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## 5.16 Emission monitoring

Emission monitoring for clean air on oceans brings maritime air pollution control closely in line with shore-based power plants, cement works and oil refineries, where CEMS have been used for decades.

In recent years, environmental protection became a crucial topic in our society. For improving air quality not only in cities but also on oceans, the emission limit targets of greenhouse gases in the shipping sector have been constantly reduced in the last few years.

There are different alternatives to comply with latest emission limits. One option for marine emissions reduction for ships is to use conventional high sulfur fuel oil and an exhaust gas cleaning system (EGCS). Nowadays, hundreds of EGCS are successfully in operation. An emission monitoring system is complementing the EGCS

and is a crucial system to prove compliance to MARPOL regulations.

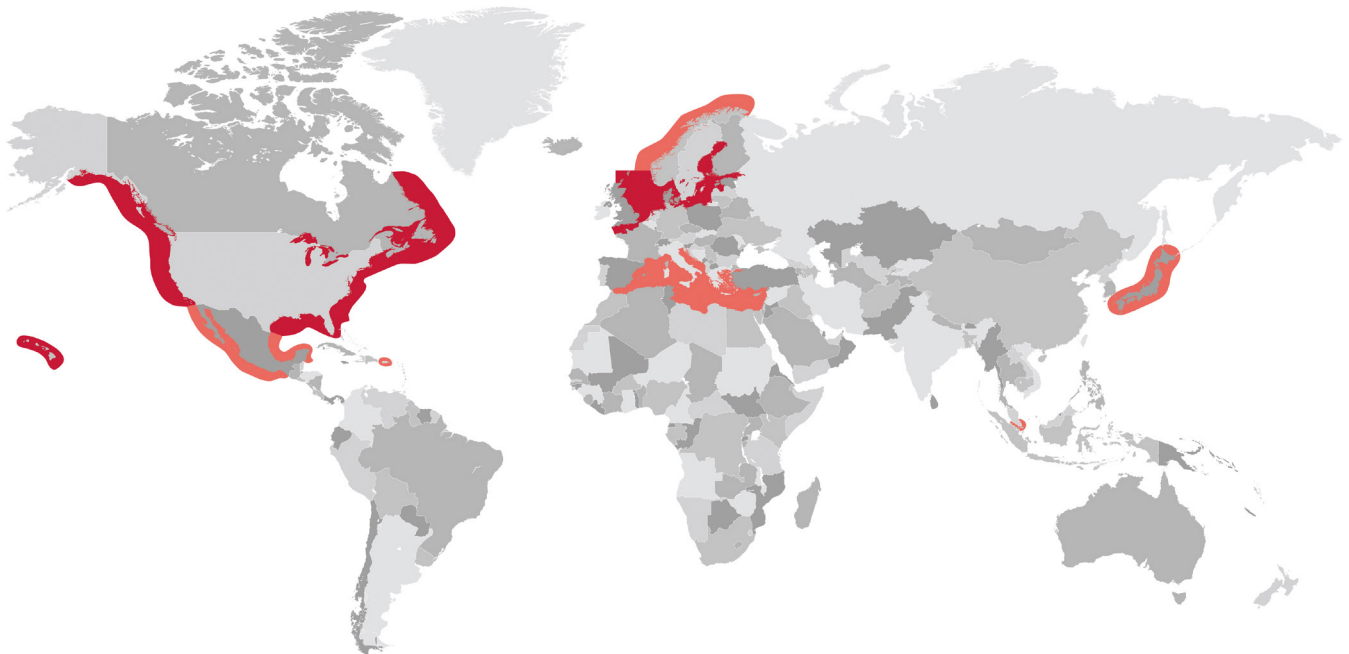
Highest availability and reliable measurement results are key to avoid stress with non-compliance issues while sailing. To meet the high-performance criteria onboard calls for the right design of a continuous emission monitoring system (CEMS).

### The benefits:

- The CEMcaptain is a powerful new emission monitoring system from ABB designed to help guarantee compliance to emission regulations today and in future.

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In below map:

- Emission Control Areas (ECA)
- Possible future ECAs





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ABB's Emission monitoring system

- By consistently achieving 98 percent and more uptime, the CEMcaptain not only requires less maintenance effort but also eliminates the stress and workload caused by non-compliance.
- It increases onboard safety, optimizes processes and reduces ownership costs.
- You receive real-time measurement, easy transfer of diagnostic information, digital software solutions and service and support wherever you are.

ABB has decades of experience in monitoring emissions on land and at sea. We help make measurement easy so you can focus on your business.

#### The measurement requirement

The International Maritime Organization (IMO) set out the MARPOL Annex VI regulations aiming to control the main air pollutants emitted by vessels. These regulations focus on the control and reduction of sulphur oxides (SOx) and nitrous oxide (NOx) emissions:

- Regulation 14 for control and monitoring of SOx emitted by the combustion of heavy fuel oil (HFO) engines
- Regulation 13 for control of NOx emitted by the combustion of diesel engines

SOx control guidelines are specified in the MEPC.259 (68). They apply in all Emission Control Areas (ECAs) starting January 1, 2015 on and have started in 2020 globally.

In order to control the efficiency of exhaust gas cleaning systems (EGCS) and following MEPC.259 (68), measurement of SOx/CO<sub>2</sub> ratio is required. The NOx Technical Code (NTC) 2008 specifies the measurement performance of a CEMS on board of a vessel.

The currently measured gases are:

- nitrogen oxides (NOx)
- sulphur oxides (SOx)
- carbon dioxide (CO<sub>2</sub>)

When it comes to getting the most from a CEMS it is important to select the right analyzer to prove compliance no matter what type of vessel and classification society is involved.

**The ABB system design and sampling technique** of CEMcaptain GAA610-M is based on a dry extractive approach which is compliant to

MARPOL Annex VI & NOx Technical Code 2008 MEPC.177(58)

CO<sub>2</sub>/SO<sub>2</sub> measurement approved according MEPC.259(68) – Guidelines for exhaust gas cleaning systems

NOx approved according MEPC.103(49) – Guidelines for onboard NOx verification procedure direct measurement and monitoring method

NOx approved as equivalent measuring principle to the reference measuring principle (CLD) acc. ISO 8178-1:2006 for onboard NOx verifications procedure direct measurement and monitoring method

The following type approvals for installations on-board of ships are available:  
 DNV GL, Lloyds Register, ABS, KR, NK, Bureau Veritas



ABB CEMcaptain is designed with busy maritime engineers and a regularly changing crew in mind and installed onboard hundreds of ships worldwide. The CEMcaptain GAA610-M is a multi-component analyzer system continuously providing real-time data.

GAA610-M is suitable for high ambient temperatures up to 55°C and high vibration environment.

GAA610-M is protected against soot ingress with innovative filter solution and back-purging option for easy integration and alignment with scrubber operation procedure.



**Actual system information on dynamic QR Code**

A dynamic QR Code is generated by the analyzer system software in real-time, based on the latest status and health information.



**Continuous gas analyzer AO2000-Uras26**

The basic version is equipped with ABB's renowned Uras26 non-dispersive IR gas analyzer and measures simultaneously and continuously SO<sub>2</sub> and CO<sub>2</sub>. Two separate gas paths allow measurement of separate streams with only one analyzer and up to four components per analyzer module.

**Adjustment without test gas**

No test gas is needed during operation. Regular adjustment during operation is automated by the internal gas filled cells of the GAA610-M that enable automated adjustment of the gas analyzer.



**ABB Ability™ Remote Assistance**  
 with secured connectivity to ABB support.



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The combination of on-site innovations and remote digital services increase regulatory compliance and operational efficiency, making measurement easy. We help you to keep the air clean and maintain sustainable environmental management together with expert service support and innovative digital solutions.

The CEMcaptain provides measurement, analytics and digital expertise in a single package, making it easier to understand and manage emissions from operations. It provides a clear route into digital automation and you can be confident of ABB's attention to cyber security.

Installing the high-quality CEMcaptain from the outset means lower total cost of ownership. Precise calibration reduces service intervals. Good CEMS are less likely to fail. The basic requirement of CEMS is 95 percent availability, ABB CEMS consistently achieve 98% and more up-time, which means less maintenance effort, lower total cost of ownership and elimination of the stress and workload caused by non-compliance.

