# Prevention of Vessel Air Pollution — study guide



Ships release nitrogen oxides, sulphur oxides, carbon dioxide and particulate matter — and MARPOL Annex VI is how the industry is held to account. This guide covers the pollutants, the regulations and the practical measures.[1][2]

## The pollutants

Ships emit nitrogen oxides (NOx), sulphur oxide (SOx) and carbon dioxide (CO2). NOx contributes to lung inflammation, algal blooms in inland lakes and acid rain. SOx causes acid rain, ocean acidification and harm to human respiratory and cardiovascular systems. CO2 is a major greenhouse gas, contributing to climate change by trapping the sun's heat — though, overall, ships release less CO2 than other types of transport. **Particulate matter** is a component of smog, forms black carbon, and contributes to climate change. The ship-caused pollutants most closely linked to public health are **volatile organic compounds (VOCs)**, sulphur oxides (SOx) and particulate matter.

## The regulations

MARPOL Annex VI applies to floating craft, air-cushion vehicles, hydrofoil boats, floating platforms, and all ship types operating under the flag of a convention state member. ECAs (Emission Control Areas) provide environmental protection from pollution close to land and sea areas, where it causes the most damage; within an ECA the sulphur content in fuel oil must not exceed **0.10% m/m**. All ships of **400 GT and above** must be surveyed to ensure compliance with MARPOL Annex VI and hold an **Engine International Air Pollution Prevention Certificate (EIAPPC)** or equivalent if engaged in international voyages. Any vessel over 400 gross tonnes and its responsible officers can be detained if the regulations are not complied with. To control NOx emissions, the IMO has adopted **three** tiers of emission limits — not four. Shipboard incinerators must possess an IMO type-approval certificate.

## The ISM Code's role

The ISM Code requires that a company establish safety and pollution-prevention objectives. Areas covered by the ISM Code include engine maintenance, firefighting systems, incineration, fuel oil usage and refrigeration.

## Practical measures

Practical measures to reduce air pollution include engine modifications, exhaust cleaning, bulbous bow modification and slow steaming.

## Key facts to remember

- Pollutants: NOx, SOx, CO2, particulate matter, VOCs. NOx → lung inflammation, algal blooms, acid rain. SOx → acid rain, ocean acidification, health harm.

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- Particulate matter → smog, black carbon, climate change. Public-health-linked: VOCs, SOx, particulate matter.
- Annex VI applies broadly (all ship types under a convention-state flag, floating craft, platforms, hydrofoils, air-cushion vehicles).
- ECA sulphur limit: 0.10% m/m. Ships ≥400 GT surveyed and hold an EIAPPC (international voyages); over 400 GT can be detained.
- NOx: three tiers (not four). Incinerators need IMO type approval.
- ISM Code: engine maintenance, firefighting, incineration, fuel oil usage, refrigeration.
- Practical measures: engine modifications, exhaust cleaning, bulbous bow modification, slow steaming.

## Sources

1. IMO MARPOL Annex VI — Regulations for the Prevention of Air Pollution from Ships (SOx/NOx limits, ECAs, EIAPPC and incinerators).
2. IMO NOx Technical Code and the ISM Code (SOLAS Chapter IX) — engine emission controls and company pollution-prevention objectives.