FORWARD® SHIPS

*The Cleanest Cargo Ships in the World*

# PRESS RELEASE

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# FORWARD SHIPS GRANTED SOUTH KOREAN PATENT

## Forward Ships' innovative machinery arrangement receives its first official patent right from South Korea, a major shipbuilding nation.

The Korean Intellectual Property Office Examiner decided to grant this patent application pursuant to Article 66 of the Korean Patent Act to Arista Shipping S. A. (Applicant code; 520170558378) with Issuance No: 9-5-2018-083274504.

The Project Forward initiative led by Athens-Based Arista Shipping, demonstrates that with LNG as fuel, an advanced hull design, and highly efficient propulsion machinery, it will be possible to meet the IMO's target for a 40 percent reduction in carbon intensity by 2030.

The patent-pending machinery arrangement consists of only two low-pressure, four-stroke Wärtsilä 31Dual Fuel main engines and two PTO/PTIs, coupled on one shaft that drives a CPP propeller.

This arrangement doubles the propulsion redundancy, quadruples the power-generating redundancy, and provides safe return to port, setting a new standard and lowering operating expenses.

This arrangement allows for an improvement in the streamlining of the aft part, the percentage of which is not taken into account in the consumption tables. Further, the positioning of the engines above gearbox centreline allows for additional hull lines' optimization.

Model tests of the Project's concept vessel indicate that the Energy Efficiency Design Index (EEDI) is well below the currently most stringent Phase III level. The EEDI reflects the CO2 emissions per transport work and is a measure of carbon intensity. EEDI Phase III is applicable to ships built after 2025 and signifies a 30 percent reduction from the 2008 reference level.

The IMO has also announced that efforts should be made for a possible further reduction in CO2 emissions per transport work of up to 70 percent by 2050. One commonly discussed way to reduce such emissions has been to limit the propulsion engine power, but this would require a significantly lower service speed, resulting in a serious impact on the chain of logistics.

Forward Ships shows that this 70 percent reduction in CO2 emissions target can be met, even without lowering service speeds, through the use of carbon neutral fuels mixed with LNG. Such carbon neutral fuels can be transported, stored, and consumed in a similar way to that of fossil LNG.

"Through the advanced engine technology available today, LNG has a clearly superior well-to-wake emissions profile compared to liquid fuel. LNG appears not as a transition fuel, but the fuel of tomorrow and for many years to come," says Antonis Trakakis, Technical Director at Arista and Chief Technology Officer of Forward Ships.

The concept vessel's hull form has been optimised in cooperation with Finnish ship designer Deltamarin and classification society American Bureau of Shipping (ABS). "Deltamarin has a long history in energy-efficient ship designs where hull form development has always been one of the spearheads," says Tommi Hietamäki, Project Engineer at Deltamarin.

"The efficient propulsion design concept for Forward Ships is based on a novel arrangement featuring just two highly efficient Wärtsilä 31DF engines without auxiliary gensets. The project is totally in line with Wärtsilä's Smart Marine vision that foresees an era of concept solutions delivering optimal efficiency, safety, and environmental sustainability," says Johnny Kackur, General Manager, Wärtsilä Marine Solutions.

"As a global leader in gas, ABS is collaborating with innovative companies and organizations to support the delivery of technologies that minimize the environmental impact of shipping," says Elias Kariambas, ABS Regional Business Director, Greece. "Forward Ships' vision to create an efficient, environmentally-protective, long-haul bulk carrier is perfectly consistent with the ABS mission, and we are proud to contribute to the joint effort."

In addition to Arista Shipping, Deltamarin, ABS and Wärtsilä, the French LNG membrane containment system designer GTT is also involved in the project. The vessel is fitted with an LNG tank positioned midships.

Image caption: The Project Forward aim is to deliver the cleanest and most efficient fleet of cargo ships in the world (image: Arista)

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**Forward Ships in brief:**
Forward Ships enables the adoption of liquefied natural gas (LNG) as the fuel of choice for ships at a global scale. Forward Ships has applied existing and tested technology to design a cargo ship that emits up to 35% less CO2, 80% less NOx, 99% less SOx, 99% less particulate matter (PM) than conventional ships. Forward Ships is the result of Project Forward, a five-year R&D effort led by Arista Shipping. Forward Ships has committed to lead the way to the decarbonization of shipping.
www.forwardships.com

**Project Forward in brief:**
Conceived in 2013 and funded by Arista Shipping, Project Forward is a Joint Development Project to combat global ship emissions by promoting the adoption of liquefied natural gas as a marine fuel. Since 2013, Arista has been joined in its R&D efforts by a prestigious and powerful group of industry leaders consisting of ABS (American Bureau of Shipping, one of the world's leading ship classification societies), Deltamarin (a ship design, offshore engineering and construction group operating in the marine and offshore industries worldwide), GTT (Gaztransport & Technigaz, the leading engineering company specialized in the design of membrane containment systems for the maritime transportation and storage of liquefied gas), Wärtsilä (a corporation which manufactures and services state of the art power sources and other equipment in the marine and energy markets) and Shell (Royal Dutch Shell plc) has also linked with Project Forward to assist in the global distribution of LNG.
www.forwardlng.org

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