

## Environmental Technologies & Practices CLIA Oceangoing Cruise Lines

August 2017

This table provides aggregated data reflecting cruise industry environmental investments, commitments and practices for a vast majority of ships across CLIA’s global oceangoing cruise line membership. Specific technologies or practices are quantified as the number of ships with such technologies and their percentage of the entire fleet, or briefly described. Cruise lines continue to transform the modern fleet to protect the oceans, air, and destinations that millions of cruise passengers enjoy each year.

INVESTMENTS, COMMITMENTS & PRACTICES	SHIPS COVERED	AGGREGATED PERCENTAGE OF TOTAL FLEET (245 Vessels)	NOTES
Oceangoing Ships Reporting	211	86%	
New Ships on Order	48	19.6%	
Ships to be added to the fleet between 1 January 2017 and 31 December 2017	8	3.3%	
Ships to be removed from the fleet between 1 January 2017 and 31 December 2017	1	0.41%	
Average age of fleet as of 01 January 2017	14.5	---	
Ships fitted with Exhaust Gas Cleaning Systems (EGCS)	99	40.4%	<p><b>Retrofit Installation Commitments:</b> Companies plan nearly 50 ship retrofits with exhaust gas cleaning systems. These systems vary in design between hybrid systems and open loop systems, some designs including catalytic filters on the engine exhaust before the EGCS, and many with wash water filters; and at least one existing Open Loop System is to be converted to a Hybrid system.</p> <p><b>New Build Installation Commitments:</b> 29 ships are committed to be installed with exhaust gas cleaning systems. Precise systems remain under consideration, however, at least 16 hybrid systems are anticipated, many with wash water filter systems, and 10 open loop systems are anticipated with catalytic filters on the engine exhaust before the EGCS and wash water filters and continuous monitoring equipment to automatically record required parameters.</p> <p>For many ships, additional technologies are being tested to</p>
Ships fitted with EGCS that are Open Loop Systems (OLS)	65	26.5%	
Ships fitted with EGCS that are Open Loop Systems and have additional Wash Water Filters (OLSWWF)	35	14.3%	
Ships fitted with EGCS that are Closed Loop Systems (CLS)	0	0%	
Ships fitted with EGCS that are Hybrid Systems	34	13.9%	
Ships fitted with EGCS that are Hybrid Systems that have additional Wash Water Filters	20	8.2%	

			improve the quality of air emissions and wash water including water-in-fuel emulsion, catalytic dry filters and diesel particulate filters.
Ships able to operate on Liquefied Natural Gas (LNG) in port	2	0.82%	
New build ships committed to using LNG as primary fuel for propulsion	13	27.1% of New Builds	
Ships capable of using alternative fuels other than LNG (e.g. biodiesel)	152	62.0%	
Ships fitted with particulate filters	16	6.5%	16 ships have catalytic filters installed on the engine exhaust before an exhaust gas cleaning system.
Ships fitted with Selective Catalytic Reduction (SCR) Systems	3	1.2%	
Ships fitted with Water Fuel Emulsion (WFE) technology	48	19.6%	
Operations with Marine Gas Oil (MGO), Ultra Low Sulfur Fuel (ULSF) or LNG	<p>CLIA members have utilized compliant fuel and innovative technologies, like exhaust gas cleaning systems, to protect the environment and meet or exceed requirements of the areas in which they operate.</p> <p>42 ships operate on low sulfur fuels in IMO Emissions Control Areas (ECAs), at-berth in EU ports and in China, Sydney, the Baltic, the Mediterranean, Alaska, Hawaii and California. MGO is also used by ships where EGCS operations are not available or permitted.</p> <p>4 ships operate on low-emission diesel in Polar waters, in vicinity of Kamchatka and in the Antarctica Area, and have done so despite considerably higher costs and in advance of implementation of regulatory requirements (Regulation 43 of MARPOL Annex I).</p> <p>8 ships operate on MGO in the North America ECA, EU Ports and consistent with regional emissions requirements in China</p> <p>1 ship operates on ULSF in the North Sea ECA</p> <p>2 ships currently use LNG in port and 13 ships are on order which will use LNG as their primary fuel for propulsion.</p>		
Use of HFO in the Arctic region	<p>CLIA Cruise Line Members support evaluating existing fuel oil tank protections and the use of established routes to provide adequate protection and reduce the risk of HFO as fuel in the Arctic while preserving the ability to continue to carry the fuel.</p> <p>Some ships have been using only MGO in the Arctic for many years. CLIA actively participated in the development of the IMO Polar Code and all Member ships intend to comply with its provisions as well as other international conventions that protect the marine environment.</p>		
Ships fitted with Shore Side Electricity / Cold Ironing Systems	52	21.2%	
Ships planned to be retrofitted with Shore Side Electricity / Cold Ironing Systems	For many existing ships, any future retrofits will be based on the availability of shore power at the berths cruise ships call that is of sufficient capacity and generated by clean sources near the port		

New build ships committed to be fitted with Shore Side Electricity / Cold Ironing Systems	28	58.3% of New Builds	
Ships which have capability to add Shore Side Electricity / Cold Ironing in the future	111	45.3%	
New build ships which will have capability to add Shore Side Electricity / Cold Ironing in the future	14	29.2% of New Builds	
Ports visited by CLIA ships fitted with Shore Side Electricity / Cold Ironing with Capacity >10MW	11 ports visited by CLIA oceangoing ships worldwide have some shore side electricity capacity, at least at some of the berths in the port. Those ports with capacity that is in excess of 10 MW are Brooklyn, Halifax, Hamburg, Montreal, Seattle, Shanghai, Vancouver, Long Beach, Los Angeles, San Diego, San Francisco and San Pedro, which specifically is not always able to provide more than 10 MW of shore side electrical capacity.		
Ships that have air lubrication systems fitted	16	6.5%	
Describe the industry's actions regarding availability and development of fuels cells or equivalent	Fuel cell technology is being looked at for upcoming new builds including the feasibility to retrofit existing vessels. The development of this technology is closely watched and supported, especially with regard to marine applications.		
Ships with low friction hull coatings installed	190	77.6%	