NSY, 23 partners join in council to talk ammonia, highly anticipated next-generation marine fuel 122

To achieve IMO-mandated decarbonization goals, parties from various industries—energy, mining, electricity, chemicals, marine terminals, shipping, shipbuilding, manufacturing, marine fuel supplying and classification societies—have come together to discuss the common challenges seen in handling ammonia, which they hope will be used as next-generation marine fuel.

Nihon Shipyard Co., Ltd. (NSY), a sales and design joint venture established through a business and capital collaboration between Imabari Shipbuilding Co., Ltd. and Japan Marine United Corporation (JMU), began operation in January 2021.

NSY has a staff of about 500 employees in sales and design from its parent companies. Its headquarters is in Chiyoda Ward, Tokyo, with five offices in Yokohama City, Kanagawa Prefecture; Marugame City, Kagawa Prefecture; and Imabari City, Ehime Prefecture. The new company is engaged in sales, design and other relevant business activities for all types of general commercial vessels except LNG carriers and marine floating structures. Its activities include marketing; planning and development; research; contract bids and signings; and designing basics and functions for merchant vessels. Business procedures following function designs are handed over to Imabari Shipbuilding and JMU, which continue with details and the construction and delivery of completed ships.

As an example of NSY's forte in planning and development as well as research and development, the company has signed a memorandum of understanding (MoU) and set up a dedicated council with 23 partners. In pursuing the use of ammonia as a marine fuel, the members will discuss how to address the common challenges that they face on inter-industrial scale.

The 23 members joining NSY are, from Japan: Itochu Corporation; Itochu ENEX Co., Ltd.; JERA Co., Inc.; Kawasaki Kisen Kaisha, Ltd.; Mitsui E&S Machinery Co., Ltd.; Nippon Kaiji Kyokai (ClassNK); NS United Kaiun Kaisha, Ltd.; Ube Industries, Ltd; and Uyeno Transtech Ltd.; and from overseas: the American Bureau of Shipping (ABS); Anglo American plc; DNV AS; Equinor ASA; Fortescue Metals Group Ltd.; Genco Shipping and Trading Ltd.; MAN Energy Solutions SE; Pavilion Energy Pte. Ltd.; TotalEnergies SE; Trafigura Group Pte. Ltd.; Uniper SE; VALE S.A.; and Vopak Terminals Singapore Pte. Ltd.

The council will gather to discuss the following common challenges: 1) the safety of ammonia-fueled vessels, 2) the safety of supplying ammonia fuel, 3) the specification of ammonia as marine fuel, and 4) the net CO_2 emissions from ammonia production. To study these subjects in greater depth, the council is considering asking ammonia producers, relevant international organizations as well as the port and harbor administrators and authorities of countries and regions that are likely to be ammonia marine fuel suppliers for their opinions, points of view, expertise and experience.

Since the Paris Agreement of 2016, momentum has gained across the globe for decarbonization. In the shipping industry, in that time, the International Maritime Organization (IMO) adopted a strategy in 2018 on the reduction of GHG emissions. The organization is now calling for the curtailment of CO_2 emissions per transport work by at least 40% from 2008 levels by 2030 and overall CO_2 emissions by at least 50% by 2050. The IMO is also recommending that GHG emissions be phased out (to accomplish zero emissions) as soon as possible within this century. To clear such targets, it is important to implement ammonia marine fuel in society, a highly promising energy resource toward realizing a zero GHG emission target.

NSY will continue in the years to come to make the most of technologies to reduce its burden on the natural environment and to contribute to building a sustainable society through the provision of eco-friendly ships.

LNG Fuel Gas Supply System (LNG FGSS) 123

Unlike the conventional heavy fuel oil, LNG is not only SOx-free, but also capable of reducing roughly 20% of CO_2 emission when compared at same heating value.
Therefore, LNG is considered as one of most expected and practical alternative marine fuel. Recently, carbon neutral methane is recognized as zero-emission marine fuel.
LNG Fuel Gas Supply System (LNG FGSS) developed by Mitsubishi Shipbuilding Co., Ltd. enables all types of marine dual fuel diesel engines to burn LNG as fuel. Solution package offered to our customer shipyards include FGSS modules, which minimizes installation work, and LNG fuel tanks and gas engineering services. All these technologies and know-hows are based on the cryogenic liquefied-gas handling technologies cultivated through our long experiences of in-house building and designing LNG/LPG carriers.

DIA-SOx Scrubber System 124

DIA-SOx Scrubber System, designed and developed by Mitsubishi Shipbuilding Co., Ltd., is the exhaust gas cleaning system to comply with 2021 EGCS Guideline with conventional heavy fuel oil. Both hybrid and open loop system are available.

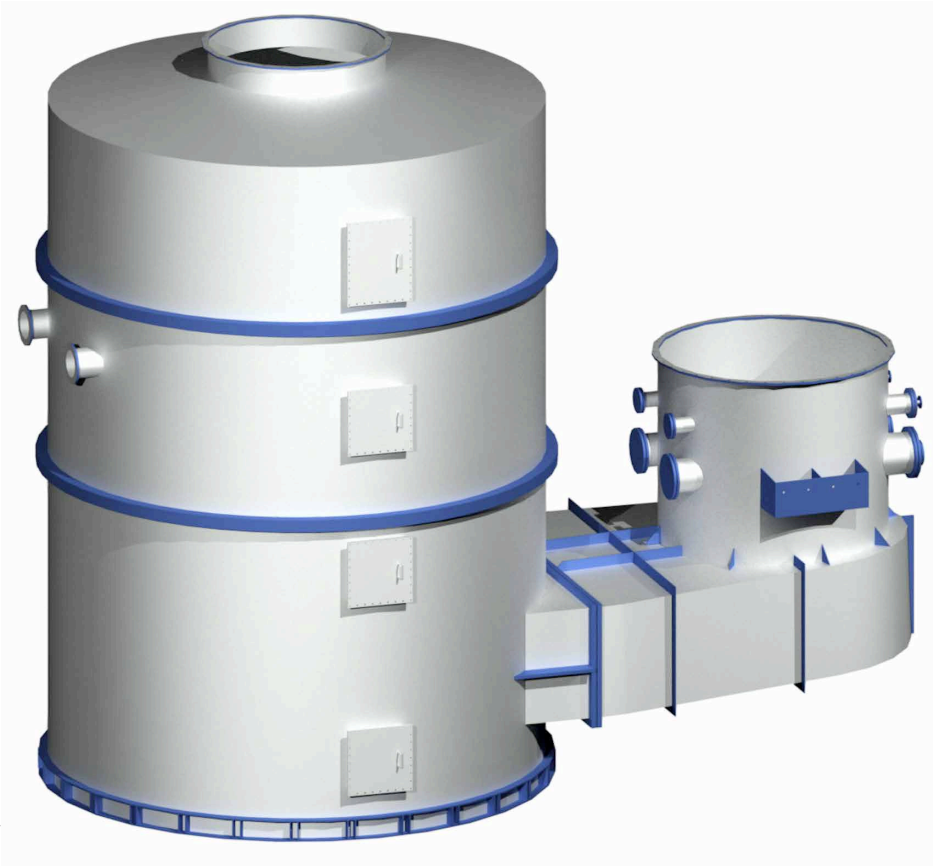
DIA-SOx C-Series

- Simple cylindrical scrubber tower
- Multi inlet type

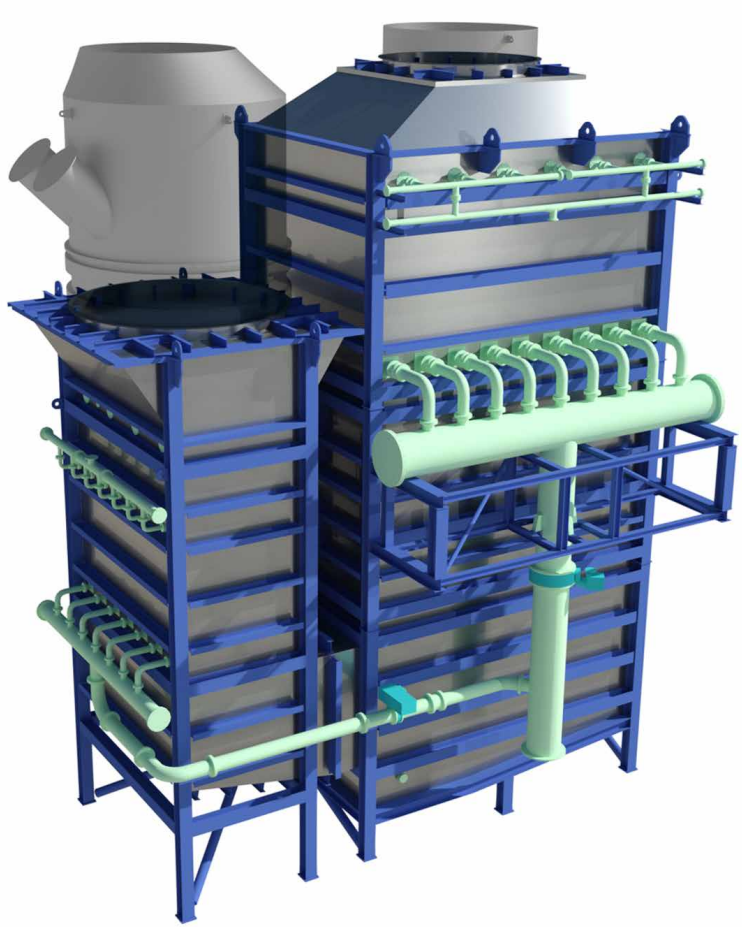
DIA-SOx R-Series

- Scrubber for high power engines
- Multi inlet type
- The unique rectangular tower maximizes the space efficiency, and especially in ultra large container ships it is possible to achieve "zero" cargo loss due to the installation of the scrubber.

The service experience has been accumulated since Container Packaged Hybrid SOx Scrubber System was firstly installed in 2016.



DIA-SOx C-Series



DIA-SOx R-Series

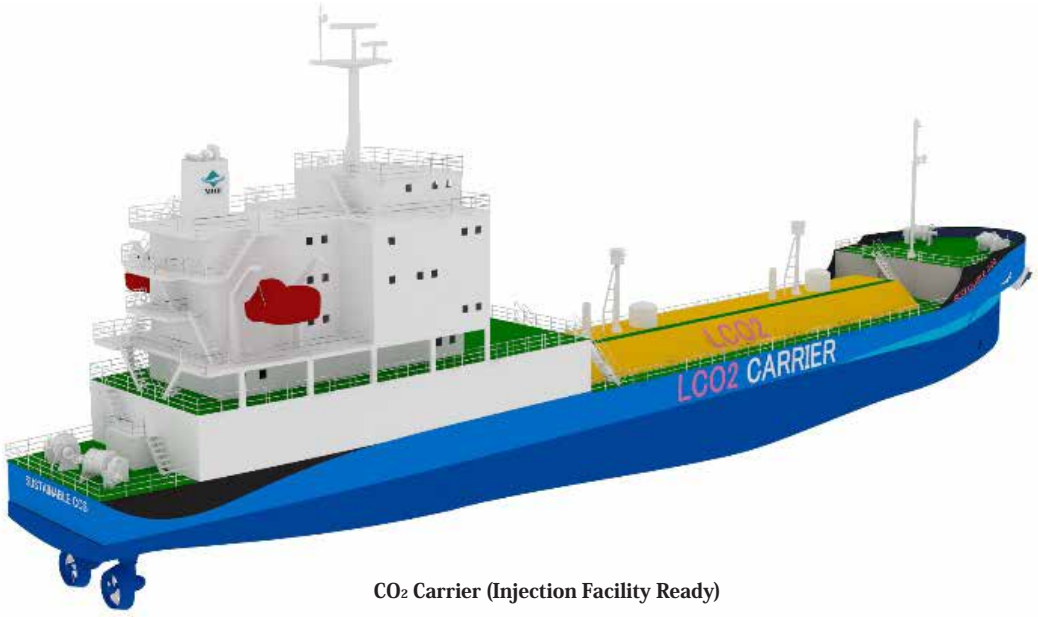
CO_2 Carrier (Injection Facility Ready) 125

Shin Kurushima Sanoyas Shipbuilding Co., Ltd. has obtained an Approval in Principle (AiP) from ClassNK for the design of "CO_2 carrier (Injection Facility Ready)" as part of "Sustainable CCS (Carbon dioxide Capture and Storage) project" by the Ministry of the Environment, Government of Japan. This project is in the background of reducing Greenhouse Gas, and it is for technical study and verification of CCS which separates and captures CO_2 in exhaust gas from thermal power plants and stores it underground. The company has developed the CO_2 carrier, under the commissioned of Uyeno Transtech, a member of the demonstration project consortium, and also carried out the risk assessment (HAZID : Hazard Identification Study) of "CO_2 carrier (Injection Facility Ready)" in anticipation of future conversion to CO_2 carrier with injection system, which led to obtainment of the AiP.

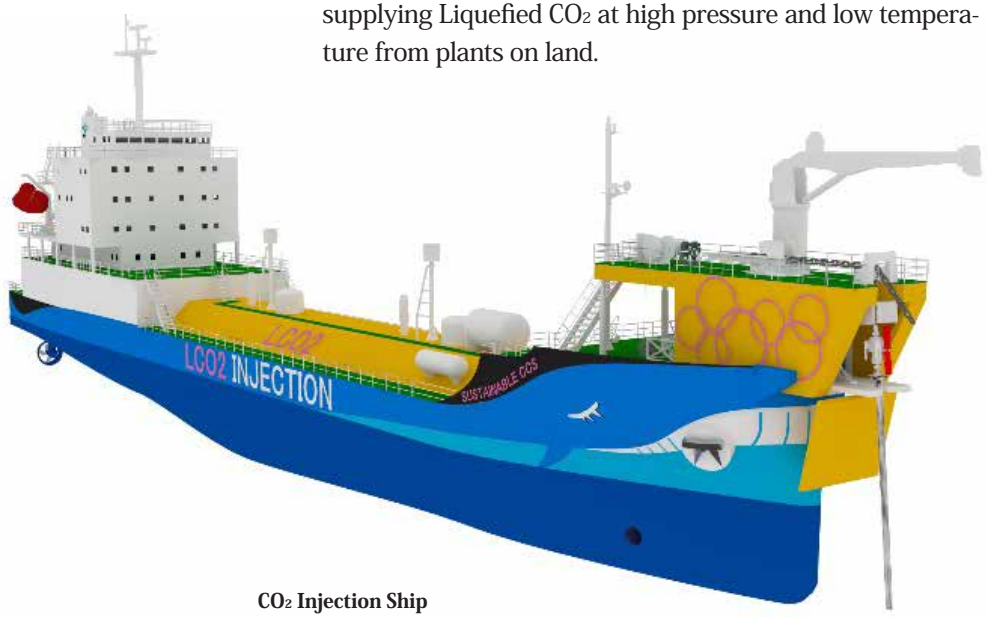
This ship design has been developed to enable CO_2 transportation, and also future conversion to injection operation. The space for the injection system including the fitting facility to an offshore storage site has been secured in front of the CO_2 cargo tank as shown in right figure.

This ship has two-axis azimuth propulsion system and buttock flow stern hull form to reduce hull resistance. As a result, it satisfies the position keeping performance required for CO_2 injection operations on the ocean, and also ensures propulsion performance suitable for ocean voyages.

Liquefied CO_2 requires high pressure and low temperature to maintain its liquefied state, which is a strict requirement for the design and manufacture of CO_2 cargo tanks. However, based on our accumulated LPG cargo tank design and manufacturing technologies, the company have developed a new TYPE-C tank suitable for receiving, transporting, and supplying Liquefied CO_2 at high pressure and low temperature from plants on land.



CO_2 Carrier (Injection Facility Ready)



CO_2 Injection Ship