सत्यमेव जयते

आज़ादी का अमृत महोत्सव

Marine Environmental Management Report 2023

MESSAGE

Director General of Shipping

Sustainable development has become a major focus of International Policy since the United Nations Declaration on Sustainable Development in 2015, endorsed by all 193 member countries. It identifies three core objectives for human development – economic growth, social inclusion and environmental sustainability.

India as a signatory to the Sustainable Development Goals (SDGs) Declaration has proactively initiated Digital India programme with focus on providing digital infrastructure as a core utility, digital services on demand and digital empowerment to all citizens.

The Digital India programme of the government of India, launched in 2015, is an ambitious initiative, which seeks to effect both process improvements as well as transform governance for the future in India through massive digitization efforts.

As part of its effort to achieve Sustainable shipping through facilitation, and monitoring, the Directorate in 2018 developed an on-line platform named "Swachh Sagar" with an initial aim to facilitate provisioning of waste reception facilities to visiting ship at Indian ports and monitor end-to-end disposal of the receipt waste.

In late 2018, the Directorate prohibited use and carriage of items made of Single use plastics on Indian ships and usage of same by foreign ships while at Indian ports. Over the next few years, the 'Swachh sagar' portal was further developed into "Indian Maritime Environmental Information Management Portal" with following objectives:

- To facilitate various environment related services to ships visiting Indian ports.
- To gather data related to various sustainability issues, analyse the same and initiate improvements through infrastructure, training and dialogue.
- Future policy decisions related to Green and Sustainable Shipping.
- Assist IMO with regulatory amendments by submitting documents based on data collection and analysis.

This 'Maritime Environmental Management Report' is a first of kind initiatives to analyse and put forth before the large stakeholders our performance on various aspects of Sustainability Indicators captured on 'Swachh Sagar', be it adequacy of Port Reception facilities at Indian ports, prohibition on Single Use Plastics or Carbon Emissions from Indian shipping.

I am please to present the first Annual Environmental Management Report on Sustainability Indicators in India, which we trust will be useful, in our continuous endeavour to enrich the Indian Maritime sector and strive for an enviable standard in all aspects of the shipping industry.

Shri ShyamJagannathan, IAS
Director General of Shipping cum
Additional Secretary to The Govt. of India

MESSAGE

Chief Surveyor

In 2019, Indian Maritime Administration developed a module on provisioning of waste reception facilities to visiting ships at Indian ports as the first module on Swachh Sagar Environmental Portal.

Over the years the following, more modules are added to the portal:

i. **Bunker Supplier Information System**: Generation of Bunker Delivery Receipt.

ii. **Single Use Plastics**: Module on Plastic Generation on Indian ships with Prohibition on Single Use Plastic usage in place.

iii. **Fuel Consumption Reporting**: Indian Ships Operational Profile and Fuel Consumption data related to various operations.

iv. **Ballast Water System**: Technical issues with Ballast Water Treatment Systems and issues related to ports with challenging waters.

v. On-line Assessment of Port Reception Facilities

vi. Audits of Recognized Organizations

There are efforts to add following additional modules in due course:

i. Facilitating submission and approval of ship recycling plans by visiting ships.

ii. Approval of Ship Recycling Facilities to Hong Kong Ship Recycling Convention.

iii. Issuance of Statement of Completion of Ship Recycling.

iv. Tracking and display: Safety, Environmental and Social Performance indicators for Indian ship recycling Industry, each yard and for each ship recycled.

v. Provision for foreign ships to submit their fuel consumption data for the incoming voyages and various operational profiles such as anchorage/port stay etc. in India.

vi. Facilitation of India's involvement in IMO.

A Sustainable Maritime Transportation System is only possible when it minimize the environmental impact of shipping and activities of maritime industries. Environmental stewardship should be reflected in the development and implementation of global standards for pollution prevention and protection of the marine environment.

As part of its sustainable shipping and Port initiatives, the Indian Maritime Administration has decided not only to create a number of modules to prevent illegal discharges, facilitate ships to comply with environmental regulations, monitor ships and port environmental performance by capturing various aspects of their actives, Indian Maritime Administration has now decided to develop areas of improvement via this first Environmental Management Report.

I hope all stakeholders be it ports, ship owners or seafarers or bunker suppliers or Recognized Organizations will draw areas of improvement from this report and prepare for and implement procedural changes for improved indicators next year.

Shri Ajithkumar Sukumaran
Chief Surveyor cum Addl. Director General (Engg.)
with the Govt. of India

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Directorate General of Shipping wants to convey its regard for the invaluable support of the Indian Register of Shipping and the Institute of Marine Engineers (India) in compiling this report.

CO_2 Emissions from Indian Shipping and Initiatives for Green Shipping

Preface

Carbon Emission from Indian Ships

In order to have develop policies and regulations for CO2 emissions from international shipping, it was imperative to have an inventory of CO2 emissions from ships (which directly depends on the fuel consumption) and with this intention the IMO Data Collection System was started.

1. The data collection for IMO's fuel data collection system (DCS) started on 1 January 2019. DCS aggregates data such as fuel consumption, distance travelled and hours underway for individual ships of 5,000 GT and above.
2. To ensure compliance with IMO DCS:
   i. Ships of 5'000 GT and above have to submit annual reports on fuel consumption, distance travelled and hours underway to their Administration, according to the Methodology set out in the Part II of the Ship Energy Efficiency Monitoring Plan (SEEMP).
   ii. Aggregated data will be reported to a ship's flag State after the end of each calendar year, which will need to verify that the data has been reported in accordance with the requirements before issuing a Statement of Compliance to the ship.
   iii. Administrations will submit aggregated data to IMO for anonymized publication.
3. To ensure that data from all ships are collected at one place, the Directorate has ensured the following:
   i. Ships of 5000 GT& above (except those Certified as RSV/ICV) can report annual aggregated data to any Recognized Organization, which after verification can issue a Statement of Compliance, but the reporting of data to IMO is only delegated to IRS.
   ii. **Ships of 5000 GT** & above and certified as RSV/ICV and ships of less than 5000 GT are required to report their annual aggregated fuel consumption data to IRS without any need for verification and issuance of any statement of compliance.
4. The Directorate reviews the aggregated data and publishes the annual fuel consumption data analysis report and in that series, this is the third review based on data collected for the calendar year 2022.

Key Statistics of CO2 emissions from Indian Shipping:

1. The information gathered demonstrates following key information about carbon emissions from Indian Shipping:
   i. There is consistently about 20% of total emissions from ships less than 5000 GT and those of 5000 GT & above and certified as RSV or ICV.
   ii. Considering that: (a) all Ships of less than 5000 GT on Coastal Run, (b) all Ships certified as RSV or ICV on Coastal Run and (c) Only 135 Ships of 5000 GT and above on Foreign Run, the emissions from Coastal run contributes to about 27.5% + 19.7% = 47.2% of total emissions from Indian Ships.

   iii. The total emissions from Indian shipping is less than 5 Million M-T and that from those on International voyages is about 2.56 Million MT. In 2018, as per IMO 4th GHG Study, International shipping emitted 740 M-MT of CO2 emissions and based on this data, Indian international shipping contribution is about 0.3%.

Size based analysis

2. The review of data based per GT and per deadweight provide following information:
   i. CO2 Emission per Ship (Million Tones /Ship) has remained at about 0.0056.
   ii. Annual carbon emissions in Metric-Tones/GT has remained same at about 0.495 in 2022 and 2021 and when compared to 2019 (leaving 2020 due to impact of COVID-19) has reduced from 0.512 to 0.495, that is, about 3.3%.
   iii. The Annual Carbon Emissions per Deadweight (Tons of Carbon Emissions /Deadweight) has remained about 0.3 in 2022 and 2021 and when compared to 2019 (leaving 2020 due to impact of COVID-19) has reduced from 0.308 to 0.297, that is, about 9.5%.
3. The above all indicates that there is no much change in design energy efficiency, usage of alternate fuels or shore power supply to ships or shore power after 2020 and a small decrease is due to a very small number of ships using biofuels and being supplied by shore power supply.

Ships of 5000 GT & above except those Certified as RSV or ICV

4. These sizes of ships contribute to about 80% of total emissions from Indian ships. Further differentiation based on voyages, it is noted that only about 135 ships are on International voyages out of 236 total ships of 5000 GT and above.

5. Out of 135 ships on international voyages, only about 49, that is 36.3% are underway for more than 50% of their operating time in a calendar year. Compared to these, there are about 101 vessels on coastal run and about 33, that is, 32.6% are underway for more than 50% of their operational time. This indicates a huge possibility to reduce emissions through JIT & Shore Power supply.

6. Though tankers and bulk carriers contribute to about 46.5% and 23.5% of total carbon emissions from Ships of 5000 GT & above respectively, their efficiency can be gauged from the fact that they emit on an average about 0.2 Tons carbon per deadweight compared to 0.61 by container, 0.46 by gas carriers and 0.35 by general cargo ships.

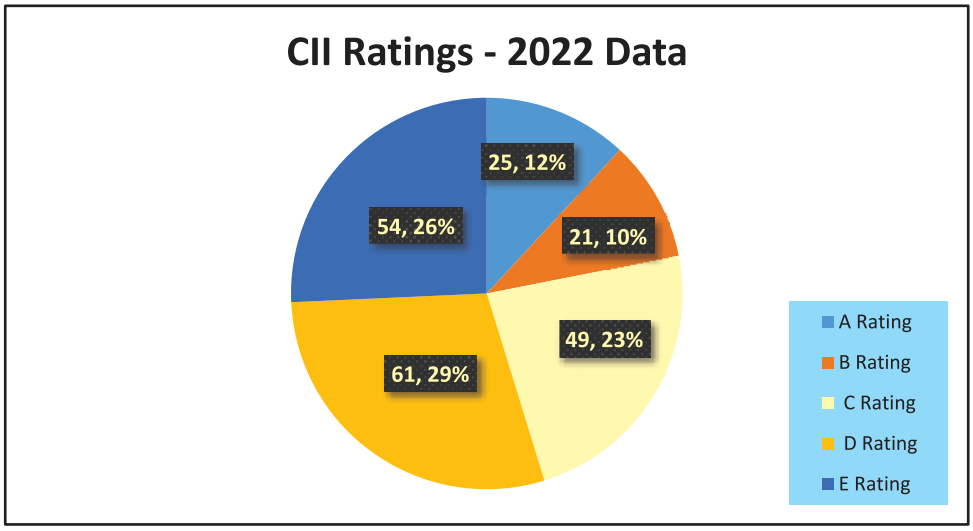
7. Operational Carbon Intensity

   i. Starting in 2024, the Annual Attained CII must be reported based on the DCS data of the previous year to the DCS verifier. The CII rating (A to E) will then be assigned and mentioned on the Statement of Compliance (SoC) - Ship Fuel Oil Consumption Reporting and Operational CII Rating. While the rating will be assigned annually based on preceding year's fuel consumption data, the SOC is required to be kept on board for five years.

   ii. A comparison between the Average AER of various ships types as detailed in IMO 4th GHG Study and that achieved by Indian Ships in 2022 demonstrates lower operational carbon intensity of Indian ships as can be seen below:

Ship Type	Vessel based Average AER in 2018 from IMO 4th GHG Study	Vessel based AER of Indian Ships
Bulk Carrier	3.8	5.85
Tanker	4.5	7.72
Container	9.5	10.8
General Cargo	14.4	13.11
Gas Carrier	11.5	13.56

An assessment has been done based on the data reported for 2022 and the projected CII Ratings are below

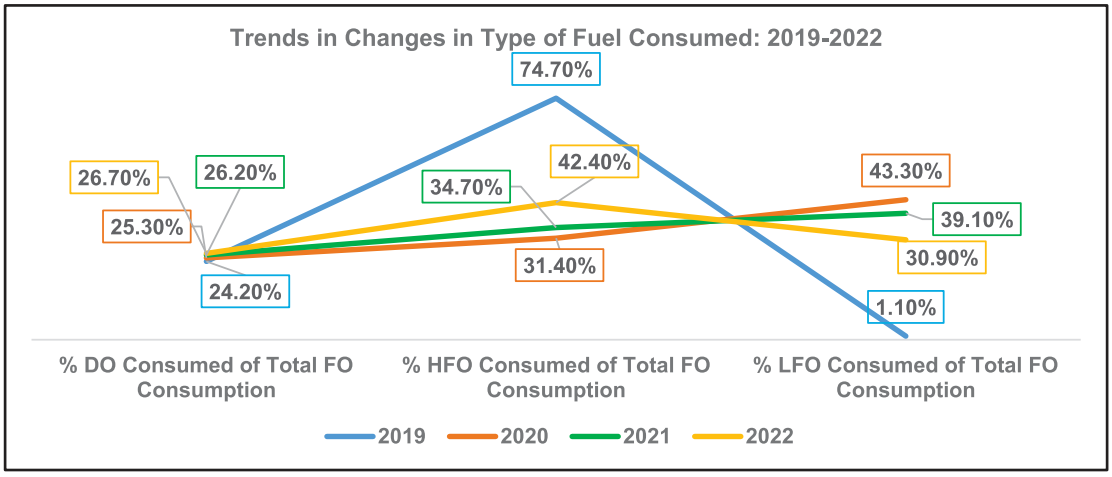


Ships less than 5000 GT

8. Out of a total 867 Indian ships, these sizes of ship are about 612, that is, 70.6% of total ships under Indian registry. These sizes of ships emits about 19% of total emissions from Indian ships.
9. Compared to ships of 5000 GT & above, Carbon Emission Tons per GT & Tons per deadweight is more than one, that is, about 1.52 & 1.6 respectively, indicating a composition comprising of a higher number of service vessels.
10. Compared to other types, Tugs & Offshore Supply vessels form a large part of this fleet and comprises about 274 and 87 vessels respectively, that is, about 45% and 14% respectively and about 59% in total.
11. Tugs emit about 0.201 Million Tons of Carbon per year and Offshore supply vessels about 0.3432 Million Tons of Carbon per year, that is, about 22% and 37.5% of all carbon emissions respectively from ships less than 5000 GT and together they emit about 59.5%.

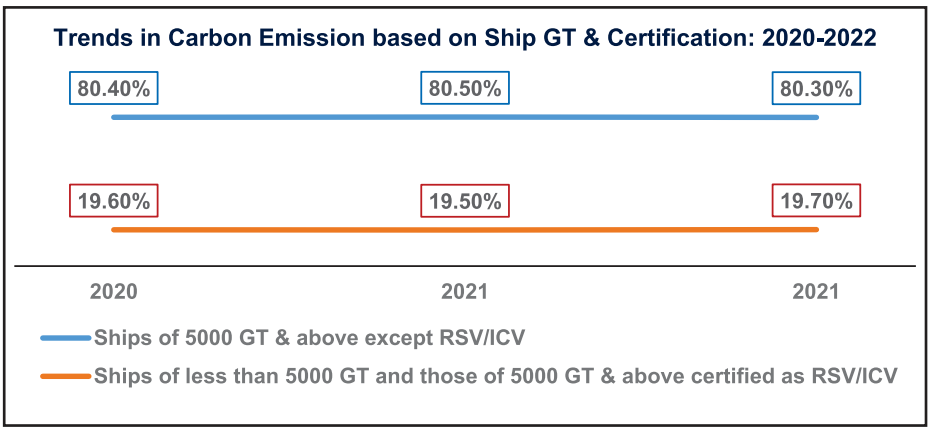
Fuel Consumption Data for 2022 Calendar Year
Comparative Carbon Emissions and Fuel Consumption: 2019-2022

Calendar Year	Gross Carbon Emissions (MT)	Gross Diesel Oil Consumption (MT)	Gross Heavy Fuel Oil Consumption (MT)	Gross Light Fuel Oil Consumption (MT)	Gross Total DO + HFO + LFO	Gross LNG Consumption (MT)
2022	4.84659	0.41026 (26.7%)	0.65309 (42.4%)	0.47527 (30.9%)	1.53862	0
2021	4.96108	0.41231 (26.2%)	0.54576 (34.7%)	0.6143 (39.1%)	1.57237	0.00147
2020	4.62146	0.36908 (25.3%)	0.45948 (31.4%)	0.63151 (43.3%)	1.46007	0.006358
2019	4.621455	0.397025 (24.2%)	1.223486 (74.7%)	0.018 (1.1%)	1.63851	0



Carbon Emissions and Ship Categories: Calendar Year 2022

Ship Category	Carbon Emissions (Million Tones)	Percentage total Carbon Emissions
Ships of 5000 GT & Above except RSV & ICV	3.89063	80.3%
RSV & ICV Ships of 5000 GT & Above	0.040842	0.8%
Ships of less than 5000 GT except RSV & ICV	0.802036	16.5%
RSV & ICV Ships of less than 5000 GT	0.113346	2.4%
Total	4.84659	100%



*** Detailed data and analysis is presented in Annexure to this section**

Efforts by Government of India to Reduce Emissions from Indian Ships

There are a number of Policy initiatives undertaken by GOI to transit Indian Shipping and Ports towards a greener regime. These include:

National Green Hydrogen Mission.

The overarching objective of the Mission is to make India the Global Hub for production, usage and export of Green Hydrogen and its derivatives. This will contribute to India's aim to become Aatmanirbhar (self-reliant) through clean energy and serve as an inspiration for the global Clean Energy Transition. The Mission will lead to significant decarbonisation of the economy, reduced dependence on fossil fuel imports, and enable India to assume technology and market leadership in Green Hydrogen.

Under the Mission, Ministry of Ports, Shipping and Waterways (MoPSW) has been assigned a crucial role in establishing India's export capabilities for green hydrogen and its derivatives. MoPSW is required to facilitate development of the required infrastructure including storage bunkers, port operations equipment, and refuelling facilities. MoPSW is to also drive the adoption of hydrogen/derivatives (ammonia/methanol) as propulsion fuel for ships. The Ministry will also work towards making India as a green hydrogen/derivative refuelling hub.

The MoPSW is given following targets:

To build/retrofit two Indian ships to be powered by Green Hydrogen or its derivative fuels (Green Ammonia, green methanol etc.) by 2027, followed by annual addition of at least two ships powered by green fuels thereafter".

"To emerge as a green refueling hub for maritime transport by establishing green refueling bunkers connected to Green Hydrogen/Ammonia production facilities at all major ports".

Under the above, following has already being completed:

i. Issuance of requirements for ships carrying liquefied hydrogen as Merchant Shipping Notice 6 of 2023.

ii. Three ports have been identified to develop as Hydrogen Hubs to accelerate the National Green Hydrogen Mission by providing logistical support for building hydrogen storage bunkers at three Indian ports in east, north, and south India by 2030, which will be scaled up to 12 Indian ports in the near future. The three key hydrogen storage hubs identified are Paradip Port in the east, Deendayal Port in Kandla, and V. O. Chidambaranar Port, formerly Tuticorin Port in Thoothukudi, Tamil Nadu.

Green Tug Transition Program

In terms of numbers, tugs constitute biggest chunk of Indian Registered vessels with almost 32% of all Indian registered vessels being Tugs. They emit about 4% of emissions from Indian Ships and about 22% of emissions from all Indian ships less than 5000 GT.

This policy initiative has set target aims to ensure Green Tugs working in all major ports by 2025, and 50% of all Tugs converted into Green Tugs by 2030. Green Hybrid Tugs are defines as ones which are initially powered by Green Hybrid Propulsion systems, and subsequently adopting non-fossil fuel solutions like (Methanol, Ammonia, Hydrogen).

Harit Sagar of Green Port Guidelines

The Maritime Vision 2030 has detailed sustainability initiatives to be undertaken by Indian ports and include initiatives such as supplying shore power to visiting ships in a three-phased manner by 2030, conversion of port vehicles and cargo handling equipment to greener fuels and shore power in a phased manner by 2030, establishing LNG bunkering stations at select ports in line with fuel adoption trends by shipping liners, increase usage of efficiency enhancements techniques such as ship-tracking and smart-lighting at ports to move towards C02 and to build infrastructure (sewage treatment plant) in a 2-phase manner and develop oil spill response plans.

The Harit Sagar of Green Port guidelines issued in 2023 has brought forward the target date of all the above initiatives in order to reduce carbon emissions in port operations faster and create sustainable ports. It aims to:

i. Supply shore power at all major ports to all ships including EXIM by 2025.
ii. Explore possibility of installation of "Desalination Plants" if not installed as an alternate of ground / surface water. This will enable production of Green Hydrogen.
iii. Green Ammonia bunkers and refuelling facilities shall be established at all Major Ports by 2035.
iv. Ports shall make efforts to retrofit Port Crafts (including Tugs, Pilot Boats, Mooring Boats, Survey Boats etc.) with available technology for propulsion on cleaner and greener fuel viz., Green Ammonia, Green Hydrogen (through Fuel Cell), Green Methanol etc in phased manner.
v. Ships calling to the Port shall compulsorily declare type (as per MARPOL) and approximate quantity of waste on board and seek Port's assistance in disposing the same. All Ports shall provide shore reception facility, with approved vendors, for discharging the waste by ships calling at ports as per the Indian Rules.
vi. All future procurements of Port vehicles and cargo handling & other equipments shall preferably be electrically driven / electrically powered or should be compatible with low carbon greener fuels viz., CNG, Methanol, Ethanol, Ammonia, Hydrogen Fuel Cell etc.

Regulatory Efforts by Directorate to Facilitate Green Shipping

- The new amendments to MARPOL Annex VI related to EEXI and operational CII has been implemented on all ships including coastal ships.
- The Directorate has granted permission to Indian ships to operate on biofuels and its blends subject to being certified for sustainability. This will help ship owners to achieve desired CII reductions and shipping conglomerates to demonstrate their efforts towards sustainability.
- The Directorate has devised procedures for supply of shore power to ships with shore power requirements up to 150 KW. The Maritime Vision 2030 has set a target for all major trade to supply shore power to all ships in a three-phase manner by 2030. This has paved way to reduce GHG emissions in ports, while working towards a strategy to supply shore power to all visiting ships.
- Facilitating operation of a Green Coastal Shipping Corridor between Muldwarka and Surat/Navi Mumbai with ship operated on 30% biofuel blended diesel with shore power at both ends and just in time arrival.

Annexure – Detailed Data on CO2 Emissions from Indian Shipping

Distribution and Size of Indian Shipping

Different Types and Numbers of Ships in Indian Flag only for the Purpose of Carbon Emissions

The Indian Ships are divided into following three categories for the purpose of fuel consumption data:

i. Ships of 5000 GT and above Certified under MS Act: These ships are further sub-divided as to whether have been undertaking coastal or International voyages during calendar year 2022.
ii. Ships less than 5000 GT and Certified under MS Act.
iii. Ships registered as ICV or RSV

Category	Total Numbers	Average Age (Years)	Total GT	Total DWT
Ships of 5000 GT and above Certified under MS Act	236	16	9208642	15561174
Ships of less than 5000 GT and Certified under MS Act	461	18	509569	484820
Ships of less than 5000 GT registered as RSV	133	13	75827	66692
Ships of less than 5000 GT registered as ICV	18	16	14817	15612
Ships of 5000 GT and above Certified as ICV	19	7.7	5811	147702
Gross Total	867	16.4	9.814 Million	16.276 Million

Ships of 5000 GT and above Certified under MS Act

Data based on coastal or foreign run

Break-up of Ships of 5000 GT and above Certified under MS Act				
Based on Area of Operation	Total Numbers	Average Age	Total GT	Total DWT
Total	236	16	9208642	15561174
On Coastal Run	101	18.7	258446	3987257
On International Run	135	13.9	6624196	11573916

Data based on Type and Area of Operation

Break - up of Ships of 5000 GT and above Certified under MS Act					
Type	Area of Operation	Total Numbers	Average Age	Total GT	Total DWT
	Any	67	13.8	2544609	4657810
Bulk Carrier	International	53	12.1	2158842	3955368

	Coastal	14	18	385767	702442
Container	Any	21	20.6	571595	737657
	International	6	19	214159	272245
	Coastal	15	21.3	357436	46542
Gas Carriers	All	19	16.6	787151	926286
	International	13	17.6	580504	501908
	Coastal	6	14.5	285243	345782
General Cargo	All	2	21	26051	38044
	International	1	23	13066	20567
	Coastal	1	19	12993	17477
LNG Carrier	International	1	2	117514	97169
Tankers	All	100	16.7	4918819	8884116
	International	57	14.7	3558320	6604613
	Coastal	43	19.2	1360499	2279503
Passenger	ALL	9.1	9.1	56938	12765
	International	2	0.5	13657	2187
	Coastal	5	12.6	43281	10578
Dredgers (Other Cargo Ships)	All Coastal	9	13.8	73689	97951
Cement Carriers (Other Cargo Ships)	All	2	14	33790	52747
	International	1	13	16102	25953
	Coastal	1	15	17688	26794
Heavy Lift Pipe Laying/Research Vessel/Transshipment Barge (Other Cargo Vessel)	All	3	10.3	42701	22474
	International	1	12	30628	15310
	Coastal	2	9.5	12073	7164

Ships less than 5000 GT and Certified under MS Act

Type	**Further Designation**	**Total Numbers**	**Average Age**	**Total GT**	**Total DWT**
Container	-	2	24.5	7470	9279
Gas Carrier	-	3	31	8727	6941
Passenger	All	33	22	28823	8748
	High Speed	11	18	3396	350
	Passenger Cum General Cargo	7	30	11304	5366
	Ferries	9	19	4003	1149
	Other	6	26	10120	1883
General Cargo	-	23	28	34015	49849
Tanker	-	2	23	5355	8777
	All	193	25	194548	179037
	Anchor Handling Tug (AHT)/AHT	15	24	25527	24468

Other	Cum Supply Vessels (AHTS)				
	Tug/Tug cum Supply Vessel	92	23	31027	20330
	Dredgers	3	20	11258	13077
	Offshore Supply Vessel/Supply Vessel/Platform Supply Vessel	34	22	64672	73826
	Crew Boat/Utility Vessels/Work Boat	22	29	6573	3980
	Pilot Launch/Survey Launch	2	29	548	488
	Mini Bulk Carrier	3	29	2214	2880
	Well Simulation Vessel	1	36	2995	2189
	Cement Carrier	7	25	15539	20546
	Deck Loading Barge/Dumb Barge	2	47	1727	1596
	Research Vessel	7	31	709	470
	Diving Support Vessel	4	38	15249	8247
	Lighthouse Tender Vessel	1	20	2466	1347

Ships Certified under ICV Notification

Type	**Further Designation**	**Total Numbers**	**Average Age**	**Total GT**	**Total DWT**
Ships less than 5000 GT Certified as ICV					
Total	-	7	28	4485	5072
Other Cargo	Tug	4	27	916	582
	Dredger	1	27	482	191
	General Cargo	1	35	1609	2021
Tanker	-	1	30	1478	2277
Ships of 5000 GT & above Certified as ICV					
Total	-	19	7.8	110418	147702
Other Cargo	General Cargo	15	1.8	85288	120151
	-	3	32	18265	26107
Passenger	-	1	25	6865	1443
Ships less than 5000 GT Certified as RSV					
Total	-	51	22	27477	25933
Other Cargo Ships	Crew Boat	1	18	15	3
	Pilot Launch/Security & Patrol Boat	4	21	298	50
	Tugs	34	21	9937	4115
	Diving Support/Offshore Support	1	18	1207	820
	General Cargo	7	26	12769	16848
Tankers	Tanker	4	27	3248	4096

Definitions of Ships of less than 5000 GT only for the purpose of Carbon Emissions and Trading Pattern assumptions

Sr. No	Ship Type	Remarks
1	Bulk Carrier	A ship which is intended primarily to carry dry cargo in bulk, including such types as ore carriers as defined in regulation 1 of chapter XII of the International Convention for the Safety of Life at Sea (SOLAS), 1974, (as amended) but excluding combination carriers.
2	Gas Carrier	A cargo ship, other than an LNG carrier, constructed or adapted and used for the carriage in bulk of any liquefied gas.
3	Tanker	An oil tanker as defined in regulation MARPOL Annex I or a chemical tanker or an NLS tanker as defined in regulation 1 MARPOL Annex II
4	Container	Ship designed exclusively for the carriage of containers in holds and on deck.
5	General cargo	Ship with a multi-deck or single deck hull designed primarily for the carriage of general cargo.
6	Passenger Ship	A ship which carries more than 12 passengers.
7	High Speed Passenger Craft	Passenger ships complying with HSC Code

Sr. No	Ship Type	Remarks
8	Dredgers	Ship engaged in Dredging operation
9	Tug	Ships which aid the mooring or berthing operation of a ship by either towing or pushing a vessel towards the port.
10	Anchor Handling Tug Supply Vessel	Tugs which are also involved in anchor handling operation and to supply essentials to other vessel/platform.
11	Offshore Support / Supply Vessel	Vessels intended for several roles/services related to offshore support
12	Utility Vessel	Vessels used for multipurpose activities such as towing, other miscellaneous works, etc.
13	Launch	Typically, a small (L < 24m) self-propelled vessel which can be used for various purposes such as mooring, hydrographic surveys, transporting marine pilots, and carrying not more than 12 passengers. Such vessels may be of the open, partially open or closed type.
14	Crew Boat	Vessels used for transporting crew of other vessels etc. with number of transported crew limited to 12. Alternatively, the requirements specified by the Administration (IP/SPS).
15	Others	Includes: Research vessels, Floating crane, Lighthouse tender, Buoy tender vessel, Security & Patrol Boat, Pipe-Laying/hook-up barge

Voyage based distribution of Carbon Emissions from Ships of 5000 GT & above excluding RSV & ICV

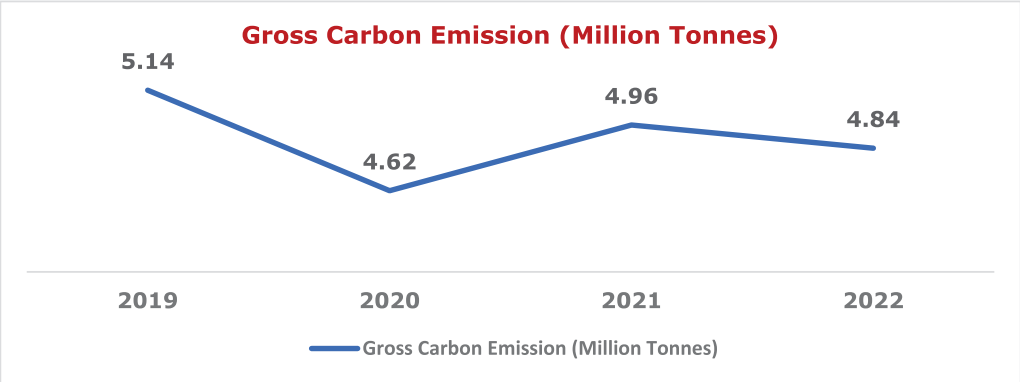
Operations	Total Number of Ships	Carbon Emissions in Million Tones	Percentage of total carbon emissions from Indian ships	Percentage of total carbon emission from ships of 5000 GT & above except RSV & ICV
2022 (Coastal)	101	1.332515	27.5%	34.2%
2022 (International)	135	2.557853	52.8%	65.8%

Considering the following:

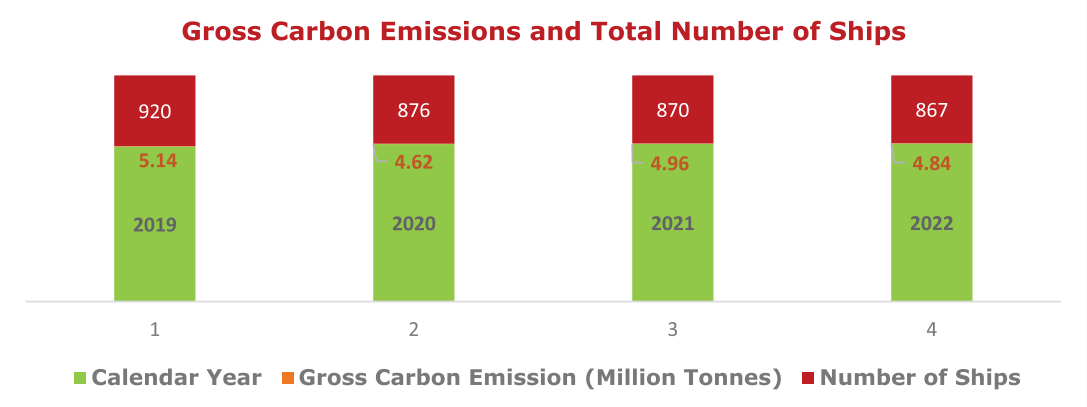
i. All Ships of less than 5000 GT on Coastal Run.
ii. All Ships certified as RSV or ICV on Coastal Run.
iii. Only 135 Ships of 5000 GT and above on Foreign Run

The emissions from Coastal run contributes to about 27.5% + 19.7% = 47.2% of total emissions from Indian Ships

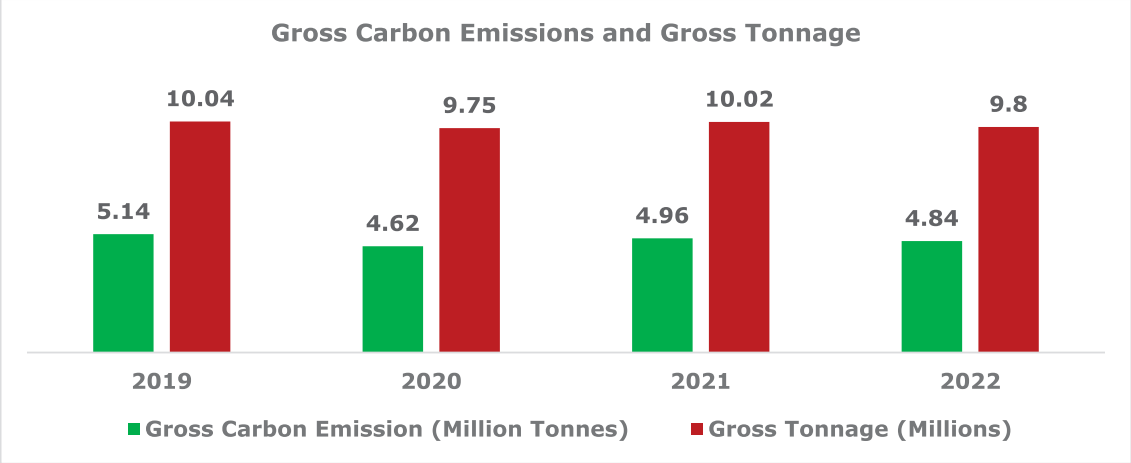
Carbon Emission from Indian Ships

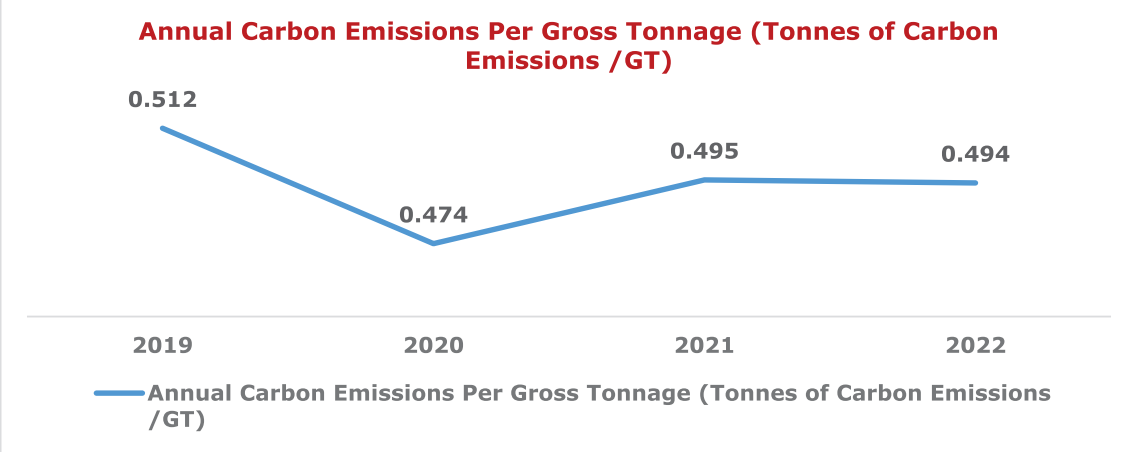


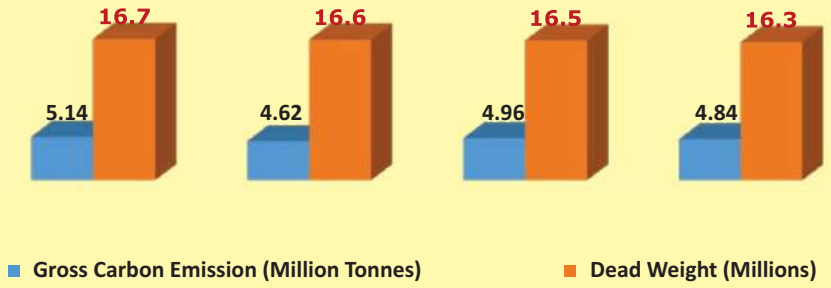
Carbon Emission Vs Number of Ship



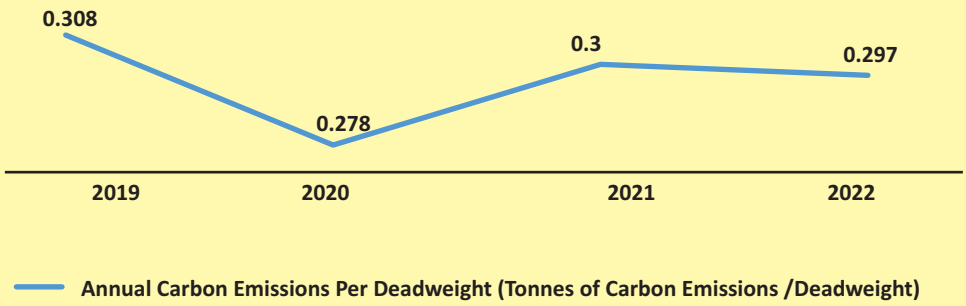

CO_2 Emission Per Ship (Million Tonnes /Ship)
0.0056
0.0053
0.0057
0.0056
2019
2020
2021
2022
CO2 Per Ship (Million Tonnes /Ship)


Gross Carbon Emissions and Gross Tonnage
5.14
10.04
4.62
9.75
4.96
10.02
4.84
9.8
2019
2020
2021
2022
Gross Carbon Emission (Million Tonnes)
Gross Tonnage (Millions)


Annual Carbon Emissions Per Gross Tonnage (Tonnes of Carbon Emissions /GT)
0.512
0.474
0.495
0.494
2019
2020
2021
2022
Annual Carbon Emissions Per Gross Tonnage (Tonnes of Carbon Emissions /GT)



Annual Carbon Emissions Per Deadweight (Tonnes of Carbon Emissions /Deadweight)



Carbon Emissions from Ships of 5000 GT & above except RSV & ICV

Basic Values of Fuel Consumption and Carbon Emissions

Calendar Year	Gross Carbon Emissions (MT)	Gross Diesel Oil Consumption (MT)	Gross Heavy Fuel Oil Consumption (MT)	Gross Light Fuel Oil Consumption (MT)	Gross Total DO + HFO + LFO	Total Number of Ships
2022 (All)	3.8903	0.122377	0.646436	0.471286	1.240099	236
2021 (All)	3.994991	0.120764	0.539505	0.610521	1.27079	242
2022 (Coastal)	1.332515	0.061231	0.196999	0.165901	0.424131	101
2021 (Coastal)	1.48556	0.080808	0.267322	0.125063	0.473193	113
2022 (International)	2.557853	0.055984	0.449437	0.305385	0.76042	135
2021 (International)	2.509405	0.039956	0.272182	0.485458	0.797596	129

Data based on Ship Type

Ship Type	No. of Ships	DO Consumption	HFO Consumption	LFO Consumption	LNG Consumption	CO2 Emissions (Million Tones)
Tanker	100	43224	308481	227249	0	1.815
Bulk Carrier	67	16944	133471	138469	0	0.906
Container	21	1732	118360	25076	0	0.453
Gas Carrier	19	8462.75	47543	80492.72	0	0.429
General cargo	2	646	3667	0	0	0.013
Passenger Vessels	7	11906	1476	0	0	0.043
LNG Carrier	1	5162	0	0	0	0.017
Others	20	34301	33438	0	0	0.214
Total	236	122377.75	646436	471286.72	0	**3.890**

Data based on Ship Age Profile

Age of the ship	No. of Ships	DO Consumption (tones)	HFO Consumption (tones)	LFO Consumption (tones)	LNG consumption (tones)	CO2 Emissions (million tons)
0-5 years	4	7808	0	2365	0	0.032
5-10 years	20	12771	53428	28095	0	0.296
10-15 years	76	39157	133902	262526	0	1.370
15-20	71	23341	286082	115948	0	1.331
20-25 years	50	24223	139787	49508	0	0.669
25 and above	15	15077.75	33237	12844.72	0	0.192
Total	236	**122377.75**	**646436**	**471286.72**	**0**	**3.890**

Important Gross Data

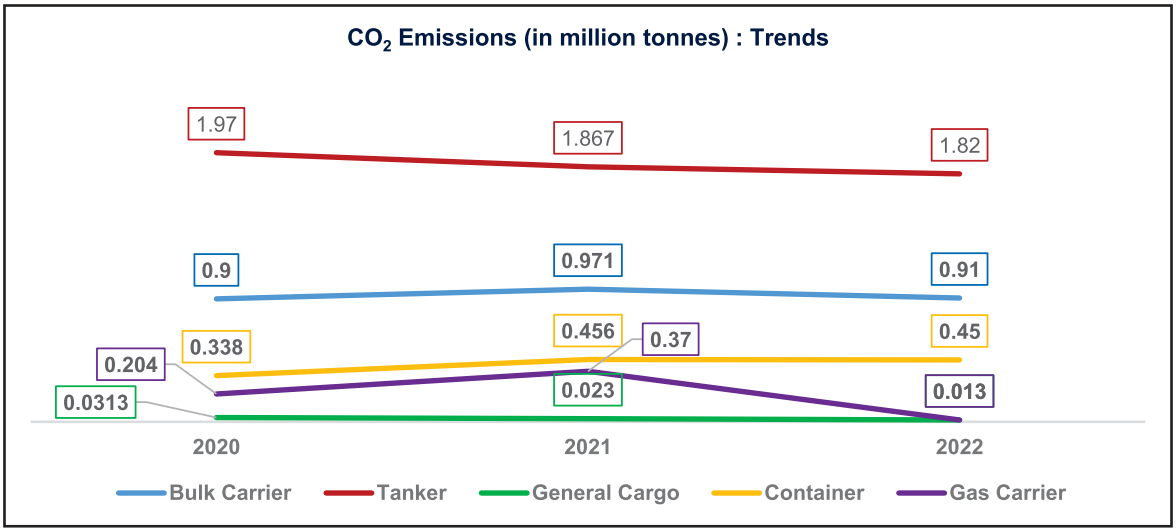
Data (Vessels of > = 5000 GT)	2020	2021	2022
Numbers	233	242	236
Total GT in Millions	9.06	9.3	9.21
Total Deadweight in Millions	15.52	15.77	15.56
Average Age	15	15	16
Hours Underway	861419	872356.7	878224.08
Percentage of hours underway of total hours in calendar year	42.20%	41.10%	42.48%
Total CO2 Emissions in Million Tonnes	3.71	3.99	3.89
CO_2 Emissions/GT	0.41	0.43	0.42
CO_2 Emissions/Deadweight	0.24	0.253	0.250
CO_2 Emissions/Hours Underway in Carbon Emissions in tons/hr underway	4.306	4.57	4.43

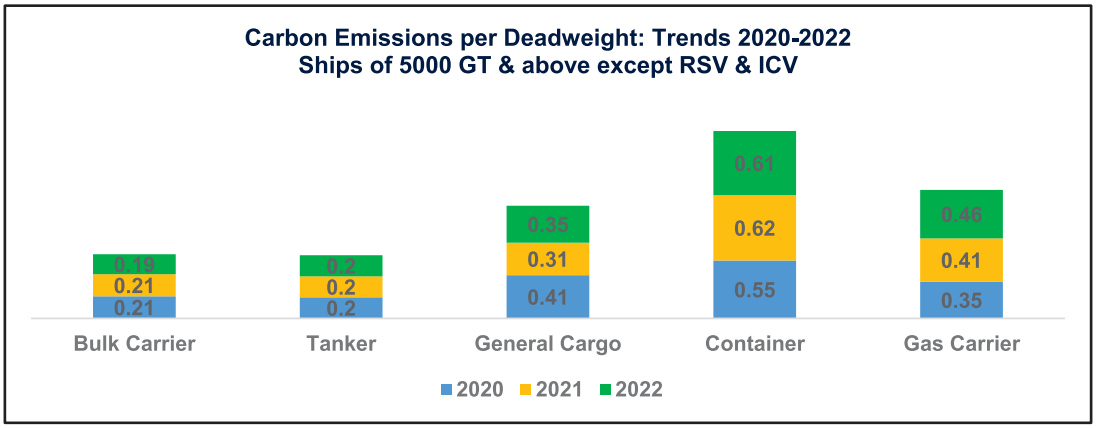
Average gm-CO_2/DWT-NM for ship types Bulk Carrier, General Cargo, Tanker, Container, Gas Carrier, LNG Carrier			
Average gm-CO_2/DWT-NM (numbers)	8.0 (205)	8.73 (214)	8.04 (210)
Average gm-CO_2/DWT-NM (numbers) underway for less than 1000 Hrs.	13.3 (15)	13.6 (15)	20.93 (13)
Average gm-CO_2/DWT-NM (numbers) underway between 1000 – 2000 Hrs	9.61 (10)	10.5 (16)	10.61(5)
Average gm-CO_2/DWT-NM (numbers) underway between 2000 – 3000 Hrs	10.79 (26)	9.45 (44)	7.13(41)
Average gm-CO_2/DWT-NM (numbers) underway between 3000 – 4000 Hrs	8.38 (54)	9.85 (46)	7.56 (63)
Average gm-CO_2/DWT-NM (numbers) underway between 4000 – 5000 Hrs	6.55 (65)	7.05 (49)	6.91(48)
Average gm-CO_2/DWT-NM (numbers) underway more than 5000 Hrs	5.29 (35)	6.39 (44)	6.60(40)

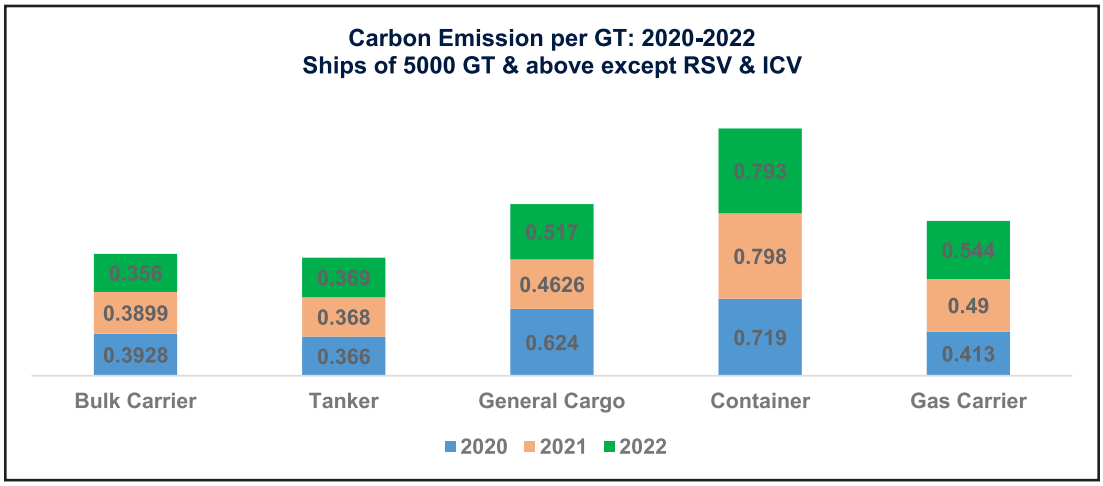
Hours under way ships > = 5000 GT	International		Coastal		Total	
	2021	2022	2021	2022	2021	2022
Underway for less than 10% of total hours in a calendar year	5	8	16	9	21	17 (7.2%)
Underway for 10-20% of total hours in a calendar year	8	7	9	2	17	9 (3.8%)
Underway for 20-30% of total hours in a calendar year	13	10	12	12	25	22 (9.3%)
Underway for 30-40% of total hours in a calendar year	24	33	21	25	45	58 (24.6%)
Underway for 40-50% of total hours in a calendar year	24	28	19	20	43	48 (20.3%)
Underway for 50-60% of total hours in a calendar year	37	26	14	16	51	42 (17.8%)
Underway for 60-70% of total hours in a calendar year	16	21	10	9	26	30 (12.7%)
Underway for more than 70% of total hours in a calendar year	2	2	11	8	13	10 (4.3%)
Gross Total	129	135	113	101	242	236

Ships of 5000 GT & Above Except RSV & ICV					
Ship Type	**Total Numbers**	**Run**	**Average Percentage of time underway out of total available time**	**Average CO_2 Emissions Per DWT-NM**	**Total Carbon Emissions/% Carbon Emission as total emissions from ships of 5000 GT & above**
Bulk Carrier	67	Coastal + International	43.6%	5.855	0.906266/23.3%
	53	International	43.9%	5.136	0.749759/19.3%
	14	Coastal	42.2%	8.577	0.156507/4.02%
Container	21	Coastal + International	56.3%	10.8	0.453140/11.64%
	6	International	62.7%	11.316	0.203385/5.2%
	15	Coastal	53.7%	10.596	0.249755/6.42%
Gas Carrier	19	Coastal + International	42.13%	13.56	0.428813/11.02%
	6	Coastal	52.4%	7.718	0.167025/4.3%
	13	International	37.4%	16.25	0.261787/6.7%
Note: The poor figures of International going Gas Carriers is due to one vessel that was operational only for about 9.8% of its total operational time in the year.					
Tankers	100	Coastal + International	38.6%	7.7273	1.81524/46.6%
	43	Coastal	32.8%	9.88	0.516482/13.27%
	57	International	43.05%	6.10%	1.298765/33.3%
Note: One Coastal tanker was non-operational during 2022 and removing the same the **Average CO_2 Emissions Per DWT-NM for tankers shall increase from 7.72 to** 7.8053 and for coastal tankers from 9.88 to 10.11.					

Trends


CO_2 Emissions (in million tonnes) : Trends
1.97
1.867
1.82
0.9
0.971
0.91
0.338
0.456
0.45
0.204
0.37
0.0313
0.023
0.013
2020
2021
2022
Bulk Carrier
Tanker
General Cargo
Container
Gas Carrier


Carbon Emissions per Deadweight: Trends 2020-2022
Ships of 5000 GT & above except RSV & ICV
0.19
0.21
0.21
0.2
0.2
0.2
0.35
0.31
0.41
0.61
0.62
0.55
0.45
0.41
0.35
Bulk Carrier
Tanker
General Cargo
Container
Gas Carrier
2020
2021
2022


Carbon Emission per GT: 2020-2022
Ships of 5000 GT & above except RSV & ICV
0.356
0.3899
0.3928
0.369
0.368
0.366
0.517
0.4626
0.624
0.793
0.798
0.719
0.544
0.49
0.413
Bulk Carrier
Tanker
General Cargo
Container
Gas Carrier
2020
2021
2022

Bulk Carriers of 5000 GT and Above

Bulk carriers >= 5000 GT	ALL		International Run		Coastal Run	
	2021	2022	2021	2022	2021	2022
Numbers	66	67	48	53	18	14
Total GT in Millions	2.49	2.544	1.96	2.15	0.528	0.385
Total Deadweight in Millions	4.57	4.65	3.607	3.955	0.964	0.702
Average Age	13	13	11	12	19	18
Hours underway	262821.8	255629	212379	203864	50442.8	51765
Percentage of hours underway of total hours in calendar year	45.40%	43.55%	50.5%	43.91%	32%	42.21%
Total CO_2 Emissions (Million Tonnes)	0.972	0.906	0.806	0.750	0.166	0.157
Average CII (t-CO_2/DWT-NM)	5.75	5.85	5.18	5.14	7.38	8.57

Data (Bulk Carriers > = 5000 GT): 2021& 2022	All		International		Coastal	
	2021	2022	2021	2022	2021	2022
All (gm-CO_2/DWT-NM)	5.75 (65 Nos.)	5.85(67 Nos.)	5.18 (48)	5.13 (53 Nos.)	7.38 (17)	8.57 (14Nos)
gm-CO_2/DWT-NM for vessels underway for less than 1000 Hrs.	7.27 (4)	4.64 (1)	0	4.64 (1)	7.27 (4)	0
gm-CO_2/DWT-NM for vessels underway between 1000 – 2000 Hrs	5.43 (12)	6.61 (1)	5.71 (7)	6.61 (1)	5.03 (5)	0
gm-CO_2/DWT-NM for vessels underway between 2000 – 3000 Hrs	5.44 (10)	6.32 (18)	5.86 (5)	6.057(14)	5.03 (5)	7.23(4)
gm-CO_2/DWT-NM for vessels underway between 3000 – 4000 Hrs	6.72 (9)	5.36(21)	7.03 (7)	5.30(16)	5.63 (2)	5.568(5)
gm-CO_2/DWT-NM for vessels underway between 4000 – 5000 Hrs	5.63 (21)	6.80(11)	4.82 (17)	5.887(8)	9.04 (4)	9.246(3)
gm-CO_2/DWT-NM for vessels underway more than 5000 Hrs	5.32 (19)	5.31(15)	4.54 (17)	3.39(13)	11.9 (2)	17.77(2)

Tankers of 5000 GT and Above

Tankers >= 5000 GT	All		International Run		Coastal Run	
	2021	2022	2021	2022	2021	2022
Numbers	104	100	59	57	45	43
Total GT in Millions	5.06	4.91	3.70	3.55	1.36	1.36
Total Deadweight in Millions	9.16	8.88	6.88	6.60	2.27	2.27
Average Age	15	16	13	14	18	19
Hours underway	328702	338680	209743	215004	118959	123676
Percentage of hours underway of total hours in calendar year	36.07%	38.66%	40.6%	43.06%	30.1%	32.83%
Total CO_2 Emissions (Million Tonnes)	1.867	1.815	1.284	1.299	0.582	0.516
Average CII (t-CO_2/DWT-NM)	8.73	7.72	6.12	6.101	12.1	9.88

Data (Tankers > = 5000 GT):	All		International		Coastal	
	2021	2022	2021	2022	2021	2022
All	8.73 (104)	7.727 (100)	6.12 (59)	6.101 (57)	12.1 (45)	9.88 (43)
gm-CO2/DWT-NM for vessels underway for less than 1000 Hrs.	12.69 (7)	16.06 (11)	11.8 (3)	13.41 (6)	13.3 (5)	19.24 (5)
gm-CO2/DWT-NM for vessels underway between 1000 – 2000 Hrs	9.49 (11)	8.45 (2)	4.9 (4)	7.47 (1)	12.1 (7)	9.42 (1)
gm-CO2/DWT-NM for vessels underway between 2000 – 3000 Hrs	9.14 (28)	9.41 (19)	6.94 (12)	6.50 (6)	10.79 (16)	7.83 (13)
gm-CO2/DWT-NM for vessels underway between 3000 – 4000 Hrs	10.48 (32)	7.71 (34)	7.03 (17)	5.385 (16)	14.39 (15)	9.78 (18)
gm-CO2/DWT-NM for vessels underway between 4000 – 5000 Hrs	5.33 (15)	5.88 (23)	5.0 (12)	5.53 (17)	6.67 (3)	6.88 (6)
gm-CO2/DWT-NM for vessels underway more than 5000 Hrs	3.93 (11)	3.68 (11)	3.93 (11)	3.68 (11)	NA	0

Containers of 5000 GT and Above

Containers >= 5000 GT	All		International Run		Coastal Run	
	2021	2022	2021	2022	2021	2022
Numbers	22	21	6	6	16	15
Total GT in Millions	0.571	0.571	0.204	0.214	0.367	0.357
Total Deadweight in Millions	0.741	0.737	0.262	0.272	0.479	0.465
Average Age	16	20.67	9	19	19	21
Hours underway	103553	103548	27946	32956	75607	70592
Percentage of hours underway of total hours in calendar year	53.7%	59.10%	53.16%	62.70%	53.9%	53.72%
Total CO_2 Emissions (Million Tonnes)	0.456	0.453	0.181	0.203	0.274	0.250
Average CII (t-CO_2/DWT-NM)	12.69	10.80	11.38	11.31	13.18	10.59

Data (Containers > = 5000 GT)	All		International		Coastal	
	2021	2022	2021	2022	2021	2022
All	12.69 (22)	10.80(21)	11.38 (6)	11.31(6)	13.18 (16)	10.59(15)
gm-CO_2/DWT-NM for vessels underway for less than 1000 Hrs.	37.69 (1)	0	NA	0	37.69 (1)	0
gm-CO_2/DWT-NM for vessels underway between 1000 – 2000 Hrs	0	0	0	0	0	0
gm-CO_2/DWT-NM for vessels underway between 2000 – 3000 Hrs	11.14 (1)	0	NA	0	11.14 (1)	0
gm-CO_2/DWT-NM for vessels underway between 3000 – 4000 Hrs	14.1 (2)	12.469 (3)	NA	0	14.1 (2)	12.469 (3)
gm-CO_2/DWT-NM for vessels underway between 4000 – 5000 Hrs	11.82 (8)	9.96 (6)	9.76 (2)	0	12.51 (6)	9.96 (6)
gm-CO_2/DWT-NM for vessels underway more than 5000 Hrs	10.76 (10)	10.80 (12)	12.55 (3)	11.31 (6)	9.99 (7)	10.29 (6)

Gas Carriers of 5000 GT and Above

Gas Carriers >= 5000 GT	All		International Run		Coastal Run	
	2021	2022	2021	2022	2021	2022
Numbers	18	19	10	13	8	6
Total GT in Millions	0.754	0.787	0.375	0.502	0.379	0.285
Total Deadweight in Millions	0.895	0.926	0.441	0.581	0.454	0.345
Average Age	17	17	19.1	17.61	15	14.5
Hours underway	64214	70130	30671	42593	33543	27537
Percentage of hours underway of total hours in calendar year	40.7%	42.14%	35.01%	37.40%	47.86%	52.39%
Total CO_2 Emissions (Million Tonnes)	0.37	0.429	0.195	0.262	0.175	0.167
Average CII (t-CO_2/DWT-NM)	9.95	13.56	11.98	16.25	7.4	7.71

Data (Gas Carrier > = 5000 GT):	All		International		Coastal	
	2021	2022	2021	2022	2021	2022
All	9.95 (18)	13.56 (19)	11.9 (10)	16.25(13)	7.4 (8)	7.71(6)
gm-CO_2/DWT-NM for vessels underway for less than 1000 Hrs.	16.23 (3)	90.84 (1)	20.5 (2)	90.84 (1)	7.58 (1)	0
gm-CO_2/DWT-NM for vessels underway between 1000 – 2000 Hrs	7.93 (1)	15.084(1)	7.93 (1)	15.084(1)	NA	0
gm-CO_2/DWT-NM for vessels underway between 2000 – 3000 Hrs	8.14 (3)	8.85(3)	9.37 (1)	8.85(3)	7.52 (2)	0
gm-CO_2/DWT-NM for vessels underway between 3000 – 4000 Hrs	9.71 (3)	12.28(4)	10.89 (2)	12.28(4)	7.35 (1)	0
gm-CO_2/DWT-NM for vessels underway between 4000 – 5000 Hrs	9.9 (4)	7.73(8)	9.9 (4)	7.62(3)	NA	7.80(5)
gm-CO_2/DWT-NM for vessels underway more than 5000 Hrs	7.3 (4)	7.069(2)	NA	6.85(1)	7.3 (4)	7.28(1)

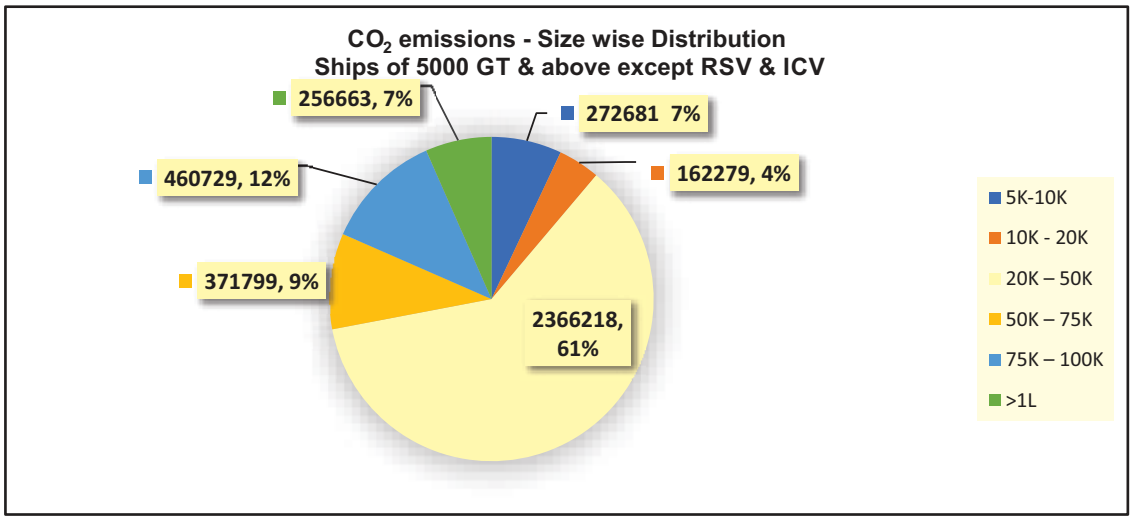
General Cargo of 5000 GT and Above

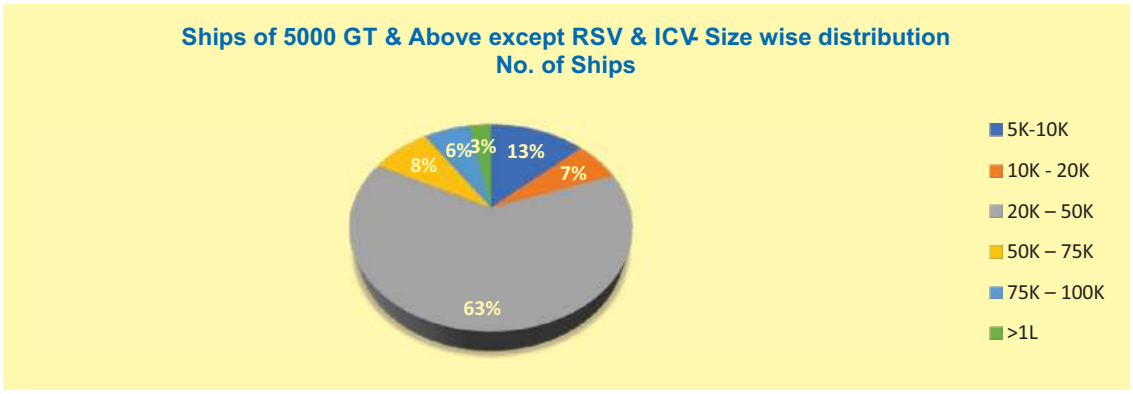
General Cargo >= 5000 GT	All		International Run		Coastal Run	
	2021	2022	2021	2022	2021	2022
Numbers	5	2	3	1	2	1
Total GT in Millions	0.05	0.0260	0.029	0.01306	0.0214	0.012993
Total Deadweight in Millions	0.0755	0.03804	0.047	0.02056	0.029	0.01747
Average Age	19	21	22.33	23	16	19
Hours underway	12108.9	5477	5688.9	2207	6420	3270
Percentage of hours underway of total hours in calendar year	27.6%	31.26%	21.64%	25.19%	36.64%	37.33%
Total CO_2 Emissions (Million Tonnes)	0.023	0.013	0.0137	0.005	0.0096	0.008
Average CII (t-CO_2/DWT-NM)	25.61	13.11	19.25	11.37	35.17	14.86

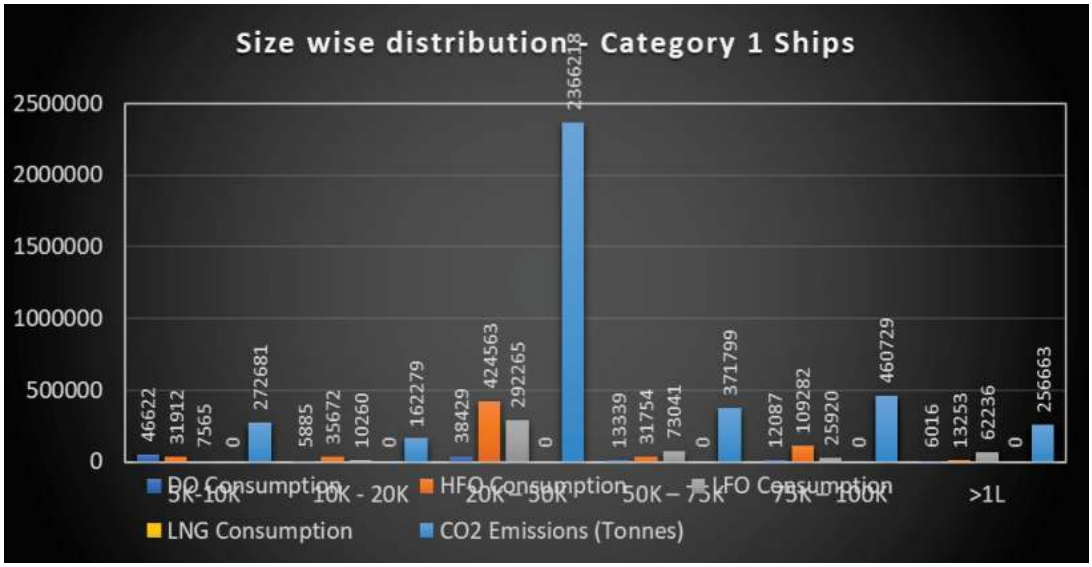
Data (General Cargo > = 5000 GT)	All		International		Coastal	
	2021	2022	2021	2022	2021	2022
All	25.61 (5)	13.11(2)	19.35 (3)	11.37(1)	35.17 (2)	14.86(1)
gm-CO_2/DWT-NM for vessels underway for less than 1000 Hrs.	NA	0	NA	0	NA	0
gm-CO_2/DWT-NM for vessels underway between 1000 – 2000 Hrs	22.5 (2)	0	22.5 (2)	0	NA	0
gm-CO_2/DWT-NM for vessels underway between 2000 – 3000 Hrs	34.99 (2)	11.37(1)	12.7 (1)	11.37(1)	57.2 (1)	0
gm-CO_2/DWT-NM for vessels underway between 3000 – 4000 Hrs	NA	14.86(1)	NA	0	NA	14.86(1)
gm-CO_2/DWT-NM for vessels underway between 4000 – 5000 Hrs	13.06 (1)	0	NA	0	13.06 (1)	0
gm-CO_2/DWT-NM for vessels underway more than 5000 Hrs	NA	0	NA	0	NA	0

Data based on Ship Size

5000-10000	31	46622	31912	7565	0	0.273
10K - 20K	15	5885	35672	10260	0	0.162
20K – 50K	149	38428.75	424563	292264.72	0	2.366
50K – 75K	19	13339	31754	73041	0	0.372
75K – 100K	15	12087	109282	25920	0	0.461
>100000	7	6016	13253	62236	0	0.257
Total	**236**	**122377.75**	**646436**	**471286.72**	**0**	**3.890**


CO_2 emissions - Size wise Distribution
Ships of 5000 GT & above except RSV & ICV
256663, 7%
272681 7%
460729, 12%
162279, 4%
371799, 9%
2366218, 61%
5K-10K
10K - 20K
20K – 50K
50K – 75K
75K – 100K
>1L


Ships of 5000 GT & Above except RSV & ICV- Size wise distribution
No. of Ships
13%
7%
63%
8%
6%
3%
5K-10K
10K - 20K
20K – 50K
50K – 75K
75K – 100K
>1L

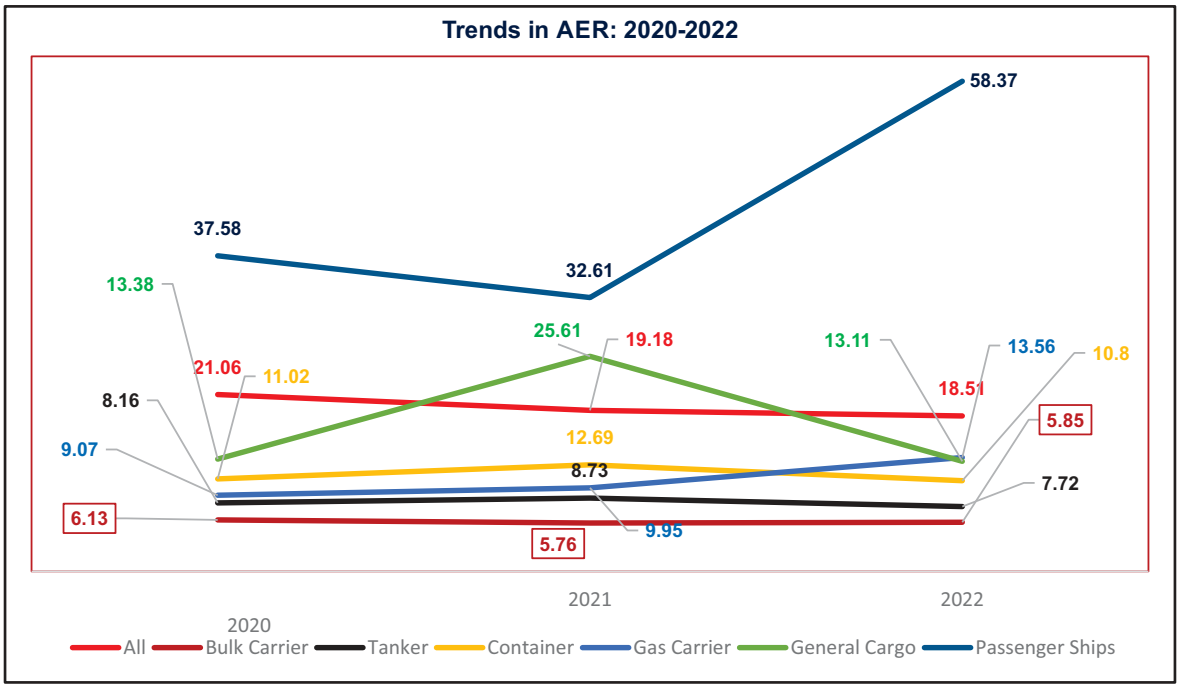

Size wise distribution - Category 1 Ships
2500000
2000000
1500000
1000000
500000
0
46622
31912
7565
0
272681
5885
35672
10260
0
162279
38429
424563
292265
0
2366218
13339
31754
73041
0
371799
12087
109282
25920
0
460729
6016
13253
62236
0
256663
5K-10K
10K - 20K
20K – 50K
50K – 75K
75K – 100K
>1L
DO Consumption
HFO Consumption
LFO Consumption
LNG Consumption
CO2 Emissions (Tonnes)

Anticipated Operational Carbon Intensity and CII Ratings

Carbon Intensity – Annual Efficiency Ratio (AER)

The carbon intensity has been determined in terms of AER i.e. Grams of CO/ DWT-Nm for Cargo ships and Grams of CO2/GT-Nm for Passenger Ships and the comparison with 2020, 2021 & 2022 data is tabulated below. The overall AER has decreased from 19.18 to 18.51.

	2020 average AER	2021 average AER	2022 average AER
Overall	21.06	19.18	18.51
Tanker	8.16	8.73	7.72
Bulk Carrier	6.13	5.76	5.85
Container	11.02	12.69	10.80
Gas Carrier	9.07	9.95	13.56
General cargo	13.38	25.61	13.11
Passenger Vessels	37.58	32.61	58.37



Carbon Intensity Indicator (CII) Ratings:

Based on Regulation 28 of MARPOL Annex VI, ships are required to report Attained Annual Carbon Intensity from 2024 based on data collected in 2023 and every year thereafter. This is compared against the Required CII for that ship type and the ships are rated into A,B,C,D,E based on their CII performance. Although the actual requirement of rating is applicable from next year, an assessment has been done based on the data reported for 2022 and the results are below:

	Total Ships	No. of Ships in A Rating	No. of Ships in B Rating	No. of Ships in C Rating	No. of Ships in D Rating	No. of Ships in E Rating
Total ships where CII is applicable	210	25	21	49	61	54
Tanker	100	5	9	31	28	27
Bulk Carrier	67	9	6	6	25	21
Container	21	11	5	3	0	2
Gas Carrier	19	0	1	8	7	3
General cargo	2	0	0	1	1	0
LNG Carrier	1	0	0	0	0	1
Gross Total	420	50	42	98	112	108

Ships of less 5000 GT

Carbon Emission in 2022

Total Carbon Emission from Indian Vessels (Million-Tones)	Total Carbon Emissions from Indian Vessels less than 5000 GT (Million-Tones)	Percentage of total emissions from Indian Vessels
4.84659	0.9153260	18.9%

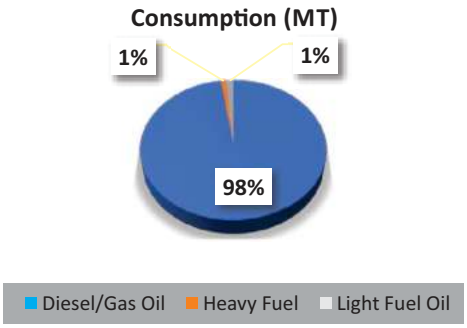
Ships Certification	Total Carbon Emissions in Million Tones	Total Number	Total Deadweight	Total Million GT	Carbon Emission in Tons Per GT	Carbon Emissions in Tons per DWT
Ships other than RSV & ICV	0.80203619	461	0.484820	0.509569	1.574	1.654
RSV Ships	0.09994078	133	0.066692	0.075827	1.49	1.318
ICV Ships	0.01340563	18	0.015612	0.014817	0.9047	0.8586

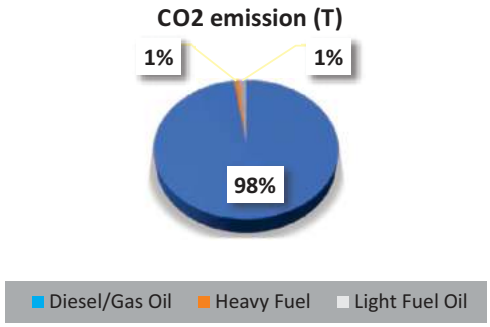
Trends in Basic Data

Data (Vessels of < 5000 GT)	2020	2021	2022
Numbers	631	609	612
Total GT in Millions	0.63	0.607	0.600
Total Deadweight in Millions	0.6	0.579	0.567
Average Age (Years)	15	15	17
Total CO_2 Emissions in Million Tonnes	0.861	0.93	0.915
CO_2 Emissions/GT	1.37	1.53	1.525
CO_2 Emissions/Deadweight	1.43	1.61	1.61

Fuel Consumption & Trends in Fuel Consumption Data

Fuel Type	Consumption (MT)	Consumption (MT)	Consumption (MT)	CO2 emission (Tonnes)	CO2 emission (Tonnes)	CO2 emission (Tonnes)
	2020	2021	2022	2020	2021	2022
Diesel/Gas Oil	261480	283104	278909	838305	907631	894182.3
Heavy Fuel	2799	3547	2777	8716	11044	8647.578
Light Fuel Oil	4520.91	3780	3984	14245	11911	12553.58
Total	268799.91	290431	285670	861266	930587	915383.4





Ship Type: Carbon Emissions

Ship Type	DO (Tonnes)	HFO (Tonnes)	LFO (Tonnes)	CO2 (Million Tonnes)
Bulk Carrier	1886	0	0	0.006
Gas Carrier	749	0	0	0.002
Tanker	1148	1148	60	0.007
Container	503	0	3461	0.013
General cargo	14999	1628.609	435	0.055
Passenger Ship	13248	0	0	0.042
Tug	62668	0	27.2	0.201
Offshore Support / Supply Vessel	107052	0	0	0.343
AHTS	58226	0	0	0.187
Multipurpose Utility Vessel	3968	0	0	0.013
Launch	1186	0	0	0.004
Crew Boat	2540	0	0	0.008
Others	10737	0	0	0.034
Total	278908.8	2776.909	3984.013	0.915

Ship Type Basis Analysis

Data (Vessels of < 5000 GT)		
Tug	**2021**	**2022**
Numbers	267	274
Total GT in Millions	0.0910	0.094
Total Deadweight in Millions	0.0500	0.0512
Average Age (Years)	14.71	15
Total DO Consumption in Million Tones	0.0609	0.0627
Total HFO Consumption in Million Tones	0	0
Total LFO Consumption in Million Tones	0	0.00003
Total CO_2 Emissions in Million Tones	0.195	0.201
CO_2 Emissions/GT	2.1445	2.1203
CO_2 Emissions/Deadweight	3.9051	3.9224

Data (Vessels of < 5000 GT)		
Anchor Handling Tug Supply Vessel	**2021**	**2022**
Numbers	41	41
Total GT in Millions	0.07445	0.07470
Total Deadweight in Millions	0.0699	0.0705
Average Age (Years)	14.07	13
Total DO Consumption in Million Tonnes	0.0603	0.0582
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.193	0.186
CO_2 Emissions/GT	2.5985	2.499
CO_2 Emissions/Deadweight	2.7666	2.645

Data (Vessels of < 5000 GT)		
Offshore Support / Supply Vessel	**2021**	**2022**
Numbers	86	87
Total GT in Millions	0.1824	0.1822
Total Deadweight in Millions	0.1913	0.1927
Average Age (Years)	16.45	17
Total DO Consumption in Million Tonnes	0.0998	0.1070
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.3200	0.3432
CO_2 Emissions/GT	1.7539	1.8833
CO_2 Emissions/Deadweight	1.6725	1.7811

Data (Vessels of < 5000 GT)		
Passenger Ship	**2021**	**2022**
Numbers	30	30
Total GT in Millions	0.0372	0.0372
Total Deadweight in Millions	0.0110	0.011
Average Age (Years)	20	21
Total DO Consumption in Million Tonnes	0.00981	0.00925
Total HFO Consumption in Million Tonnes	0.0	0
Total LFO Consumption in Million Tonnes	0.0	0
Total CO_2 Emissions in Million Tonnes	0.0314	0.02965
CO_2 Emissions/GT	0.844	0.7962
CO_2 Emissions/Deadweight	2.870	2.706

Data (Vessels of < 5000 GT)		
High Speed Passenger Craft	**2021**	**2022**
Numbers	13	12
Total GT in Millions	0.003688	0.00364
Total Deadweight in Millions	0.00039248	0.000387
Average Age (Years)	13	17
Total DO Consumption in Million Tonnes	0.003165557	0.004
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.010149	0.01282
CO_2 Emissions/GT	2.7518	3.5223
CO_2 Emissions/Deadweight	25.8581	33.0882

Data (Vessels of < 5000 GT)		
General cargo	**2021**	**2022**
Numbers	74	66
Total GT in Millions	0.125	0.126
Total Deadweight in Millions	0.177	0.1562
Average Age (Years)	19.21	20
Total DO Consumption in Million Tonnes	0.0188	0.015
Total HFO Consumption in Million Tonnes	0.0024	0.00163
Total LFO Consumption in Million Tonnes	0.0004	0.00044
Total CO_2 Emissions in Million Tonnes	0.0692	0.05453
CO_2 Emissions/GT	0.552	0.4839
CO_2 Emissions/Deadweight	0.392	0.3491

Data (Vessels of < 5000 GT)		
Utility Vessel	**2021**	**2022**
Numbers	22	24
Total GT in Millions	0.00685	0.00743
Total Deadweight in Millions	0.00514	0.00553
Average Age (Years)	11.63	13
Total DO Consumption in Million Tonnes	0.00943	0.00397
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.0302	0.01272
CO_2 Emissions/GT	4.4128	1.64
CO_2 Emissions/Deadweight	5.8824	2.2969

Data (Vessels of < 5000 GT)		
Crew Boat	**2021**	**2022**
Numbers	16	18
Total GT in Millions	0.002487	0.002794
Total Deadweight in Millions	0.000662	0.000719
Average Age (Years)	29.18	29
Total DO Consumption in Million Tonnes	0.0024969	0.00254
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.0080	0.00814
CO_2 Emissions/GT	3.2188	2.9145
CO_2 Emissions/Deadweight	12.0934	11.60

Data (Vessels of < 5000 GT)		
Launch	**2021**	**2022**
Numbers	14	13
Total GT in Millions	0.0014	0.001416
Total Deadweight in Millions	0.000610	0.000635
Average Age (Years)	12.14	12
Total DO Consumption in Million Tonnes	0.00158	0.00119
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.00508	0.00380
CO_2 Emissions/GT	3.532419	2.6855
CO_2 Emissions/Deadweight	8.321247	6.2713

Data (Vessels of < 5000 GT)		
Dredgers	**2021**	**2022**
Numbers	6	7
Total GT in Millions	0.0130	0.0148
Total Deadweight in Millions	0.0145	0.01702
Average Age (Years)	17	16
Total DO Consumption in Million Tonnes	0.00466	0.00391
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.0149	0.01253
CO_2 Emissions/GT	1.1480	0.8464
CO_2 Emissions/Deadweight	1.0286	0.737

Data (Vessels of < 5000 GT)		
Bulk Carrier	**2021**	**2022**
Numbers	5	5
Total GT in Millions	0.00713	0.00713
Total Deadweight in Millions	0.00887	0.00887
Average Age (Years)	19.6	21
Total DO Consumption in Million Tonnes	0.002191	0.00189
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.00702	0.00605
CO_2 Emissions/GT	0.9845	0.8477
CO_2 Emissions/Deadweight	0.79191	0.6819

Data (Vessels of < 5000 GT)		
Gas Carrier	**2021**	**2022**
Numbers	3	3
Total GT in Millions	0.00873	0.00872
Total Deadweight in Millions	0.00694	0.00694
Average Age (Years)	29.66	31
Total DO Consumption in Million Tonnes	0.000942	0.00075
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.00302	0.0024
CO_2 Emissions/GT	0.35	0.2751
CO_2 Emissions/Deadweight	0.43	0.3459

Data (Vessels of < 5000 GT)		
Tanker	**2021**	**2022**
Numbers	11	13
Total GT in Millions	0.0129	0.0148
Total Deadweight in Millions	0.0183	0.029
Average Age (Years)	20.09	19
Total DO Consumption in Million Tonnes	0.0010	0.00115
Total HFO Consumption in Million Tonnes	0.0012	0.00115
Total LFO Consumption in Million Tonnes	0.0001	0.00006
Total CO_2 Emissions in Million Tonnes	0.00713	0.00745
CO_2 Emissions/GT	0.553	0.5029
CO_2 Emissions/Deadweight	0.389	0.3548

Data (Vessels of < 5000 GT)		
Container	**2021**	**2022**
Numbers	3	3
Total GT in Millions	0.0088	0.0088
Total Deadweight in Millions	0.0108	0.0108
Average Age (Years)	18	19
Total DO Consumption in Million Tonnes	0.0005	0.0005
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0.0033	0.00346
Total CO_2 Emissions in Million Tonnes	0.0119	0.0125
CO_2 Emissions/GT	1.356	1.4218
CO_2 Emissions/Deadweight	1.103	1.1565

Data (Vessels of < 5000 GT)		
Other (Includes: Research vessels, Floating crane, Lighthouse tender, Buoy tender vessel, Security & Patrol Boat **&** Pipe-Laying/hook-up barge)	**2021**	**2022**
Numbers	18	16
Total GT in Millions	0.0317	0.0286
Total Deadweight in Millions	0.0144	0.0135
Average Age (Years)	21.5	22
Total DO Consumption in Million Tonnes	0.00746	0.00683
Total HFO Consumption in Million Tonnes	0	0
Total LFO Consumption in Million Tonnes	0	0
Total CO_2 Emissions in Million Tonnes	0.0239	0.02189
CO_2 Emissions/GT	0.7545	0.7638
CO_2 Emissions/Deadweight	1.6596	1.6112

Vessels Registered as RSV

Data (Vessels of < 5000 GT)		
RSV	2021	2022
Numbers	119	126
Total GT in Millions	0.06961	0.07582
Total Deadweight in Millions	0.06439	0.06691
Average Age (Years)	13.1	13
Total DO Consumption in Million Tonnes	0.028165	0.03111
Total HFO Consumption in Million Tonnes	0.000000	0.00000
Total LFO Consumption in Million Tonnes	0.000078	0.00006
Total CO_2 Emissions in Million Tonnes	0.09054	0.09994
CO_2 Emissions/GT	1.3007	1.318
CO_2 Emissions/Deadweight	1.40605	1.4985

Ship Type Wise Break-up of Vessels registered under RSV

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Bulk Carrier			2022	
Numbers	0	0	0	2
Total GT in Millions	0	0	0	0.0049
Total Deadweight in Millions	0	0	0	0.0060
Average Age (Years)	0	0	0	8.00
Total DO Consumption in Million Tonnes	0	0	0	0.00146
Total HFO Consumption in Million Tonnes	0	0	0	0.0000
Total LFO Consumption in Million Tonnes	0	0	0	0.0000
Total CO_2 Emissions in Million Tonnes	0	0	0	0.00467
CO_2 Emissions/GT	0	0	0	0.9485
CO_2 Emissions/Deadweight	0	0	0	0.7792

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Tanker			2022	
Numbers	0	2	0	5
Total GT in Millions	0	0.00192	0	0.00396
Total Deadweight in Millions	0	0.00267	0	0.00518
Average Age (Years)	0	4	0	24
Total DO Consumption in Million Tonnes	0	0.00012	0	0.0005
Total HFO Consumption in Million Tonnes	0	0	0	0.0000
Total LFO Consumption in Million Tonnes	0	0	0	0.00006
Total CO_2 Emissions in Million Tonnes	0	0.00039	0	0.00179
CO_2 Emissions/GT	0	0.2023	0	0.4526
CO_2 Emissions/Deadweight	0	0.1452	0	0.3457

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Container			2022	
Numbers	0	0	0	1
Total GT in Millions	0	0	0	0.0013
Total Deadweight in Millions	0	0	0	0.0015
Average Age (Years)	0	0	0	8.00
Total DO Consumption in Million Tonnes	0	0	0	0.00007
Total HFO Consumption in Million Tonnes	0	0	0	0.0000
Total LFO Consumption in Million Tonnes	0	0	0	0.0000
Total CO_2 Emissions in Million Tonnes	0	0	0	0.00024
CO_2 Emissions/GT	0	0	0	0.1799
CO_2 Emissions/Deadweight	0	0	0	0.1554

General cargo	2022			
	Type 1	Type 2	Type 3	Type 4
Numbers	1	0	0	10
Total GT in Millions	0.00219	0	0	0.01876
Total Deadweight in Millions	0.00094	0	0	0.02613
Average Age (Years)	15	0	0	19
Total DO Consumption in Million Tonnes	0.00006	0	0	0.00294
Total HFO Consumption in Million Tonnes	0	0	0	0.0000
Total LFO Consumption in Million Tonnes	0	0	0	0.0000
Total CO_2 Emissions in Million Tonnes	0.00020	0	0	0.00944
CO_2 Emissions/GT	0.0922	0	0	0.5033
CO_2 Emissions/Deadweight	0.2156	0	0	0.3613

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Dredgers	2022			
Numbers	0	1	0	1
Total GT in Millions	0	0.0005	0	0.0018
Total Deadweight in Millions	0	0.0002	0	0.00248
Average Age (Years)	0	9.0000	0	1
Total DO Consumption in Million Tonnes	0	0.00026	0	0.00019
Total HFO Consumption in Million Tonnes	0	0.0000	0	0
Total LFO Consumption in Million Tonnes	0	0.0000	0	0
Total CO_2 Emissions in Million Tonnes	0	0.00084	0	0.00061
CO_2 Emissions/GT	0	1.6913	0	0.3405
CO_2 Emissions/Deadweight	0	4.0057	0	0.2463

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Tug	2022			
Numbers	43	2	2	49
Total GT in Millions	0.01846	0.00039	0.00057	0.0157
Total Deadweight in Millions	0.00961	0.00018	0.00048	0.0082
Average Age (Years)	10.00	12	14	13
Total DO Consumption in Million Tonnes	0.01128	0.00031	0.00052	0.01336
Total HFO Consumption in Million Tonnes	0.0000	0.0000	0.0000	0.0000
Total LFO Consumption in Million Tonnes	0.0000	0.0000	0.0000	0.0000
Total CO_2 Emissions in Million Tonnes	0.03616	0.0010	0.00165	0.03643
CO_2 Emissions/GT	1.9584	2.6081	2.8989	2.314
CO_2 Emissions/Deadweight	3.7608	5.5384	3.4719	4.4338

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Offshore Support / Supply Vessel	2022			
Numbers	0	0	0	2
Total GT in Millions	0	0	0	0.0024
Total Deadweight in Millions	0	0	0	0.0016
Average Age (Years)	0	0	0	16
Total DO Consumption in Million Tonnes	0	0	0	0.00071
Total HFO Consumption in Million Tonnes	0	0	0	0.0000
Total LFO Consumption in Million Tonnes	0	0	0	0.0000
Total CO_2 Emissions in Million Tonnes	0	0	0	0.00228
CO_2 Emissions/GT	0	0	0	0.9409
CO_2 Emissions/Deadweight	0	0	0	1.4026

Data (Vessels of < 5000 GT) (RSV)	TYPE 1	TYPE 2	TYPE 3	TYPE 4
Other	**2022**			
Numbers	3	0	0	0
Total GT in Millions	0.00229	0	0	0
Total Deadweight in Millions	0.00128	0	0	0
Average Age (Years)	18	0	0	0
Total DO Consumption in Million Tonnes	0.00035	0	0	0
Total HFO Consumption in Million Tonnes	0.0000	0	0	0
Total LFO Consumption in Million Tonnes	0.0000	0	0	0
Total CO_2 Emissions in Million Tonnes	0.00113	0	0	0
CO_2 Emissions/GT	0.4948	0	0	0
CO_2 Emissions/Deadweight	0.8833	0	0	0

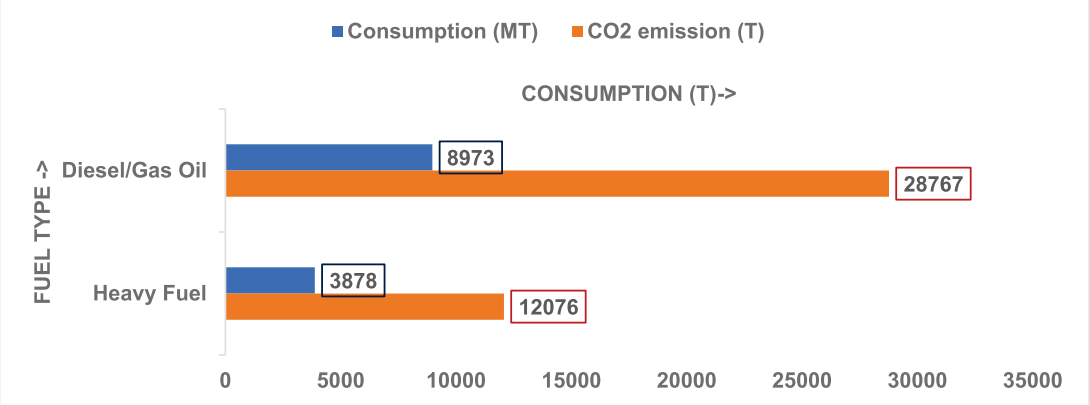
Vessels Registered Under ICV Notification

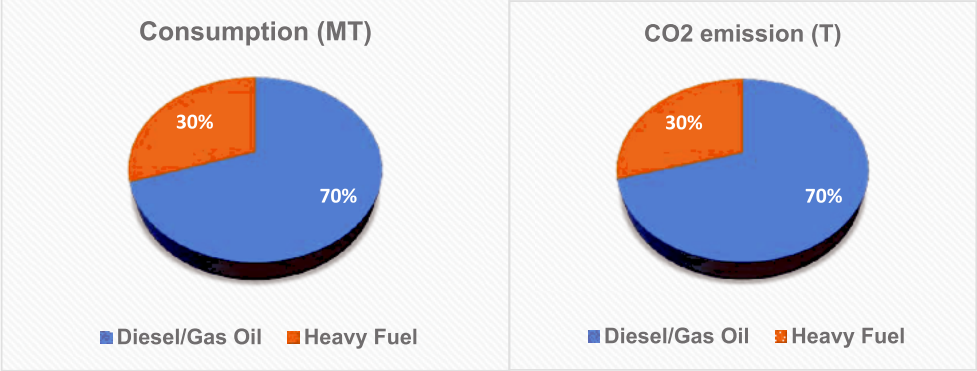
Data (Vessels of < 5000 GT)		
ICV	**2021**	**2022**
Numbers	15	18
Total GT in Millions	0.01336	0.01482
Total Deadweight in Millions	0.01510	0.01561
Average Age (Years)	17.0	16
Total DO Consumption in Million Tonnes	0.002773	0.00325
Total HFO Consumption in Million Tonnes	0.001639	0.00096
Total LFO Consumption in Million Tonnes	0.000000	0.000000
Total CO_2 Emissions in Million Tonnes	0.01399	0.01341
CO_2 Emissions/GT	1.0474	0.9047
CO_2 Emissions/Deadweight	0.92661	0.8587

Ships of 5000 GT & above Certified as RSV or ICV

Data (RSV & ICV)	2020	2021	2022
Numbers	12	19	19
Total GT in Millions	0.071	0.11	0.11
Total Deadweight in Millions	0.093	0.147	0.147
Average Age (Years)	12.9	6.8	7.78
Total CO_2 Emissions in Million Tonnes	0.045	0.0355	0.0408
CO_2 Emissions/GT	0.63	0.32	0.36
CO_2 Emissions/Deadweight	0.48	0.241	0.276

In the year 2022 there were total 19 ships in this category accounting for approximately 0.0408 million tonnes of CO2 emissions

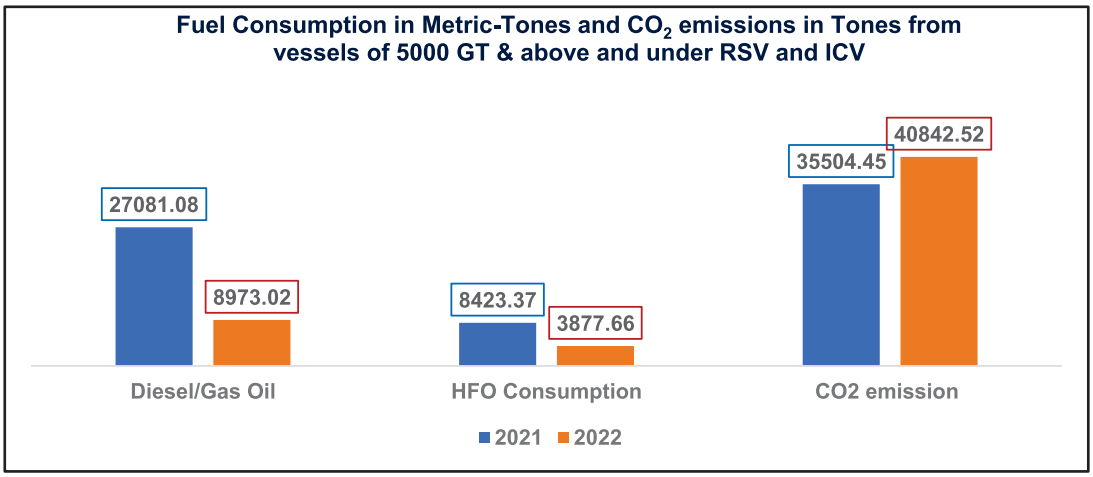




Fuel Type	Consumption (MT)	Consumption (MT)	Consumption (MT)	CO2 emission (Tonnes)	CO2 emission (Tonnes)	CO2 emission (Tonnes)
	2020	2021	2022	2020	2021	2022
Diesel/Gas Oil	6790.6	8447	8973	21770.66	27081	28767
Heavy Fuel	7441.94	2705	3878	23174.2	8423	12076
Total				44944.86	35504	40843

Owing to the small number of vessels in this category, detailed data distribution tables are not included. Out of the 19 vessels; 15 were general cargo ships, 3 were dredgers and 1 passenger ship.

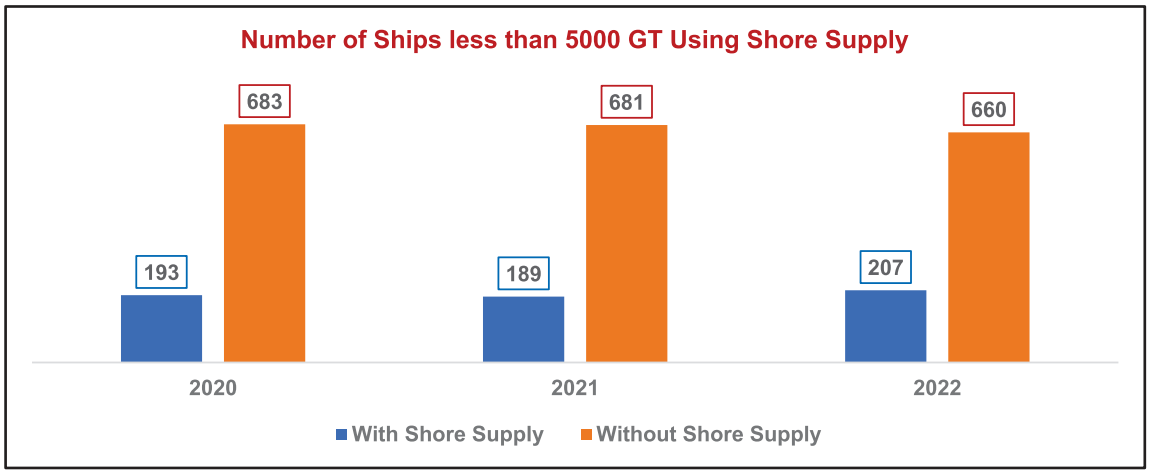
Regarding age distribution, 13 ships were in the category 0 5 years, 2 ships is 5-10 years, 1 ship in 10 15-year bracket, and 3 ships were over 25 year age.



Shore Power Supply to Ships

Trends in Shore Power Supply to Ships less than 5000 GT

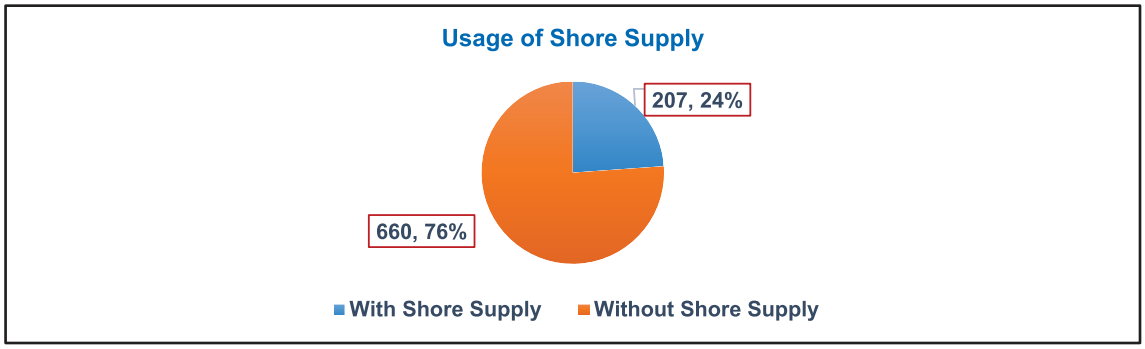
	No. of Ships	DO / MGO Consumption (MT)	HFO Consumption (MT)	LFO Consumption (MT)	Total CO2 (Tones)
With Shore Supply	196	64251.30	960.2	119.54	209356.42
Without Shore Supply	416	214657.52	1816.71	3864.47	706026.19



There is a continuously increase in number of ships using shore power with an increase of about 9.5% increase in number of ships in 2022 compared to 2021.

Distribution of Ships reporting use of Shore Power

Category of Ships	Number using Shore Power
Ships of 5000 GT & above except RSV & ICV	**9**
RSV & ICV Certified Ships of 5000 GT & above	**2**
Ships less than 5000 GT	**196**
Total	**207**



Ports that have reported supply of Shore Power

Port	Ship Type being supplied shore power	Maximum Power which can be supplied	Voltage and Frequency of Supply
Adani Port, Mundra	Tugs, Barges, Pilot Boats etc.	50 KW	440 V, 50 Hz, 3-Phase
Cochin Port Berth	Tugs, Barges, Pilot Boats etc	125 KW	415 V, 50 Hz, 3-Phase
	For small ships, supply at various berths at Ernakulum, Mattancheery	1250 KW & 1000 KW	
UTL own berth at Cochin Port	Own Passenger Vessels	850 KW	415 V, 50 Hz, 3-Phase
GoI Own berth at Cochin Port	Own Vessel	1400 KW	415 V, 50 Hz, 3-Phase
New Mangalore Port Authority	Indian Coast Guard Vessel, Port tugs & Pilot Launches only.	150 KW	415 V, 50 Hz, 3-Phase
Karwar Port	Indian Coast Guard Vessel & Harbour Tugs	20 KVA for Harbor Tugs 65 KVA for IGC	
Gujarat Pipavav Port Ltd	Tugs and pilot boats(Chartered Hire)	125 AMP/70 KW	415 V , 50 Hz , 3 Phase
Adani Port, Muldwarka	Tugs,Costal ships with power demand at ports less than 200 kW	200 KW	440V, 50 Hz, 3 Phase
Offshore Oil Terminal Deendayal Port Authority	Port Owned/Hired Tugs	200 KW	440V, 50Hz, 3 Phase
Pardip Port Authority	Port Owned/Hired Tugs/Floating Crafts	Sufficient Power for small vessels	415 V , 50 Hz , 3 Phase
VOC Port Authority	**Tug, Pilot Launch, Patrol Boat, small crafts and other ships**: Shore Power supply provided at all Berths inside VOCPA, but provided on their request	1MVA or 1000 KVA	415 V , 50 Hz , 3 Phase
	All other Commercial Vessels at VOC 2 & 3 Berths: Shore Power supply has been provided to ships on their request since 2017. However, not made as mandatory.	500 KVA	415 V , 50 Hz or 60 Hz as required , 3 Phase
Adani Gangavaram Port	Port Tugs	50 KW	415 V , 50 Hz , 3 Phase

Chennai Port Authority	Naval Vessels/Customs vessels and Port Tugs and Launches	150KW	415 V , 50 Hz , 3 Phase
Kamarajar Port Limited	Tugs, Pilot Boats, Mooring Boats	50 KW	415 V , 50 Hz , 3 Phase
Adani Krishnapatnam Port Ltd	Tugs,	50 KW	110V/220V/440V 2 Phase 50 Hz
Mumbai Port Authority	Port Crafts	150kW	415volt, 50Hz
	MbPA is in the process of providing shore to ship power supply facility by June 2025 at BPX mainly for cruise vessels. The facility can be used for other cargo vessels also.	5MVA x 2No. (proposed as on date)	6.6 KV/11 KV, 50/60 Hz
Jawaharlal Nehru Port Authority (JNPA)	All Container Ships and feasible oil Tankers ships	7.5 MW	6.6 KV and 0.415 KV at 50/60 Hz both
Mormugao Port Authority	Tug Boats	(i)Breakwater berth: 200 KVA- 1 No & 500 KVA - 1 No (ii)Mole berth: 200 KVA - 1 No. (iii) Berth No.8 12 KVA - 3 Nos. (iv) Berth No.4 - 200 KVA 1 No	440v, 50 Hz
JSW Jaigarh Port Ltd	Patrol Boat	22 KW	3- Phase -440 V / 50 Hz
	Harbor Tugs	44 KW	
	Mini Bulk Carrier: Will be available from Oct'2023 Onwards	172 KW	
JSW Revdanda Port	MBCs -3000 DWT, Speed Boats, Tug Boats	200KW	3- Phase -415 V / 50 Hz

eBDN

Bunker Supplier Information System

{A Digital-Module to Generate E-BDN}

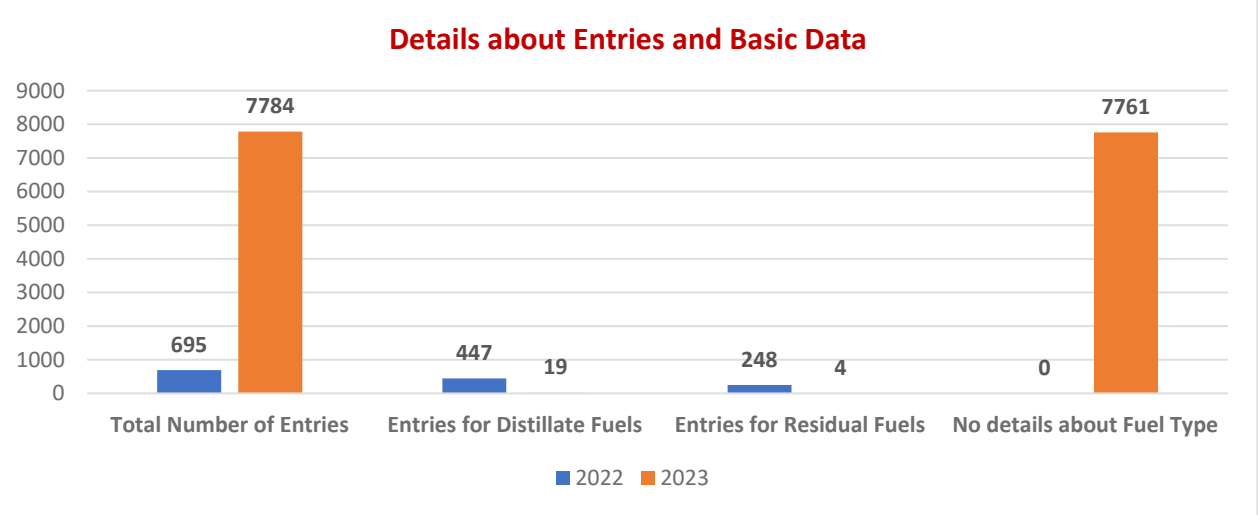
Background

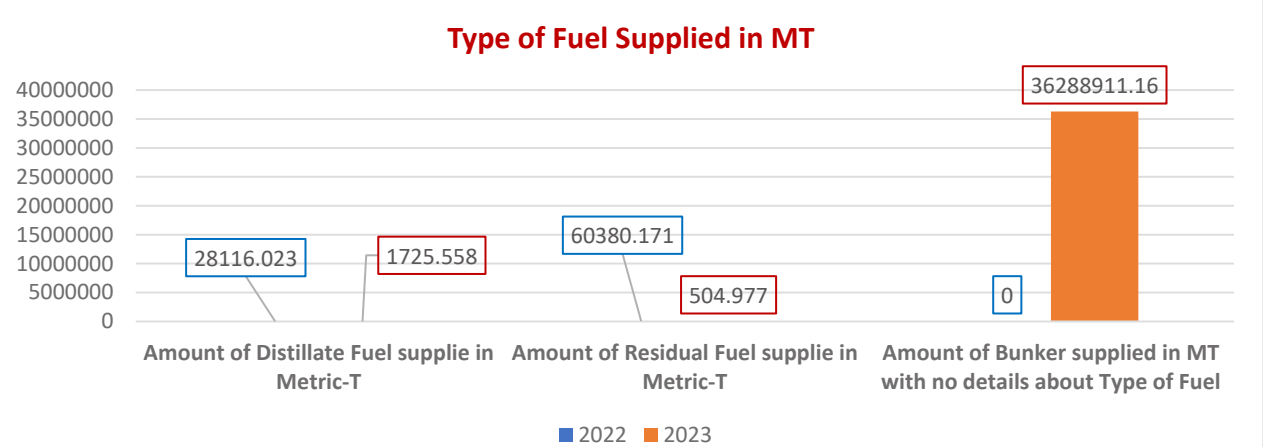
1. **The Bunker Delivery Note is a** standard document required by Annex VI of MARPOL that contains information on fuel oil delivery: name of receiving vessel, port, date, and data of supplier, quantity and characteristics of fuel oil.
2. The **Bunker Delivery Note (BDN)** required by regulation 18 of MARPOL Annex VI is intended to verify that fuel oil delivered to, in use or carried for use on board ships subject to regulation 5 and 6 of Annex VI meets the applicable requirements of regulation 18 and is a signed declaration by the fuel oil supplier's representative that the fuel oil supplied is in conformity with the applicable requirements of regulation 18.3 of Annex VI.
3. The Directorate General of Shipping has developed an on-line portal named Bunker Supplier Information System on its Swachh Sagar portal to generate electronic Bunker Delivery Note (eBDN) as required by regulation 18.5 contains all the information specified in Appendix V to MARPOL Annex VI and additionally the type of alternate fuels such as Biofuel, ammonia, methanol, hydrogen etc.
4. The system helps gather information to various types of fuels supplied to various categories of vessels at various ports in India and help take policy decisions regarding creation of supply chains for various alternate fuels in time to come.
5. The system is recently made operational and has not been completely implemented and may have data gaps, however, this document list an analysis of the data sourced from the portal and performance of approved Bunker Suppliers with respect to usage of this system.

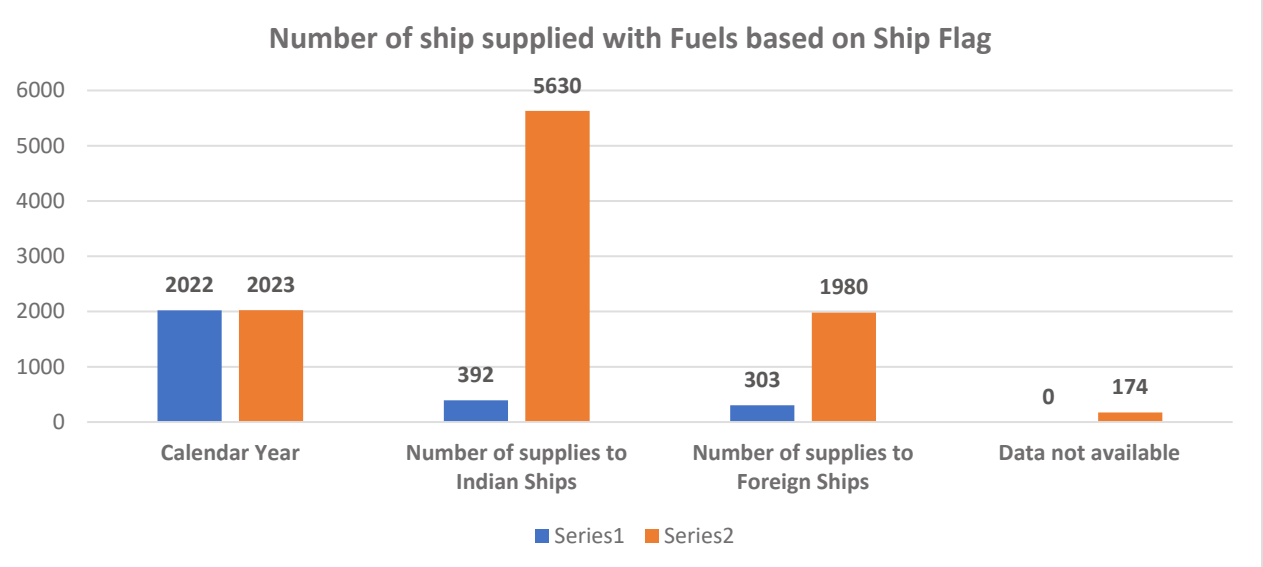
Analysis

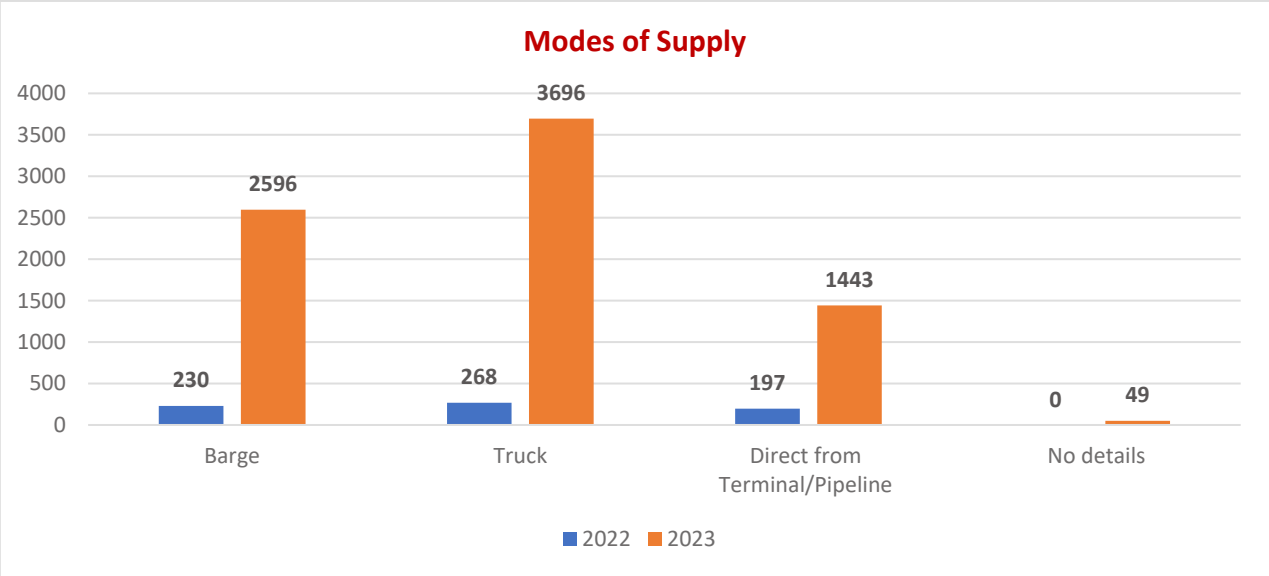
6. As per data generated through the system (not completely implemented in 2022), there was a supply of about 0.089 Million MT of fuel oil, while until 30 September in 2023, the figure is 36.29 Million MT.
7. Among all the modes of delivery, that is, barge, truck & direct from terminal, supply via trucks take the maximum share with almost 48% of all the deliveries, that is 7784 till 30 September in 2023.
8. There is a supply of 14.723 Million MT of fuel oil via trucks, that is, 40% of all fuel oil supplied till 30 September this year.
9. There have been supplies to 58 ports and terminal in India in Calendar year 2023 until date.
10. About 1980 foreign ships were supplied with fuel oil in 2023 till 30 September 2023.

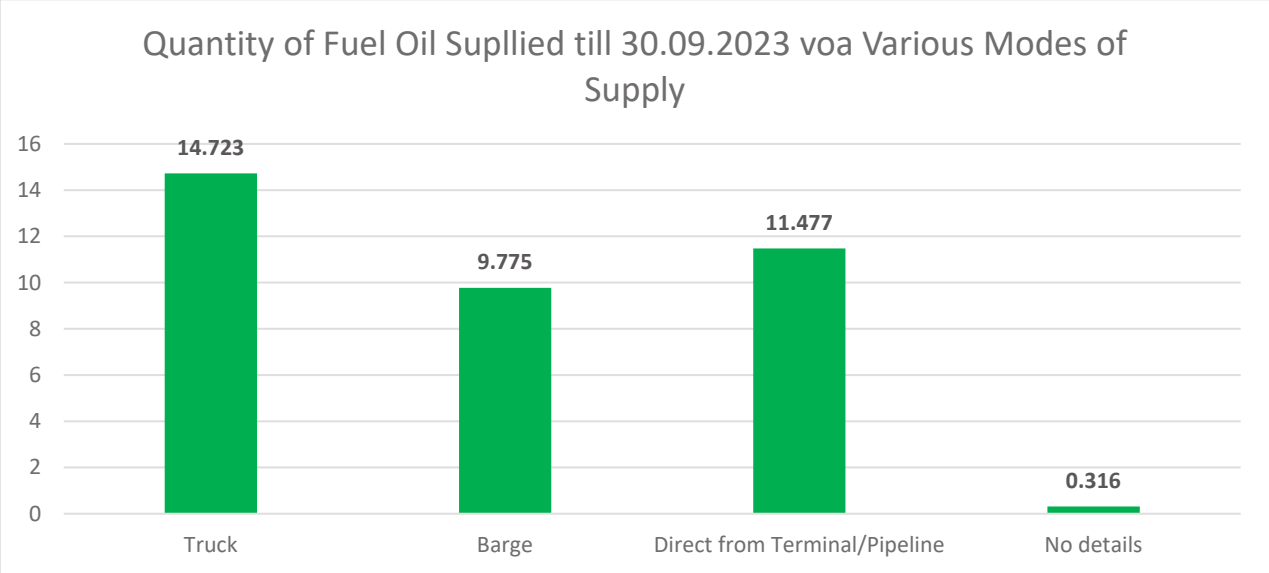
11. The data and analysis and various issues with implementations are detailed in below tables and graphs and with better implementation and quality of data, the Directorate shall publish a detailed analysis report next year.











Ports of Supplies					
Port	**Total Number of Supplies/Total Quantity in MT**	**Supplies from Barge Number/% of total quantity**	**Supplies by Truck Number/% of total quantity**	**Supplies Direct by Terminal/Pipeline Number/% of total quantity**	**No details about supply Number/% of total quantity**
Andaman/Port Blair	768/1133411.87	0/NA	455/2.91%	312/97%	1/0.09%
Angre	9/**310.69**	0/NA	9/100%	0/NA	0/NA
Bhavnagar	3/29.68	0/NA	3/100%	0/NA	0/NA
Bedi	3/141.595	3/100%	0/NA	0/NA	0/NA
Beypore	2/9927.423	0/NA	2/100%	0/NA	0/NA
Budge-Budge/Diamond Harbour/FALTA	12/36635.843	12/100%	0/NA	0/NA	0/NA
Chennai	411/2139213.549	278/53.1%	130/46.7%	1/0.1%	2/0.1%
Cochin	594/1040741.809	537/99.05%	21/0.05%	36/0.9%	0/NA

Dahej	66/2920.127	0/NA	66/100%	0/NA	0/NA
Dhamra	58/341180.396	3/99%	54/0.9%	1/0.1%	0/NA
Dharamtar	372/402304.541	3/0.07%	365/99.2%	1/0.05%	3/0.05%
Dabhol	6/237.131	0/NA	6/100%	0/NA	0/NA
Dighi	3/59.207	0/NA	3/100%	0/NA	0/NA
Ennore	120/480237.341	109/96.1%	9/3.8%	0/NA	2/0.1%
Gopalpur	9/88.348	0/NA	9/100%	0/NA	0/NA
Gangavaram	46/5958.8903	8/72.3%	38/37.7%	0/NA	0/NA
Hazira	148/323867.263	147/99.99%	0/NA	1/0.01%	0/NA
Haldia/Jellingham	377/491693.4752	294/99.7%	83/0.3%	0/NA	0/NA
Jaigarh	17/441.317	0/NA	17/100%	0/NA	0/NA
Jaffrabad	10/1622.542	10/100%	0/NA	0/NA	0/NA
Jakhau	2/16.531	0/NA	2/100%	0/NA	0/NA
JNPA	175/104523.599	63/35.3%	112/64.7%	0/NA	0/NA
Kavaratti	2/65.753	0/NA	1/62.5%	1/37.5%	0/NA
Kandla	446/125347.501	234/63.9%	198/29.2%	13/6.8%	1/0.1%
Karwar	54/14191.011	0/NA	1/0.9%	53/99.1%	0/NA
Kakinada	281/9830611.342	7/0.03%	117/68.8%	153/29.1%	4/2.07%
Kattapulli	3/700.778	3/100%	0/NA	0/NA	0/NA
Kolkata	94/151998.618	151/100%	0/NA	0/NA	0/NA
Kollam	13/211.843	0/NA	13/100%	0/NA	0/NA
Kozhikode	4/65.923	0/NA	4/100%	0/NA	0/NA
Krishnapatnam	54/778700.595	0/NA	54/100%	0/NA	0/NA
Lavgan	3/219.867	0/NA	3/100%	0/NA	0/NA
Mumbai	505/707347.517	289/61.1%	210/38.5%	4/0.3%	2/0.1%
Mangalore	226/3077003.842	118/82.5%	107/17%	0/NA	1/0.5%
Mundra	263/58243.342	39/29.5%	205/53.6%	19/16.9%	0/NA
Magdalla	151/1979.442	1/1.3%	38/30%	112/68.7%	0/NA
Marmugao	268/28384.885	24/8.0%		39/3.0%	205/89%
Nhava Supply Base	640/7449355.784	0/NA	0/NA	640/100%	0/NA
Navlakhi	1/199.871	1/100%	0/NA	0/NA	0/NA
Okha	77/697.788	0/NA	77/100%	0/NA	0/NA
Paradip	282/838433.916	108/92.9%	173/7.0%	1/0.1%	0/NA
Panvel	64/66970.452	0/NA	68/100%	0/NA	0/NA
Porbander	124/9007.552	0/NA	124/100%	0/NA	0/NA
Pipavav	49/1576.003	1/Quantity not detailed	47/100%	0/NA	1/Quantity not detailed
Raigad	10/20232.826	0/NA	10/100%	0/NA	0/NA
Revdanda	5/62.672	0/NA	5/100%	0/NA	0/NA
Ratnagiri	37/41546.4822	0/NA	34/99.9%	0/NA	3/0.1%
RASSAIM	2/29.625	1/66.7%	1/32.3%	0/NA	0/NA
Ramayapatnam	15/671047.238	0/NA	14/99.9%	0/NA	1/0.1%
Sikka	176/63893.08	116/87.3%	13/4.1%	37/8.6%	10/Quantity not detailed
Trombay	7/9935.135	0/NA	5/100%	0/NA	0/NA
Tuna	21/6093.476	5/49.3%	16/50.7%	0/NA	0/NA
Tuticorin	150/325236.756	37/73.6%	109/25.9%	3/0.4%	1/0.1%
Ulwe	1/24	0/NA	0/NA	1/100%	0/NA
Umbergaon	1/32.786	0/NA	1/100%	0/NA	0/NA

Vishakhapatnam	231/4643645.715	147/41.1%	64/57%	18/0.07%	1.83%
Veeraval	13/50.327	0/NA	13/100%	0/NA	0/NA
Vadinar	117/21820.191	43/93.1%	74/6.9%	0/NA	0/NA

Data: Calendar Year 2023: Fuel Supplied till 30 September 2023		
Sulphur Content Fuel Oil Supplied	**Quantity Supplied in Metric-T**	**Number of Supplies**
0.0001-0.001	6976262.527	1458
0.001-0.002	285837.929	417
0.002-0.003	1966.7298	126
0.003-0.004	143113.2013	140
0.004-0.005	4445.689	125
0.005-0.006	29633.377	32
0.006-0.007	1536.936	21
0.007-0.008	347158.4182	26
0.008-0.009	2479.056	101
0.09-0.01	7293.928	154
0.01-0.02	4086235.899	283
0.02-0.03	39451.464	95
0.03-0.04	9061.115	44
0.04-0.05	1943.006	96
0.05-0.06	2891739.344	66
0.06-0.07	145.501	1
0.07-0.08	7238.014	60
0.08-0.09	217708.049	25
0.09-0.1	2502.6595	22
0.1-0.2	715.048	14
0.2-0.3	281.064	2
0.3-0.4	6523424.1	760
0.4-0.5	11317673.24	1287
0.5-0.6	368.149	2
0.6-1.0	467.664	4
1-2.0	7041.353	14
2.0-3.5	38821.214	76
>0.5	44787.01	90
< 0.1	1722.265	20
0.5%<S>=3.5%	455.4	1
Illegible entries about Fuel Sulphur	445583.093	73

Approved Bunker Suppliers with illegible entries about Fuel Sulphur Content: 2023	
Approved Bunker Supplier	**Number of Illegible entries**
Bapu's Shipping (Jamnagar) Pvt. Ltd.	1
Bharat Chemical	1
Bharat Petroleum Corporation Limited,	3
Hindustan Shipping Agency	7
Indian Oil Corporation	26
Link Enterprises	1
Nayara Energy Limited, Gujrat	2

Reliance Industries Limited, Sikka Gujrat	28
SSE Bunkering Private Limited, Mumbai	1
Shambhavi Aryan Support Services, Mumbai	1
Shiny Shipping & Logistics Pvt. Ltd.	1
VHM Bunkers Private Limited	1

Approved Bunker Suppliers with no entry related to Fuel Quantity Supplied: 2023	
Approved Bunker Supplier	**Number of Illegible entries**
Bapu's Shipping (Jamnagar) Pvt. Ltd.	1
Bharat Petroleum Corporation Ltd.	3
Hindustan Shipping Agency	7
Indian Oil Corporation Ltd.	18
Link Enterprises	7
Nayara Energy Limited	2
Oil and Natural Gas Corporation Ltd.	3
Raj Shipping Agencies	1
Reliance Industries Limited	28

Approved Bunker Suppliers with no entry related to Flag of Vessel to which Fuel is supplied: 2023	
Approved Bunker Supplier	**Number of Illegible entries**
Bharat Petroleum Corporation Limited	3
Hindustan Shipping Agency	4
Indian Oil Corporation Ltd.	8
Reliance Industries Limited	15

Performance of Approved Bunker Suppliers

Approved Bunker Supplier	**Number of Supplies**	**Modes of Supply**	**Ports of Supply**	**Issues noted**
Adani Bunkering Pvt. Ltd. Mundra	104	Barge, Direct from Terminal, Truck	Kandla, Mundra, Sikka, Vadinar, Tuna	Ship name not entered, same name of ship entered with many different flags
Ambuja Cements Limited, Ulwe	2	Pipeline, Truck	Ulwe, Magadalla	Exact Sulphur content not entered
Axiom Global Oil & Gas Trading Private Ltd, Kandla	15	Barge, Truck	Kandla, Sikka, Vadinar	Nil
Axiom Global Oil & Gas Trading Private Ltd, Kochi	50	**Barge**	Cochin and Cochin OPL	**Nil**
Bapu Shipping (Jamnagar) Pvt. Ltd, Kutch	14	Barge, Truck	Sikka, Kandla, Bedi, Vadinar	Wrong Flag and Ship name entered, Sulphur Content not entered

Bharat Chemicals, Kochi, Gandhidham, Uran, Fort	143	Barge, Truck	Cochin, Mumbai, Kandla, JNPA	Name of ship not entered, Sulphur Content not entered, Port of supply not entered
Bharat Petroleum Corporation Limited, Mumbai	17	Barge, Direct from Terminal	Mumbai, JNPA	Mode of supply not entered, Name of ship not entered, Sulphur content not entered, Port of supply not entered
Bharat Petroleum Corporation Ltd., Sewree, Kakinada, Kochi, Irimpanam, Surat	195	Barge, Direct from Terminal	Kakinada, Mumbai, Cochin, Hazira, JNPA	Name of ship not entred, Wrong Flag details entered
Green Fuels Global Trading Pvt Ltd, Andhra Pradesh	38	Barge, Truck	Cochin, Kandla, Vishakhapatnam, Paradip, Mumbai, Krishnapatnam	Name of ship incorrectly entered.
Hindustan Petroleum Corporation Ltd., Vishakhapatnam	96	Barge, Direct from Terminal, Tuck	Kakinada, Vishakhapatnam, Gangavaram	Flag and name of ship not entered, Mode of supply not entered
Hindustan Petroleum Corporation Ltd., Kakinada	57	Barge, Direct from Terminal, Tuck	Cochin, Kakinada	Name of ship and Flag incorrectly entered
Hindustan Petroleum Corporation Ltd, Mangalore	**16**	Truck	Mangalore	Name of ship and Flag incorrectly entered, Mode of entry not entered
Hindustan Shipping Agency, Ratnagiri	39	Truck	Lavgan Drydock, Angre Port, Ratnagiri,	Quantity supplied not entered, Mode of supply not entered, Sulphur content not entered, Flag of ship not entered.
IOCL, Visaka Terminal, Willingdon Island, Kochi,	393	Barge, Direct from Terminal,	Vishakhapatnam, Cochin, Gangavaram	Quantity supplied not entered, Mode of supply not entered, Sulphur content not entered, Flag of ship not entered
IOCL, Surat, Rajkot, Port Blair Terminal, Haldia Terminal, Goa, Chennai, Ernakulam Kochi, Karvar, Karravati, Kakinada, Kakinada Foreshore Terminal, Karravati, Mangalore Terminal, Sewree, Rajkot, Tuticorin, Vadodara	4797	Barge, Direct from Terminal, Truck	Mumbai, Dahej, Katthupalli, Vishakhapatnam, Veeraval, Jellingham, Kandla, Kochi, Dabhol, Bhavnagar, Budge-Budge, Vadinar, Umbergaon, Dhamra, Dharamtar, Diamond Harbour Dighi, Trombay, Sikka, Ramayapatnam.	Quantity supplied not entered, Mode of supply not entered, Sulphur content not entered, Name and Flag of ship not entered, Port of supply not entered.

Kotak Petroleum LLP	2	Truck	Mundra	Flag of ship not entered,
Link Enterprises, Kandla	75	Barge, Truck	Kandla, Jafrabad, Bedi, Dahej, Hazira, Tuna, Sikka, Mundra	Wrong details of ship name and flag entered and quantity supplied not entered.
Nayara Energy Limited, Gujrat	36	Truck	Dahej, Hazira, Jarfrabad, Kandla, Mundra	Sulphur content not entered, Quantity supplied not entered, grade of fuel oil supplied not entered
Oil and Natural Gas Corporation Ltd, Nhava	640	Direct from Terminal	Nhava Supply Base	Quantity supplied not entered, grade of fuel oil supplied not entered, ship details not entered
OLEO Energy (India) Private Limited, Amereli	1	Barge	Kandla	Grade of fuel oil supplied not entered
Photon Trading & Marine Services LLP, Mumbai	1	Truck	Jaigad	Grade of fuel oil supplied not entered,
Raj Shipping Agencies	**34**	Barge	Mumbai	Quantity supplied not entered, grade of fuel oil supplied not entered, ship details not entered
Reliance Industries Limited, Sikka, Jamnagar	**49**	Direct from Terminal	Sikka	Quantity supplied not entered, Mode of supply not entered, Sulphur content not entered, Name and Flag of ship not entered, Port of supply not entered, Grade of fuel oil supplied not entered
Reliance Industries Limited, Kakinada, Hazira	**178**	Direct from Terminal	Magdalla, Kakinada	Name and Flag of ship not entered Port of supply not entered, Grade of fuel oil supplied not entered
Reliance Industries Limited, JNPA Terminal	**195**	Truck	Dharamtar, Dighi, Dolvi, Jaigarh, Pen, Raigad, Ratnagiri	Name and Flag of ship not entered Port of supply not entered, Grade of fuel oil supplied not entered
Richa Shipping Pvt. Ltd.	**14**	Truck	Panvel, Revdanda, Dharamtar	Name of ship not entered, Grade of fuel oil supplied not entered
SES Bunkering Pvt. Ltd.	**2**	Barge	Mumbai	Grade of fuel oil supplied not entered
Shambhavi Aryan Support Services	**20**	Barge	Mumbai	Grade of fuel oil supplied not entered
Shiny Shipping & Logistics Pvt. Ltd.	**357**	Barge, Truck	Cochin, Dharamtar, JNPA, Mumbai	Name of ship not entered, Grade of fuel oil supplied not entered, Mode of supply not entered,
The Adani Harbour Services Limited	**152**	Truck	Mundra	Name of ship not entered, Grade of fuel oil supplied not

				entered, Sulphur content not entered
Triton Bunker Lines India Private Limited	**5**	Truck, Barge	Kamrajar Port, Chennai	Name of ship not entered, Grade of fuel oil supplied not entered, Sulphur content not entered
Vert Line Marine Bunkers Pvt. Ltd	**11**	Barge	Kandla, Mangalore, Vishakhapatnam, Kakinada	Grade of fuel oil supplied not entered
VHM Bunkers Private Limited	**34**	Barge	Mumbai	Grade of fuel oil supplied not entered

Single Use Plastic (SUP) Prohibition

DGS Single Use Plastic (SUP) Prohibition On board ships- Analysis and Overview

INTRODUCTION:

In recognition of the urgency to address marine plastic litter from ships, IMO adopted the Action Plan to Address Marine Plastic Litter from Ships (resolution MEPC.310(73)) and subsequently adopted the Strategy to Address Marine Plastic Litter from Ships
(Resolution MEPC 341(77).

The 2018 UNEP report titled "Single-use plastics– A roadmap for sustainability" report highlighted the ubiquitous nature of plastic for being one of the greatest environmental challenges that chokes marine life, transforming some marine areas into a plastic soup.

Single use plastics (SUP) are also known as disposable plastics like plastic bags, straws, coffee stirrers, water bottles and food packaging which are used only once before they are thrown away or recycled.

The Indian Maritime Administration, as a proactive measure, has introduced from 2 October 2019, a phased reduction on usage and carriage of materials made of single-use plastics on Indian-flagged ships. The directorate issued DGS Order No. 05 of 2019 for Prohibition on Use of Single Use Plastics Onboard Merchant Ships and a ban was imposed on single use plastic on Indian ships and foreign ships while in Indian water, as per terms and conditions of the said order.

As per the said order, Single use plastics as listed therein were prohibited to be used on board Indian ships and foreign ships when such ships are at a port or place in India with effect from 1st January 2020 and the list also covers single use plastics which were prohibited with Immediate effect.

The administration issued an Addendum No. I to DGS Order 5 of 2019 on 8th January 2020 which defines single-use plastics as disposable plastics like plastic bags, straws, coffee stirrers, soda and water bottles and food packaging, which are used only once before they are thrown away or recycled. It prohibited all items made of single-use plastics except those related to crew and passenger personnel effects and personal protective equipment, medicines, medicinal equipment, life-saving appliances, fire-fighting appliances, and other statutory items used on such equipment which are made up of SUP or contained in SUP.

Addendum No. I to DGS Order 5 of 2019 also requires all ships to have a plan on board showing how the ship is going to comply with the requirement of gradual phase out of SUP on board. All Indian flag ships have such plans on board, and these are verified by recognized organizations during their annual surveys and by flag State inspections.

The addendum required preparation of inventory of single use plastic on board ship by 3lst January 2020 or 31st March 2020 for cargo ships or passenger ships respectively.

Based on the list of inventories, the Identification, listing and prohibition of single use plastic items are to be as per execution methodology and the execution schedule were detailed in the order for **50%, 75% and 90%** of the items detailed in the inventory.

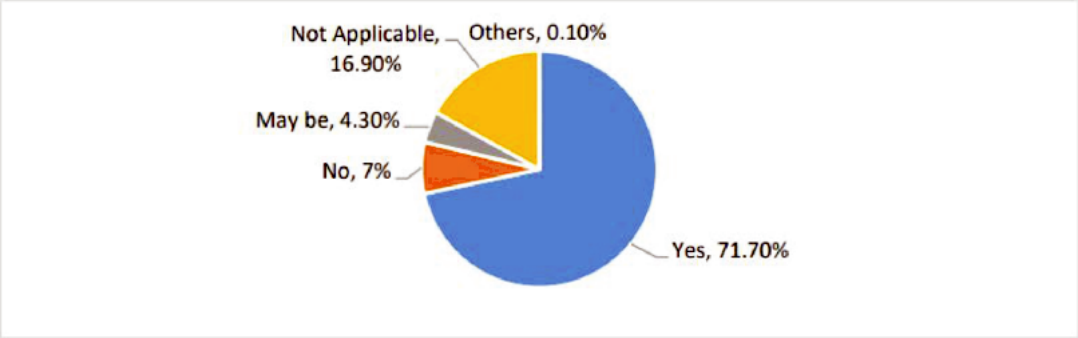
The execution schedule for Identification. listing & prohibition of 90% of items detailed in the inventory was 1st October 2020 for Indian/foreign flag cargo ship at an Indian Port or place and 1st dec 2020 for Indian/foreign flag passenger ship at an Indian Port or place.

Paper submitted by India at IMO (MEPC 78) on the impact of the proactive policy on prohibition of SUP:

India had submitted a paper at MEPC (MEPC 78/8) which shares the experience and findings of a survey conducted after two years of introduction of the measure. The survey was carried out to understand whether the measure has served its purpose of educating seafarers on the impact of SUP on the environment and reduced the usage of SUP on board ships.

The participants of the survey included Recognized Organization surveyors, ship staff, master, superintendent; company's purchase division, spare and store suppliers, etc.

The Impact of the proactive policy shows more than 70% of the participants believe that the prohibition is successful and has resulted in reduction of single-use plastics on board ships.



Impact of the prohibition on the reduction of SUP usage on ships

DGS Single use plastic portal:

In collaboration with the Indian Registrar of Shipping, the Directorate set up the Swachh Sagar portal of DGS Single Use Plastics Application in September 2021 which required the vessels calling and operating Indian ports to submit details concerning the use of single use plastics.

The DGS Single use plastic portal has been used extensively by the ship owners and other users for compliance record on board and verification of single use plastic prohibition by ROs and Administration.

Salient features of the portal:

The ship owners (users) can login to the portal and the login credentials can be obtained at psc-dgs@nic.in.

Once logged in, the user is directed to the homepage where he can add a ship and can enter the ship single use plastic details.

The user to add ship information like Ship Name, Imo Number, Ship type, Distinct number, Flag State

Clicking on Add New SUP will give option to add Single Use Plastic Details. Users can add multiple single use plastic items to ship by clicking on ADD NEW SUP.

The user can add the new Single Use Plastic Category to the existing list.

The report that is generated through the Management Information System- MIS of the portal are as below:

1. Ship details with percentage of single use plastic ban achieved.
2. Ship details where single use plastic ban status 'Yes'.
3. Ship details where single use plastic ban status 'No'.
4. Management Information System.
5. Vendor Report.
6. Summarized details of Single use plastic Items.

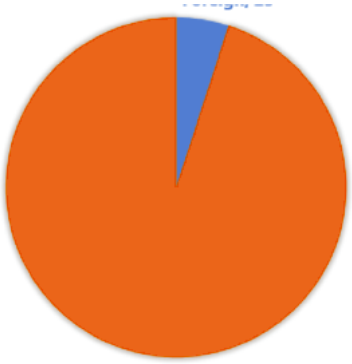
Analysis carried out by Administration for the data/records submitted on the Swachh Sagar DGS Single use plastic portal:

The highlights of analysis of the data gathered for the year 2023 (from January 2023 till September 2023) are as follows:

Total number of records submitted by Ships at Indian ports by Indian flag and foreign flag ships in which a certain SUP item is replaced by an alternative SUP or banned = 2675.

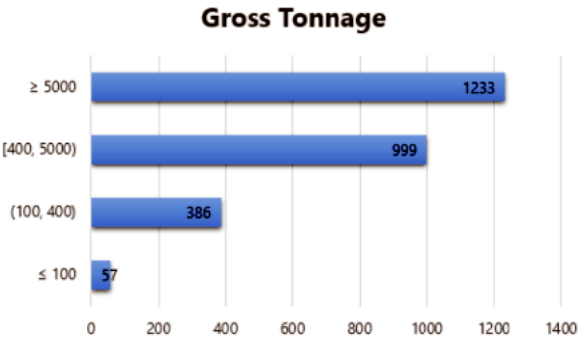
Origin of Ships reported the data

	Count	%
Foreign Vessels	25	6%
Indian Vessels	352	94%
Total	377	100%



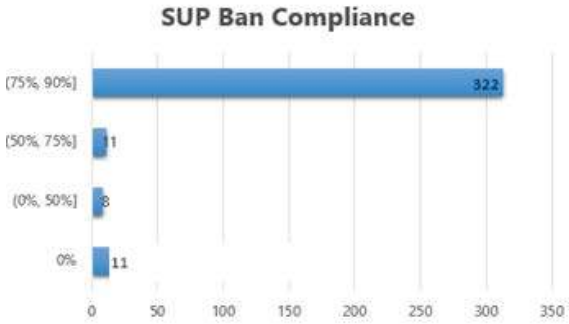
Gross Tonnage wise Records:

Gross Tonnage	%	Count
100	2.1%	57
(100, 400)	14.4%	386
[400, 5000)	37.3%	999
5000	46.1%	1233
Total	100.0%	2675



SUP ban compliance as per Circular (number of vessels)

SUP Compliance	%	Count
0%	3.1%	11
(0%, 50%]	2.3%	8
(50%, 75%]	3.1%	11
(75%, 90%]	91.5%	322
Total	100.0%	352



Distribution of Flag States as per Record Count

Major Flag States	Count	%
Bermuda (United Kingdom)	39	1.5%
China	25	0.9%
Greece	8	0.3%
Guyana	1	0.0%
Hong Kong	4	0.1%
India	2463	92.1%
Malta	5	0.2%
Norway	1	0.0%
Portugal	3	0.1%
Republic of Liberia	30	1.1%
Marshall Island	6	0.2%
Panama	16	0.6%
Singapore	10	0.4%
Bahamas	59	2.2%
Tunisia	1	0.0%
Vietnam	4	0.1%
Total Records	2675	100.0%

Inferences from the above analysis:

The data fetched from Swachh Sagar DGS Single use plastic portal reflects that the Portal has been highly effective and as can be inferred, there has been a complete awareness and compliance for prohibition of single use plastic either by totally removing the item from the ships or by having alternate compliant replacement as shown in the replacement data mentioned below for reference.

Name of Single Use Plastic Items which got replaced by new items totally by Ships on voluntary basis for compliance with the requirements of SUP prohibition:

Item Name	Replaced Details
Plastic tumbler	Replaced with glass and steel tumbler
Plastic spoon	Replaced with metal spoons
Teacups	Replaced with paper teacups
Plastic container	Refill packs ordered where available. Smaller capacity plastic containers are replaced with larger capacity containers to minimize use of plastic
Plastic waste bag	Plastic waste bags replaced with bio-degradable plastic waste bags
Package material of various provision item	Replaced with paper/jute bags.
Packaged food/spice products	Replaced with paper bags.
Plastic stationery item	Replaced with paper bags.
Carry bags	Replaced with paper bags
Chemical cans	Replaced with large 200 ltr metal drums.
Plastic packing material from store suppliers	Plastic packing material replace with paper bags. Packing material returned to suppliers.
Plastic garbage bins	Replaced with metal garbage bins
Plastic container	Replaced with stainless steel container.
Plastic bowl	Replaced with ss bowl
Waste bag	Replaced with bio-degradable waste bag
Plastic utensils	Replace still utensils
Plastics cups	Replace paper cups
Old lube oil barrels	Replace by steel barrels
Plastic straw & stirrers	Replace by steel straw & stirrers
Plastic plates	Replace by still plates
Plastics drum	Replace by still drum
Plastics drinking bottles (1 ltr0	Replace by 20 ltr bottles
Synthetic fevicol bottles	Replaced with steel container
Plastic pouches	Replaced with paper pouches
Old plastic identity cards	Replaced with paper cards
Plastics disposable gloves	Replaced as cotton type
Cutlery plates	Replaced with ceramic plates
Microwave dishes	Replaced with ceramic dishes

Plastic used in various packing of ship spares	Stores shall be checked ashore prior to supply and plastic packing shall be replaced with paper or similar bio degradable material
Sause sachets	Replaced with sauce glass bottles.
Plastic spoons	Disposable plastic spoons replaced with wooden spoons.
Oil storing tanks	Replaced the plastic drums with the metal drums for oil storing
Plastic waste bag	Replaced with paper bags
Pickle	Replaced with glass bottle
Plastic food warping foil	Replaced with aluminum foil
Plastic tumbler	Replaced with glass and steel tumbler
Disposable drums in cabin & common spaces	Replaced with Reusable Metal drums
Food packing films	Replaced with aluminum foil.
Waste bag	Replaced with paper bags
Rice packet	Replaced with steel drum with lid
Plastic polithing for vegetables	Replaced with paper bag
Surf packet	Replaced with glass jar
Surf packet	Replaced with glass jar
Soft drink bottle	Replaced with glass bottle
Candy sticks and icecream sticks	Replaced with wooden sticks
Plastic tea/cofee stirrers	Replaced with wood
Plastic tray	Replaced with steel trays
Plastic disposable oil bottles	Replaced with steel tins
Plastic knife for party	Replaced with steel knife
Plastic refils for hand wash	Replaced with reusable disposers
Thermocol	Replaced with paper stuffed between objects
Plastic straw	Replaced with paper straw
Sweet boxes	Replaced with paper boxes
Plastic garbage cover	Replaced with paper bags
Plastic buckets	Replaced with neoprene rubber buckets
Detergent powder plastic packets	Replaced with jute bags
Plastic folders & files	Replaced with cardboard files

Plastic polythene for vegetable	Replaced with paper bag
Surf packet	Replaced with glass jar
Soft drink bottle	Replaced with glass bottle
Flour bag	Replace with cloth bag
Waste plastic bags in pkts	Plastic bags will be replaced by biodegradable paper bags
Cups	Replaced with glass
Plastics cotton buds	Replace by wood buds
Plastic pouches	Replace by paper paunches
Plastic jar	Replaced with ss jar
Plastic Garbage drums	Replaced with metal drums
Plastic packing material	Replaced with cartons
Rice/flour bag	Replaced with steel container
Noodles packaging	Replaced with paper wrapping
Sliced bread packaging	Replaced with paper wrapping
Ice Cream packing	Replaced with paper packaging
Plastic seafood packing	Replaced with cotton bags
Pulses packing	Replaced with cotton bag
Cable ties	Replaced with stainless steel cable ties
Shoe cover	Replaced with biodegradable shoe covers
Water bottle 1 ltr.	Replaced with 20 ltrs. Water bottle(reusable)
Shoe cover	Replaced with biodegradable shoe covers
Plastic tumbler	Replaced with glass & stell tumbler
Plastic decorative items	Prohibited onboard. Replaced by paper decorative items
Plastic linings	Replaced with non-plastic
Plastic waste bag	Plastic waste bags replaced with biodegradable waste bags

International Requirements: Obligations of Coastal State on Port Reception Facilities

The objective of the MARPOL Convention is to reduce the volumes of harmful materials entering the world's ocean and marine environment. To achieve this goal, the Convention and its Annexes contain requirements to control the accidental or deliberate discharge of substances such as oil, chemical, sewage and garbage.

The six technical Annexes of MARPOL contain detailed regulations with respect to the handling on board ships and in respect to any discharge into the sea or release into the atmosphere of six main groups of harmful substances:

i. Petroleum in any form (Annex I);
ii. Noxious Liquid Substances (NLS) carried in bulk (Annex II);
iii. Harmful substances carried in packaged form (Annex III);
iv. Sewage (Annex IV); Garbage (Annex V); and
v. Air emissions (Annex VI)

MARPOL imposes numerous operational and technical requirements on ships. MARPOL also imposes one important obligation to the Government of each Party, which is to ensure the provision for reception of ship-generated residues and garbage that cannot be discharged into the sea. MARPOL requires that residues that cannot be discharged into the sea in accordance with relevant requirements shall be delivered to port reception facilities. It also requires that port States shall ensure the provision of reception facilities, **which must be adequate to meet the needs of ships**, without causing undue delay to them. The relevant regulations on port reception facilities are:

Oily residues (from ER or from cargo): Annex I, regulation 38;

NLS residues: Annex II, regulation 18;

Sewage: Annex IV, regulation 12;

Garbage: Annex V, regulation 7; and

Annex VI wastes & residues: regulation 17.

The word adequate was deliberated at Marine Environmental Protection Committee of IMO and Resolution 83(44) [Guidelines for Ensuring Adequacy of Port Reception Facilities] defines it as those facilities provided by visiting port, which:

i. mariners use;
ii. fully meet the needs of the ships regularly using them;
iii. do not provide mariners with a disincentive to use them; and
iv. contribute to the improvement of the marine environment.

It also states that the facilities provided by the port must:

i. meet the needs of the ships normally using the port; and
ii. allow for the ultimate disposal of ships' wastes to take place in an environmentally appropriate way.

Port Reception Facilities Report

Indian Regulatory Framework: Port Reception Facilities

The Indian Regulatory framework adequately covers the provision of Port Reception facilities in accordance with MARPOL and other IMO Conventions such AntiFouling Convention. The law alsocovers the end -disposal of waste received from ships. The various provision are detailed in below paragraphs.

Section 356-I {Oil reception facilities at ports in India: It may be noted that the word Oil reception Facilities has been substituted by word Recœption Facilities by 2003 amendments to MS Act, 1958].of the Merchant Shipping Act, 1958 provides substantive provisions related to Port Reception Facilities as below:

i. **Sub-section (1) gives duty and Powers to provide Port Reception Facilities**: Notwithstanding anything contained in any other law for the time being in force, in respect of every port in India, the powers of the port authority shall include the power to provide [The word reception facilities].
ii. **Sub-Section 4 defines Port Authorities**: The Central Government may, by notification in the Official Gazette, specify the ports in India having reception facilities in accordance with the requirements of the Convention.
Explanation.—For the purpose of this section, "port authority" means:
(a) in relation to any major port, the Board of Trustees in respect of that port constituted under any law for the time being in force;
(b) in relation to any other port, the Conservator of the Port, within the meaning of section 7 of the Indian Ports Act, 1908 (15 of 1908).

The following **Merchant Shipping Rules** specify provision related to Port Reception facilities at Indian Ports:

i. Rule 38, Chapter VI of MS (Prevention of Pollution by Oil from Ships) Rules 2010.
ii. Rule 18, Chapter VIII of Merchant Shipping (control of Pollution by Noxious Liquid Substance in Bulk) Rules, 2010. (MARPOL-Annex II)
iii. Rule 12 of Merchant Shipping (Prevention of Pollution by Sewage from ships) Rules, 2010. (Annex-IV)
iv. Rule 7 of Merchant Shipping (Prevention of Pollution by Garbage from Ships) Rules, 2010. (Annex-V)

The Ministry of Environment and Forest is the nodal agency in the administrative structure of the Central Government of development and implementation of Rules related to end disposal of waste ashore. Some the key rules are:

i. The Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 established under the provision of the Environment Protection Act.
ii. The Solid Waste Management Rules 2016.
iii. Plastic Waste Management Rules, 2016
iv. Batteries Waste Management Rules 2001
v. E-Waste Management Rules, 2016

The Efforts of Directorate General of Shipping in ensuring adequate Port Reception Facilities

MEPC had agreed that "to achieve adequacy the port should have regard to the operational needs of users and provide reception facilities for the types and quantities of wastes from ships normally using the port'. Resolution MEPC 83(44) further elaborates the Operational need by stating:

i. **Mutually Agreed Time of Transfer**: The time of transfer [of waste] should be mutually agreed upon and transfer of waste should take place during the cargo handling working hours of the port unless the ship's normal call at the port is not at a time within this period.
ii. **Advance Notification:** For logistical reasons, the providers of waste reception facilities may require advance notification of the intention to use facilities, particularly if independent waste contractors provide some or all of the port's waste collection services. Providing advance notification of the type and quantity of wastes on board for delivery to a reception facility should minimise the risk of undue delay to the ship. Once alerted to the volumes and types of wastes expected, the waste facility provider will be better able to meet the needs of the ship at a mutually acceptable time.

Resolution MEPC 83 (44) also stresses importance on the following aspects to ensure adequate port reception facilities:

i. **Review of Data Collected through Advance Notification**: The universal application of a advance notification or similar procedure should ensure that ports receive a regular supply of documented material. They may use this to monitor the provision and adequacy of their facilities, which will greatly assist the port waste management planning and review process.

ii. **Disposal of Wastes:** The facilities provided by the port must allow for the ultimate disposal of ships' wastes to take place in an environmentally appropriate way.

The Directorate General of Shipping has developed an On-Line Module named Swachh Sagar to ensure the following:

i. The ships are able to raise Advance Notification for Port Reception Facilities to visiting ports.
ii. The ships can choose vendor, fix the date, and time for collection of waste with the selected vendors.
iii. The vendor is required to upload the receipt of waste received and the proof/ receipt that the waste is disposed in accordance with rules.

The Directorate General of Shipping has also being annually assessing the Port Reception Facilities at various ports across India. This year onwards, an On-line digital platform has been developed to ensure that all assessments are carried out using this digital platform so that data can be analysed and improvements suggested.

The DGS Circulars related to Swachh Sagar are:

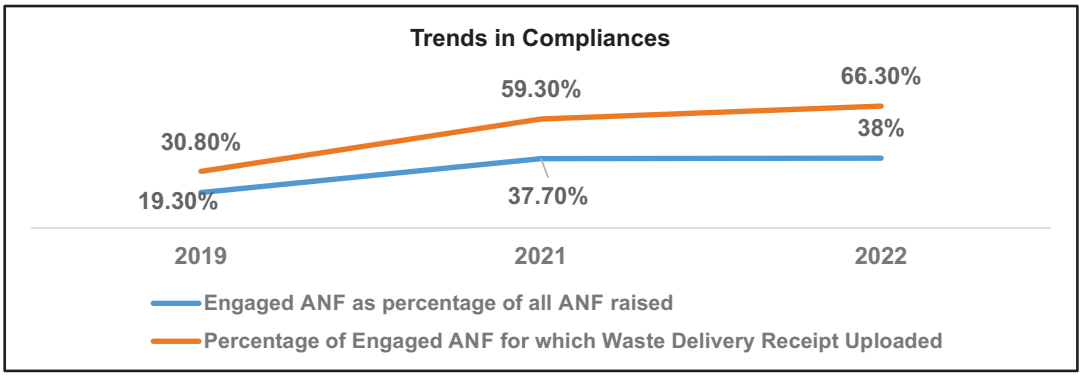
i. DGS Order No. 02 of 2018: Assessment of Port Reception Facilities.
ii. DGS Circular 06 of 2018: Utilization of Centralized Port Reception Facilities: Swachh Sagar.
iii. Addendum to Engineering Circular No. 06 of 2018.
iv. Standard Operating Procedure for Assessment of Adequacy of a Port Reception Facility dated 06.03.2018

Review of Data on Swachh Sagar

Trends in Gross Performance Indicators: The key gross performance indicators:

i. Number of Ports Registered on Swachh Sagar
ii. Vendor count
iii. Number of Advanced Notifications (ANF) which got converted into waste delivery:
iv. Number of Waste Delivery for which waste receipt is uploaded

Attributes	2019	2021	2022
Number of Ports Registered on Swachh Sagar	46	63	66
Number of ANFs filled up by Ships	12949	40862	42572
Engaged ANFs	2502	15410	16207
Vendor Count	241	476	402
Number of Reception Receipts Uploaded	772	9145	10754



Gross Indicators for the Calendar Year 2022

Number of Ports registered on the Swachh Sagar	66	**Number of Ports on Which ANF raised**	49
Number of Ports which supplied Port Reception Facilities	61	**Total Number of Advanced Notifications raised.**	42572
Number of ANF which led to discharge of waste to PRF	16207 (38% of total ANF raised resulted in delivery in waste)	**Number of Receipts Uploaded**	10754 (65.2% of total ANF raised which resulted in delivery in waste

Inferences

1. Is Non-Conversion of Advance Notification (ANF) an indication about non-availability or inadequacy of Port Reception Facilities?

   No, because raising of Advance Notification is mandatory irrespective of whether the ship intends to deliver waste or not at visiting port.

2. Is the conversion rate of ANF to delivery of waste is an indication of adequacy of port reception facilities?

   Yes, because a higher conversion rate indirectly indicates that the port facilitate the ships and the facilities are adequate.

There are only 38% of ANF converted into delivery of waste. The ports with less than average that is 38% conversion of ANF to waste delivery may be verified at next assessment for compliance to Swachh Sagar requirements.

% ANF Conversion = (ANF Converted to Waste Delivery/Number of ANF Raised) x 100 %

% Waste Delivery Receipt Uploaded = (Number of Waste Delivery Receipt Uploaded/ ANF Converted to Waste Delivery) x 100 %

The data on ports with respect to conversion of ANF to waste deliver and uploading of waste delivery receipt is as below:

Minor Ports			
Ports	**% ANF Converted to Waste Deliver/% Waste Delivery Receipt Uploaded**	**Port**	**% ANF Converted to Waste Deliver/% Waste Delivery Receipt Uploaded**
Adani Krishnapatnam Port Ltd (AKPL)	16%/76%	Adani Petronet Dahej Port Limited	16.3%/12.3%
Adani Ports and SEZ Limited Mundra	27.1%/49%	AEML Dahanu Port- Adani	0%/0%
Ambuja Cement Ltd - Muldwarka	83%/0.5%	Ambuja Magdalla Jetty	92.6%/95.8%
Ambuja Ulwa Jetty	94%/69.1%	AMNS Ports Hazira Ltd.	51.7%/66.3%
Angre Port Pvt Ltd	54.1%/7.5%	Bedi Group of Ports - owned by GMB	53.6%/40.9%
Beypore Port	97.4%/4.4%	Bharat Oman Refineries Ltd SPM Sikka	0%/0%
Bhavnagar Group of Ports -Owned by GMB	7.7%/0%	Captain of Ports GOA	0.17%/0%
Dahej RORO Jetty owned by GMB	0%/0%	Dahej Group of Ports - Privately owned terminals	14%/62.3%
Dhamra Port Company Limited	35.5%/4.6%	Ennore Minor Port -Coromandel	0%/0%
Essar Bulk Terminal-Salaya	82.5%/90.6%	Finolex Terminal Ratnagiri	3.4%/0%
Gangavaram Port	31.9%/75.8%	Gopalpur Ports Ltd	61.5%/47.5%
Gujarat Pipavav Port Ltd	3.7%/82.1%	Hazira (Surat) Port	20%/74%
JSW Dharamtar Port	0%/0%	JSW JAIGARH PORT LIMITED	46.3%/38.8%
Kakinada Anchorage Port (Government Of Andhra Pradesh)	38.5%/66.3%	Kakinada Deep Water Port (sea port)	36.9%/3.4%
Karaikal Port Private Limited	20.3%/19.5%	Karwar Port	2.8%/0%
KLL LNG terminal Dabhol	16.7%/0%	KMB Vizhinjam	0%/0%
Kollam Port	0%/0%	Magdalla Group of Ports -owned by GMB	0.09%/100%
Mandvi Group of Ports -owned by GMB	0%/0%	NAV LAKHI GROUP OF PORTS (owned by GMB)	0%/0%
Nhava Supply Base	68.4%/48.5%	Okha Group of Ports -Owned by GMB	59%/69%
Porbandar Group of Ports -owned by GMB	0%/0%	Port Management Board, Andaman and Nicobar Islands	94.6%/100%
Reliance Hazira Shipping and Offshore Division	95.2%/58.9%	Revdanda JSW Steel (Salav) Ltd	0%/0%
Sanghi Port	51.7%/93.3%	Sikka Ports and Terminals Ltd	86.7%/46.5%
Thirukkadaiyur Port	0%/0%	UltraTech Captive Jetty Sewagram	100%/0%
UTCL Captive Berth- pipavav	0%/0%		

Taking into account that more than 500 ANF raised in Calendar Year 2022, the best performing ports in terms of ANF conversion to waste delivery and uploading of waste receipt is **Port Management Board, Andaman and Nicobar Islands.**

Major Ports			
Ports	**% ANF Converted to Waste Deliver/% Waste Delivery Receipt Uploaded**	**Port**	**% ANF Converted to Waste Deliver/% Waste Delivery Receipt Uploaded**
Chennai Port Authority	10.7%/45.5%	Cochin Port Authority	64%/66.3%
Deendayal or Kandla Port Trust	64.2%/36%	Haldia Dock Complex - KoPT.	7.2%/2%
Jawaharlal Nehru Port trust(JNPT)	14.8%/0.9%	Kamarajar Port Limited	36.9%/3.9%

Mormugao Port Authority	42.1%/0.7%	Mumbai Port Authority	33.3%/37.9%
New Mangalore Port Authority (NMPT)	31.1%/79.6%	Paradip Port Authority	36.1%/60.4%
Syama Prasad Mookerjee Port, Kolkata - Kolkata Dock System	3.9%/0%	V. O. Chidambaranar Port Trust Tuticorin	28.8%/43.5%
Visakhapatnam Port Trust	76.4%/78.2%		

Taking into account that more than 500 ANF raised in Calendar Year 2022, the best performing ports in terms of ANF conversion to waste delivery and uploading of waste receipt is **Visakhapatnam Port Authority.**

Port, which have received MARPOL Annex VI Waste in 2022

1. Ozone Depleting Substances

i	Adani Krishnapatnam Port Ltd (AKPL).	viii	Gangavaram Port
ii	Adani Ports and SEZ Limited Mundra	ix	Haldia Dock Complex - KoPT.
iii	Chennai Port Trust	x	Hazira (Surat) Port
iv	Cochin Port Trust	xi	JSW JAIGARH PORTLIMITED
v	Dhamra Port Company Limited	xii	Kakinada Deep Water Port (sea port)
vi	KAMARAJAR PORT LIMITED	xiii	New Mangalore Port Trust (NMPT)
vii	Paradip Port Trust	xiv	Visakhapatnam Port Trust

Ports which Received Exhaust Gas Scrubber Residues

i	Adani Krishnapatnam Port Ltd (AKPL)	iv	KAMARAJAR PORT LIMITED
ii	Adani Ports and SEZ Limited Mundra	v	New Mangalore Port Authority (NMPT)
iii	Hazira (Surat) Port	vi	Visakhapatnam Port Authority

Port with more than 100 ANF and more than 90% of raised ANF resulting in Delivery of Waste

S.no	Port	% of ANF resulting in waste discharge	% of Waste Delivery Receipt Uploaded
i	Port Management Board, Andaman and Nicobar Islands	94.6%	100%
ii	Reliance Hazira Shipping and Offshore Division	95.3%	**58.9%**
iii	Beypore Port	97,4%	**4.5%**
iv	AMBUJA MAGDALLA JETTY	92.6%	95.8%
v	AMBUJA ULWA JETTY	94%	**69%**

Port with more than 100 ANF and between 50-90% of raised ANF resulting in Delivery of Waste

Port	% of ANF resulting in waste discharge	% of ANF resulting in waste discharge	Port	% of ANF resulting in waste discharge	% of ANF resulting in waste discharge
Ambuja Cement Ltd - MULDWARKA	82.9%	0.5%	Gopalpur Ports Ltd	61.5%	47.5%
AMNS Ports Hazira Ltd.	51.7%	66.3%	Nhava Supply Base	68.4%	42.5%

Cochin Port Trust	64%	66.3%	Sikka Ports and Terminals Ltd.	50.6%	46.5%
Deendayal or Kandla Port Authority	64,2%	36%	Visakhapatnam Port Trust	76.4%	78.2%
Essar Bulk Terminal-Salaya	82.5%	90.7%			

Amount and Type of Waste Discharged at Indian Ports

Type of Waste	Quantity Discharged	**Type of Waste**	Quantity Discharged
Amount of Oily Bilge Water delivered to PRF	35332.7 m^3	**Amount of Oily Residues Sludge delivered to PRF**	75536.03 m^3
Amount of Oily Tank Washings delivered to PRF	64360.99 m^3	**Amount of Dirty Ballast water delivered to PRF**	18440.18 m^3
Scale and Sludge from Tank Cleaning	5541.5 m^3	**Annex II: Category X**	38218.9 m^3
Annex II: Category Y	15426 m^3	**Annex II: Category Z**	**16653.2** m^3
Annex IV: Sewage	22395.4 m^3	**Plastics**	10633.85 m^3
Food Waste	3014.9 m^3	**Domestic Waste**	9385.25 m^3
Cooking Oil	1969 m^3	**Incinerator Ashes**	833.7 m^3
Operational Waste	3774.8 m^3	**Cargo Residues**	2875.37 m^3
Animal Carcasses	38.64 m^3	**Fishing Gear**	105.9 m^3
E-Waste	450 m^3	**Quarantine Waste**	89.4 m^3
Ozone Depleting Substances	922.2 m^3	**Exhaust Gas Cleaning Residues**	27.65 m^3

Ports with no registered Vendors

Bharat Oman Refineries Ltd SPM Sikka
Chemplast Cuddalore Vinyls Terminal
Dahej RORO Jetty owned by GMB
Ennore Minor Port -Coromandel
JSW Dharamtar Port
KMB Vizhinjam
Mandvi Group of Ports -owned by GMB: Only 1 ANF raised without waste delivery.
PNP Port, Dharamtar
Revdanda JSW Steel (Salav) Ltd: 94 ANF raised and none resulted in Waste Delivery
The Vizhinjam Port

Ports where no ANF raised

AEML Dahanu Port- Adani	Azhikkal port
Bharat Oman Refineries Ltd SPM Sikka	Chemplast Sanmar Limited Terminal Karaikal
Chemplast Cuddalore Vinyls Terminal	Dahej RORO Jetty owned by GMB
Ennore Minor Port -Coromandel	JSW Dharamtar Port
KMB Vizhinjam	Kollam Port
Mandvi Group of Ports -owned by GMB	NAV LAKHI GROUP OF PORTS (owned by GMB)
PNP Port, Dharamtar	Porbandar Group of Ports -owned by GMB

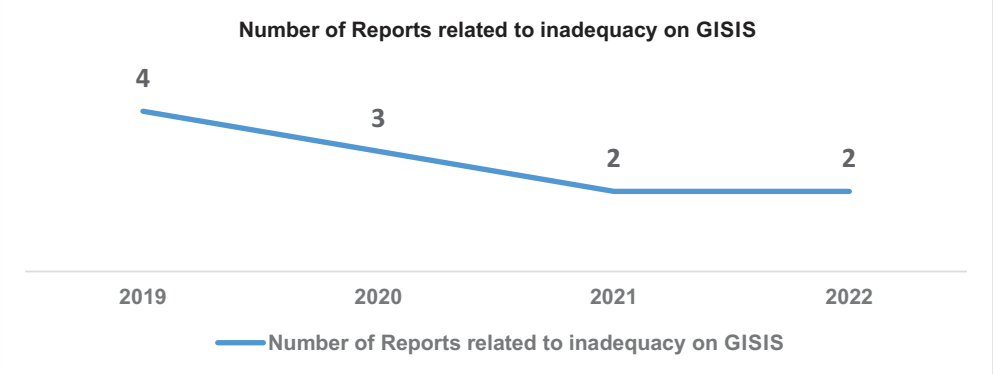
Revdanda JSW Steel (Salav) Ltd	The Vizhinjam Port
Thirukkadaiyur Port	UTCL Captive Berth- Pipavav

Ports where less than 10 ANF raised

Port Name	No. of ANFs
Bhavnagar Group of Ports -Owned by GMB	1
Captain of Ports GOA	1
Finolex Terminal Ratnagiri	1
Karwar Port	3
KLL LNG terminal Dabhol	1
Magdalla Group of Ports -owned by GMB	2
UltraTech Captive Jetty Sewagram	1

Data Analysis of Reports of Inadequacy Logged-In on IMO GISIS

Trends in Inadequacy Reports Registered on GISIS



Ports against which the Inadequacy Reports Registered

Ports	Jurisdictional MMD	Number of Complaints Registered				Number of pending reports requiring validation
		2019	2020	2021	2022	
Sikka	Kandla	1	1	2	1	4
Nhava Sheva (JNPA)	Mumbai	**1**	**0**	**0**	**0**	**1**
Mundra	Kandla	0	0	0	1	1
Vadinar	Kandla	1	0	0	0	1
Deendyal Port Authority	Kandla	0	1	0	0	1
Hazira	Mumbai	1	0	0	0	Nil
Salaya	Kandla	0	1	0	0	1

Nature of Complaints Registered on GISIS

Type of Waste	Nature of Complaint	Port
Plastics, Domestic Waste, Food Waste, E-Waste, Operational Waste	Disposal Certificate not issued after discharge	Mundra
Plastics, Domestic Waste, Incinerator Ashes, E-Waste, Operational Waste	Unreasonable Charges	Sikka
Plastics, Cooking Oil, Domestic Waste, Incinerator Ashes, E-Waste, Operational Waste	Excessive Price	Sikka
Plastics, Domestic Waste, Food Waste, E-Waste, Operational Waste, Cooking Oil	No facilities available for expired medicines and pyro-techniques. Excessive charges for other garbage.	Kandla
Plastics, Domestic Waste, Food Waste, E-Waste, Operational Waste, Incinerator Ashes.	Undue delay	Salaya
Domestic Waste, E-Waste, Operational Waste, Incinerator Ashes	No facility available	Nhava Sheva

Review of Inadequacy Reports on GISIS based on Swachh Sagar Data

Inadequacy reports registered on GISISand sufficiency of vendors for PRF collection and disposal

Ports	Number of Vendors registered on Swachh Sagar
Mundra	0
Sikka	5
Salaya	0
Vadinar	0
Deendayal Port Authority ex Kandla	20
Hazira	6
Nhava Sheva	8

Port	Number of ANF raised	Number of ANF converted into waste delivery	Percentage to total ANF raised converted into waste delivery	Number of ANF where waste delivery resulted and receipt uploaded (Percentage of total delivery based on ANF Conversion to waste delivery)
Sikka	480	243	50.6%	113 (46.5%)
Nhava Sheva	1119	766	68.4%	326 (42.6%)
Deendayal Port Authority ex Kandla	1849	1187	64.2%	428 (36%)
Salaya	0	NA	NA	NA
Hazira	1843	369	20%	273 (74%)
Mundra	0	NA	NA	NA
Vandinar	0	NA	NA	NA

Data on registered vendors for waste collection, ANFs raised and PRF provided was not available from the ports of Salaya, Vadinar and Mundra.

Ballast Water Convention

Ballast Water Convention

Introduction:

The International Convention for the control and management of ships' ballast water and sediment was adopted in the year 2004. The Convention finally achieved the required numbers of ratification and entered into force in 2017. The prolonged delay between the adoption and entering into force of the convention was a marked period of uncertainty for ship owners and the Ballast Water equipment manufacturers. In anticipation of the BWM Convention entering into force, the BWMS manufacturers sought the Type Approval (TA) for their plant as per the G8 Guidelines and by the year 2017, more than 50 Type approved BWMS were available in the market for owners to choose from.

Taking a proactive step towards the biodiversity conservation , the Directorate issued circulars 2 of 2016, 32 of 2020 and 16 of 2022 encouraging the Indian ship owners to follow the BW convention requirements. Over the last couple of years, the Indian flagged ships and vessels calling Indian ports have successfully implemented the Ballast Water Convention requirements through installation of approved Ballast Water Management Systems and carrying our operations to comply with D1 (Ballast Water Exchange) and D2 (Ballast Water Treatment). However, the industry received feedback related to the failures or inoperability of the BWMS in certain conditions. The Indian port state inspection, presently, does not inspect the vessels for the Ballast water compliance. With the MEPC finalizing the Compliance Monitoring Devices (CMDs) approval process for indicative testing of the ballast water, it is envisaged that in future, the PSC inspection will entail indicative testing of the ships ballast water discharges in ports. Recognizing the importance of the proper operations of the BWMS and higher degree of confidence in the BWMS being able to meet the D2 compliance, the directorate had initiated a study to map the challenges in BWMS operations.

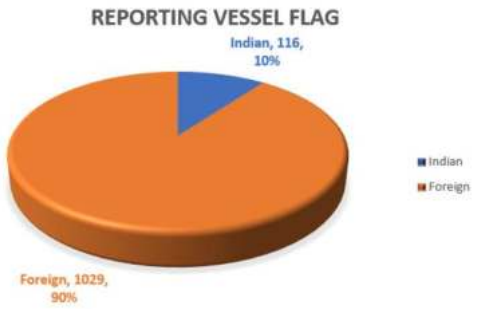
Also, as per the Paris MOU statistics, it was evident that the maximum deficiencies are noted in the Recordkeeping section concerning the Ballast Water Record Book entries.

This paper puts forward the study carried out by the team under the guidance of the directorate in the following paragraphs.

1. Data on BWMS- Phase 1:

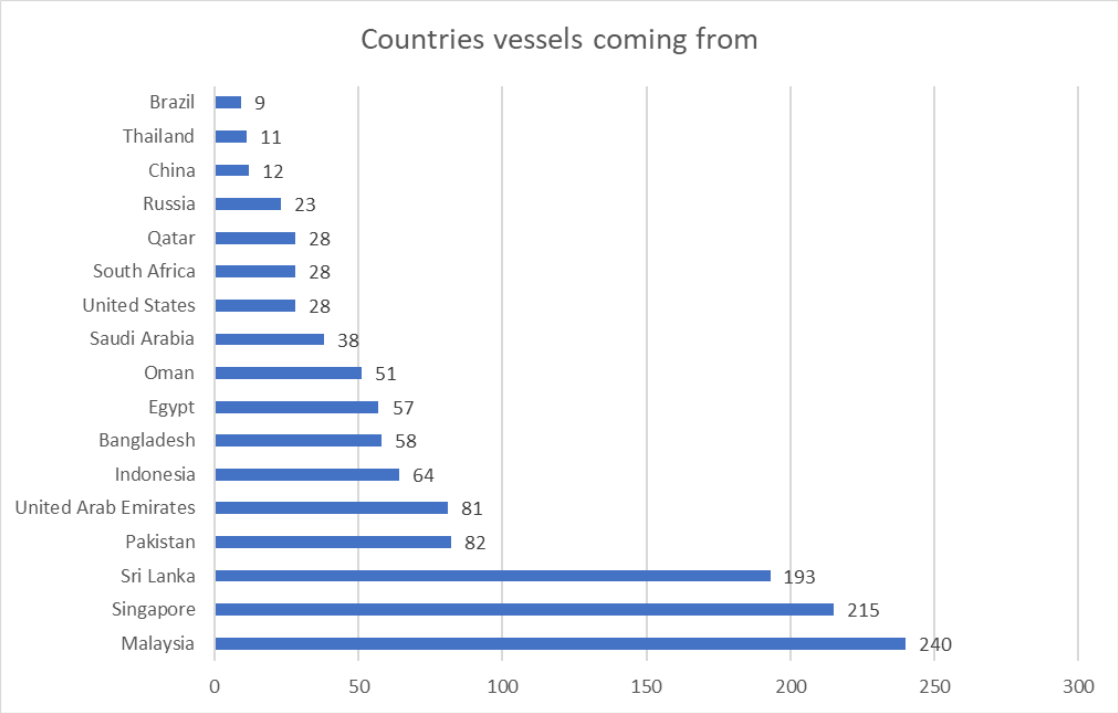
In collaboration with the Indian Registrar of Shipping, the Directorate set up the Swatch Sagar portal of Ballast Water Reporting in September 2022 which required the vessels calling and operating Indian ports to submit details concerning the Ballast Water operations. The highlights of analysis of the data gathered during October 2022 to January 2023 are:

i. More than 2700 validated entries from vessels.
ii. A Total of 1145 vessel reported of which 10% were Indian Flagged vessels.
iii. The Chlorination and UV systems adopting BWMS were noted to be the most preferred technology covering more than 90% of the installations.
iv. Containers were the maximum reported vessels accounting for 35% and are noted to not carrying out Ballasting/ deballasting operations.



Ships	Indian	Foreign
Total ships reported	116	1029
Ships with BWTS Installed	69	884
Installed with BWMS %	59.4%	85.9%

v. The counties where the vessels originate their voyage to arrive at India was analyzed to understand the possible source of Ballast water.



2. Data on BWMS inoperability – Phase 2:

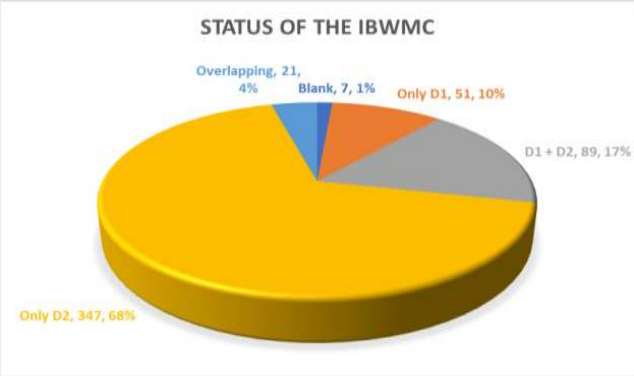
Based on the experience gained through the initial data, the Swach Sagar portal survey questions were realigned to focus on the BWMS failures, and the new questionnaire was rolled out in July 2023. The data received from the vessels in August and September 2023 was further analyzed to provide greater insights into the Malfunctioning of the BWMS.

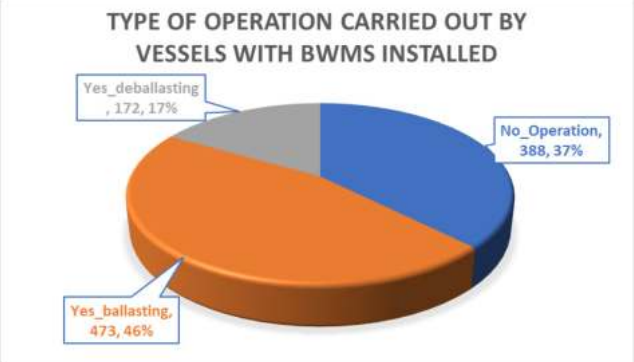
i. A Total of around 1400 entries received in 2 months.

ii. A total of 515 vessels reported.

iii. 455 vessels were installed with BWMS which accounts to 88% of the vessels.

iv. 17 vessels reported to have faced issues during BWMS operations. 15 vessels faced issue during Ballasting (3.1 %) and only 2 faced during Deballasting (1%).

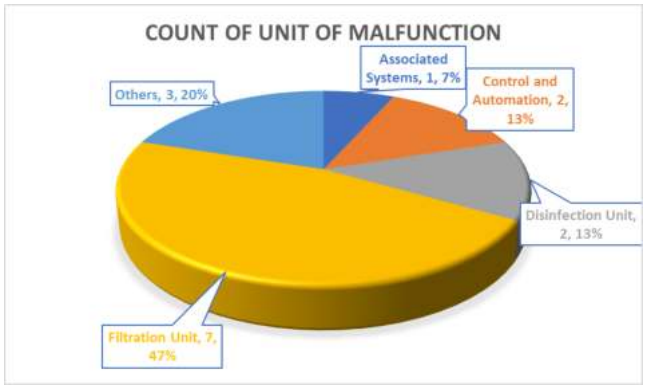


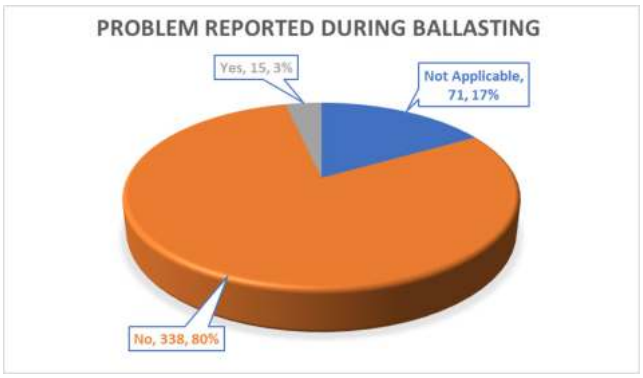


v. Majority of the vessels operating in the Indian ports, including that of Dahej, Kandla, Hazira and Haldia have reported no issues in carrying out Ballasting or Deballasting operations.

vi. 7 out of the 15 units which reported malfunction reported during the uptake process is attributed to Filters. No particular port is identified as a Port with Challenging Water (PCWQ)

vii. Couple vessels installed with electro- chlorination plants commented on the issue of achieving the TRO due to Fresh water in the port.



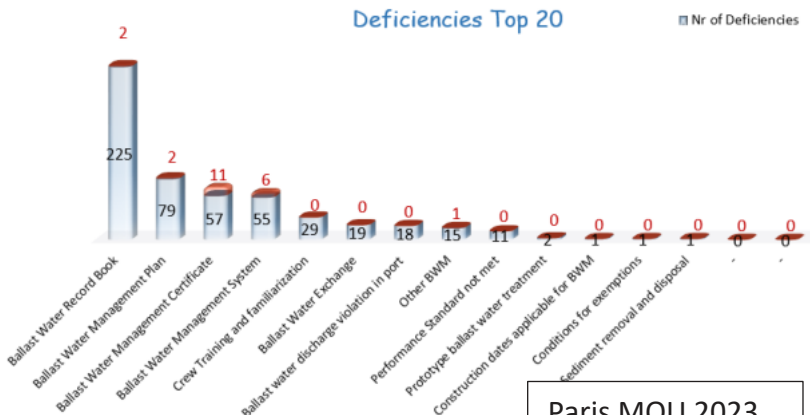


viii. Contrary to the submission made at MEPC, the vessel operating in the Indian ports have reported of lesser challenges in the operation of the BWMS.

3. Ballast Water Record Book and associated guidelines:

Noting the increased deficiencies in the PSC inspections as per Paris MOU statistics and taking into account the high number of Indian seafarers onboard serving both Indian and foreign flagged vessels, the directorate submitted papers at the MEPC 78, 79 and 80 to resolve the recordkeeping related issues.

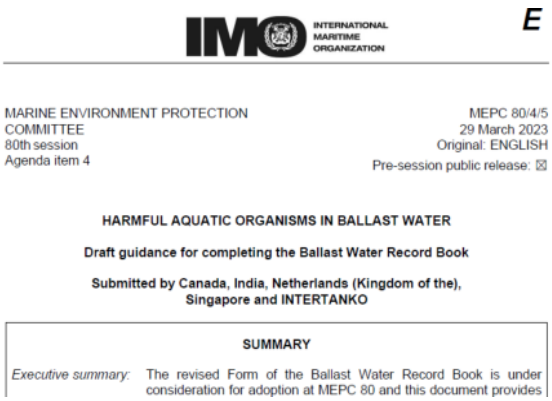
The new Ballast water record book developed by India and submitted to MEPC



Paris MOU 2023

79 was unanimously supported by all member states and it was adopted at MEPC 80. The new format of record keeping aligned the record book to the existing Oil record book format which used Item/ Code format.

Further to the amendment of the Ballast Water Record Book, India submitted the guidelines for recording various operations in the BWRB at MEPC 80. This submission was co-sponsored by Canada, Singapore, Netherlands and Intertanko has been accepted at Ballast Water Review Group of MEPC 80 and released as a Circular.



IMO INTERNATIONAL MARITIME ORGANIZATION E

MARINE ENVIRONMENT PROTECTION COMMITTEE
80th session
Agenda item 4

MEPC 80/4/5
29 March 2023
Original: ENGLISH
Pre-session public release: ☒

HARMFUL AQUATIC ORGANISMS IN BALLAST WATER

Draft guidance for completing the Ballast Water Record Book

Submitted by Canada, India, Netherlands (Kingdom of the), Singapore and INTERTANKO

SUMMARY

Executive summary: The revised Form of the Ballast Water Record Book is under consideration for adoption at MEPC 80 and this document provides

Conclusion:

MEPC discussions and the Convention Review Process presently underway is emphasizing on the development of robust BWMS which can be operated in all types of waters. The present study does not indicate presence of challenging water in Indian ports, which would render the BWMS inoperable.

It is proposed that a further scientific study be undertaken to check the effectiveness of the BWMS operations in Indian waters and ensure that the D2 compliance is achieved.

MARPOL AT 50

Our Commitment Goes On