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'Norwegian Escape' fitted with largest scrubber system

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# 'Norwegian Escape' fitted with largest scrubber system

Lightweight, low footprint inline scrubbers are fitted to each of the cruise ship's five engines.  
*by Ian Cochran, Editor International Cruise Ship Industry*

The recently delivered Norwegian Cruise Line's cruise ship 'Norwegian Escape' is fitted with what is claimed to be the world's largest scrubber system installed thus far.

Attached to each of the five main medium speed engines - two MAN 14V48/60 each rated 16.8 MW and three MAN 12V48/60 rated at 14.4 MW each - are five Yara Marine Technologies' SOx scrubbers.

Yara has developed what the company claims is a simple and cost-efficient solution to combat pollution at sea - the inline scrubber. An inline scrubber is basically a gas washing machine. A simple cylinder that replaces the engine's silencer, which cleans the exhaust gas and reducing SOx emissions by up to 99%.

The five SOx scrubbers fitted on board the 'Norwegian Escape' have the capacity to clean emissions from 76.8 MW engine power.

"This particular delivery of our small, lightweight scrubber system was special as it is the biggest operating marine scrubber system in the world so far,"

said Kai Låtun, Yara Marine Technologies' Chief Sales & Marketing Officer. "The customer is happy and the environment is protected and those are our two ultimate goals."

Each scrubber supplied by the company is of the patented GreenTech Marine\* type and are tailor made for each engine and/or vessel.

'Norwegian Escape' has a capacity for up to 4,248 pax and 1,731 crew. Diesel consumption at full cruising load is about 11 tonnes per hour and she was handed over by Meyer Werft to NCL last October. The shipyard undertook the scrubber installation, while Yara was responsible for the start-up and commissioning, as well as the installation supervision, Låtun explained.

"We are very satisfied with the scrubber system delivery from Yara Marine Technologies. The system performs as guaranteed, compliance test was passed with flying colours and we had full support from Yara Marine Technologies during installation, commissioning and start up," said Christer Karlsson, NCL's Senior Vice President Newbuilding. "Yara Marine Technologies also provided expert personnel on board



during 'Norwegian Escape's' maiden voyage from England to USA in case more support should be needed. Their customer support is impeccable."

## Inline advantages

Describing the advantages of an inline scrubber system to Innovations, Låtun said that this type of system replaces the silencer - a scrubber has the same or similar sound attenuating effect as a silencer. It can be operated 'dry', ie, as a silencer only. It also does not need a bypass, has no moving parts and does not require an exhaust gas fan designed to be within the back pressure envelope acceptable for the engine, has very low energy demand (about. 1-1, 5% of engine load when scrubbing) and minimal maintenance requirements.

The scrubber towers are also built in high grade corrosion resistant steel thus enabling the scrubber's life time to be the same as for the vessel. Inline scrubbers can be fitted to low, medium and high speed engines. The system that Yara normally delivers is what the company calls a 'hybrid' wet scrubber system, which is capable of both open loop operation and closed loop/zero discharge operation. It is described as 'Wet' as seawater is used for the scrubbing process.

Other systems available are either 'packed bed' or 'dry' scrubbers, Låtun explained.

Packed bed scrubbers are very large and heavy, they require a bypass as they cannot be run dry, due to the high back pressure created and they also need an exhaust gas fan to compensate for the high back pressure when in operation. Another problem is that exhaust gas fans are liable to experience mechanical problems and require a lot of maintenance.

Dry scrubbers use chemical substances for the scrubbing, are also very large and heavy, requiring a lot of space and must be fitted with a bypass.

As for the wash water, Låtun explained that when in an open loop operation, wash water is discharged into the sea, in accordance with IMO regulations. In a closed loop operation, wash water cleaning units are fitted in the loop, so when wash water is later discharged into

the sea (ie, when the vessel sailing in the open sea), it is cleaned before discharge, which is also in accordance with IMO regulations.

It should be noted that when uncleaned wash water is discharged from open loop mode, the sulphur from the exhaust gas is mainly turned into sulphates in the wash water and the ocean is full of sulphates by nature. There are a number of scientific reports documenting that scrubber wash water is totally harmless to the marine environment, Låtun stressed.

Some Non-Governmental Organisations (NGOs) claim that the wash water could be damaging, especially in coastal waters, but this is the "better safe than sorry" approach environmentalists normally take. No documentation exists to prove that scrubber wash water has damaged or will damage the marine environment. This whole discussion is on political level, not on a scientific level, he explained.

A 10 MW engine load during scrubbing, requires 100 kW of energy to run the inline system. The scrubber is working continuously when in an ECA, as well as in open seas in open loop mode and in port/near the coastline in closed loop mode if there are zero discharge regulations in place around that particular area.

The scrubbers are only turned off when the engines are not in use, as long as the vessel is operating inside an ECA. However, ports and port state control (PSC) regimes operating in ECAs have different rules regarding zero discharge of wash water to sea. For example, some port/PSCs allow discharge of wash water to sea, others do not. If there is a zero discharge requirement, the scrubber should be changed from open loop to closed loop mode when entering the zero discharge area. This is done seamlessly while the vessel is underway with the engines running, Låtun claimed.

To date, Yara has delivered around 50 scrubbers to more than a dozen cruise vessels for owners, such as RCCL and NCL and another in the pipeline that the company said was still confidential. "We have more scrubbers on order. I believe we are the largest global scrubber supplier to the cruise segment," Låtun told ICSI.

\*Yara Marine Technologies, a subsidiary of Yara International and formerly GreenTech Marine, supply small, lightweight in-line scrubbers, replacing the existing silencers with no extra structural requirements, able to operate in dry mode, open loop and closed loop, as per customer requirements. Thanks to the scrubber's small footprint and low weight, the patented GreenTech Marine scrubbers are suitable for almost any type of vessel, whether it a newbuilding or a retrofit solution. The scrubbers can be custom-made for any engine size, both 2-stroke and 4-stroke.

The scrubber requires about the same space as the silencer it replaces. When operating in closed loop, the GreenTech Marine scrubber apply harmless Magnesium Oxide as an alkali additive, in lieu of the hazardous Caustic Soda for safety reasons.

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