

Freshwater solutions move forward with expedition cruise and 'green' demands

Thu 12 Jul 2018 by Rebecca Moore



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The growth in the expedition cruise sector and the need to be environmentally friendly are twin drivers for the freshwater generation solutions market

Enwa global sales director Kjetil Øxnevad told *Passenger Ship Technology* “We have seen a dramatic increase in requests from smaller and more exclusive cruise ships which will operate in more sensitive waters. Therefore, environmental awareness has improved, and thus the opportunities for suppliers who can deliver products that meet and provide a positive environmental benefit for the vessels has increased.”

He said using energy recovery units for reverse osmosis (RO) plants is an example of such a solution. And using a seawater heat exchanger (that increases the seawater temperature by using the ship's surplus heat) leads to a reduction of energy consumption which again contributes environmental benefits. This solution has been used in an expedition vessel Enwa delivered to last July. Here, it delivered its latest design, a Water Maker SW75T Compact RO system, to a shipyard in Croatia for an expedition cruise vessel.

Mr Øxnevad said “The benefit of this new system is that it has a very small footprint so the owner can utilise the available space better, while it is easy to operate, service and maintain. As the vessel will also be operating in Antarctica, our system has been installed with a steam heat exchanger for the feed water to the RO units.” This enables the seawater temperature to be below 0°C without freezing, despite its salinity.

Enwa has recently delivered, or has on order, RO-type Water Maker units for cruise ships with fresh water capacities ranging from 37 m³ to 600 m³ a day. This includes two MT-50T SRH units for an expedition cruise vessel; two complete potable water systems for drinking water and swimming pools to USPH (US Public Health) standards for cruise ships being built at a Norwegian yard; and four complete USPH-compliant potable water systems for swimming pools and jacuzzis for another Norwegian shipyard project.

Mr Øxnevad added “Furthermore, we are seeing more and more owners adding RO systems for both potable and technical water. Many are also opting for energy recovery units to further reduce energy costs, by up to 60%.”

He said the return on investment for an energy recovery unit installed with an RO unit is around 12-18 months, depending on size.

Alfa Laval also noted the impact of the boom in expedition vessels for the freshwater generation system market. Alfa Laval global business manager Alex Jönsson told *Passenger Ship Technology* “Another trend is that more cruise ships are and will be sailing in colder waters and polar waters.”

Mr Jönsson highlighted how the Alfa Laval MEP multi-effect evaporator was suited to expedition cruise ships sailing in colder and polar waters.

“The trend of sailing in polar waters or colder waters unfortunately limits the capacity for reverse osmosis desalination technology. RO equipment cannot operate below 5°C seawater because the membranes can be damaged.” Therefore shipowners should not rely on a single desalination technology. Mr Jönsson said MEP multi-effect evaporators and RO units run in synergy, with evaporators using available free energy, and RO being used for the rest to match consumption. He noted that in cold waters one Alfa Laval multi-effect evaporator can provide 3-4 MW heat and due to that heat recovery, the crew can operate the RO in cold waters.

In 2017 Alfa Laval received a key multi-effect evaporator order for two cruise ships. Each will have two Alfa Laval MEP-6-1000 multi-effect evaporators on board, producing two x 1,000 tonnes fresh water per day.

Alfa Laval received orders for its multi-effect evaporators to be installed on board a further four cruise ships last year. All four cruise ships will have two MEP-6-500 multi-effect evaporators on board, producing two x 500 tonnes daily per ship.

Elsewhere, Alfa Laval has updated the control concept of Alfa Laval MEP multi-effect evaporators, and developed solutions that will save on its electric consumption.

Mr Jönsson told *Passenger Ship Technology* “The update on the controls secures that the Alfa Laval MEP multi-effect evaporators will follow the available energy, and secures that steam produced on the oil-fired boilers are not used for water production.” The new control can also be used for using excess heat in the Alfa Laval MEP multi-effect evaporators.

The controls include energy management systems that will tell the customer the status of the multi-effect evaporators, including electric consumption and thermal heat from exhaust gas boilers.

Trends and future developments

Examining current trends within freshwater solutions, Mr Jönsson said “More shipowners plan to install solar panels and the distillate from the Alfa Laval multi-effect evaporators is an ideal water to clean the solar panels since there is no mineral residue in the distillate.”

He added “It has also been reported that shipowners prefer distillate water for laundry to avoid scaling and reduce cleaning detergent consumption thanks to the very clean distillate water.”

Meanwhile, a trend Mr Øxnevad singled out is an increased interest in environmentally friendly water treatment solutions for chilled water and HVAC systems. “Protecting HVAC systems is a proactive step toward safeguarding the environment. As an alternative to chemical dosing, continuous filtration and treatment will prolong the system and component lifespan without risking the environment.”

Mr Øxnevad added that HVAC systems require “major capital investment, have long-term operating costs and their energy consumption impacts significantly on the environment and profit”. To maximise the return on investment and minimise the impact of the wider environment, he emphasised it was “crucial” to protect and maintain structural integrity and design efficiency.

To this end, EnwaMatic technology has been used on numerous cruise ships and passenger ferries. With increased focus on the environment and consequently environmentally friendly solutions a “renewed interest has been noticed especially from the cruise market”, said Mr Øxnevad.

Looking at future developments, Mr Øxnevad noted that in the past the most common way to produce technical water for vessel boilers and to clean the outer hull was through using an evaporator. However, he said more owners choose to produce technical water with a double-pass RO system. He commented that an advantage of using an RO is that it can produce water even when the main engine is turned off. Because the RO is not dependent on heat dissipation, it is also not affected by adjustments to reduce energy consumption on other installations. But he said perhaps the biggest difference is the recovery of the proportion of clean water.

“It is many times larger for an RO than an evaporator. This requires significantly less energy, a smaller amount of raw water and lower capacity feed pumps,” said Mr Øxnevad.

And freshwater trends could be pushed even further – sanitation system company Headhunter president Mark Mellinger told *Passenger Ship Technology* that its current research is on recycled water. “We are doing extensive functional testing on membrane treatment of mixed shipboard collected wastewater,” Mr Mellinger said.

“We’ve had quite a few requests from customers that want to reuse the wastewater from the toilet. The challenge is to make something user-friendly that meets the MEPC and EPA requirements. The effluent will be able to be re-used under EPA guidelines for secondary use, like toilet flushing.”

