

# Marine Emissions

## Testing Gases



Shipping companies are required to substantially reduce their emissions and to more closely monitor, control and report ship emissions.

Global MARPOL and local Emission Controlled Areas (ECA) impose limits on NO<sub>x</sub> and SO<sub>x</sub> emissions from ship exhausts, and regulate greenhouse gas emissions.

## IMO Compliance

Air Liquide offers all compliant gases required to perfectly calibrate analytical equipment that monitors and controls ship engine emissions.

We are with you all the way, from gases for your R&D, testing of sensors and equipment, through commissioning of engines and scrubbers and their analytical equipment.

Our global presence allows us to support engine manufacturers, scrubber system manufacturers, ship owners, regulatory authorities and other stakeholders with high precision calibration gas mixtures required for analysis in R&D, testing, certification, commissioning or continuous monitoring applications, anywhere in the world.

# Legislative landscape

The regulations set out by the **International Maritime Organisation (IMO)**, MARPOL Annex VI, mandate a phased reduction of key polluting molecules over the next 10 years - Sulphur oxides (SO<sub>x</sub>), Nitrogen Oxides (NO<sub>x</sub>), Carbon dioxide (CO<sub>2</sub>), but also gases such as Ammonia (NH<sub>3</sub>) and Hydrocarbons (C<sub>n</sub>H<sub>m</sub>) are of high interest.

Compliant, high precision gases **supporting all sectors involved in emissions monitoring**, in ports, on the oceans and in ECA areas:

Research and Development	Certification & Commissioning	Maintenance and in-service conformity testing
<b>Companies:</b> Marine engines, scrubber manufacturers and analytical equipment OEMs, universities, port authorities	<b>Companies:</b> Shipping companies, engine manufacturers and analytical OEMs, surveyors, 3rd party assessors	<b>Companies:</b> Shipping companies, analytical OEMs, service providers, surveyors and authorities

## Marine Emissions Monitoring = Exhaust Emissions + Process Control

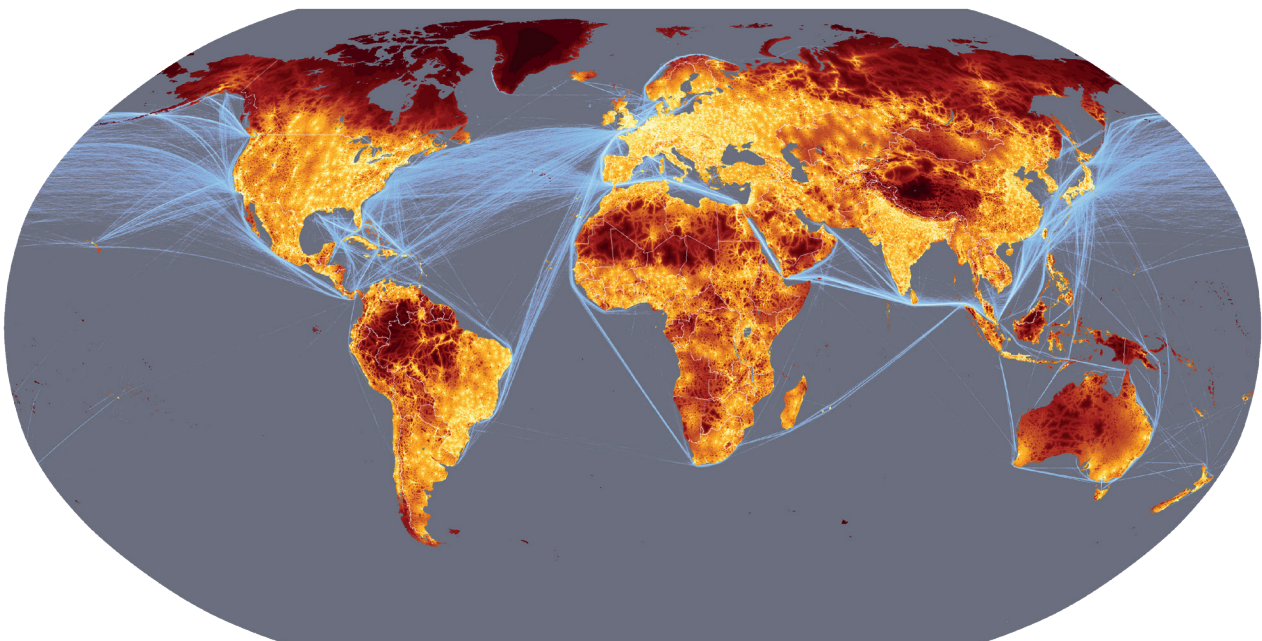
**Exhaust Emissions** to continuously or periodically monitor the pollutant emission levels in the gases at the outlet of the marine engine, before or after the scrubber or at the chimney:

- NO<sub>x</sub>, NH<sub>3</sub> to monitor the efficiency of the engines and the scrubbers
- NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub>, and CH<sub>4</sub> to monitor efficiency of engines when changing fuel

**Process control** at the inlet of scrubber to regulate ship engine, scrubber and to control exhaust emissions:

- NO<sub>x</sub>, H<sub>2</sub>O and O<sub>2</sub> to control the efficiency of the engines and the scrubber
- SO<sub>2</sub> and CO<sub>2</sub> in flue gas to regulate the gas scrubber accurately and more cost effective

## Shipping lanes density



Source: [forobs.jrc.ec.europa.eu](http://forobs.jrc.ec.europa.eu)

# Products & services offered

## **Air Liquide ALPHAGAZ™ Marine Emission Gases:**

- Gases for fully IMO compliant monitoring
- Accredited high precision multi-component calibration gases with guaranteed stability
- Instrument support gases, FID fuel, zero gas and high purity gases
- Convenient cylinders sizes available for portable as well as fixed monitoring equipment
- Equipment for instrument calibration
- Global transport and delivery

Air Liquide facilitate your monitoring, from R&D through commissioning, from continuous monitoring to in-service conformity and mandated checks, wherever you need them and when you need them.

## **Your Benefits:**

- Calibration solutions for all marine stack emission and process control applications
- Convenient cylinders sizes, “Go-anywhere” portability makes on-site calibration easy
- Guaranteed accuracy and long-term stability
- High quality accessory equipment available
- Global availability





# High-performance gases for demanding applications



- Complete range of calibration mixtures
- High purity analyser gases
- Delivery worldwide



- Multi-component gas mixtures
- ISO 9001:2015 Certification
- ISO 17025:2015 Accreditation



- Safety Data Sheets
- Expertise in regulators and equipment
- Full range of cylinder sizes

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The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 67,000 employees and serves more than 3 million customers and patients.