

New scrubber does not pollute sea water

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Fresh-water gas exhaust scrubbers produce so little effluent that, in the future, it will be possible to build ships with zero effluent discharge into the sea, reveals a new study from the University of Vaasa, Finland.

The doctoral thesis of Jari Lahtinen, Lic. Sc. (Tech) examines fresh-water closed-loop gas exhaust scrubbers, which are used on merchant ships.

According to Lahtinen, all regulations concerning effluent water will become irrelevant on these environmentally-friendly ships. In the future, there will be no need for washwater treatment equipment onboard.

"The results showed that the fresh water scrubber was excellent at removing sulphur from [exhaust gas](#)", says Lahtinen.

From an environmental perspective, a scrubber ship is a better option than a gas oil ship, at least when carbon dioxide, sulphur dioxide and nitrogen oxides are considered. This is true if heavy fuel oil is assumed to be a low-value product – essentially a waste product – and refinery emissions are also allocated to the environmental loads of gas oil ships.

"Cheap oil and scrubber investments"

In the last few years, scrubbers have made the headlines several times. Shipping companies have prepared themselves for the EU's Sulphur Directive. The directive entered into force at the beginning of 2015 inside sulphur-emission control areas. Global regulations restricting the

sulphur content of exhaust gas will come into force in 2020 or in 2025.

Shipping companies have been concerned about the high investment costs of scrubbers. The investment cost of a sulphur scrubber, including installation, is typically millions of euros. The cost varies according to the size of the vessel.

An alternative way for ship owners to meet regulations is to change the fuel. Low-sulphur, high-quality fuels are more expensive than high-sulphur heavy fuels. For example, the price of heavy bunker oil dropped to USD 0,12 per kilogram in January 2016; at the same time, low-sulphur fuel cost more than twice the same price.

"The relative difference in fuel price is significant and, therefore, [shipping companies](#) remain interested in using heavy fuel oil. However, low oil prices make scrubbers and other fuel-cost-saving technologies less attractive", Lahtinen comments.

Based on Lahtinen's study, scrubber installation is profitable for large and medium-sized vessels with high fuel consumption, at long-term average [oil](#) prices.

For the study, measurements were taken on the tank ship Suula and on the container vessel Containerships VII. The Suula scrubber was the first certified unit in the world. These data were used to estimate the scrubber's technical applicability for merchant ships. In addition, Lahtinen analysed the cost-effectiveness and environmental load of the scrubber.

The exhaust gas scrubber efficiently removes sulphur dioxide from exhaust gas. The scrubber unit is typically located in the ship's funnel and in principle it looks like a cylindrical car exhaust silencer but on a larger scale. The diameter can be several metres. Water is sprayed inside

the scrubber and sulphur is captured in the washwater from the exhaust gas.

"By using a fresh-water scrubber, it is possible to limit the production of effluent to less than the level where the balance with the ship's fuel consumption can be reached continuously. The required effluent holding tank volume does not limit the ship's cargo transport capacity", says Lahtinen.

There will be no need to treat washwater on board and pump it overboard; instead, effluent can be transported to the port and onwards in pipelines to the wastewater treatment plant.

Provided by University of Vaasa

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