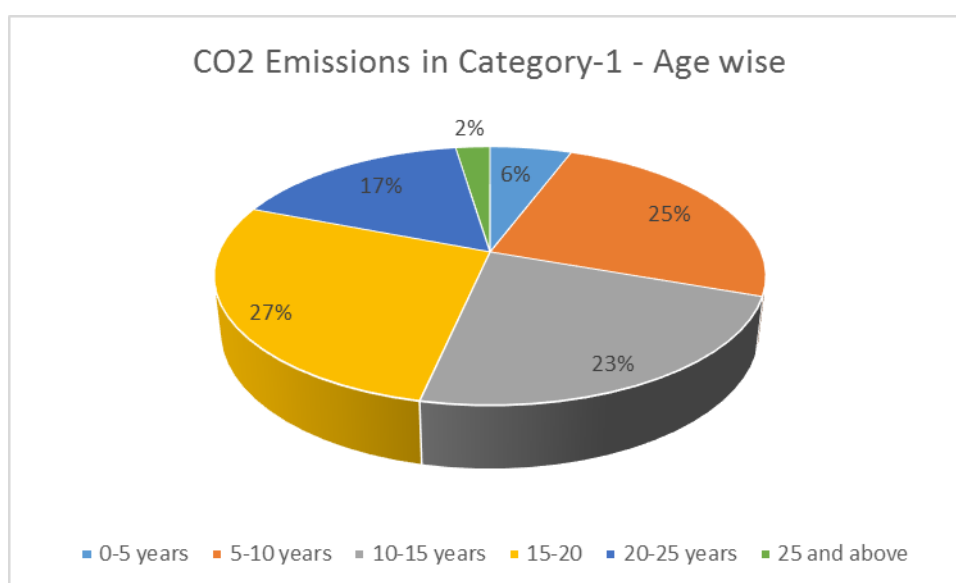
Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	100807	323187.242
Heavy Fuel	449241	1398936.474
Light Fuel	626987	1975636.037
LNG	6358	17484.5
Total	1183393	3715244.253



## 1.1 Category 1 Vessels – Age wise distribution

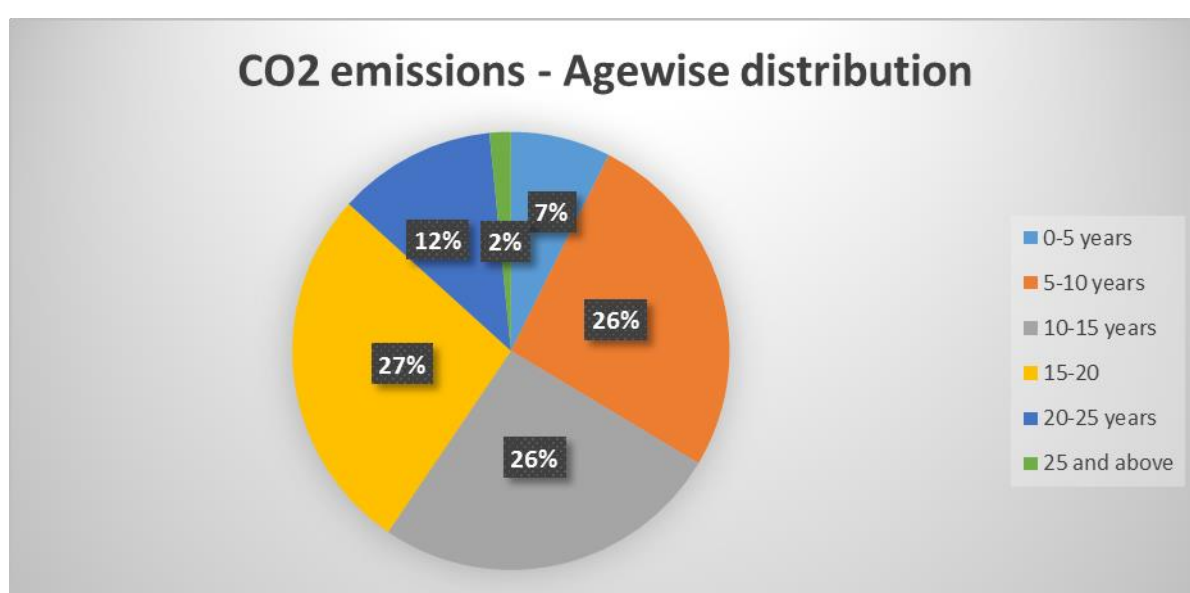
2019

Age of the ship	DO Consumption	HFO Consumption	LFO Consumption	Total CO2
0-5 years	5253	70077	512	236676
5-10 years	29230	290866	7890	1024330
10-15 years	21097	278294	5177	950559
15-20	11007	351760	2852	1139652
20-25 years	18544	201513	1175	690665
25 and above	11573	19209	728	99214

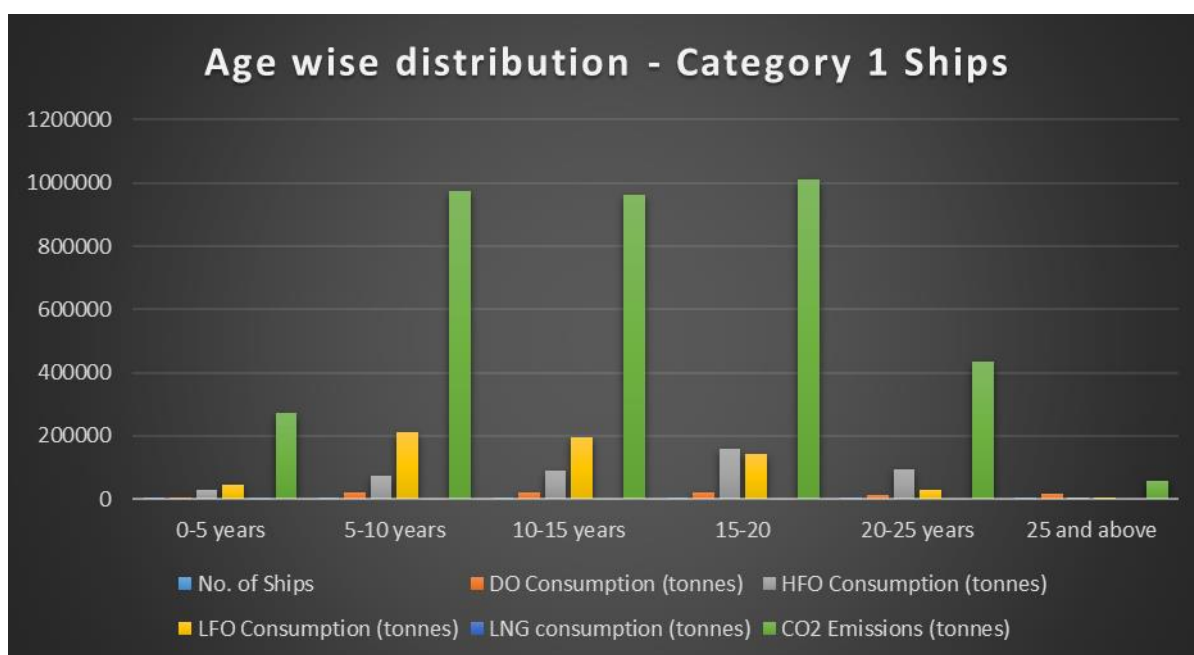


2020

Age of the ship	No. of Ships	DO Consumption (tones)	HFO Consumption (tones)	LFO Consumption (tones)	LNG consumption (tones)	CO2 Emissions (tones)
0-5 years	15	6106	29098	46611	6358	274542.77
5-10 years	54	21700	74597	212950		972870.71
10-15 years	52	22297	88213	195756		963006.62
15-20	64	19506	160408	142304		1010446.65
20-25 years	40	15090	95440	28750		436170.00
25 and above	8	16108	1485	616		58207.55



The majority of the ships in category 1 are of age 15-20 years (27.5%) and are the major contributors to CO2 emissions. The detailed age-wise distribution in terms of types of fuel, CO2 emissions is illustrated in the below graph.



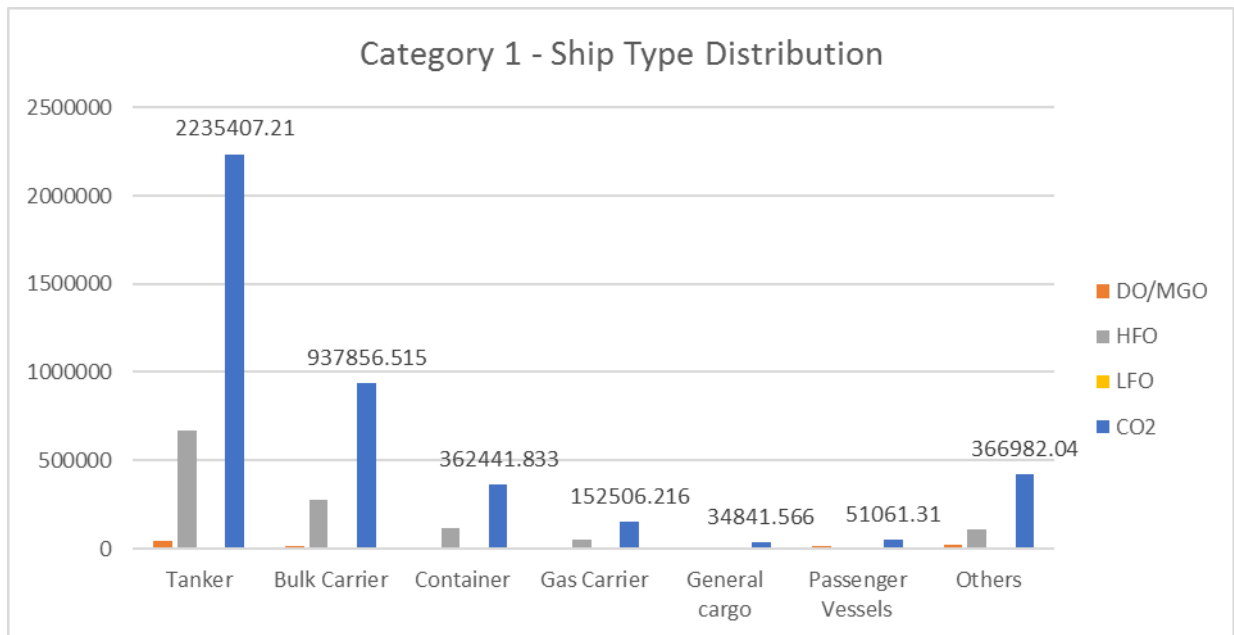
## 1.2 Category 1 Vessels –Distribution by Ship Types

As tankers form the majority of ship types in this category, and owing to their size and fuel consumption, the majority of CO2 emissions are from tankers. The distribution of emissions based on ship types is identical to the one observed for 2019 data.

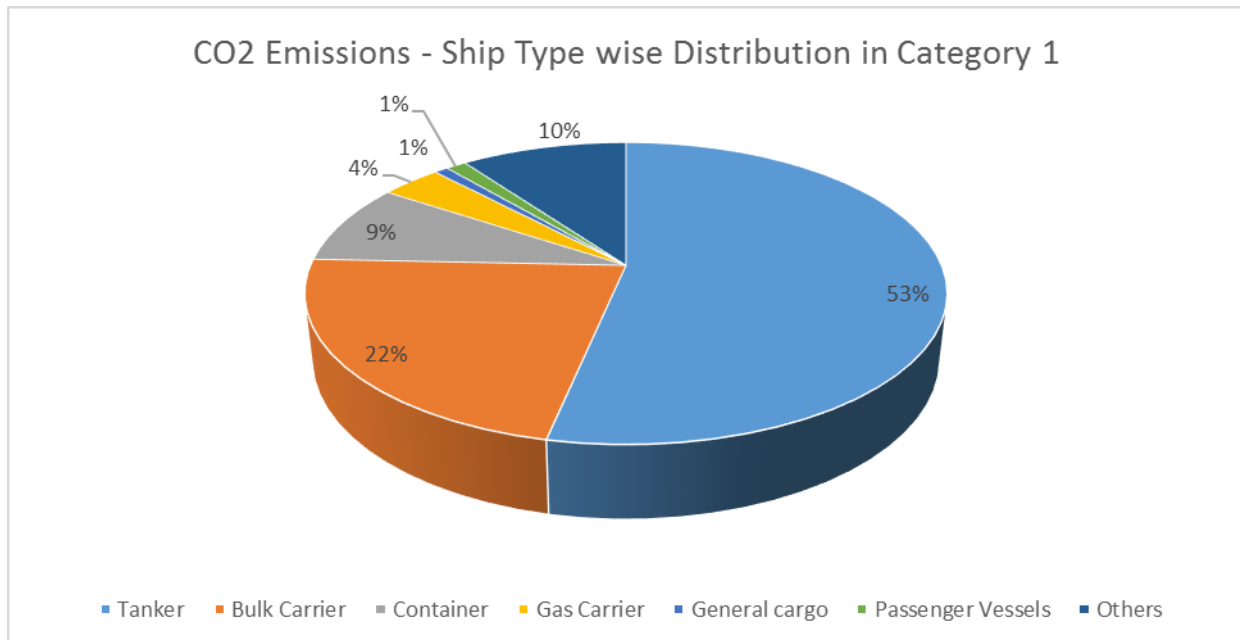
Bulk Carriers and Tankers combined together account for approximately 78% of total CO2 emissions from category 1 ships.

Ship Type	2019		2020					
	No. of Ships	CO2 Emissions (Tonnes)	No. of Ships	DO Consumption	HFO Consumption	LFO Consumption	LNG Consumption	CO2 Emissions (Tonnes)
Tanker	113	2235407	108	37472	194116	395402		1970524
Bulk Carrier	64	937856.5	62	11656	102022	173029		900280
Container	20	362441.8	19	2076	94069	12330		338438.3
Gas Carrier	8	152506.2	12	641	23810	40766		204653.052
General cargo	8	34841.57	5	1930	7198	883		31384.485
Passenger Vessels	7	51061.31	7	10794	1000	616		39660.58
Others	23	366982.04	20	36238	27026	3961	6358	230303.603

2019



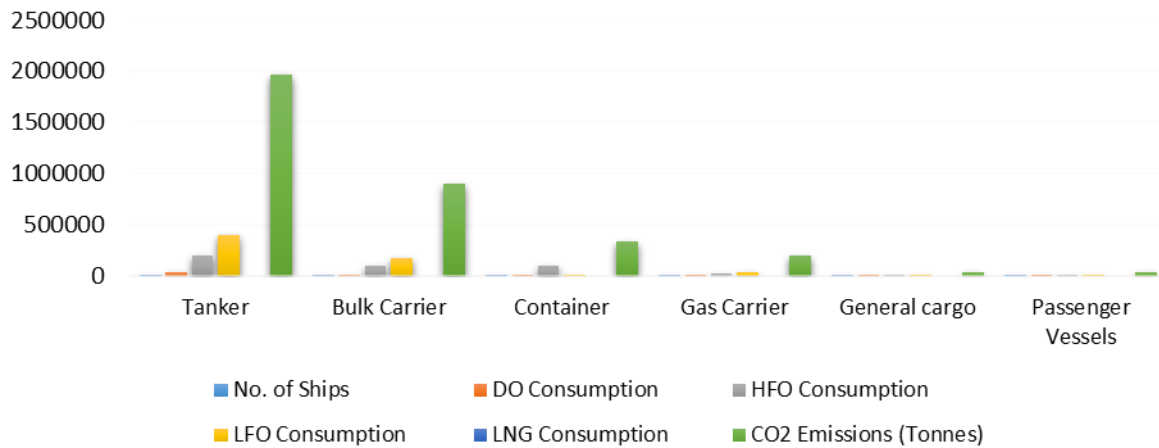
2019





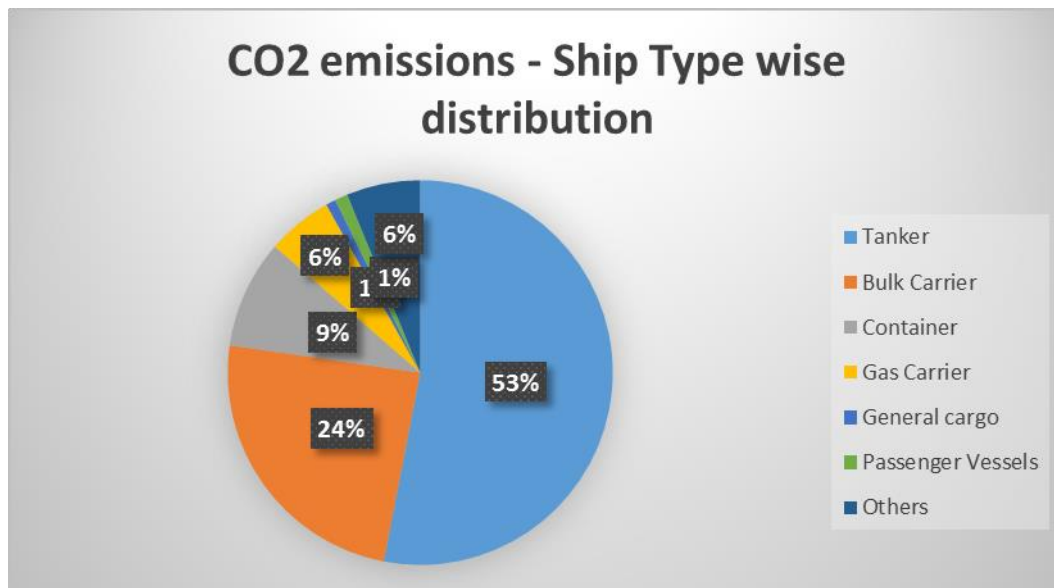
2020

**Ship Type wise distribution - Category 1 ships**



2020

**CO2 emissions - Ship Type wise distribution**

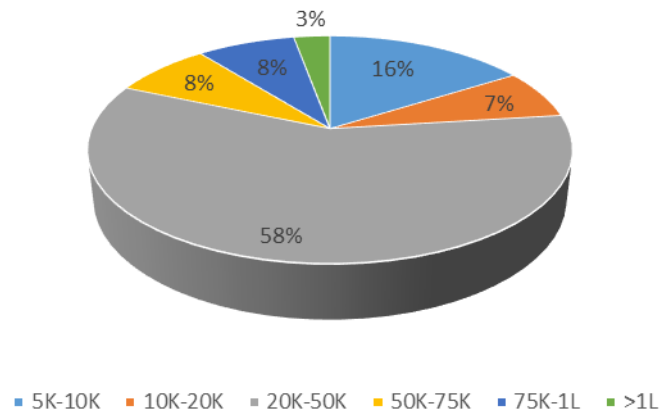


### 1.3 Category 1 Vessels –Distribution based on Ship Size

Size (GT)	2019		2020					
	No. of Ships	CO2 emissions (Tonnes)	No. of Ships	DO Consumption	HFO Consumption	LFO Consumption	LNG Consumption	CO2 Emissions (Tonnes)
5000-10000	39	304599.6	38	44949	43898	12725		320901.34
10K - 20K	17	176667.1	16	6650	37615	4011		151091.67
20K - 50K	142	2191781	133	29202	286712	330910		2029140.19
50K - 75K	19	503509.2	20	9447	19348	127039		490836.643
75K - 100K	19	633289.4	18	6079	46262	100179		479213.17
>100000	7	331250.6	8	4480	15406	52123	6358	244061.24

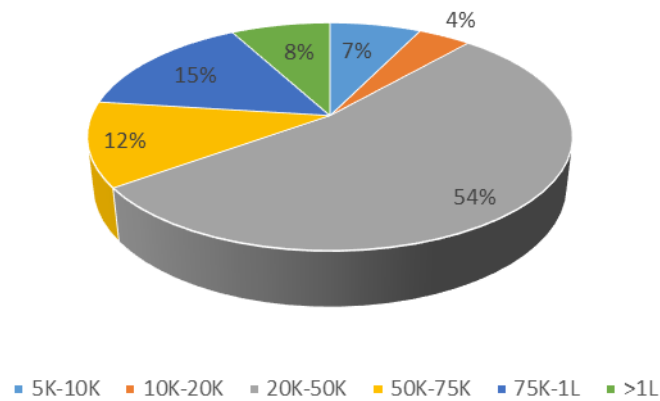
2019

Category 1 ships - Size wise distribution  
No. of Ships



2019

Category 1 - Size wise distribution  
CO2 Emissions

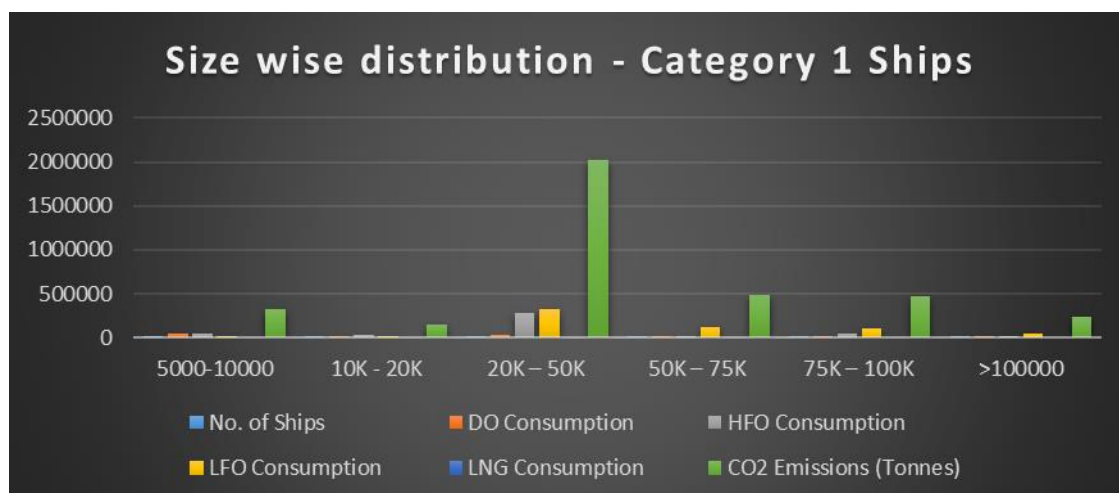


2020

CO2 emissions - Size wise Distribution  
Category 1 ships

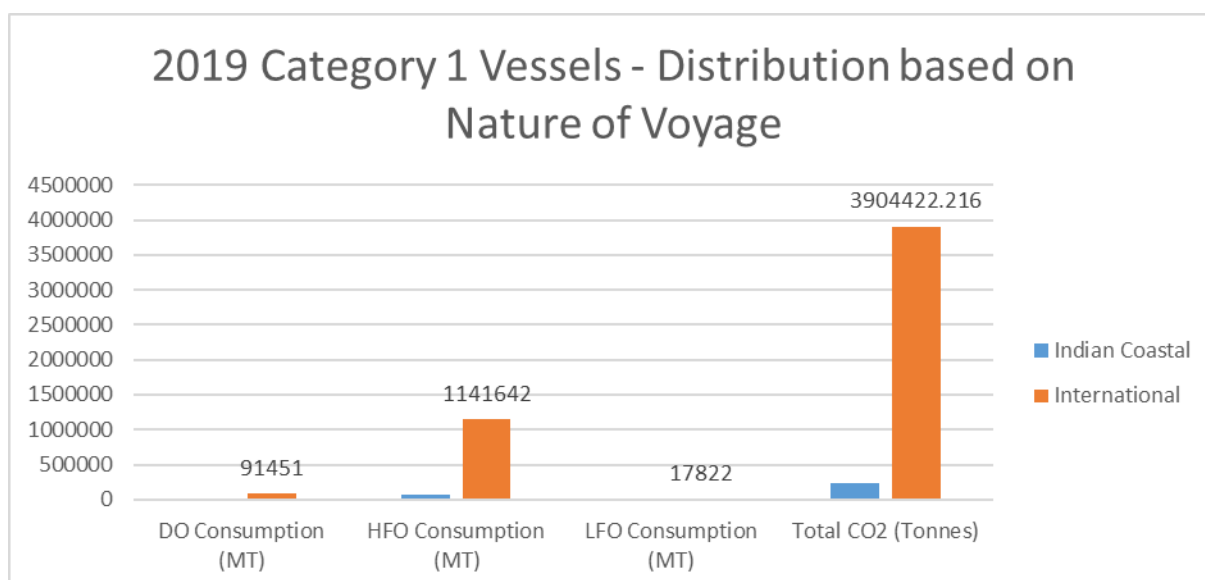


2020

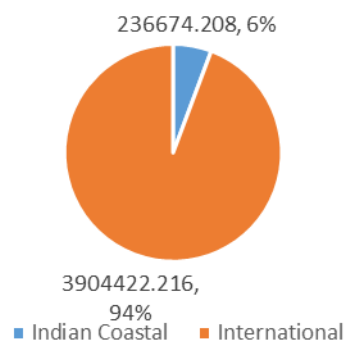


#### 1.4 Category 1 Vessels –Distribution based on Nature of Voyage (2019)

Age of the ship	DO Consumption (MT)	HFO Consumption (MT)	LFO Consumption (MT)	Total CO2 (Tonnes)
Indian Coastal	5253	70077	512	236676
International	91451	1141642	17822	390442.216



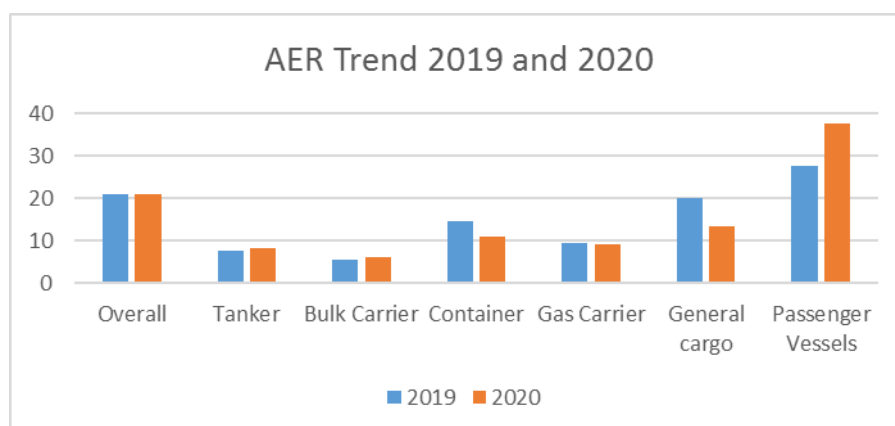
## 2019 Category 1 vessels - CO2 Emissions Nature of Voyage



### 1.4A. Carbon Intensity – Annual Efficiency Ratio (AER)

The carbon intensity has been determined for 2020 in terms of AER i.e. Grams of CO/ DWT-Nm for Cargo ships and Grams of CO<sub>2</sub>/GT-Nm for Passenger Ships and the comparison with 2019 data is tabulated below. The overall AER has increased marginally from 21.03 to 21.06.

	2019 Avg AER	2020 Avg AER
<b>Overall</b>	<b>21.03</b>	<b>21.06</b>
<b>Tanker</b>	<b>7.67</b>	<b>8.16</b>
<b>Bulk Carrier</b>	<b>5.53</b>	<b>6.13</b>
<b>Container</b>	<b>14.64</b>	<b>11.02</b>
<b>Gas Carrier</b>	<b>9.5</b>	<b>9.07</b>
<b>General cargo</b>	<b>20.21</b>	<b>13.38</b>
<b>Passenger Vessels</b>	<b>27.62</b>	<b>37.58</b>

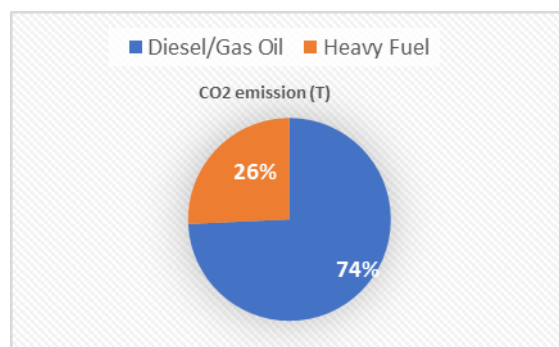
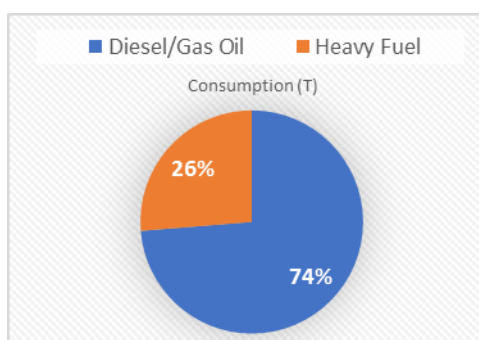
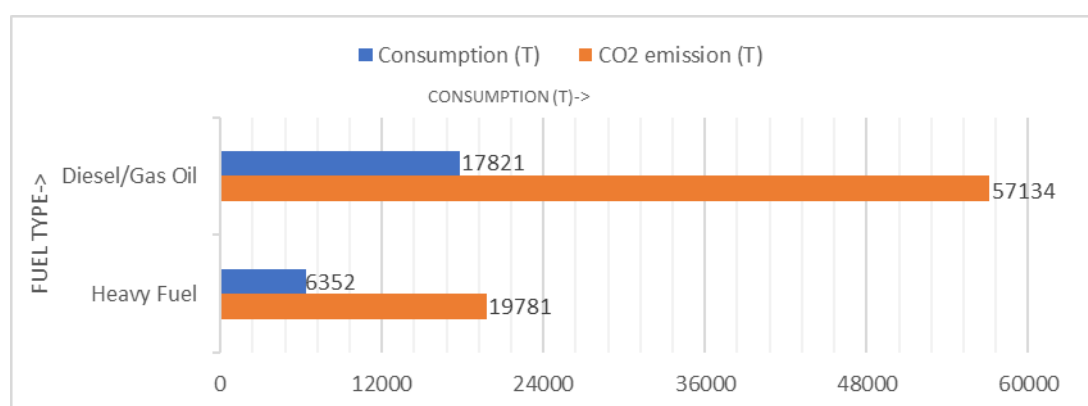


## 2. Data from ships of 5000GT and above certified in accordance with RSV

### Notification or Indian Coastal Vessel Notification

In the year 2019 there were total 10 ships in this category accounting for approximately 0.0769 million tonnes of CO2 emissions

Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	17821	57134.19
Heavy Fuel	6352	19781
Total	24173	76915



Owing to the small number of vessels in this category, detailed data distribution tables is not included.

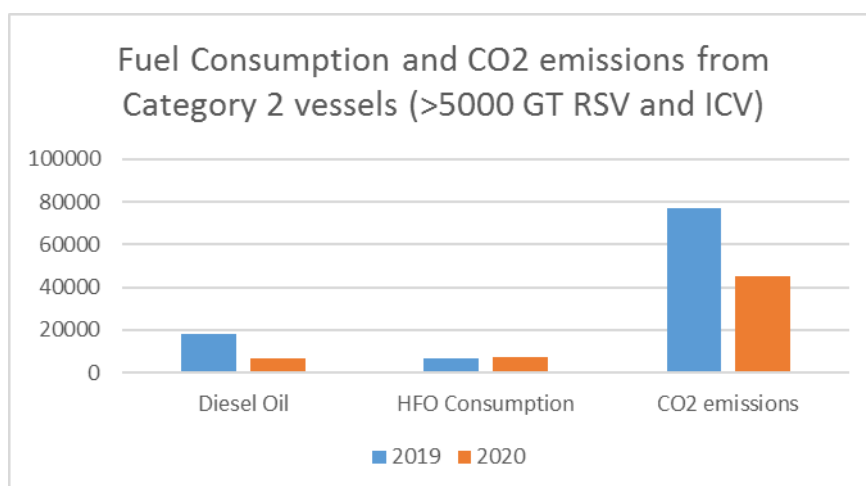
Of the 10 vessels, 7 were dredgers, 1 passenger ship and 2 general cargo ships

Regarding age distribution, 2 ships were in the category 0-5 years, 1 ship in 10-15 year bracket, 2 ships in 15-20 years and 5 ships were over 25 year age.

In the year 2020 there were total 12 ships in this category accounting for approximately 0.04494 million tonnes of CO2 emissions.

In this category there are General Cargo ships and Dredgers. Majority of the emissions in this category of ships is from Dredgers accounting for 0.032417 million tonnes of CO2. The consumption from general cargo ships in this category is lower, owing to the fact that newly 5 general cargo ships were delivered in the latter half of 2020 and as a result did not have significant fuel consumption. Average age of the vessels in this category is 13 years.

Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	6790.6	21770.6636
Heavy Fuel	7441.94	23174.20116
Total		44944.86476

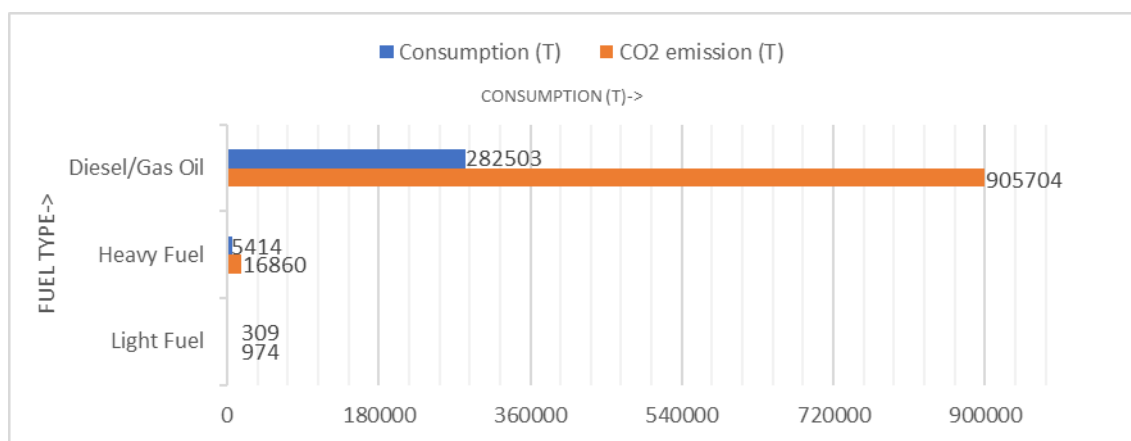


### 3. Data from ships of less than 5000GT

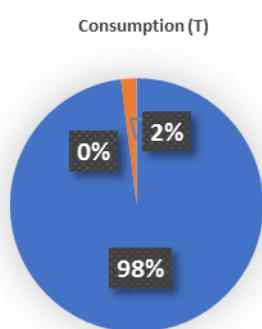
There were total 667 ships in this category accounted for approximately 0.917 million tonnes of CO2 emissions

2019

Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	282503	905704.618
Heavy Fuel	5414	16859.2
Light Fuel Oil	309	973.659
Total	288227	923537.473

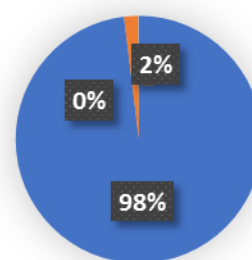


■ Diesel/Gas Oil ■ Heavy Fuel ■ Light Fuel



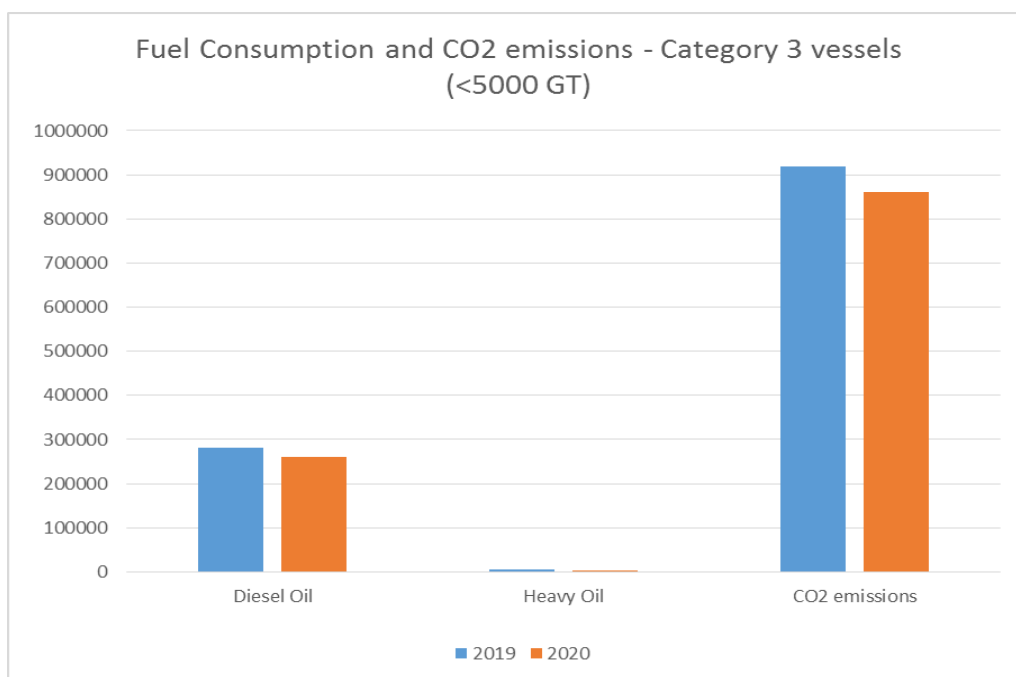
CO2 emission (T)

■ Diesel/Gas Oil ■ Heavy Fuel ■ Light Fuel



In 2020, there were total 631 ships in this category and they accounted for .86 million tonnes of CO2 emissions. Owing to the smaller size of the ships in this category and the nature of engines installed, major consumption of fuel in this category ships was diesel oil. Compared to 2019 data there is a reduction of 6.16% of CO2 emissions from this category. For 2019, the CO2 emissions from this category of vessels was 0.917 million tonnes of CO2 from 667 ships.

Fuel Type	Consumption (MT)	CO2 emission (Tonnes)
Diesel/Gas Oil	261480	838304.9
Heavy Fuel	7374.25	22963.420
Total	268854	861268.3



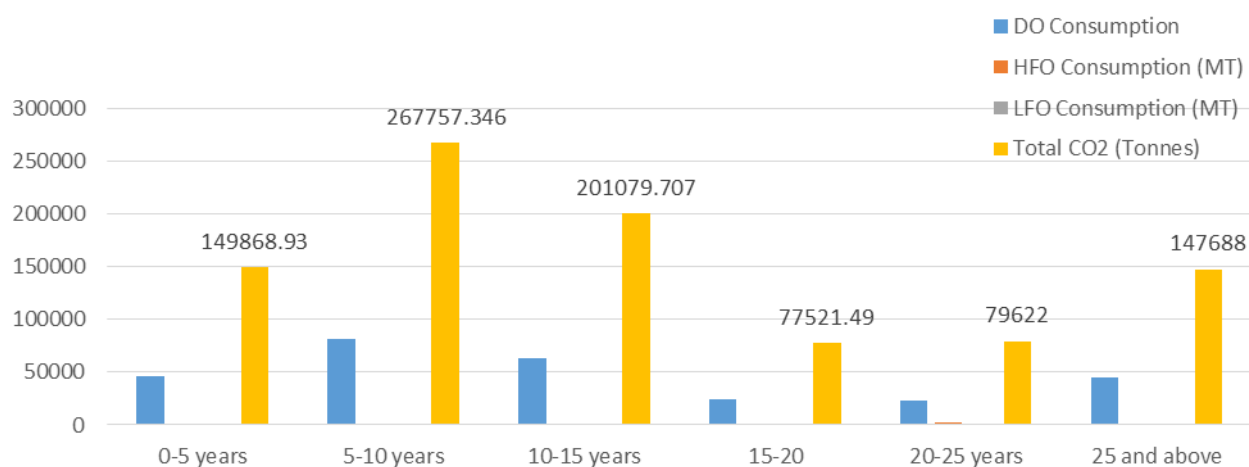
### 3.1 Category 3 Vessels – Age wise distribution

**2019**

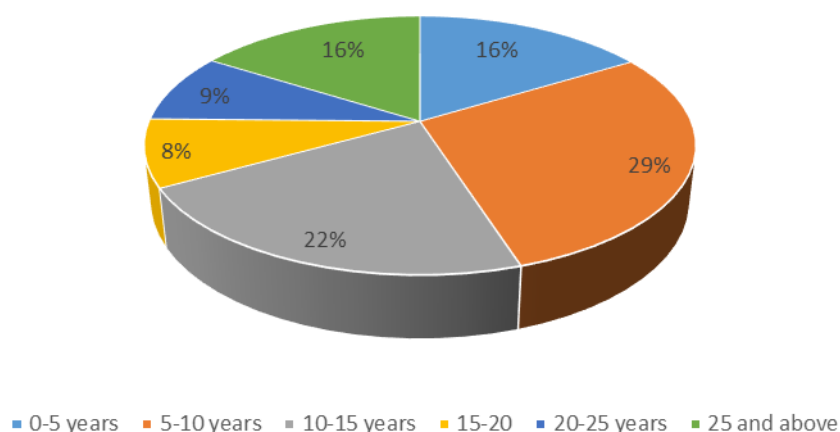
Age of the ship	DO Consumption	HFO Consumption (MT)	LFO Consumption (MT)	Total CO2 (Tonnes)
0-5 years	46232.23	854.038	0	149868.93
5-10 years	81694.67	1100.412	0	267757.346
10-15 years	62689.09	436.55	0	201079.707
15-20	24180	0	0	77521.49
20-25 years	22839.4	2055	0	79622
25 and above	44867.61	968	309	147688



## Age-wise distribution of Category 3 vessels

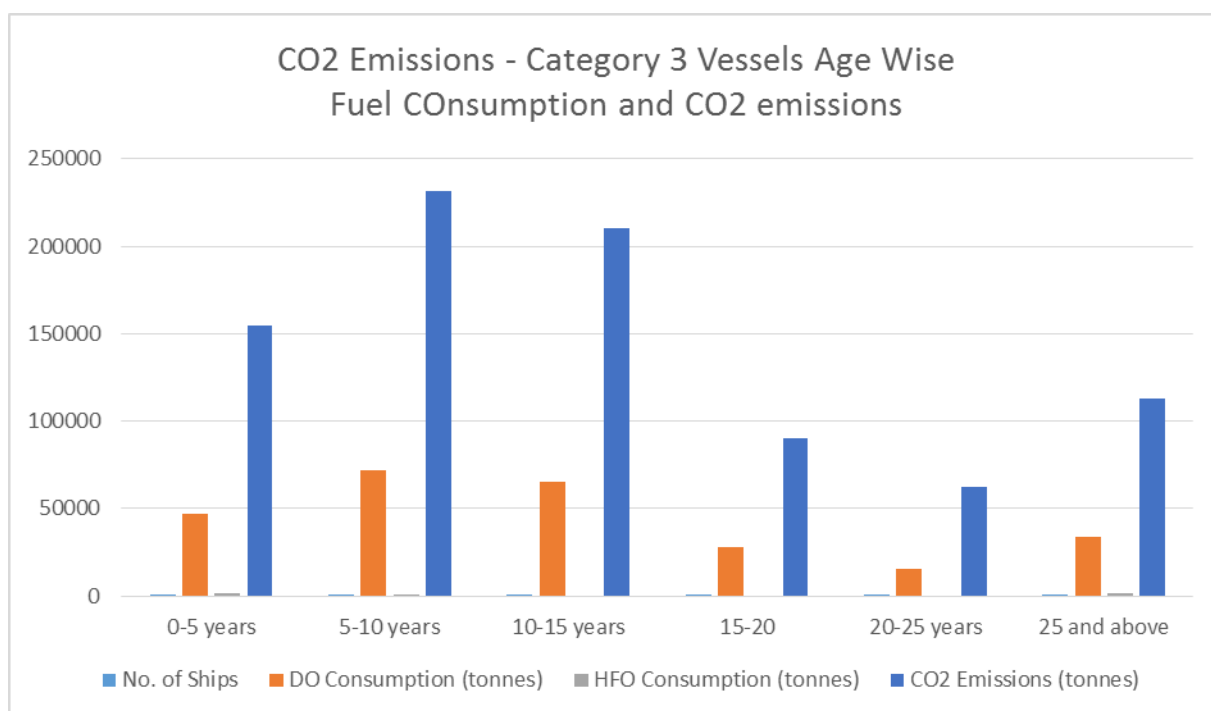
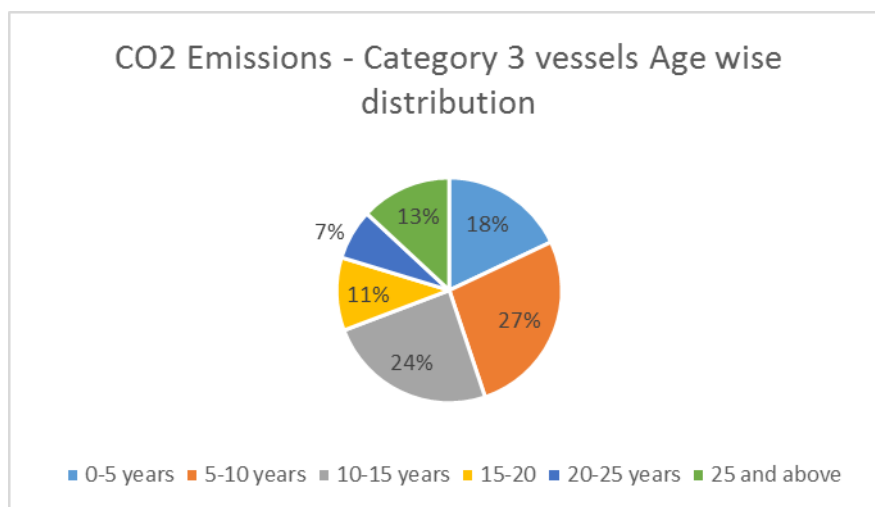


## CO2 Emissions in Category 3 - Age wise



2020

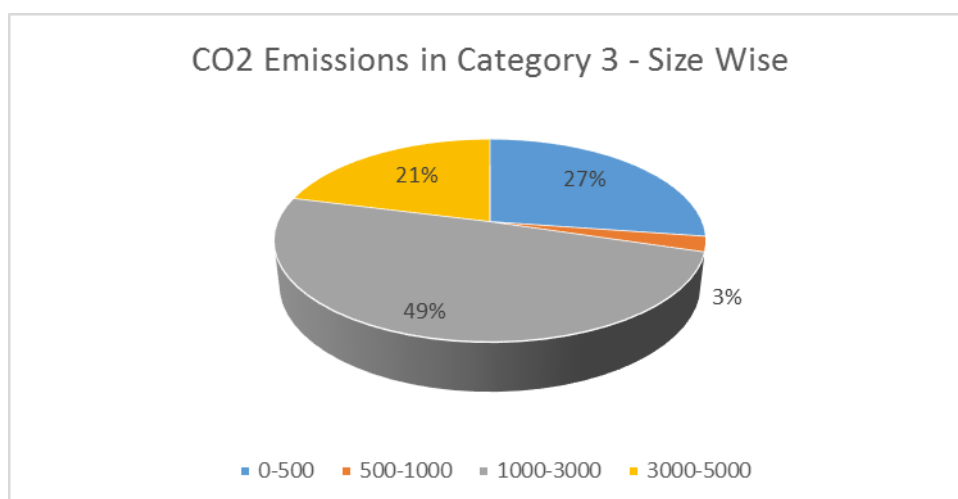
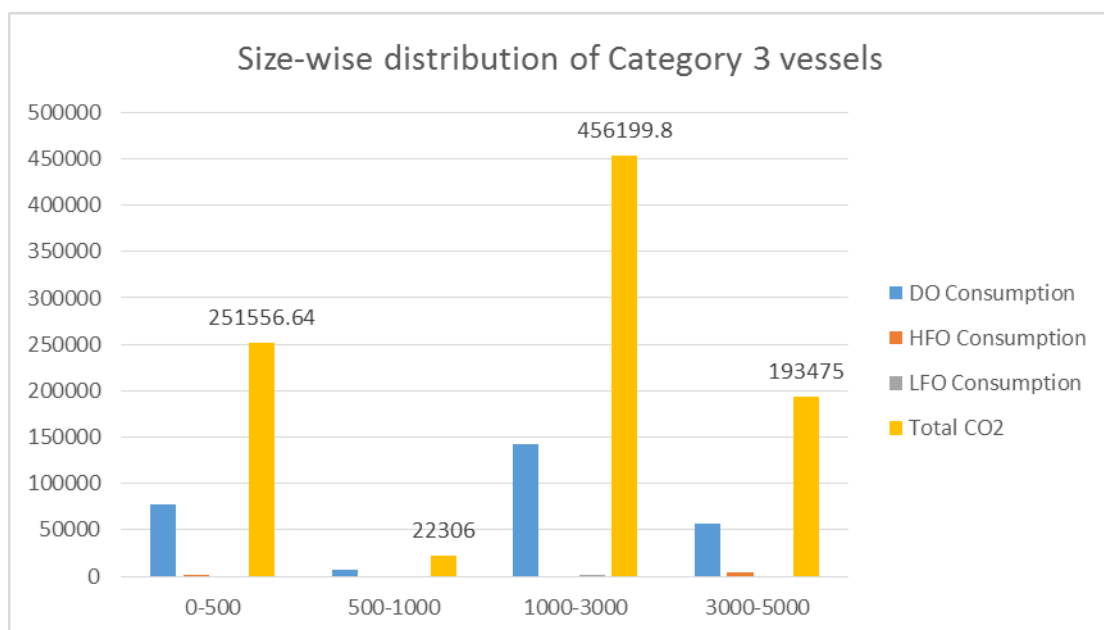
Age of the ship	No. of Ships	DO Consumption (tonnes)	HFO Consumption (tonnes)	CO2 Emissions (tonnes)
0-5 years	121	46839.76	1489.34	154806.1
5-10 years	150	72002.25	213.23	231503.2
10-15 years	116	65507.5		210017.1
15-20	72	28185.6		90363.02
20-25 years	69	15350.51	4119.4	62041.55
25 and above	103	33594.4	1552.28	112537.4



Ships aged 5-10 and 10-15 years account for the most number of ships and hence the major contribution of CO2 emissions in this category. Diesel Oil is the type of fuel majorly used in this category.

### 3.2 Category 3 Vessels – Size wise Distribution

Size (GT)	DO Consumption	HFO Consumption	LFO Consumption	Total CO2
0-500	77230.32	1538	0	251556.6
500-1000	6958	0	0	22306
1000-3000	141731.7	0	309	456199.8
3000-5000	56583	3876	0	193475

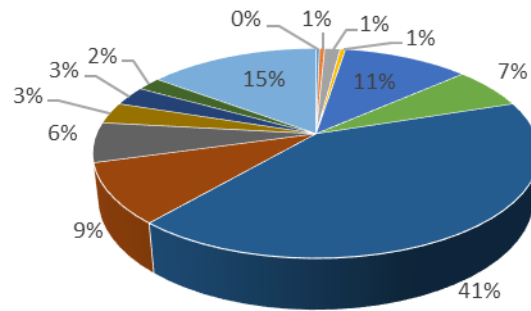


### 3.3 Category 3 Vessels – Ship Type wise distribution

2019

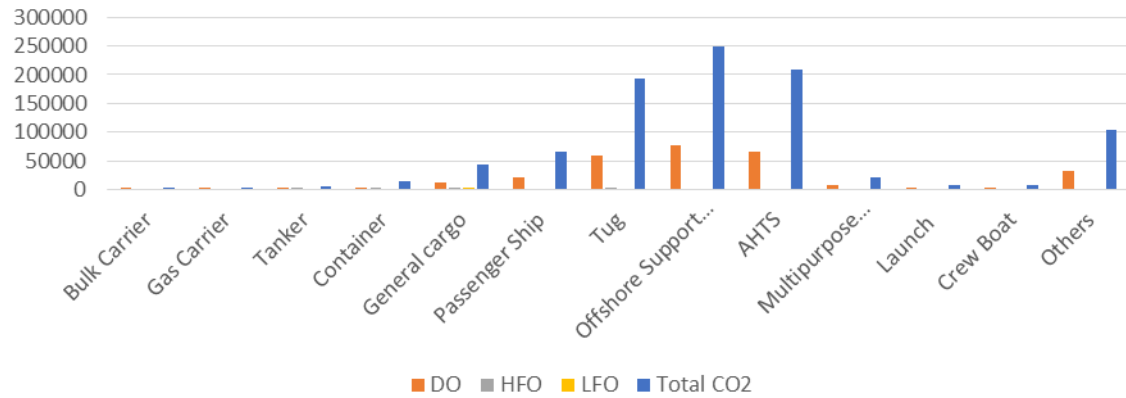
Ship Type	DO	HFO	LFO	Total CO2
Bulk Carrier	1195	0	0	3831.17
Gas Carrier	1163	0	0	3728.578
Tanker	989	968	0	6185.086
Container	2186	2054	0	13404.472
General cargo	12420	854	309	43451.535
Passenger Ship	20559	0	0	65912.154
Tug	59051.19	1538.1	0	194107.759
Offshore Support Vessel	77524	0	0	248541.944
AHTS	65024.8	0	0	208469.509
Multipurpose Utility Vessel	6833.12	0	0	21906.9827
Launch	2310.22	0	0	7406.56532
Crew Boat	2058.08	0	0	6598.20448
Others	32384.59	0	0	103824.996

No. Of Ships - Category 3  
Ship Type wise

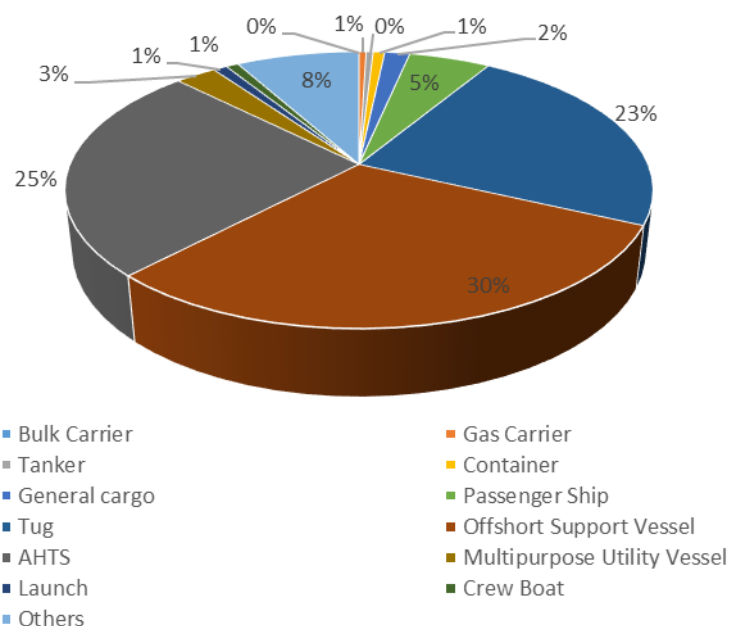


- Bulk Carrier
- Gas Carrier
- Tanker
- Container
- General cargo
- Passenger Ship
- Tug
- Offshore Support Vessel
- AHTS
- Multipurpose Utility Vessel
- Launch
- Crew Boat
- Others

Ship Type wise distribution of Category 3  
vessels



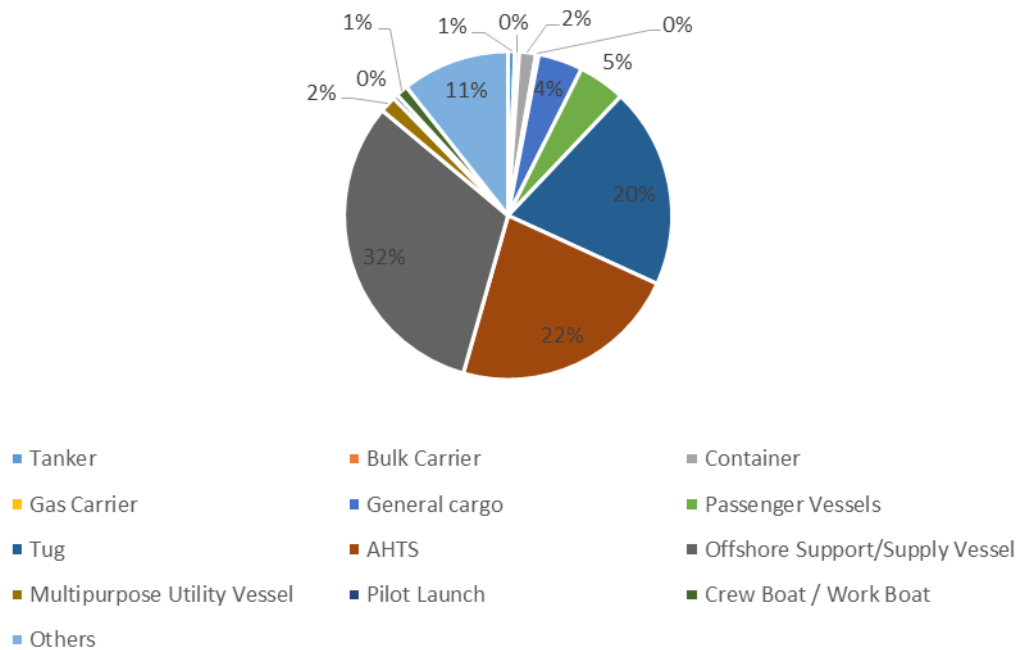
CO2 Emissions in Category 3 - Ship Type Wise



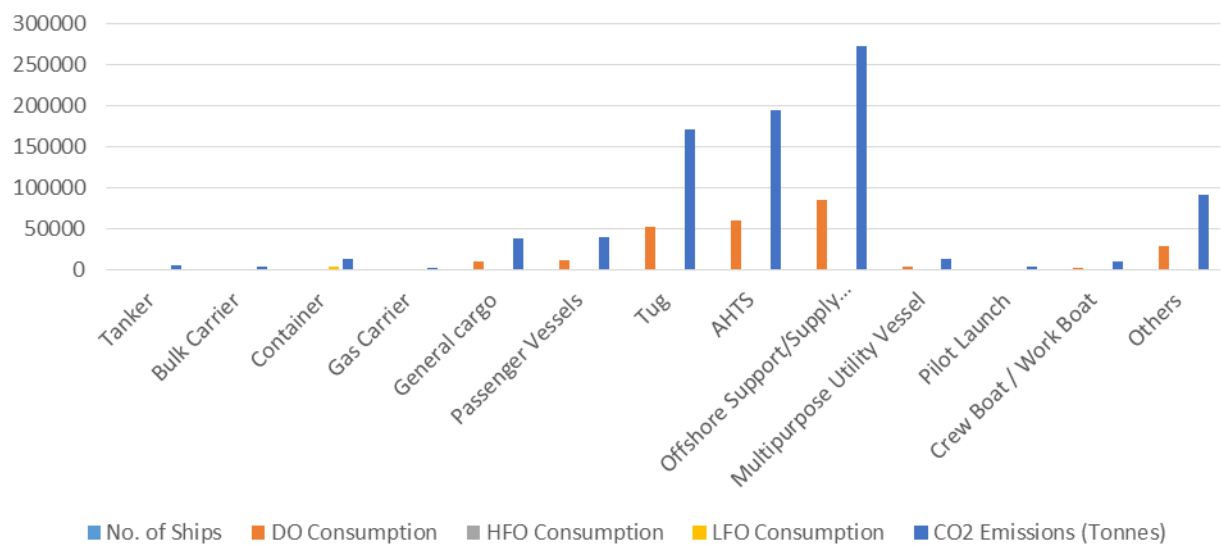
2020

Ship Type	DO Consumption	HFO Consumption	CO2 Emissions (Tonnes)
Tanker	674.204	1183.17	5845.8894
Bulk Carrier	1132.33		3630.24998
Container	434.38	4007	13870.4203
Gas Carrier	778.632		2496.29419
General cargo	9963.566	1890.85	37831.2995
Passenger Vessels	12520.24		40139.9023
Tug	52870.06	293.23	170414.543
AHTS	60692.11		194578.905
Offshore Support/Supply Vessel	84981.42		272450.433
Multipurpose Utility Vessel	4352.36		13953.6662
Pilot Launch	1258.54		4034.87924
Crew Boat / Work Boat	3190.79		10229.6727
Others	28631.36		91792.1402

Ship Type Wise distribution of CO2 Emissions - Category 3 Ships



Fuel Consumption and CO2 emissions



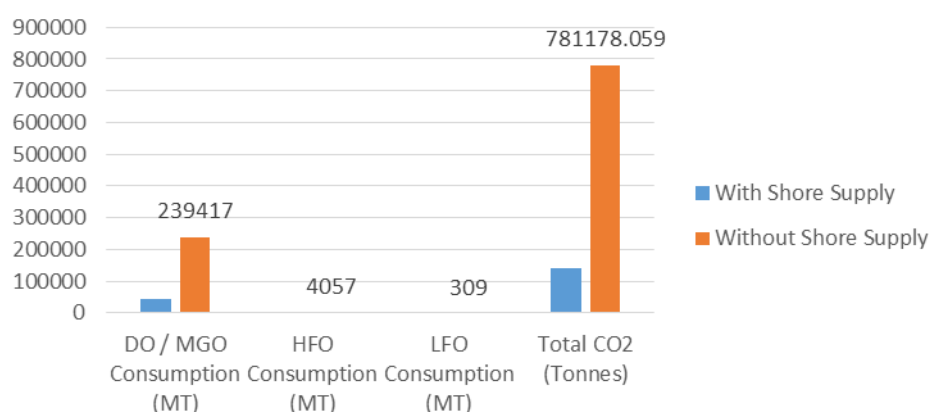
In this category, Tugs, AHTS and Offshore Support/Supply Vessels are the major contributors to CO2 emissions

## 4. Shore Supply

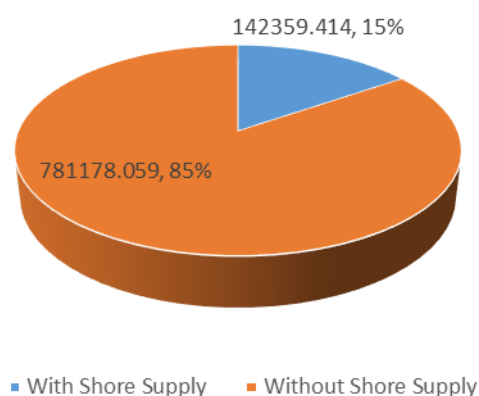
In this category in 2019, 169 vessels reported use of shore power supply whereas 458 vessels did not use shore supply. The distribution of fuel consumption and CO2 emissions from such ships is as below

Whether Shore Supply Used	DO / MGO Consumption (MT)	HFO Consumption (MT)	LFO Consumption (MT)	Total CO2 (Tonnes)
With Shore Supply	43086	1357	0	142359.4
Without Shore Supply	239417	4057	309	781178.1

Category 3 Vessels - Distribution based on whether Shore Supply used

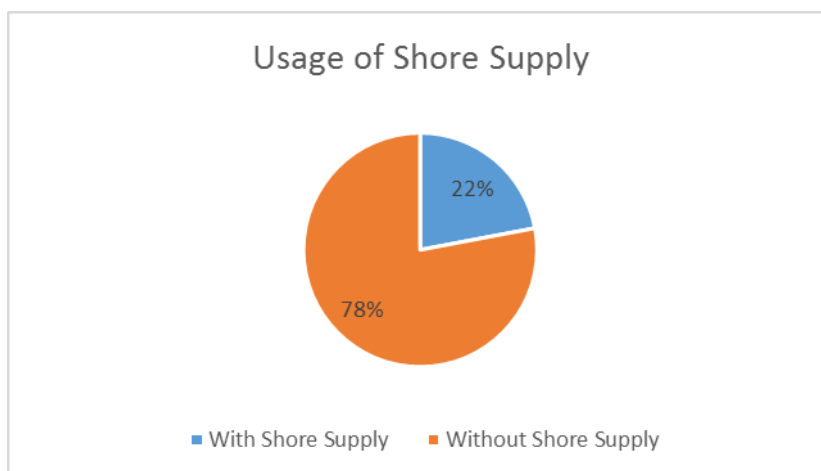


Category 3 vessels - CO2 Emissions based on whether shore supply used

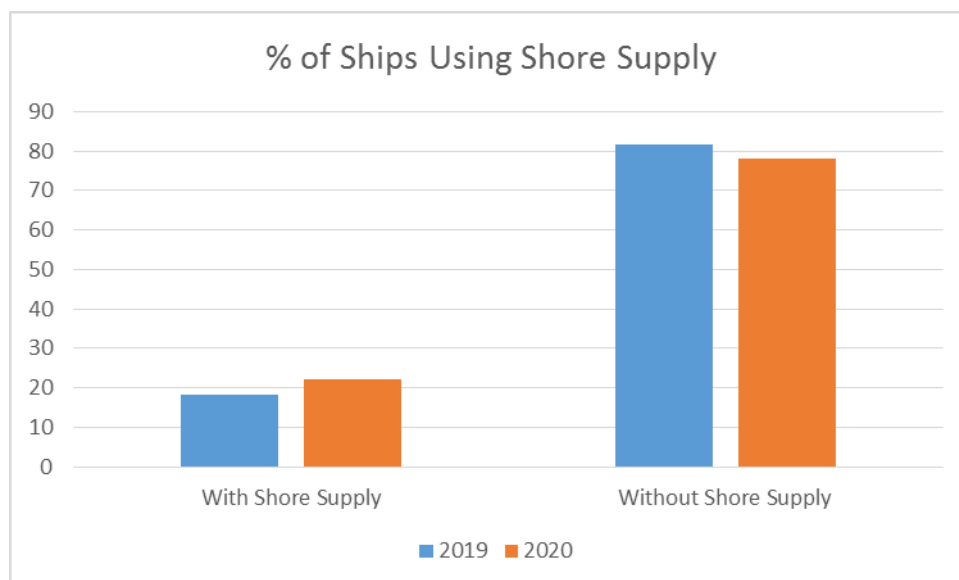


A total of 193 out of 876 vessels reported usage of shore supply at some point during the calendar year 2020

No. of Ships	With Shore Supply			Without Shore Supply		
	Category 1	Category 2	Category 3	Category 1	Category 2	Category 3
	9	2	182	224	10	449
	193			683		



Compared to 2019, there is a 4 % increase in percentage of ships reporting usage of shore power.





## **5. Conclusions**

### **5.1 Conclusion for 2019**

1. Total CO2 emissions from Indian Flag vessels is approximately 5.1 million tonnes from all 3 categories of vessels as per DGS Engineering Circular 2 of 2018.
2. Owing to their larger size and distance travelled, ships of category 1, i.e. ships of 5000 GT and above on international voyages, account for nearly 81% emissions from Indian Flag vessels.
3. The majority of contribution to CO2 emissions in category 1 vessels is from ship types Tankers and Bulk Carriers.
4. There are a small number of ships in category 2, i.e. Ships of 5000 GT and above registered under RSV or ICV notification. There were 10 ships in this category accounting for approximately 0.0769 million tonnes of CO2 emissions.
5. When we focus on ships of category 3, i.e. ships of less than 5000 GT, these are plying mostly on Indian coastal waters. The CO2 emissions from these vessels is approximately 0.917 million tonnes.
6. Category 3 vessels account for nearly 17.8 % emissions from Indian Flag vessels. In this category, major contribution is from ship types Offshore Supply vessels, Tugs and Anchoring Handling Tugs/Supply vessels.

### **5.2 Conclusions for 2020**

1. Total CO2 emissions from Indian Flag vessels is approximately 4.62 million tonnes of CO2 from all 3 categories of vessels as per DGS Engineering Circular 2 of 2018. This represents a 9.4% reduction in CO2 emissions compared to 2019.
2. The reasons could be attributed to the reduction in number of applicable ships, reduced cargo movement due to COVID-19 pandemic and to a certain extent to the awareness amongst the shipping community to reduce emissions owing to the regulatory requirements. However, the carbon intensity in terms of average annual AER has marginally increased from 21.03 to 21.06 Grams CO2/DWT-Nm
3. Owing to their larger size and distance travelled, ships of category 1 , i.e. ships of 5000 GT and above on international voyages, account for nearly 80.4% emissions from Indian Flag vessels.
4. The majority of contribution to CO2 emissions in category 1 vessels is from ship types Tankers and Bulk Carriers.

5. There are a small number of ships in category 2, i.e. Ships of 5000 GT and above registered under RSV or ICV notification. There were 12 ships in this category accounting for approximately 0.04494 million tonnes. This figure for 2019 was 0.0769 million tonnes of CO2 emissions, thus representing a reduction of approximately 42%. The consumption from general cargo ships in this category is lower, owing to the fact that newly 5 general cargo ships were delivered in the latter half of 2020 and as a result did not have significant fuel consumption.
6. When we focus on ships of category 3, i.e. ships of less than 5000 GT, these are plying mostly on Indian coastal waters. The CO2 emissions from these vessels is approximately 0.86 million tonnes. This figure for 2019 was 0.917 million tonnes, thus representing a reduction Of 6.3%
7. Category 3 vessels account for nearly 18.6% emissions from Indian Flag vessels. In this category, major contribution is from ship types Offshore Supply vessels, Tugs and Anchoring Handling Tugs/Supply vessels.



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