



Marpol Annex VI: Regulations on Energy Efficiency for Ships: Further Energy Efficiency Measures

Training for the Turkish Maritime Administration on MARPOL Annex VI and the EU Sulphur Directive

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*Istanbul,
12th – 15th January 2020*

- IMO contributes to the global fight against climate change, in support of the UN Sustainable Development [Goal 13](#), to take urgent action to combat climate change and its impacts.
- Mandatory measures to reduce emissions of greenhouse gases from international shipping, under IMO's pollution prevention treaty (MARPOL) - the Energy Efficiency Design Index (EEDI) mandatory for new ships, and the Ship Energy Efficiency Management Plan (SEEMP)..
- In 2018, [IMO strategy](#) on the reduction of GHG emissions from ships, confirms IMO's commitment to reducing GHG emissions from international shipping and to phasing them out.
- Global technical cooperation projects to support the capacity of States to implement and support energy efficiency in the shipping sector.

- IMO Strategy - confirms IMO's commitment to reducing GHG emissions from international shipping and, as a matter of urgency, to phasing them out as soon as possible.
- “levels of ambition”,
- the initial strategy envisages for the first time a reduction in total GHG emissions from international shipping
- should peak as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008, while, at the same time, pursuing efforts towards phasing them out entirely.

Specific reference to “a pathway of CO2 emissions reduction consistent with the Paris Agreement temperature goals”.

Initial strategy was adopted by IMO’s Marine Environment Protection Committee (MEPC), during its 72nd session

The initial strategy represents a framework for Member States,
Sets out

- the future vision for international shipping,
- the levels of ambition to reduce GHG emissions and guiding principles; and
- candidate short-, mid- and long-term further measures with possible timelines and their impacts on States.
- also identifies barriers and supportive measures including capacity building, technical cooperation and research and development (R&D).

Vision:

IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century.

Initial Strategy identifies levels of ambition noting that technological innovation and the global introduction of alternative fuels and/or energy sources for international shipping will be integral to achieve the overall ambition.

- Carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships
- To review with the aim to strengthen the energy efficiency design requirements for ships with the percentage improvement for each phase to be determined for each ship type, as appropriate;
- Carbon intensity of international shipping to decline
- To reduce CO₂ emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008; and
- GHG emissions from international shipping to peak and decline
- to peak GHG emissions from international shipping as soon as possible and
- to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008

- Solar/Wind Power
- Imaginative Passage Planning
- Better port/Ship interfaces
- Slow Steaming
- Better Ship and Generator Management
 - maximum possible load (Let's say 75%) for all round benefit.
 - second generator is started
 - good team work
- Hull form and propeller efficiency
 - CAD and computational fluid dynamics (CFD)
 - optimum trim
- Efficient maintenance/operation of deck cranes also assist in energy conservation.

- Successful garbage disposal method
- **Speed Nozzle:** Speed Nozzles are generally used in small supply vessels and tugs to provide power to the ships. Along with new design features of merchant vessels, they can improve the propulsion efficiency of the ship by saving power up to approx 5 %.
- **Hull Paint:** Another important factor that can increase the fuel consumption of a ship and hence emissions is improving hull properties. Applying correct paint at correct hull area can reduce the frictional resistance of the ship resulting in 3-8% of fuel savings.
- **Waste Heat Recovery System:** This system is already in use for quite some time now, but making it more efficient can reduce the fuel consumption of the ship drastically up to 14% of the total consumption. The waste heat from the exhaust gases can be utilised to heat and generate steam which in turn can be used for heating cargo area, accommodation, fuel oil etc.

Exhaust Gas Recirculation: In this system, NOx emissions from the engine is reduced by recirculation of exhaust gas from engine cylinder with scavenge air which lowers the temperature of the combustion chamber. Reduces the oxygen content along with temperature of combustion cylinder. With this method NOx reduction of up to 80% can be achieved.

Improved Pump and Cooling Water System: An optimized cooling water system of pipes, coolers and pumps can result in decreased resistance to the flow. This will lead to savings of up to 20% of electric power of the ship and fuel consumption up to 1.5 %.

Sail and Kite Propulsion System: reduce the fuel as well as NOx, SOx and CO2 emissions by 35%.

Fuel and Solar Cell Propulsion: The fuel cell propulsion utilizes power from a combination of fuel cells, solar cells and battery systems. This helps in reduction of GHG emission to a great extent.

"Regulation 22A Collection and reporting of ship fuel oil consumption data"

1 From calendar year 2019, each ship of 5,000 gross tonnage and above shall collect the data specified in appendix IX to this Annex, for that and each subsequent calendar year

2 The ship shall aggregate the data collected in that calendar year or portion thereof, as appropriate.

3 Within three months after the end of each calendar year, the ship shall report to its Administration the aggregated value for each datum specified in appendix IX

4 In the event of the transfer of a ship from one Administration or company to another, the ship shall on the day of completion of the transfer or as close as practical thereto report to the last organisation the aggregated data for the portion of the calendar year.

"Regulation 22A Collection and reporting of ship fuel oil consumption data"

5. The data shall be verified according to procedures established by the Administration,

6. Disaggregated data shall be readily accessible for a period of not less than 12 months from the end of that calendar year

7. Applies to ships over 5,000 gross tonnage

8. IMO annual report to the Marine Environment Protection Committee

New appendix IX - Information to be submitted to IMO Ship Fuel Oil Consumption Database

- IMO number
- Period of calendar year covered
- Technical characteristics of the ship - Ship type - Gross tonnage (GT) - Net tonnage (NT) - Deadweight tonnage (DWT) - Power output (rated power) of main and auxiliary engines (kW)
- EEDI (if applicable)
- Ice class
- Fuel oil consumption, by fuel oil type, in metric tonnes and methods used for collecting fuel oil consumption data
- Distance travelled (over ground), hours underway

Statement of Compliance – Fuel Oil Consumption Reporting

- Upon receipt of reported data, the Administration shall determine whether the data has been reported in accordance with regulation 22A of this Annex
-and, if so, issue a Statement of Compliance related to fuel oil consumption to the ship no later than five months from the beginning of the calendar year.

Data collection system for fuel oil consumption of ships

Key references:

MEPC.278(70) Amendments to MARPOL Annex VI - Regulation 22A Collection and reporting of ship fuel oil consumption data - Appendix IX Information to be submitted to the IMO Ship Fuel Oil Consumption Database

MEPC.282(70) 2017 SEEMP Guidelines - PART II : Ship Fuel Oil Consumption Data Collection Plan