# GREENHOUSE GAS (GHG)


# What is Greenhouse Gas emission?

Greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to global warming.


The International Maritime Organization (IMO) was established by Governments as a specialized agency under the United Nations to provide the machinery for intergovernmental cooperation in the field of regulation of ships engaged in international trade.

IMO is responsible for the global regulation of all aspects of international shipping and has a key role in ensuring that lives at sea are not put at risk, including security of shipping, and that the environment is not polluted by ships' operations –as summed up in the IMO's mission statement:

**to promote safe, secure, environmentally sound, efficient and sustainable shipping through cooperation**

# How long do they stay in the atmosphere?

Each of these gases can remain in the atmosphere for different amounts of time, ranging from a few years to thousands of years. All these gases remain in the atmosphere long enough to become well mixed, meaning that the amount that is measured in the atmosphere is roughly the same all over the world, regardless of the source of the emissions.

# IMO Greenhouse Gas Studies

The 1997 Air Pollution Conference resolution 8 on $CO_2$ emissions from ships that initiated IMO's work to address GHG emissions from ships invited IMO to undertake a study of $CO_2$ emissions from ships for the purpose of establishing the amount and relative percentage of such emissions as part of the global inventory of $CO_2$. To date, three IMO Greenhouse Gas Studies have been published:

1. **The First IMO GHG Study, published in 2000, estimated that international shipping in 1996 contributed about 1.8% of the global total anthropogenic CO2 emissions.**
2. **The Second IMO GHG Study, published in 2009, estimated international shipping emissions in 2007 to be 880 million tonnes, or about 2.7% of the global total anthropogenic $CO_2$ emissions; and**
3. **The Third IMO GHG Study, published in 2014, estimated international shipping emissions in 2012 to be 796 million tonnes, or about 2.2% of the global total anthropogenic $CO_2$ emissions.**

# IMO Goals for Shipping

## 2030 goal (40% efficiency)

Probably achievable with current technology
But will increase pressure for immediate development of new IMO regulations for implementation before 2023

## 2050 Goal (70% efficiency, 50% total Cut)

Only possible with arrival of ‘’zero CO2 fuels – Hydrogen, fuel cells etc


# IMO Strategy on Reduction of GHG emissions from Ships - Levels of Ambition

The IMO in her pursuit of a safe, secure, environmentally sound, efficient and sustainable shipping through cooperation and in line with her mandate and set up objectives has embarked on the following strategies as a way of reducing GHG emission from Ships.

1. **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.

2. **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.

3. **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 whilst pursuing efforts towards phasing them out as called for in the Vision as a point on a pathway of CO2 emissions reduction consistent with the Paris Agreement temperature goals.

MARPOL

International Convention for the Prevention of Pollution from Ships

# MARPOL Regulations on Carbon Emission Reduction

1. Switch fuel to a fuel with low sulphur content
2. Switching to natural gas as a fuel
3. Introduce an exhaust gas treatment plant, scrubber, etc

# Scrubber – Exhaust Gas Treatment

Scrubber is a system that is designed to by the use of water wash the exhaust gases from main, auxiliary and boilers to remove sulfur dioxide (SO2) which is a toxic gas, that is directly harmful to human health. There different designs in the market today however they could be divided into two categories, open and closed types. Power consumption of operating a scrubber system is typically between 1-2% of main engine power.

# Types of Scrubber

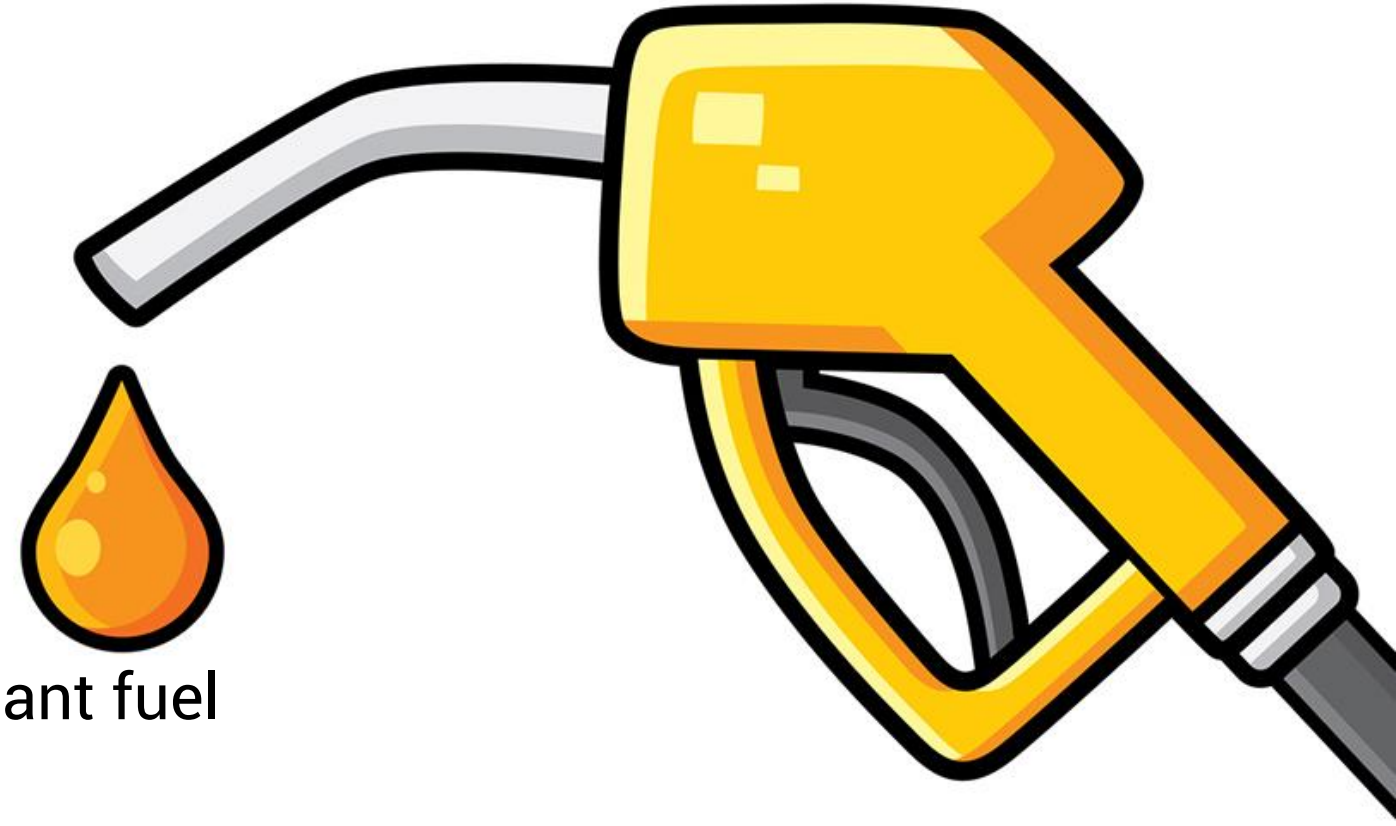
## Open type Scrubber

The open type uses sea water to wash the exhaust gases. The wash water is then treated and discharged back to sea, with the natural chemical composition of the seawater being used to neutralize the results of SO2removal. Open seawater typically systems use 45m3/MW h for scrubbing

## Closed type Scrubber

The closed type uses fresh water in “closed” fresh water circuit that is treated with an alkaline chemical such as caustic soda neutralization and scrubbing. The wash water is re-circulated and the losses is made up with additional freshwater. A small quantity of the wash water is bled off to a treatment plant before discharge to sea. Typically closed freshwater systems have a discharge rate of 0.1- 0.3m3/MW h. The system could also be designed with a holding tank for zero discharge for a certain period.

# Fuel Availability



1. Sufficient global supply of compliant fuel predicted
2. Expect regional variability
3. Compliant fuel includes 0.1%
4. Limited Scrubber and LNG fuel take up by 2020
5. Compliant fuel needs to be available several months before implementation date.

# Fuel Standard & Safety

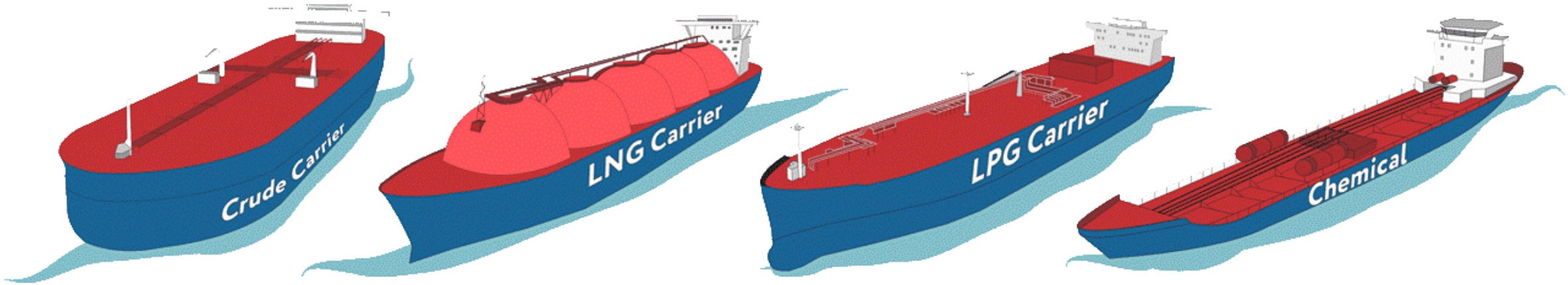
1. ISO 8217 will not be amended before implementation
2. ISO interim Publicly Available Standard (PAS) by late 2019
3. Solas flash point
4. MARPOL VI regulation 18 quality and Safety requirements.

ISO

MARPOL
International Convention for the Prevention of Pollution from Ships


# IMO not working in Isolation

1. World Bank (Carbon Pricing Leadership Coalition) now has maritime work group looking at MBMs
2. This now includes several maritime administrations as well as green NGOs, IMF etc
3. ICS is participating and providing advice, while maintaining public position that MBMs are not necessary




# Implementation & Transition

1. Ships must be compliant by 1st January 2020
2. No possibility of a delay
3. MARPOL carriage ban of non-compliant fuel will be adopted at MEPC 73

# Ways to Reduce Greenhouse Gas Emission & Transition

1. Reduce, Reuse, Recycle
2. Use Less Heat and Air Conditioning.
3. Replace Your Light Bulbs
4. Drive Less and Drive Smart.
5. Buy Energy-Efficient Product

# CONCLUSIONS

1. Most governments seem broadly satisfied with IMO’s goals and strategies
2. 2050 goals on gas emission reduction can only be achieved with zero C02 fuels
3. Threat of unilateral action and market distorting measures remains, unless we help IMO to get on with the job of developing the strategy

# Thank You