

ENVIRONMENTAL LEGISLATION

NATURE CALLS FOR SUSTAINABILITY TO BE BUILT-IN TO PROTECT OUR OCEANS

By **Lars Nupnau**, business development manager, RWO

Sustainability is now a top priority for shipowners and designers, and this is particularly the case in the cruise and passenger ship industry where a growing number of guests bring highly developed environmental sensibilities onboard.

Consumers are also increasingly better informed on the impact shipping is having on the planet: passenger service providers may be measured by standards set in domestic lives on energy consumption, recycling or on opting for plant-based detergents.

A recent survey conducted by travel agency network Virtuoso* found that 82% of respondents wanted to travel more responsibly in the future, with 70% agreeing that sustainable travel enhanced the experience. Half of respondents ranked a strong sustainability policy as "very important" when choosing a hotel, cruise line or travel company.

Ship emissions represent a central consideration for cruise lines. However, today, expectations go beyond holding owners accountable, with guests now wishing to play an active role in environmental protection, whether through responsible towel laundering, recycling, or investing in reusable water bottles.

Regulating Change

While not a conversation starter at the buffet, sewage management is increasingly important for ship

operators because guests witnessing the majesty of nature have a strong preference not to cause it direct damage. Also referred to as black water, sewage contains a myriad of hazardous pathogens, bacteria, viruses, and chemical nutrients which are harmful to human and marine life.

However, like many areas of concern for the marine environment, regulation remains the most consistent means of controlling whether, where and in what form sewage can be discharged.

IMO MARPOL Annex IV regulates the discharge of sewage waste from ships. Annex IV prohibits the discharge of sewage into the sea unless the ship has an approved sewage treatment plant in operation, or the sewage being discharged into the sea has been broken down and disinfected using an approved system at a distance of more than three nautical miles from the coast.

However, the 2016 resolution MEPC.227(64) introduced Special Areas and entirely prohibited the discharge of sewage from passenger ships within these areas unless the vessel has an approved sewage treatment plant that also removes chemical nutrients.

Chapter 4.2 of the resolution states that, if a vessel is intending to discharge sewage effluent in Special



EXISTING ADVANCED WATER TREATMENT SYSTEMS CAN BE CONVENIENTLY UPGRADED TO THE NEW CS-MBR STANDARD

Areas, the treatment system must meet the nitrogen and phosphorus removal standards.

The Baltic Sea is currently the only Special Area under these regulations and as of 2021 applied to all new and existing passenger ships operating in this area. However, from 1 June 2023, restrictions will apply to "existing passenger ships enroute directly to or from a port located outside the Special Area and to or from a port located east of longitude 28°10' E within the Special Area that do not make any other port calls within the Special Area".

RWO, a supplier of 'intelligent water management solutions', suggests that it is fair to assume that more areas will come under the regulations as pressure to protect the world's oceans from pollutants continues to grow.

Next Generation AWTS

In today's environment, cruise lines have two main options when it comes to sewage treatment – to install an advanced wastewater treatment system (AWTS) or hold treated sewage onboard.

RWO recently launched its new generation AWTS, with first installations taking place onboard two of the Solstice-class vessels – the *Celebrity Silhouette* and *Celebrity Reflection*. The installations will upgrade the vessels existing RWO MEMROD sewage treatment plants in preparation for the regulation changes in 2023. Type approved in accordance with IMO MEPC.227(64) including chapter 4.2 for nitrogen and phosphorus removal within special areas, RWO's CleanSewage Membrane Bioreactor (CS-MBR) is a sustainable biological treatment technology that has been designed to minimise a vessels impact on the environment, exceeding regulatory requirements by providing the highest effluent standards.

Customisable to individual requirements, the CS-MBR treatment process can be broken down into three stages: solids are removed from the wastewater during the mechanical pre-treatment process; a high-performance activated sludge process commences where pollutants are degraded and removed; and clean water is separated from the activated sludge using a submerged membrane resulting in water that is completely free of solids and pure enough to be re-used in other functions such as laundry, or as technical water.

Membrane technology will be game-changing for the cruise sector. Membranes remove over 99% of solids, including microplastics and viruses, which enhances water purity and prevents diseases. While membranes are sometimes used as an additional stage after the biological treatment process, what makes the CS-MBR unique is its submerged membrane design used in the bioreactor during the final treatment stage. This enables a compact design and increases energy efficiency.

The system also features an automated cleaning-in-place (CIP) function to clean the membranes. This is a

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crucial design point as it makes it easier for the crew to operate the system and minimises downtime and maintenance requirements.

Furthermore, a sustainable membrane technology uses fewer chemicals during the treatment process. Chlorination is not needed to remove bacteria and viruses, and the CS-MBR also does not require the use of flocculants or other chemicals for disinfection.

Cross-industry Collaboration

As the recent COP26 gathering showed, expectations for sustainability will only continue to rise. In an increasingly digital and connected maritime industry, RWO is also working alongside industry partners including TUI Cruises and Hanover University in support of the cross-industry 'OSCAR' research project. Funded by the German government, OSCAR is researching online modelling, simulation, and remote-control systems for onboard environmental technologies on cruise ships.

Scientists from the Institute of Sanitary Engineering and Waste Management (ISAH) are developing and testing digital twins for AWTS. The aim of the project is to design a digital twin that enables ship management companies to simulate the AWTS of a cruise ship onshore using data from the vessel, to support crew and provide advice or guidance where required.

In October last year, the ship sewage treatment plant in the ISAH technical centre located at the Hanover-Herrenhausen sewage treatment plant went live. It was fitted with a smaller version of RWO's CS-MBR system. ■

*Source: https://www.virtuoso.com/getmedia/2a8b057b-8b0b-4bcf-bf1d-834d8227acfe/2021-VIR-Sustainability-Release_FINAL.aspx

