

JMU GREEN TECHNOLOGY

Norway-Japan Maritime Innovation Seminar

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 **Japan Marine United Corporation**



Collaboration with All Japan Team K-Line "DRIVE GREEN PROJECT"

DRIVE GREEN PROJECT

Kawasaki Kisen Kaisha, Ltd. ("K" Line) has launched "DRIVE GREEN PROJECT" in order to pursue environmental protection and energy savings with the world's most advanced technologies to be integrated on the 7,500-unit Car Carrier on order with Japan Marine United Corporation as Flag Ship of this project.

Ships have the lowest environmental impact of all transportation modes compared with aircraft, railway and motor vehicles. On the other hand, exhaust gas from marine diesel engines include factors that cause photochemical smog and acid rain, such as sulfur oxide (SOx) and nitrogen oxide (NOx), in addition to carbon dioxide (CO2) that are causes of global warming.

In K-Line "DRIVE GREEN PROJECT," to reduce CO2 emissions per transport vehicle, advanced hull design and energy saving technology have been adopted, with the goal of reducing CO2 emissions 25% or more compared to conventional design. In addition, SOx and NOx emissions are also reduced by using the world's most advanced technology.

To protect the environment of the earth and its oceans, K-Line will continue to vigorously strive to promote energy saving and reduce environmental impact of our fleet.



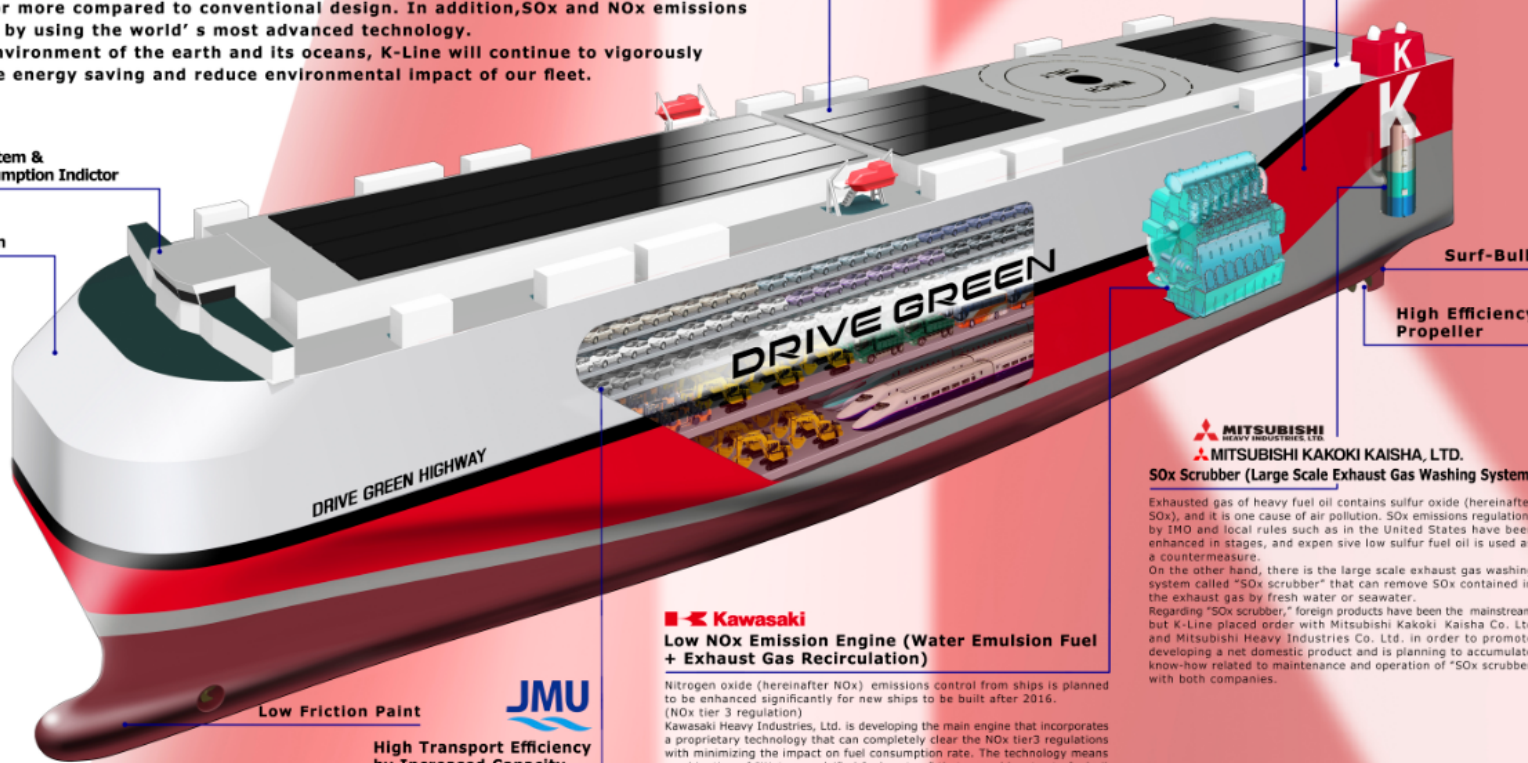
This is a system that utilizes the electric power generated by solar for inboard power and can generate about 150kw, this power generated amount being the world's largest as for ships. K-Line is planning to utilize solar power supply for the LED lighting in car holds (about 150kw) and order solar panels for this system from Solar Frontier K.K. that can be expected to provide stable power generation in the long term.

Exhaust Gas Heat Recovery System for Diesel Generator

Inverter Control of E/R Fan & Cooling Sea Water Pump

Voyage Support System & Real Time Fuel Consumption Indicator

Wind Resistance Reduction Design



Surf-Bulb

High Efficiency Propeller

DRIVE GREEN HIGHWAY

DRIVE GREEN

Low Friction Paint

High Transport Efficiency by Increased Capacity



Exhausted gas of heavy fuel oil contains sulfur oxide (hereinafter SOx), and it is one cause of air pollution. SOx emissions regulations by IMO and local rules such as in the United States have been enhanced in stages, and expensive low sulfur fuel oil is used as a countermeasure. On the other hand, there is the large scale exhaust gas washing system called "SOx scrubber" that can remove SOx contained in the exhaust gas by fresh water or seawater. Regarding "SOx scrubber," foreign products have been the mainstream, but K-Line placed order with Mitsubishi Kakoki Kaisha Co., Ltd. and Mitsubishi Heavy Industries Co., Ltd. in order to promote developing a net domestic product and is planning to accumulate know-how related to maintenance and operation of "SOx scrubber" with both companies.

Kawasaki
Low NOx Emission Engine (Water Emulsion Fuel + Exhaust Gas Recirculation)

Nitrogen oxide (hereinafter NOx) emissions control from ships is planned to be enhanced significantly for new ships to be built after 2016. (NOx tier 3 regulation) Kawasaki Heavy Industries, Ltd. is developing the main engine that incorporates a proprietary technology that can completely clear the NOx tier3 regulations with minimizing the impact on fuel consumption rate. The technology means combination of "Water emulsified fuel system" that can add water to fuel oil and "Exhaust gas recirculation system" that can reflux the exhaust gas in scavenging air. In addition, in order to reduce CO2 emissions, "Turbo charger cut-out device" is also incorporated, that can control turbochargers' running in accordance with the load. K-Line decided to install this engine and perform a test operation proactively before the IMO regulation is strengthened.



*These programs are supported by Ministry of Land, Infrastructure, Transport and Tourism (MLIT) development of the combined emission reduction system for marine main diesel engine and ClassNK as part of the ClassNK Joint R&D for Industry Program (development of the combined emission reduction system for marine main diesel engine and SOx scrubber).

CO2 25% Reduction

(Advanced Hull form,
fuel oil saving device,
Solar Power system,
Low Friction A/F Paint,
Voyage Support System. etc.)

ECO Friendly

NOx Reduction

(EGR+WEF)

SOx Reduction

(Hybrid SOx Scrubber)



Programs for NO_x, SO_x reduction technology

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