



ENVIRONMENT SUSTAINABILITY REPORT
2016



CRUISE LINES INTERNATIONAL ASSOCIATION

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INTRODUCTION

This report provides a general overview of environmental sustainability in the global cruise industry in 2016 and highlights examples of Cruise Lines International Association's (CLIA) Cruise Line Member initiatives as they continue to push the envelope on responsible, sustainable cruising.

Never before has there been so much global focus on responsible marine environmental stewardship. In December 2015, the government leaders and representatives emerging from COP21 meetings in Paris announced a major breakthrough with a global commitment to reducing environmental pollution.

The maritime community, represented globally through the International Maritime Organization (IMO), is the only sector to have already applied stringent requirements to reduce emissions from the global maritime fleet. CLIA has actively supported the development and implementation of these measures, including a mandatory 30 percent reduction in carbon emission rates by 2025 for new ships. This was the first ever global and legally binding greenhouse gas reduction regime for an entire international industry

sector and, for the cruise industry, added to steps that cruise lines are already taking to reduce their carbon footprints. Still, CLIA, the shipping industry and the IMO recognize that more must be done in the maritime realm.

For its part, the cruise industry has long played a key role in leading robust environmental initiatives. While the cruise industry's 300 oceangoing cruise ships are only a small fraction of the international commercial maritime fleet (which comprises an estimated 50,000 ships worldwide), the industry draws more than 23 million passengers each year to the beauty of the sea and worldwide destinations.

Built on a business model that delivers vacation experiences in pristine settings, the cruise industry takes very seriously its commitment to environmental stewardship. Preserving the world's oceans, the destinations where the cruise industry operates and the health and well-being of our guests and crewmembers is not only a good idea, it is an operational imperative, especially as passenger demand for cruises continues to grow and the industry meets this demand with the delivery of new cruise ships each year.



HEADING IN THE **RIGHT** DIRECTION

Some CLIA Cruise Line Members' ships are already repurposing nearly 100 percent of the waste generated on board by reducing, reusing, donating, recycling and converting waste into energy.

While the public and passengers often marvel at the size and state-of-the-art amenities on board cruise ships, there is much that takes place behind the scenes for the industry to comply with the latest construction and operations requirements.

Cruise ships offer elaborate systems of design, construction, manufacturing and supply chain management, training and performance that are years in the making — from concept to operations — so that vessels can sail as efficiently as possible. Regulatory compliance is pervasive throughout this process for both new and existing ships, and every year cruise lines invest millions of dollars in research and technology for the next generation's innovative vessels.

As the world's largest cruise industry trade association, CLIA is uniquely positioned to represent the interests of its global membership on environmental matters. Established in 1975, CLIA provides one unified voice for its 62 Cruise Line Members and affiliated companies, which represent more than 95 percent of oceangoing cruise capacity worldwide. CLIA Cruise Line Members, which carry more than 23 million passengers a year to 1,000 ports around the globe, have earned a reputation for meeting and exceeding regulatory requirements. CLIA staffs 15 offices throughout the areas in which the industry operates, with representation in North and South America, Europe, Asia and Australia.

CLIA actively pursues the consistent implementation of environmental regulations globally as a critically important component of its members' operations, and the cruise industry



has been a major contributor to such efforts at the IMO. In 2009, the then-IMO Secretary-General explained:

“[T]he very structure of shipping — in which ships move between countries, between different regions and continents of the world and, therefore, between different legal regimes — makes internationally agreed and universally applied

standards an absolute prerequisite. It was for that very reason that IMO was founded — to provide a global forum for governments in which to convene, debate and, through democratic processes, develop and adopt uniform technical

standards that, once ratified, must be put into practice through national legislation. The alternative, a “patchwork” of different standards and regulations applying in different parts of the world, is clearly untenable for an industry in which the principal assets — the ships and their cargoes — must be able to move freely around the world in pursuit of their legitimate business. It is thanks in large part to the extensive network of global regulations, developed and adopted by IMO over the past fifty years, that shipping today is not only a safe and secure mode of transport, but it is also clean, environment-friendly and very energy efficient.”¹

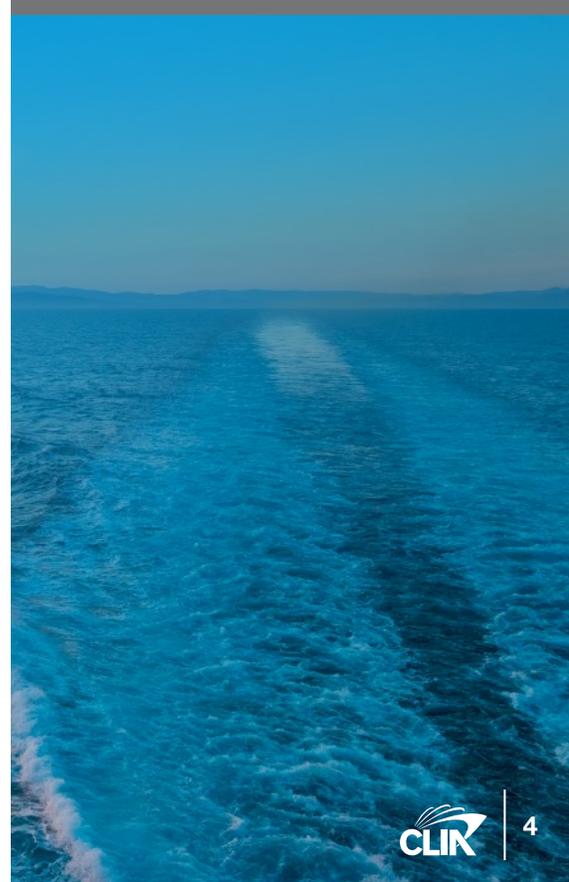
Every year cruise lines invest millions of dollars in research and technology for the next generation's innovative vessels.

¹“Shipping and the Environment,” (second edition) Colin De La Rue and Charles B. Anderson, forward



ABOUT CLIA

Cruise Lines International Association (CLIA) is the world's largest cruise industry trade association, providing a unified voice and leading authority of the global cruise community. CLIA supports policies and practices that foster a safe, secure, healthy and sustainable cruise ship environment and is dedicated to promoting the cruise travel experience.



The IMO creates a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented. CLIA oceangoing Cruise Line Members are required to comply with or exceed all applicable IMO regulations.

It remains the cruise industry's clear preference for globally applicable regulations that provide consistency in performance and enforcement across operating areas. Nevertheless, regional, national and local jurisdictions continue to impose more restrictive regulatory measures without engaging in the deliberate IMO process; this is a political reality that cannot be ignored as it creates the very regulatory disparity that the cruise industry seeks to avoid. Examples include:

- The European Commission's Monitoring, Reporting and Verification regulations
- Low sulfur fuel requirements in New South Wales, Iceland, China and Europe
- Ballast water treatment requirements in the United States
- Hull-biofouling regulations in California

At the core of CLIA Cruise Line Members' environmental programs is the recognition that the industry should pioneer new technologies and procedures to meet or exceed growing requirements across myriad operating areas while also engaging at all regulatory levels to pursue uniform approaches. Moreover, consistent with CLIA Cruise Line Members' commitment to sustainability and environmental stewardship, and to achieve consistency and predictability across fleets, CLIA Cruise Line Members notably go above and beyond regulatory requirements through self-imposed industry policy commitments. It is not only the right thing to do, it makes good business sense. Examples include CLIA oceangoing Cruise Line Members' commitments to:

- Not discharge untreated sewage anywhere in the world
- Limit the discharge of graywater for ships on regular itineraries beyond territorial waters to locations more than 4 miles from nearest land when traveling at a speed of at least 6 knots
- Collect and recycle used electronic equipment generated aboard for proper handling by reputable vendors

In recognition of the cruise industry's commitment to continuous improvement in environmental stewardship, measurable outcomes and significant sustained impact, CLIA proudly accepted two distinguished awards on behalf of its Cruise Line Members:



The 2014 Marine Environment Protection Association Award presented by the North American Marine Environment Protection Association (NAMEPA)



The 2015 Maritime Award of the Americas in Environmental Waste Management by the Secretariat of the Inter-American Committee on Ports (CIP) of the Organization of American States (OAS)



A few representative examples of energy efficiency innovations that some CLIA Cruise Line Members have introduced into their fleets include:

- Use of LED lighting that lasts 25 times longer and uses 80 percent less energy
- Energy efficient engines to consume less fuel and reduce emissions
- Special paint coatings for ship hulls that can reduce fuel consumption by up to 5 percent
- Solar panels that can capture clean energy for shipboard use – one example, strategic use of solar panels generates enough power to operate approximately 7,000 LED lights
- Technologies to allow ships to “plug in” at ports to further reduce air emissions when available as the source of shore-provided power is a cleaner alternative
- Installation of tinted windows, higher efficiency appliances and HVAC systems and windows that capture and recycle heat resulting in the use of less air conditioning
- Reuse of engine waste heat
- Advanced wastewater purification systems
- Optimized itineraries affecting speed, routes and distances traveled to significantly reduce fuel consumption



In addition to its technical and regulatory involvement, CLIA and its members are also proud to work in partnership with reputable environmental organizations such as United for Wildlife, the World Ocean Council and North American Marine Environment Protection Association (NAMEPA), among others, to advance mutual commitments to environmental stewardship and sustainability.

As a result of these collaborations and environmental innovations by CLIA Cruise Line Members, new ships that enter into service today, no matter their size, are among the most environmentally friendly vessels sailing. In fact, CLIA Cruise Line Members are constantly innovating and have invested more than \$1 billion in new environmental technologies and cleaner fuels over the past decade, and have committed more than \$8 billion to build new liquefied natural gas (LNG)-fueled cruise ships.

The Nature Conservancy



Protecting nature. Preserving life.®

In 2014, one CLIA Cruise Line Member pledged \$2.5 million over a five-year period to support the Nature Conservancy’s work on Mapping Ocean Wealth and global marine protection priorities. The Nature Conservancy and its more than one million members have protected nearly 120 million acres worldwide. During the cruise line’s first year of supporting the Nature Conservancy, the following goals were achieved:

- Building new coral nurseries in the Caribbean
- Transplanting 20,000 corals in the Bahamas and U.S. Virgin Islands
- Installing new pilot reef enhancement structures to provide greater habitat for fish and a potential area for future coral growth in Grenada’s Grenville Bay.



“Leadership, investment and commitment to continuous improvement are hallmarks of the industry’s efforts to advance sustainable solutions.”

THE REGULATORY ENVIRONMENT & INDUSTRY-LEVEL LEADERSHIP

International Regulations

CLIA advocates cruise industry legal, legislative and technical positions before regulatory organizations, policymakers, and various industry stakeholders. By actively monitoring and participating in the development of shipping policies and regulations at the international, national and regional levels, the cruise industry is better positioned to not only meet or exceed regulatory requirements, but to pioneer experimental technologies and procedures as well as lead the marine industry in environmental stewardship.



CLIA has been involved with important work at the International Maritime Organization (IMO) for more than 20 years. Holding consultative status as a non-governmental organization, CLIA has participated in deliberations on behalf of the cruise industry when international regulations and guidelines are under development.

At the forefront of environment-related regulations is the International Convention for the Prevention of Pollution from Ships and its six annexes, more commonly known as MARPOL. CLIA and its Cruise Line Members participate in a number of IMO working groups and committees related to MARPOL and other international conventions, regulations, standards and guidelines that protect the environment. These groups include:

- Marine Environment Protection Committee (MEPC)
- Pollution Prevention and Response Sub-Committee (PPR)
- Review Group on Ballast Water Management (BWM)
- Working Group on Air Pollution
- Working Group on Further Technical and Operational Measures for Enhancing Energy Efficiency in International Shipping
- Working Group on Reduction of Greenhouse Gas Emissions from Ships
- Drafting Group on Special Areas
- Correspondence Groups on Energy Efficiency Design Index, Fuel Oil Quality, Fuel Oil Availability, Review of the Guidelines (G8) for Approval of Ballast Water Management Systems and a Fuel Consumption Data Collection System

A few examples of recent environment-related regulatory matters in which the cruise industry has significantly contributed at IMO include:

- Energy Efficiency Design Index (EEDI) – Beginning in September 2015, new cruise ships must meet energy efficiency standards in compliance with the IMO’s EEDI, which requires a 30 percent reduction in CO2 levels over time. The cruise industry contributed to the development of the EEDI standards by working with the IMO MEPC to craft an appropriate calculation method and guidelines for determining the EEDI of cruise passenger ships. The cruise industry fully supports the IMO’s EEDI efforts, which provide for more energy-efficient and less polluting equipment and engines.
- Ship Energy Efficiency Management Plans (SEEMP) – Cruise ship owners work closely with equipment manufacturers to modernize existing equipment, update procedures and create awareness for passengers and crew regarding technical and operational measures that enhance energy efficiency. These efforts also include measures to reduce fuel consumption and CO2 emissions through route planning and maintenance, while maintaining safe operation and cost effectiveness. SEEMPs, which the IMO made mandatory for existing ships in 2013, capture cruise industry efforts that often exceed regulatory compliance and reflect the cruise industry’s commitment to protecting marine ecosystems.
- Development of an IMO Monitoring, Reporting and Verification (MRV) scheme – CLIA continues to participate in the IMO’s MEPC efforts to identify further technical and operational measures for enhancing the energy efficiency of international shipping. With strong support from the maritime industry, the Committee approved draft mandatory requirements for ships to record and report their fuel consumption for each type of fuel. These requirements are the first of a three-step process to further actions related to fuel efficiencies and emissions. As currently developed, the aggregated data will be reported to the Flag State at the end of every year, and the Flag State will verify compliance and issue a Statement of Compliance to the ship. The data would then be transferred to the IMO Ship Fuel Consumption Database. These efforts are designed to provide data the IMO can use to determine if further energy efficiency measures are needed.



National Implementation of IMO requirements by Flag and Port States

While the maritime industry, including the cruise industry, is comprehensively regulated by the IMO, international conventions must be implemented through national legislation. Accordingly, national laws are enforced by regulatory agencies for ships that fly the nation's flag (Flag State requirements) and for ships that call in the nation's ports (Port State Control requirements).

CLIA and its Cruise Line Members remain actively engaged with regulators throughout the industry's areas of operation to best understand how requirements will be implemented and enforced. Some cruise lines have specially trained environmental officers responsible for 24-hour compliance with regulations from destination to destination.

For example, the U.S. Environmental Protection Agency (EPA) and the U.S. Coast Guard play important regulatory roles as a large number of cruise ships in the worldwide fleet frequently sail to U.S. waters. Similarly, Port States throughout the Caribbean, Mediterranean, Baltic, Australia and Asia all administer international and national requirements via their own Port State Control enforcement measures.



Some cruise lines have specially trained environmental officers responsible for 24-hour compliance with regulations from destination to destination.

Cruise Ships are part of a comprehensive system of regulation, enforcement and inspection that protects passengers, crew and the environment



Port States

U.S. COAST GUARD, CDC, EPA, FBI, CUSTOMS & BORDER PROTECTION

- Review ship designs and issue safety certification before the ship sails.
- Conduct announced and unannounced inspections and enforce compliance with all international and domestic laws and regulations.
- Detain ships if serious violations are found.



International Maritime Organization & International Labour Organization

- Set comprehensive standards for cruise ship, including safety, security, crewmember protections, and environmental practices.



Countries of Registration

FLAG STATES

- Ensure that registered ships meet national and international requirements.



Classification Societies

- Set safety and environmental rules and guidelines and provide oversight for ship design, construction, and operation.
- Conduct inspections and surveys on behalf of flag states, insurers, and other members of the maritime community to make sure ships are seaworthy and managed responsibly.

National Laws and Regulations

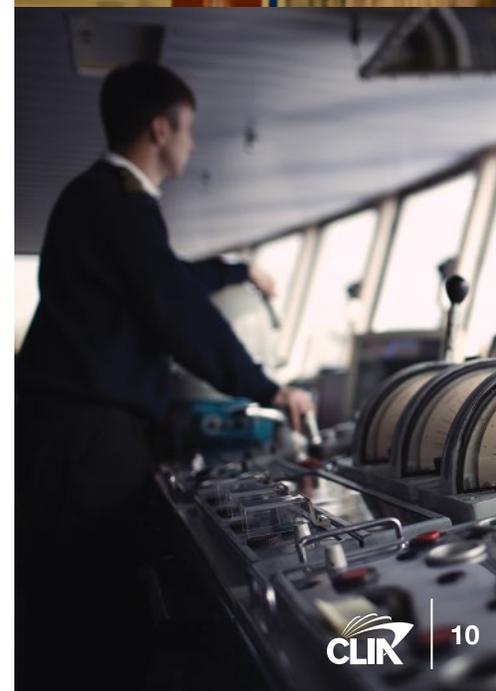
Beyond compliance with international requirements, each ship that visits a country's port must also comply with any applicable environmental laws and regulations in effect. For example, in the U.S., the Oil Pollution Act of 1990 helped bring attention to environmental issues at sea, which together with the Clean Water Act and the Act to Prevent Pollution from Ships, introduced strict liability and criminal penalties for illegal discharges from ships, including cruise ships.

In the U.S. in 2009, the Vessel General Permit (VGP) came into effect under the EPA's National Pollution Discharge Elimination System (NPDES). This permit imposes additional controls on the discharges from ships in U.S. waters, including several that were previously not expressly covered in the U.S. Clean Water Act. As a result, everything from rain water runoff to engine cooling water discharged into U.S. waters is regulated. The VGP is renewed periodically and subject to ongoing review. Based on recent legal challenges to the VGP, it is anticipated that the 2018 VGP revision may include significant changes.

State and Local Regulations

In some instances, local measures are more stringent than those put in place on an international or national level. Accordingly, CLIA and its Cruise Line Members engage with local authorities to work toward local requirements that track as closely as possible with national and international laws for consistency and predictability. Nevertheless, cruise ships must comply with all applicable laws.

In Alaska, for instance, legislation passed in 2006 set wastewater rules for cruise ships that are among the most stringent worldwide and far exceed regulations placed on most shoreside municipal wastewater treatment facilities. This legislation was updated in August 2014 by the Alaska Department of Environmental Conservation. Cruise ships must obtain a permit in order to discharge treated sewage and other wastewater, and abide by the rules of the permit.



CLIA Policies - Beyond Compliance

When adopted by its Global Board of Directors, CLIA issues industry-level policies, the implementation of which Cruise Line Member CEOs must verify annually. Safety and environmental policies, including CLIA's internationally recognized Waste Management Policy, must be incorporated into each ship's Safety Management System (SMS), which is subject to independent, third-party verification by classification societies and governments.

Classification Society Certification

Classification societies are non-governmental organizations that conduct inspections of cruise ships under construction and throughout their lifecycles, ensuring compliance with the many applicable rules and requirements. This verification covers a wide range of potential environmental impacts, including oil pollution, sewage, garbage, exhaust emissions, ballast water and others. The verification regime comprises initial plan approval and on-board surveys, as well as surveys held at periodic intervals to ensure compliance is maintained.

When ships exceed IMO requirements, classification societies can award Class Notations to recognize demonstrated performance. For example, Lloyd's Register awards the Environmental Protection (EP) Class Notation that covers all major environmental impacts, including:

- Installation and operation of ballast water treatment systems
- Treatment of swimming pool water before it is discharged to the sea
- Installation and operation of oily water separators with a discharge standard that exceeds the IMO limits
- Use of environmentally-friendly refrigerant gases and/or natural substances which do not deplete the ozone layer
- Antifouling coatings that are not harmful to marine organisms

Some CLIA Cruise Line Members also demonstrate their commitment to environmental stewardship through voluntary independent certification of their environmental management system (EMS) against the International Standards Organization's ISO 14001: 2015 standard, which provides regulators, customers and other stakeholders with assurance that the cruise line is running a sound business by continuously proving its environmental credentials.

Classification societies will continue to challenge CLIA Cruise Line Members to raise the bar even higher as they recognize and encourage environmental development and innovation. Environmental regulation is constantly evolving, and CLIA Cruise Line Members continue to meet and exceed the growing requirements.



CLIA Cruise Line Members have received numerous recognitions from classification societies. One Cruise Line Member was the first cruise operator to receive Bureau Veritas' Six Golden Pearl Label, the highest notations and certifications for Quality Health & Environment for cruise vessels. Six ships in its fleet have the notations.

Another Cruise Line Member has received Bureau Veritas' first Energy Efficiency Design notation. This recognizes that adjustments to the design of the ship have saved more than 10 percent in energy consumption compared to a conventional ship of the same size.

Other CLIA Cruise Line Members have obtained the "Green Ship Notation" from Italian class society, Registro Italiano Navale (RINA). Twenty-one ships have qualified from six different member lines. One operator's entire fleet has the Italian class society's Energy Saving Index, which helps cruise ship owners reduce the energy they use.



AIR QUALITY

Toward a Global Cap of 0.5 Percent Sulfur

The International Convention for the Prevention of Pollution from Ships, or MARPOL, requires that ships worldwide use fuel oil with a maximum sulfur content of 3.5 percent or an alternative compliance method, such as an exhaust gas cleaning system, to achieve the same result. This global sulfur cap underlies the more stringent requirements of the IMO-designated Emission Control Areas (ECAs), which require that the maximum sulfur content not exceed 0.1 percent.

Regulation 14 of MARPOL Annex VI provides that the global sulfur cap will be further reduced so that it will not exceed 0.5 percent on or after January 2020 (or January 2025), pending a review by the IMO of the availability of fuel oil to comply with the 0.5 percent standard. The Marine Environment Protection Committee is expected to make a decision in October 2016 whether the new global sulfur cap will be implemented in 2020 or 2025. Notably, the European Commission has maintained its intent, consistent with its Sulphur Directive, to adhere to the 2020 implementation date, which would add an additional layer of intricacy to an already complex set of regional requirements.

Whether implemented in 2020 or 2025, the increased demand for compliant fuel will, no doubt, have significant impacts across marine markets and ashore. To ensure consistent implementation and enforcement of the 0.5 percent sulfur limit and to minimize market distortion, CLIA supports IMO implementation of measures to maintain a fair and level commercial environment and to achieve the benefits the sulfur cap intends to provide.

Further Reducing Sulfur and Nitrogen Oxides in IMO Emission Control Areas

CLIA and its Cruise Line Members already have significant experience with strict sulfur limits in light of industry's proven track record of compliance with the existing IMO ECAs, which the industry actively supported in principle. As of January 2015, MARPOL requires that ships traveling in ECAs, including cruise ships, use fuel with a maximum sulfur content of 0.1 percent, or an approved alternative compliance method in order to reduce sulfur oxides (SOx). Cruise lines have diligently identified sources of compliant fuel or installed innovative technologies, like exhaust gas cleaning systems, to comply with ECA requirements. The IMO ECAs include:

- North American Area (Canada and the United States)²
- United States Caribbean Sea Area (Puerto Rico and the U.S. Virgin Islands)³
- North Sea Area
- Baltic Sea Area

²Emission reduction regulations may also include requirements for reduction of nitrogen oxides (NOx). The IMO has set NOx emission limits for diesel engines depending on an engine's maximum operating speed. Tier I and Tier II limits are global requirements, while the Tier III standards apply only in designated ECAs with NOx limits, which currently includes the North American and United States Caribbean Sea Areas. The NOx requirements became effective on January 1, 2016. Member State efforts throughout the Baltic and North Sea are underway to propose, via the IMO, additional ECAs for NOx consistent with the boundaries of those areas.

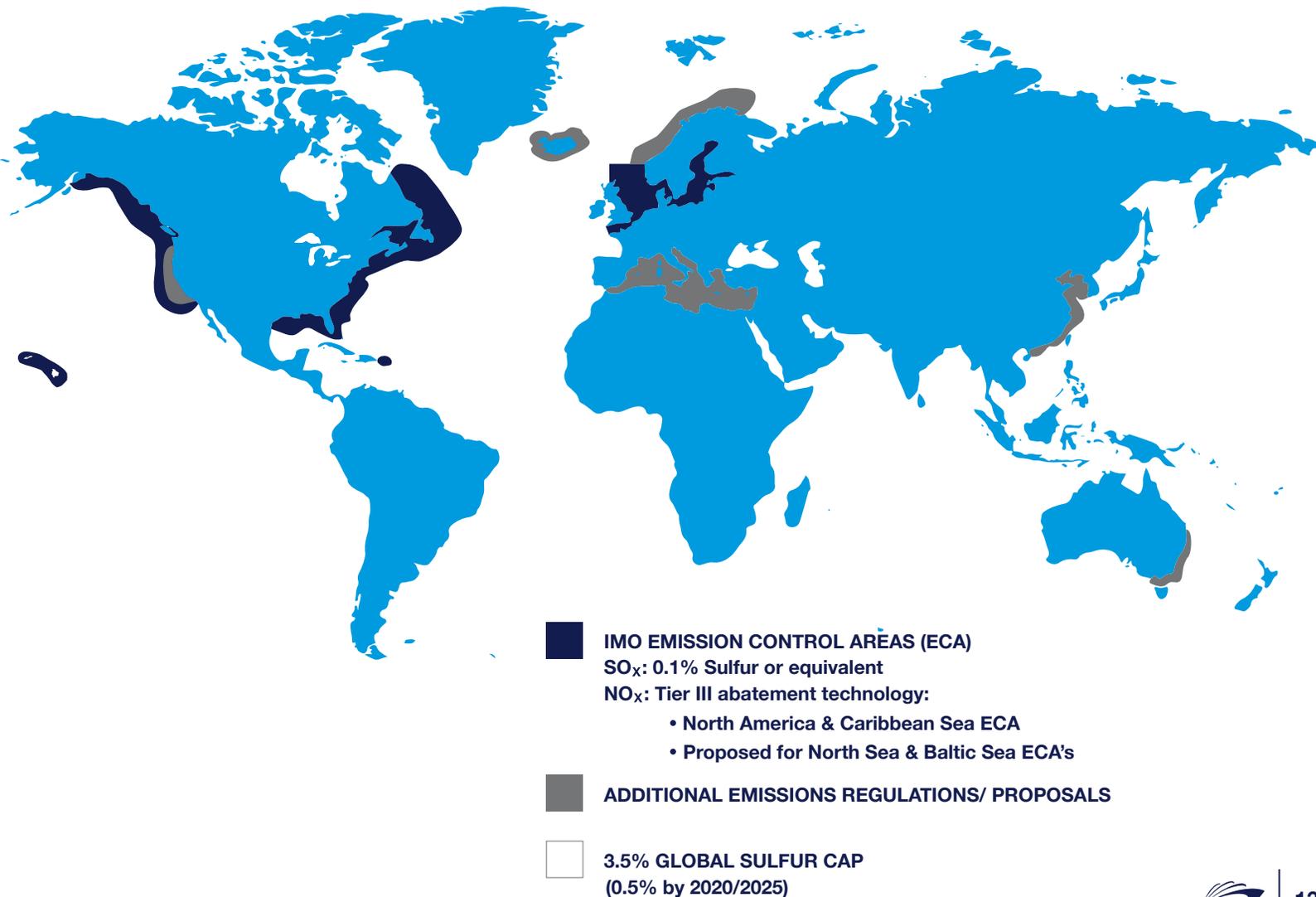
³ibid.

Disparate Regional, National and Local Emission Regulations

Additional emissions regulations have been imposed, or are under development, separate from the IMO regulatory process. CLIA and its Cruise Line Members favor the development of regulations via the IMO for consistency in application and to avoid implementation of onerous requirements that are difficult to comply with across multiple operating areas. (Imagine if one state required different tail lights on your car than other states. While it would be possible to conform to varying speed limits with the same vehicle, it would be quite challenging to stop at each border to change the vehicle's tail lights.) Remarkably, however, disparate regulations continue to emerge in regional, national and local jurisdictions, and CLIA Cruise Line Members must face these challenges and comply. A few of these regulated areas for air emissions include:

- New South Wales
- Europe (in accordance with the EU Sulphur Directive)
- Iceland
- Norway
- China
- Hong Kong
- California
- Antarctica

Emissions Control Regulations





A CLIA Cruise Line Member's newest ships emit about **20 percent less** carbon dioxide per person per day than ships built only a few years ago. The cruise line has also upgraded existing ships with new technologies that have improved propulsion efficiency by up to **10 percent**.

CLIA supports the public health goals of emission control regulations, especially when implemented via the IMO, in order to limit sulfur and nitrogen oxide emissions. The cruise industry is continually searching for emissions reductions and innovative solutions that meet or exceed all regulatory requirements.

Exhaust Gas Cleaning Systems as an Alternative Compliance Method

Exhaust gas cleaning systems offer a degree of flexibility in the approach to achieving emissions reduction goals and have been shown to reduce by as much as 98 percent the level of sulfur oxides in a ship's exhaust. The U.S. EPA, consistent with the IMO regulation, has said that exhaust gas cleaning systems can be used to achieve the same results as using low sulfur fuel on board. CLIA Cruise Line Members have demonstrated that such systems can often achieve an even better result.

As an example, one of CLIA's Cruise Line Members partnered in the development and installment of exhaust gas cleaning systems on several of its ships that sail to many North American ports, leading to those cruise ships exceeding ECA requirements. They have invested \$400 million in the building, design and installation of exhaust gas cleaning system technology. The technology allows for sulfur to be removed from the exhaust, along with some reduced carbon and particulate matter. The system is based on what has already been proven to work in factories, power plants and automobiles.

Cruise lines have pioneered the use of this technology in the marine environment and have employed open, closed and hybrid exhaust gas cleaning systems. To date, nearly one-third of CLIA oceangoing cruise lines have either installed or are committed to installing this technology on board and have proven its viability as an alternative compliance measure for the rest of the sector and commercial shipping at large. Some regulatory requirements necessitate cruise lines identifying alternative compliance methods on their own, while others can be achieved by working in concert with ports and other stakeholders to achieve a desired result.



The **Port of Seattle** is just one example where cruise lines have worked closely alongside a port partner to achieve mutual goals in environmental stewardship to improve air quality. Several of CLIA's Cruise Line Members were recognized in 2016 by the Port of Seattle with its Green Gateway Award. These members demonstrated additional environmental and "green" performance initiatives beyond U.S. requirements when transiting the waters near the Port of Seattle and while berthed at the port so that their vessels were operating as efficiently as possible. In order to qualify for these awards, cruise lines applied and were vetted by a third party. The awards were presented for environmental programs and initiatives that exceeded regulatory requirements and helped move the port toward the goal of becoming the cleanest, greenest and most energy efficient port in North America.

Shore Power as an Alternative

Connecting to shore power, or a port's electrical grid (also known as cold ironing), while at berth is an alternative to burning fuel while in port and, provided that the shore power is cleaner and sourced close to the port, is one way cruise ships might reduce the amount of carbon emissions in the atmosphere. The Port of Seattle was one of the first North American ports to provide this infrastructure. Although the use of shore power is not mandatory, where it is available, the seaport must meet regional and local air quality targets.

While the use of shore power remains an alternative worthy of serious consideration, the cost of retrofitting older vessels and the limited availability of shore power infrastructure at many ports remains an important issue. CLIA supports continued port infrastructure development where cruise ships call and the availability of a clean supply of power close to the port that will achieve an overall emission reduction. CLIA also supports efforts at the IMO inviting proposals from Member States for onshore power supply equipment that is made available for shipboard installation to meet an international standard.

The need for continued cooperation between manufacturers, ship operators and ports is most apparent in industry efforts to find alternatives to traditional fossil fuels – such as the use of LNG.



LNG presents an intriguing alternative to traditional fuels that can potentially greatly reduce air emissions – nitrogen oxides by up to 80 percent and particulate matter by approximately 85 percent.

Exploring Alternative Fuels

Given the continued evolution of regulations limiting the sulfur and nitrogen oxide content of emissions in ECAs throughout the regions in which cruise ships operate, ships often carry multiple different grades of compliant fuel depending on the regulations that must be satisfied as well as the quality and availability of compliant fuel. CLIA Cruise Line Members continue to invest substantial amounts of time and money in consideration of the fuel options that present the safest and most effective solutions.

LNG presents an intriguing alternative to traditional fuels that can potentially greatly reduce air emissions – nitrogen oxides by up to 80 percent and particulate matter by approximately 85 percent. Because LNG doesn't contain sulfur, these emissions are completely eliminated.

In an industry first, three CLIA Cruise Line Members have announced they will build up to eight cruise vessels that can principally run on LNG or diesel fuel. These next-generation ships, the first of which is expected to be delivered in 2019, are expected to use LNG to generate 100 percent of the ship's power in port as well as on the open seas, which will significantly reduce exhaust emissions to help protect the environment.

Whether pioneering exhaust gas cleaning systems or exploring new applications for alternative fuels, the cruise industry continues to be at the forefront of technologies to meet or exceed regulatory requirements and to responsibly reduce air emissions. Similarly, the global cruise industry continues to lead the maritime industry in its commitment to environmental stewardship and sustainability in managing myriad waste streams on board cruise ships to go above and beyond the requirements of MARPOL.

WASTE MANAGEMENT

Working with the IMO, Flag States and Port States, CLIA has participated in the development of consistent and uniform international standards governing waste management that apply to all ships that travel internationally, including cruise ships. The International Convention for the Prevention of Pollution from Ships, or MARPOL, and its annexes set the international standard for prevention of pollution related to oil and oily waste, hazardous substances, garbage and sewage, among others.

The many layers of regulation make waste management increasingly complex. For instance, many of the regions cruise ships visit require different levels of effluent water quality. These requirements continue to evolve. For example, the U.S., which is notably not a Party to the regulations at MARPOL Annex IV governing prevention of pollution by sewage, has imposed national laws that differ from MARPOL. Many individual U.S. states, including Alaska, have also enacted their own standards under the U.S. EPA Clean Water Act and reflected in the associated Vessel General Permit.

CLIA Cruise Line Members have additionally adopted the Cruise Industry Waste Management Policy, which is even more protective than a number of existing regulatory requirements. The CLIA Waste Management Policy is one of the most comprehensive and advanced set of practices for environmental stewardship in the marine environment, covering shipboard waste disposal, including cooking oil, incinerator ash, photo processing and dry cleaning fluid waste, electronic equipment,

pharmaceuticals, batteries, sewage, graywater, trash, bilge and oily water residues and plastics.

CLIA Cruise Line Members' waste management strategies are multilevel in approach. Cruise ships are to minimize waste wherever possible by carrying out comprehensive procedures for disposing of waste ashore to appropriate port reception facilities, incinerating waste onboard and discharging liquid food and food waste only in accordance with regulatory requirements. Shoreside waste facilities are also to be evaluated prior to offloading the waste from ships for appropriate disposal, including reuse, recycling and incineration.

The CLIA Waste Management Policy is one of the most comprehensive and advanced set of practices for environmental stewardship in the marine environment, covering shipboard waste disposal, including cooking oil, incinerator ash, photo processing and dry cleaning fluid waste, electronic equipment, pharmaceuticals, batteries, sewage, graywater, trash, bilge and oily water residues and plastics.

Cruise lines employ dedicated environmental officers who are ranked among the most senior shipboard leaders. They are responsible for compliance with applicable regulations. Member lines also encourage passengers and crew to reduce waste and proactively monitor their water consumption.



Cruise Industry Commitment to Not Discharge Untreated Sewage

While international law permits the discharge of untreated sewage 12 nautical miles from shore, under the CLIA Waste Management Policy, oceangoing Cruise Line Members have committed to treat all sewage prior to discharge. All sewage is treated using equipment certified to meet the standards for Type II Marine Sanitation Devices, which is a system approved by the U.S. Coast Guard for all vessels in U.S. ports, using its international equivalent, or by using an advanced wastewater purification system (AWPS), also referred to as an Advanced Wastewater Treatment System (AWTS).

Further, CLIA's Waste Management Policy states that treated sewage will not be discharged within 4 nautical miles from land and at speeds below 6 knots, unless processed by an AWPS. Any and all discharge is always to take place in accordance with local laws and regulations since there are some jurisdictions that do not allow for such discharge.

The CLIA Waste Management Policy also limits the discharge of untreated graywater (e.g., from sinks and drains), a waste stream that is not regulated by MARPOL. CLIA oceangoing Cruise Line Members have agreed that for ships not using onshore reception facilities and traveling regularly on itineraries beyond the territorial waters of coastal states, graywater may only be discharged while the ship is underway and proceeding at a speed of not less than 6 knots and at a distance not less than 4 nautical miles from the nearest land, unless treated by an AWPS.

The CLIA Waste Management Policy has proven to be a model for the maritime industry and adaptive to dynamic regulatory changes. Nowhere is this truer than in the Baltic Sea. Despite significant cruise line investments in sewage treatment technologies and the commitment of oceangoing cruise lines to not discharge untreated sewage anywhere, the extraordinary eutrophication situation⁴ in the Baltic Sea has demanded additional consideration and action.

⁴Eutrophication occurs when high nutrient concentration results in algae growth and oxygen depletion, due primarily to agricultural runoff.



Early Implementation of Special Area Requirements in the Baltic Sea

The situation in the Baltic Sea necessitated its designation as a Special Area under MARPOL Annex IV which will require the offload of all treated and untreated sewage to port reception facilities beginning in 2019 for new ships and 2021 for existing ships. Although adequate port reception facilities remain widely unavailable throughout the vast majority of ports at which cruise ships call throughout the Baltic Sea and discharge of treated sewage is an available option by law until the Special Area comes into effect, CLIA and its Cruise Line Members have proactively committed to discharge MARPOL Annex IV waste ashore where adequate port reception facilities are available under a 'no special fee' arrangement. This early implementation commitment has been adopted in a new section within the CLIA Waste Management Policy.

Moreover, consistent with the new policy, CLIA Cruise Line Members have initiated a program to track their discharges to port reception facilities in the Baltic Sea in order to more accurately assess the region's readiness to support sustained cruise ship operations in the region once the no discharge requirement of the special area goes into effect. This initiative seeks to highlight industry needs to port partners while also encouraging appropriate infrastructure development so that cruise tourism can remain a vibrant and contributing component within the Baltic Region for the foreseeable future.

Both the new policy provision and the regional engagement strategy are designed to facilitate the success of the Special Area and demonstrate the cruise industry's heightened commitment to environmental stewardship.

Shipboard Recycling Outpacing Land-Based Efforts

CLIA Cruise Line Members take great measures to manage shipboard garbage and continuously strive to implement new and more effective waste minimization procedures and environmental training. Recycling is an important component of these efforts and is carried out during a cruise as well as in port. Everything has to be stored on the ship until it can be offloaded to suitable shoreside facilities. Unfortunately, suitable shoreside facilities are not always available at every port of call. CLIA Cruise Line Members have adopted rigorous programs on ships and within company structures ashore so that the highest standards are maintained and waste is disposed in the most eco-friendly manner possible.

CLIA policy is to minimize potential waste that comes on board, for example, by partnering with suppliers to reduce packaging. Onboard a ship, measures to minimize waste include:

- Meticulously separating recyclable materials
- Compacting aluminum cans into bricks with below-deck equipment
- Compacting plastics and crushing glass by on board crushing machines
- Flattening or shredding of paper and cardboard

Recyclable materials are to be offloaded when the ship arrives at a port and sent to a suitable recycling facility on shore. CLIA Cruise Line Members inspect these facilities regularly to confirm recycling takes place as contracted. When materials are incinerated onboard, the resulting ash is also to be landed ashore to appropriate facilities.

One example of aggressive recycling strategies: One CLIA Cruise Line Member made a commitment to reduce its ships' waste-to-landfill levels by 70 percent by 2015 and increase its recycling level by 125 percent. Crewmembers hand-sort all materials from every trash bin on the ship, including those in staterooms, carefully separating recyclables from what would likely go to a landfill shoreside. Reusable clothing and books are donated, and dry waste and internationally regulated food-contacted wastes that cannot be directly recycled are sent to a waste-to-energy facility where they are converted into electricity.



Hazardous Waste Management

All hazardous waste is to be landed in accordance with local requirements. CLIA's Cruise Line Members produce only very small quantities of hazardous or special waste (as defined by the U.S. Resource Conservation and Recovery Act), the management of which remains one of the industry's highest priorities.

CLIA Cruise Line Members have adopted a policy that all wastes with hazardous substances are appropriately categorized and landed in accordance with the local requirements and only where acceptable handling and disposal practices are in place. This includes identifying and segregating hazardous wastes aboard cruise ships for individual handling and management in accordance with applicable laws and regulations.

CLIA Cruise Line Members have further adopted a policy that hazardous wastes are not to be commingled or mixed with other waste streams. The CLIA policy applies to waste streams that include photo processing (with silver recovery units) and x-ray developing waste fluid, dry cleaning waste fluids, electronics disposal, photo copying and laser print cartridges, fluorescent and mercury vapor lamp bulbs, batteries and outdated pharmaceuticals. Whenever possible, items are recycled. CLIA policy strictly forbids disposal of hazardous waste in other waste streams including graywater systems such as sinks and drains, or in blackwater systems such as toilets.

Only qualified contractors and hazardous waste vendors who are knowledgeable about CLIA Cruise Line Members' strict disposal processes are to be permitted to handle the hazardous waste generated onboard. The handlers are to segregate the waste into leak-proof containers to be sent to an approved shoreside disposal facility. At destinations that have no approved recycling facility, the ships' hazardous materials are to be packaged and stored onboard until they can be transferred and unloaded at ports with appropriate recycling facilities. Certain types of medical waste can be incinerated onboard.

Despite the limited availability of shipboard storage space, cruise lines are continually refining recycling equipment and capacity to improve programs with increasing success. As a result:

- Cruise ship waste management professionals recycle 60 percent more waste per person than the average person recycles on shore each day
- Cruise ships recycle more than 80,000 tons of paper, plastic, aluminum and glass each year
- Unrecyclable waste on cruise ships can be as little as 1.5 pounds per person a day, compared to the average of 4–5 pounds per person on land in the U.S
- Some cruise ships recycle or repurpose nearly 100 percent of the waste generated on board — by reducing, reusing, donating, recycling and converting waste into energy.



Individual recycling achievements by some CLIA Cruise Line Members include:

- Eliminating more than 6,400 tons of metals, glass, plastic and paper from traditional waste streams through recycling
- Removing 31,000 pounds of trash and debris from beaches and waterways

Oily Wastes

Bilge water is the name given to the oily water that collects in the ships' bilges at the bottom of the hull. Waste oil is an incidental result of normal operation of various machinery, the engines and lubricated seals. Regulators require that discharged bilge water should contain less than 15 parts per million (ppm) of oil, but CLIA Cruise Line Members are often able to improve on that standard by cleaning the water closer to 2 ppm.

Bilge water treatment systems work by pumping the oily water into a tank where gravity separation leads to the oil being drained off the top. It then moves into a holding tank to be discharged ashore or incinerated.

To ensure bilge water meets the requirement of being less than 15 ppm oil when it is discharged, devices have been fitted to monitor the content of oil in the water. A three-way valve operates such that in the event that the oil content exceeds 15 ppm, the water will be automatically redirected back to the holding tank and recycled for further cleaning. Strict precautions are in place so that discharges only take place when the appropriate cleaning has been conducted.

The maritime industry is now actively involved in replacing traditional oils with lubricants that are environmentally sensitive. A biodegradable lubricant will degrade more than 60 percent within 28 days. Manufacturers have already started to release such lubricants for a range of uses from stern tube and gear oils to controllable pitch propeller systems.

Ballast Water

Ships often carry ballast water to ensure stability, trim and structural integrity while also reducing bending moments. Where as ballast water on cargo ships often compensates for the absence of a delivered cargo, on cruise ships it plays a much more minor role. In fact, cruise ship ballast water volumes are relatively small and fairly predictable, so some ships can manage ballast internally without discharge, avoiding the inadvertent discharge of water potentially with invasive species (non-native plant and fish life that can be transferred from one body of water to another, and in some cases, present risks to the body of water where the discharge occurs).

Some cruise ships may have to take on or discharge ballast water, but will rarely do so in a different marine environment, given the nature of their itineraries. The challenge for the cruise sector, like the entire commercial maritime industry, is the frustration associated with being early movers who invested in and installed ballast water treatment technologies that are type-approved in accordance with IMO requirements for operation, but have not been approved in certain regions, such as the U.S. The industry continues to prefer one set of universal regulations on ballast water discharge from IMO that are effective and accepted across operating regions.



ENERGY EFFICIENCY

Hull Coatings

The use of paints on a cruise ship's hull can have dual benefits. With the advent of a variety of eco-friendly paint options, there are now far less toxins emitted into the atmosphere when these products are applied. In addition, these non-toxic paints can also help a ship move more efficiently through the water, thereby reducing energy consumption.

Estimates indicate that ecological, non-toxic, slick hull coatings can save as much as 5 percent fuel usage for propulsion. CLIA Cruise Line Members have long been committed to using advanced green paints and varnishes. In fact, one CLIA Cruise Line Member made history as the first cruise line to utilize an innovative hull coating on its ships that is 100 percent non-toxic.

CLIA ships are using innovative silicon-based anti-fouling coatings. Some coatings are estimated to give as much as five years of additional protection, with resulting reductions in energy use and carbon dioxide emissions.

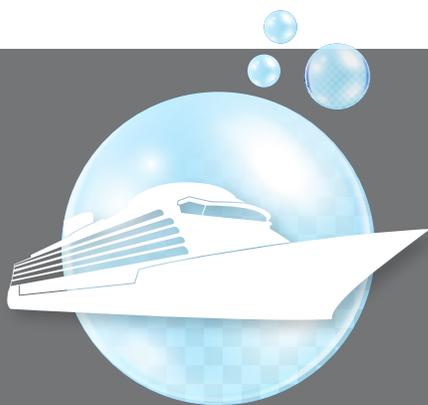


Innovative Hull Design

CLIA Cruise Line Members have already realized significant energy savings due to their close cooperation with shipyards, consultants and manufacturers to design and construct innovative hull designs. Hull design advances offer an innovative method to reduce fuel consumption and enable CLIA Cruise Line Members to maintain first-class itineraries that maximize the amount of time passengers can spend enjoying destinations.

Other options for improved water flow across hulls include an optimized bulbous bow design to reduce drag and improve fuel efficiency by generating a bow wave slightly earlier than a traditional V-shape bow. This can result in energy saving of up to 15 percent. The ducktail design of a hull's stern end on some ships, flat welding seams for a smooth hull surfaces, and more efficient propulsion designs also make cruise ships more hydrodynamic and reduce drag. Other methods of reducing energy consumption involve adjusting the speed profile of the itinerary, sailing with currents and avoiding bad weather where possible and using software to optimize vessel trim. Specific software dedicated to optimizing fuel efficiency and energy management has become one of the most important advances in this area. One of CLIA's Cruise Line Members created the first "smartship" by utilizing this type of software technology.

The software works by gathering data from onboard sensors connected to the bridge and other vital ship operations that helps officers calculate exactly what trim and speed to use in real-time, taking into account all the prevailing conditions. In addition, the software provides guidance on engine use, just-in-time port arrivals and fleet performance management that provides the captain and other officers with essential decision-making data they can access on flat screen monitors, tablets and smartphones. There are countless shipboard applications to which this technology could expand.



Two CLIA Cruise Line Members are using a built-in air lubrication system which channels air to the bottom of the hull, and, in turn, creates air bubbles at the front of the ship's hull in order to reduce resistance and increase energy efficiency.

Waste Heat Recovery

Even the most efficient engine will produce some sort of waste energy. For instance, modern diesel-electric engines produce upwards of 50 percent waste energy that can be used in other ways. CLIA Cruise Line Members have invested in creative technologies that put this waste energy into productive use on board ships. This eco-friendly approach has become increasingly important both in terms of keeping costs down and reducing emissions.

One way to recover lost heat energy is to install heat exchangers which turn water into steam. Technologies can use steam generated from the engines to create fresh water for drinking, for showers, for ships' galleys and for heating areas such as passenger cabins. Additionally, some of the water used to cool the engines can be further used for other shipboard systems.

Energy Efficient Lighting

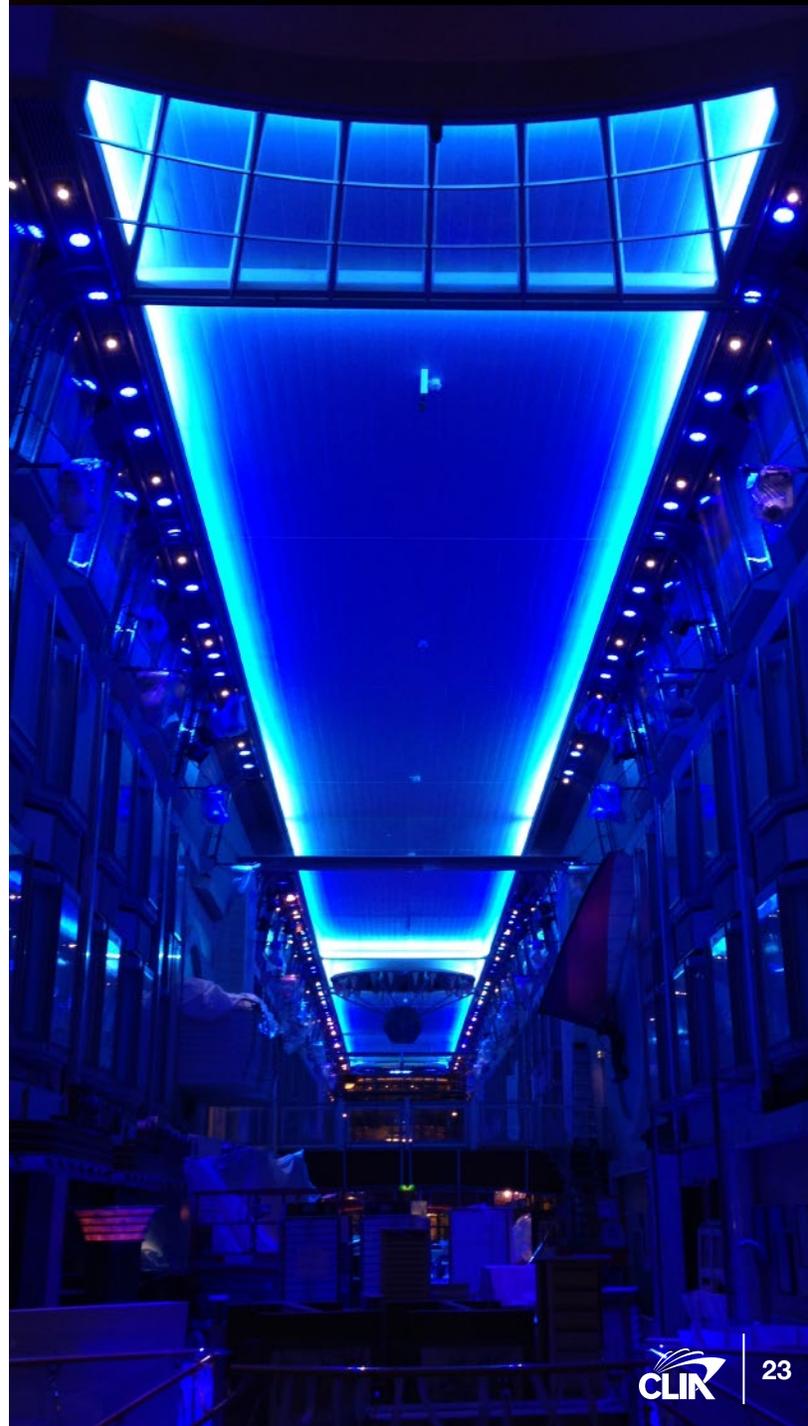
As a result of conservation efforts, lighting on newer ships accounts only for 10 percent of power consumed. Fluorescent and LED bulbs, which are widely used, require 80 percent less energy and generate less than 50 percent of the heat generated by halogen bulbs. Cooler bulbs mean reduced energy consumption and more efficient air conditioning systems. In addition, fluorescent and LED bulbs last much longer, which reduces the number of bulbs for disposal.

The use of intelligent lighting systems can also significantly reduce the total energy used on board. Automatic lighting control systems are designed to adjust the ship's external lighting in accordance with sunlight intensity. They also have an automatic dark-activated sensor that switches on all the ship's external lights at dusk. Some new ships are being built with keycard holders so that lights and other electrical devices can only be turned on when the passenger cabin is occupied. In addition, motion-sensitive lighting in passenger cabin passageways allows lights to be automatically dimmed when not in use.

Heating, Ventilation and Air Conditioning Systems

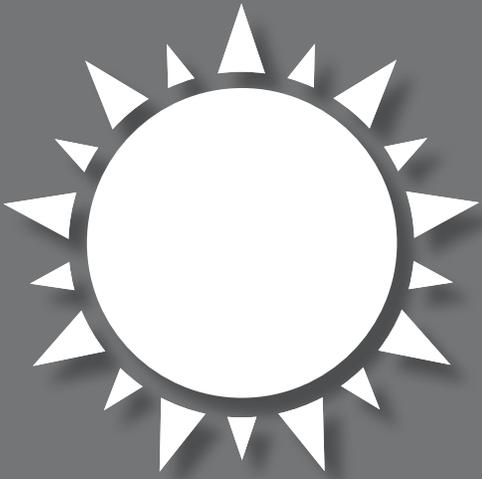
Heating, ventilation and air conditioning (HVAC) systems are among the largest consumers of energy aboard ships, after propulsion. With cruise ships operating in both temperature extremes, from the cold of Alaska to the hot and humid environments of the tropics, demands on HVAC systems vary significantly. However, since most CLIA Cruise Lines Members' itineraries involve warmer environments, the energy consumption of high-demand air conditioning systems is an important target of ship-board efficiency efforts.

Newer ship systems are designed to pump only the amount of chilled water required for the cooling demand, which results in significant energy savings. Fan efficiency, occupancy control sensors and optimal sizing and routing of duct work make air disbursement more efficient. These efficiency measures are bolstered by the use of tinted glass windows, using special coatings to reduce the amount of heat transferred into the ship from outside so that less air conditioning is required to cool rooms.

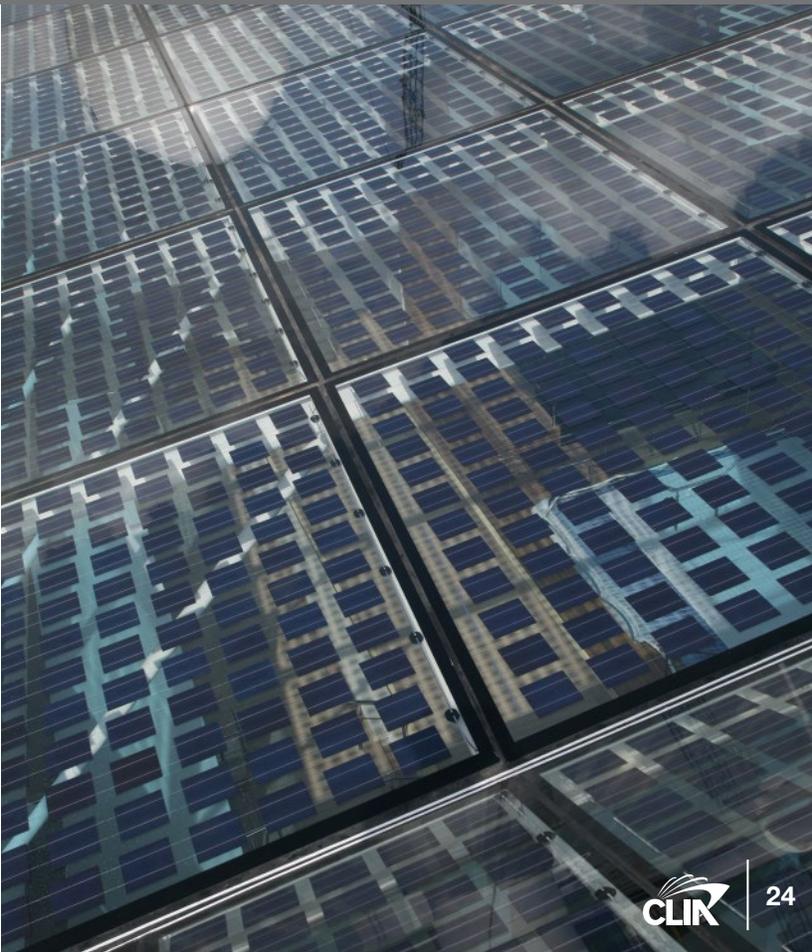


Solar Panels

Since cruise ships spend so much time under the bright sun, solar panels are a logical source of supplementary energy for ships. Installation of solar panels can generate power to help run ship systems such as LED lights. As the use of solar energy continues to grow, so does consideration of the use of new solar-powered technologies as an economically viable option onboard cruise ships.



When one of CLIA's Cruise Line Members became the first to install solar panels on one of its cruise ships, **216 solar panels** were used in five different spaces, which generated enough power to operate nearly 7,000 LED lights. Another member installed approximately 21,000 square feet of thin-film solar collectors on a single deck, which powered all of the lighting in two main public areas of the ship.





LOOKING FORWARD

A Commitment to Continuous Improvement

Advances in technology, lessons learned through new ship design, construction and operation and the industry's strong commitment to environmental stewardship all factor into the cruise industry's culture of continuous improvement on environmental matters. This commitment can be seen with each new generation of cruise ships, which are more and more energy efficient and environmentally friendly.

Through its active participation in regulatory developments at the IMO, the sharing of best practices and the evolution of industry-level environmental policy, cruise lines continue to be leaders in the maritime industry's environmental stewardship. The cruise industry's commitment is an important component of its external engagement as well as its ability to have a positive influence and lead within the maritime community.

Technical and Regulatory Forums

CLIA coordinates technical and regulatory events throughout the world to engage with Cruise Line Members, supply chain partners and other stakeholders to continually improve and enhance the industry's commitment and coordination related to regulatory and policy matters, including environmental stewardship. These forums examine current issues and generate invaluable dialogue on challenges facing the industry, at sea and in port, as well as consideration of promising operational and technical solutions. The events not only help to educate participants, but also help shape industry-level positions and engagement on key issues.

Carbon Reduction

The IMO has the exclusive mandate to address carbon reductions by shipping under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, and governments and industry are committed to doing more. CLIA anticipates that the IMO may ultimately augment the mandatory operational and design measures that have already been put in place with additional, still unidentified measures, in its effort to achieve further carbon reductions.



Ocean Governance

On behalf of its Cruise Line Members, CLIA has actively participated as a stakeholder in marine spatial planning efforts with regional governments and stakeholders that operate in the U.S. coastal environment. The Northeast and Mid-Atlantic regions are the first of any such organizations to develop comprehensive plans, and the cruise industry has been integral to the process.

On a global scale, CLIA has also confirmed its participation in the World Ocean Council coalition to implement a U.N. General Assembly initiative to develop a new international legally binding instrument under the U.N. Law of the Sea for conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. The agreement will have potentially significant implications for decades to come for shipping, oil and gas, cruise tourism, fishing, marine mining, biotechnology and submarine cable as well as maritime law, insurance and investment.

Throughout CLIA's history, the cruise industry's leadership, investment and engagements have positioned the cruise industry as a responsible member of the maritime community. As the international community further considers the dynamic way forward across a broad spectrum of issues that impact the marine environment, the cruise industry will continue to find itself as a leader in environmental stewardship and sustainability.





1201 F STREET NW, SUITE 250
WASHINGTON, DC 20004
+1.202.759.9370