

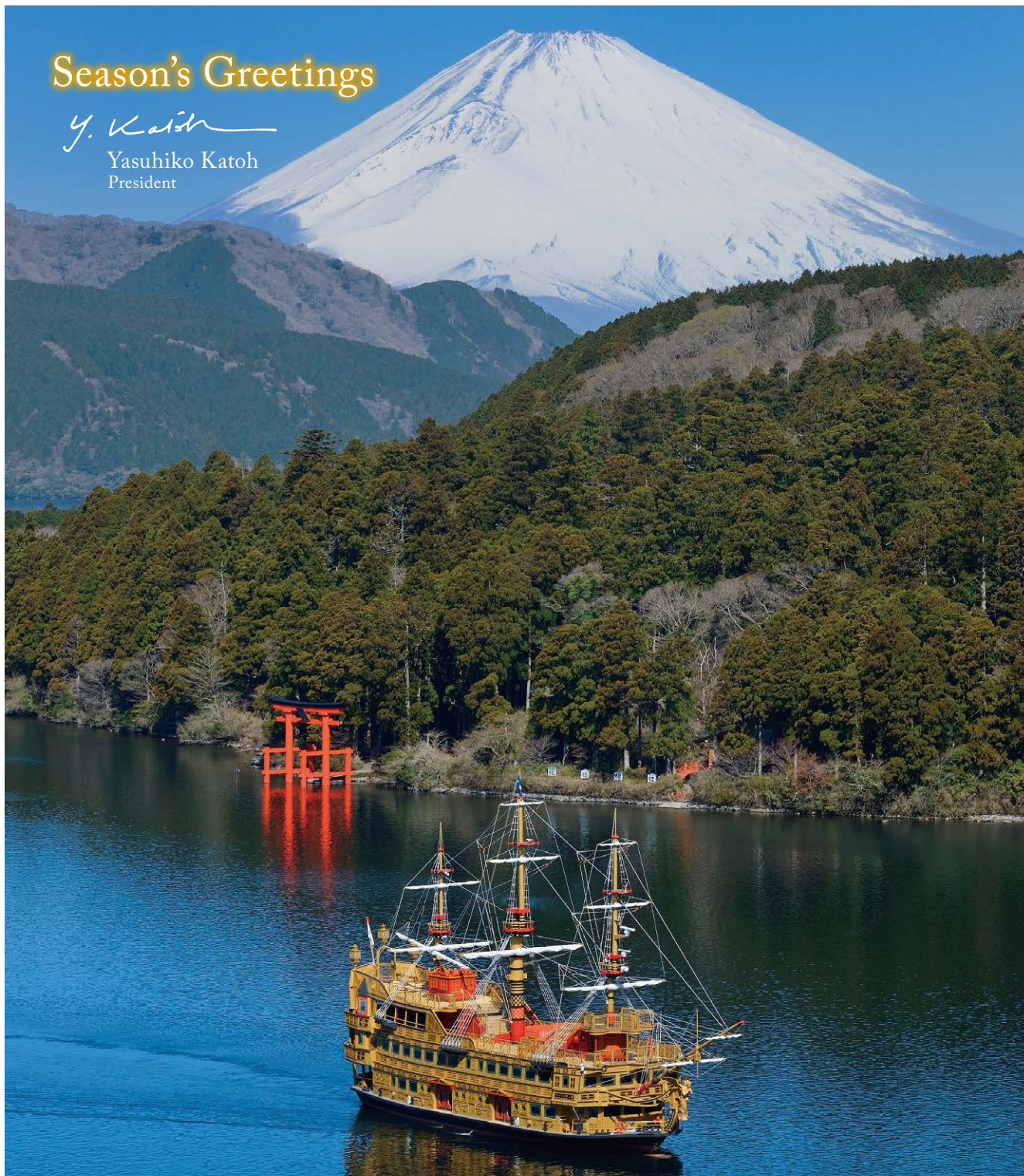
# SEA-Japan

No. 398 Dec. - Jan. 2020

## Season's Greetings

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## JAPAN SHIP EXPORTERS' ASSOCIATION

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## JMU completes G-Series Dunkirkmax bulker, EMPEROR PAMPERO

Japan Marine United Corporation (JMU) delivered the 182,000DWT bulk carrier, EMPEROR PAMPERO at its Tsu Shipyard on August 29, 2019. This is the 20th vessel of the G-Series of Dunkirkmax bulk carriers, called G182BC. JMU previously built the G-Series Newcastlemax and

Panamax bulk carriers, and the G182BC is the third ship type of the G-Series.

The G182BC type has succeeded in reducing fuel oil consumption through various and comprehensive measures for energy-saving, and the Energy Efficiency Design Index (EEDI) is much improved. The G182BC type was developed with the expertise and vast experience of JMU. The SSD<sup>®</sup> (Super Stream Duct<sup>®</sup>) and Surf-Bulb<sup>®</sup> (Rudder Fin with Bulb) equipped fore and aft of the propeller,

respectively, much improve the propulsive performance. Furthermore, the unique bow shape of the LEADGE Bow<sup>®</sup> can reduce the resistance in waves, and the well-refined shape of the superstructure has low wind resistance.

In addition, the features of low level EEDI, ballast water treatment system, and compliance with the MARPOL NO<sub>x</sub> (Tier II) and SO<sub>x</sub> emission regulations are environmentally friendly.

### Principal particulars

L (o.a.) x B x D x d:	292.00m x 45.00m x 24.55m x 18.18m
DWT/GT:	182,567t/93,722
Main engine:	MAN B&W 7S65ME-C8.5 diesel x 1 unit
Speed:	15.05kt
Complement:	25
Classification:	ClassNK



## MHIMSB completes new generation MOSS type LNG Carrier, BUSHU MARU

Mitsubishi Shipbuilding Co., Ltd. (MHIMSB), a group company of Mitsubishi Heavy Industries, Ltd. (MHI) completed construction of the BUSHU MARU (HN:2327), a new generation MOSS type LNGC "SAYARINGO STaGE" with a tank capacity of 180,520m<sup>3</sup>, and delivered the vessel to Trans Pacific Shipping 6 Limited on July 4, 2019.

The "SAYARINGO STaGE" succeeds the "SAYAENDO" (podded peas), a design highly acclaimed for its improved Moss-type spherical tanks that achieve a high level of reliability.

The adoption of apple-shaped (ringo) tanks in the "SAYARINGO STaGE" has enabled increased LNG carrying capacity without changing the ship's beam, and incorporation of a hybrid propulsion system has significantly boosted fuel efficiency compared with the "SAYAENDO."

"STaGE," an acronym deriving from "Steam Turbine and Gas Engines," is a hybrid propulsion system combining a steam turbine and en-

gines using gas as fuel. Efficient use of the engine's waste heat in the steam turbine results in substantial improvement in plant efficiency, enabling high-efficiency navigation throughout a full range of speeds.

The adoption of a tank cover integrated with the hull structure, developed by MHI Group with technical support from Aker Arctic Technology Inc. of Finland, enables a lighter vessel while fully retaining overall structural strength. The design also reduces wind resistance during navigation.

MHIMSB will continue to deliver solutions that enable stable energy supply and environmental benefits by constructing high quality and environmental-friendly LNG carriers with advanced technology.



### Principal particulars

L (o.a.) x L (b.p.) x B x D x d:	297.5m x 293.0m x 48.94m x 27.0m x 11.5m
Gross tonnage:	149,367
Cargo tank capacity:	180,520m <sup>3</sup>
Main engine:	
1) Mitsubishi, MR21-II, marine steam turbine with reduction gear x 1 set	
Output:	12,450kW x 61.1rpm
2) GE, N3 HXC 1000 J8, electric propulsion motor with reduction gear x 1 set	
Output:	12,450kW x 61.1rpm
Speed, service:	19.5kt
Classification:	ABS

## NAMURA develops LNG fuelled ore carrier, WOZMAX type GF

Namura Shipbuilding Co., Ltd. has completed developing the concept design of the LNG-fuelled very large ore carrier, which has been jointly developed with Kawasaki Kisen Kaisha, Ltd. (K LINE), and obtained AIP (Approval in Principle) for the concept from DNV GL in August 2019.

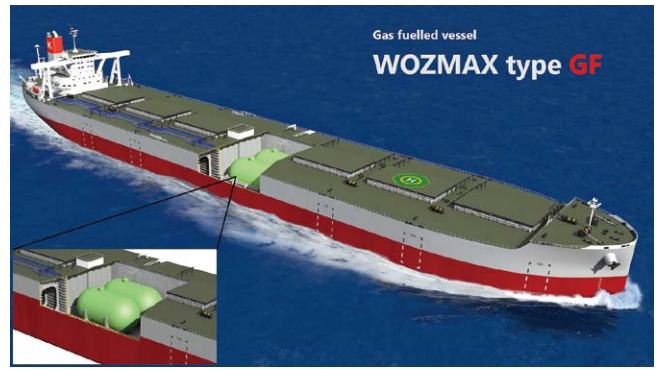
This concept design is based on the second generation WOZMAX® developed by Namura as the optimized ore carrier for West Australian iron ore loading ports, which complies with formal design screening according to key requirements of the IGF Code and DNV GL's classification rules. The risk assessment HAZID (Hazard Identification Study) for this concept has been performed to satisfy the DNV GL formal Risk Based Design process.

To satisfy the stringent international legislation for protection of the

environment, the vessel can use LNG as fuel so that emissions of SO<sub>x</sub> as well as NO<sub>x</sub> and CO<sub>2</sub> will be reduced. Namura is actively working on the Eco-friendly ship to conserve the global environment together with ship owners and operators.

The following features will be available for the WOZMAX type GF:

- (1) Large LNG fuel tanks will be arranged in the centre section of the hull to have almost same deadweight compared with the conventional design.
- (2) The vessel can cope with EEDI Phase 3 by changing the primary fuel to LNG.



- (3) The vessel has enough cruising capacity to make the round-trip between Singapore and Brazil in only gas-fuel mode without refueling.

### Principal particulars

L (o.a.) x B (mld) x d (mld): 329.90m x 57.00m x 25.60m  
 DWT: about 250,000t  
 LNG tanks: about 4,000m<sup>3</sup> x 2 units  
 Main engine: MAN B&W 6G80ME-C9.5-GI x 1 unit  
 Complement: 28

## Oshima designs concept vessel "Ultramax 2030" to meet IMO 2030 environmental targets

Oshima Shipbuilding Co., Ltd. has developed the "Ultramax 2030" in cooperation with DNV GL and Wartsila, and unveiled the vessel at the Nor-Shipping trade fair 2019 in Norway. This vessel is designed to achieve low emission levels to fulfil the IMO's requirements to reduce CO<sub>2</sub> emissions per capacity-mile by at least 40% by 2030, and low emissions in ports.

This vessel utilizes LNG as fuel, and has a 2,000m<sup>3</sup> LNG tank. This

capacity is enough to cover the main global trading pattern of a round trip from Singapore to South Africa (13,600nm). The vessel design is based on actual operating profile data from Ultramax bulk carriers, and incorporates an LNG fueled Wartsila 31DF dual-fuel main engine as one of two engine options, connected to a power take out (PTO) shaft generator and controllable pitch propeller (CPP).

The GFRP hard sail being devel-

oped jointly by Oshima and Mitsui OSK Line is equipped to generate extra propulsion as an option. The hard sail has 60m height, and satisfies the SOLAS visibility requirements. The hard sail can automatically rotate to the optimal

angle of attack to maximize thrust in response to changing wind conditions. The sail can be folded in unfavorable wind conditions and during loading/unloading.

Solar panels and batteries are equipped to cover the hotel load during waiting time as an option. Solar panels are installed on top of the hatch covers, and generate electric power during sunlight hours, with the remaining electric power supplied by battery.

The Ultramax 2030 is a concept vessel which aims to maximize operational performance and minimize emissions by utilizing currently available technologies. As a result, this vessel will achieve 46-50% EEDI reduction.

### Principal particulars

L (o.a.) x B x d (Summer): 200.00m x 32.26m x 13.30m  
 DWT: 62,000t  
 Loading capacity: 79,000m<sup>3</sup>  
 Main engine:  
 2S Option: MAN B&W 6G50MEGI x 1 set  
 4S Option: Wartsila 12V31DF x 1 set  
 Classification: DNV GL





## Sanoyas completes SUPRAMAX bulk carrier, INDIGO HERITAGE

Sanoyas Shipbuilding Corporation completed construction of the SUPRAMAX bulk carrier, INDIGO HERITAGE, at the Mizushima Shipyard and delivered the vessel to Cleveland Shipmanagement S.A. on September 5, 2019.

This is the 11th vessel of a series of the newly developed Sanoyas 60,000DWT type SUPRAMAX bulk carriers. The vessel has large deadweight and achieves the highest fuel efficiency for a vessel with length less than 200m. The optimized hull form to improve the performance in actual sea conditions including waves contributes to a better total performance with less fuel consumption and low emissions.

For improvement of propulsion efficiency, the vessel is equipped with a low-speed and long-stroke electronically controlled main engine combined with a high-efficiency propeller and associated energy saving devices such as the Sanoyas STF (Sanoyas-Tandem-Fin (patent)); max. 6% energy

saving) on the stern shell and highly efficient appendages on the rudder, which also contribute to the reduction of CO<sub>2</sub> emissions.

Eco-friendly features include the main engine compliant with NO<sub>x</sub> emission Tier II limits for the prevention of air pollution, dedicated low sulphur diesel oil tank to cruise in ECAs (Emission Control Areas), BWTS (Ballast Water Treatment System) and fuel oil tank protection for the protection of the marine environment. In addition, independent holding tanks for accommodation discharges, dirty hold bilge and rainwater on upper deck are provided.

### Principal particulars

Owner: Cleveland Shipmanagement S.A.  
Hull No.: 1359



L (o.a.) x B x D x d (Summer):

199.99m x 32.24m x 18.38m x 12.868m

DWT/GT: 60,515t/34,178

Cargo hold capacity: 77,067m<sup>3</sup> (Grain)

Main engine: MAN B&W 6G50ME-B9.3 diesel x 1 unit

Speed, service: about 14.3kt (at C.S.O. with 15% sea margin)

Complement: 25

Classification: ABS

Registry: Liberia

Delivery: September 5, 2019

## Mitsui E&S Machinery increases diesel engine production of IMO NO<sub>x</sub> Tier III compliant products

Environmental regulations for international marine transportation, as determined by the International Maritime Organization (IMO), are becoming stricter. The Tier III regulation for NO<sub>x</sub> (Nitrogen Oxides) emitted by ships requires reduction of emissions by 80%, compared with 2000, in specific sea areas.

In response, Mitsui E&S Machinery Co., Ltd. will dramatically increase

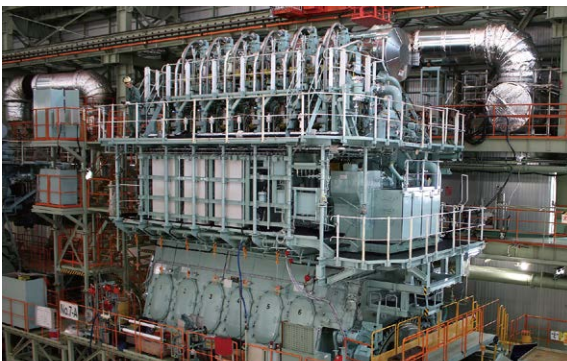
production of Mitsui-MAN B&W diesel engines at its Tamano Works compliant with IMO NO<sub>x</sub> Tier III regulations in FY2019 and later, with projected production of FY2018: 2 units; FY2019: 14 units; and FY2020: 81 units.

Several technologies are available for meeting IMO NO<sub>x</sub> Tier III requirements. In Japan, the technologies used can be divided into two types.

Mitsui E&S, which has the largest market share for large diesel engines for ships in Japan, uses one of the world's largest diesel engines installed in the Works for tests, to advance the development of technology for conforming to environmen-

tal regulations based on orders of engines, and has developed the world's first built-in exhaust gas recirculation, the High-Pressure EGR system. The other technology is the High-Pressure Selective Catalytic Reduction (High-Pressure SCR), which uses chemical reactions with catalysts and reducing agents to reduce the NO<sub>x</sub> in exhaust gases.

Mitsui E&S's High-Pressure EGR recirculates some of the exhaust gases from the engine to the exhaust pipe after cooling and cleaning, to reduce the oxygen content of scavenged air and remarkably suppress NO<sub>x</sub> generation during combustion. Integrating the main EGR devices with the engine enables a compact configuration, with the advantage of reduced impact on engine room design and



(Continued on Page 5)

## Kawasaki delivers LNG transport vessel, SOHSHU MARU

Kawasaki Heavy Industries, Ltd. has delivered the SOHSHU MARU (HN: 1735), a 177,000m<sup>3</sup> capacity LNG carrier, to Trans Pacific Shipping 8 Ltd., a joint venture between JERA Co., Inc. and Mitsui O.S.K. Lines, Ltd.

This ship is the third of Kawasaki's line of 177,000m<sup>3</sup> capacity LNG carriers to be commissioned, and is designed to enable passage through the newly expanded Panama Canal, which opened for full operations in 2016. The SOHSHU MARU will be used by JERA to transport LNG procured via the Freeport LNG Project in the U.S. The vessel features standard LNG carrier hull dimensions to enable docking at major LNG terminals around the world while offering larger cargo tanks for increased transport capacity, thus cutting LNG transport costs and facilitating more flexible LNG trade operations by ship owners.

Kawasaki has optimized the hull structure to decrease overall ship weight, enhanced the hull-shape design, and adopted a two-motor, twin-screw propulsion system to achieve the

best propulsive performance possible, while also integrating a DFD electric propulsion system which increases fuel efficiency at all speeds.

### Features

1. This large-scale LNG carrier is equipped with four independent Moss LNG tanks for a total cargo capacity of 177,269m<sup>3</sup>. By increasing the LNG tank diameter to the maximum installable limit and utilizing stretched tanks, Kawasaki has successfully expanded the maximum LNG carrying capacity designed to pass through the newly expanded Panama Canal.
2. The SOHSHU MARU uses a DFD electric propulsion system, which enables greater fuel efficiency than the existing steam turbine plant design. Moreover, the inclusion of a two-motor, twin-screw propulsion system enables high propulsive



performance at a wide range of speeds.

3. The thermal insulation system of the LNG tanks adopts the proprietary Kawasaki Panel System developed in-house, which offers outstanding heat insulation performance for an LNG boil-off rate of no more than approximately 0.08% per day.
4. The cargo tank section is protected by a double-hull and double-bottom design, so the LNG tanks within would remain safe and undamaged even if the hull is damaged.
5. The bridge is designed with state-of-the-art electronic navigation equipment concentrated in one location for greater ease of operation as well as panoramic windows offering a 360-degree view to the outside.

In the future, Kawasaki will continue to pursue shipbuilding operations to satisfy the anticipated rise in demand for LNG and other clean-energy fuels.

### Principal particulars

Length (o.a.):	299.90m
Length (b.p.):	286.00m
Breadth (mld.):	48.90m
Depth (mld.):	27.00m
Draft (mld.):	11.80m
DWT/GT:	82,254t/135,951
Tank cargo capacity:	177,269m <sup>3</sup> (at -163°C, 100% capacity)
Main propulsion system:	2 propulsion motors, 2 reduction gears
Speed:	Approx. 19.5kt
Complement:	38
Classification:	ClassNK
Registry:	Bahamas
Delivery:	July 19, 2019

(Continued from Page 4)

ship construction process, compared with other technologies for complying with NO<sub>x</sub> regulations. In addition, the improved exhaust gas cleaning water treatment system reduces the displacement of the water treatment system, and initial costs are decreased to that of a High-Pressure SCR or less.

During operation of the EGR, the engine tuning prioritizes NO<sub>x</sub> exhaust reduction, and fuel efficiency deteriorates slightly. The next-generation Eco-EGR, currently under development, will significantly improve fuel efficiency in sea areas outside the IMO NO<sub>x</sub> Tier III-regulated areas. When considering operation costs, the High-Pressure EGR uses caustic soda to neutralize exhaust gas cleaning water, whereas the High-Pressure SCR uses urea as a reducing agent. The amount of caustic soda used for a High-Pressure EGR is small com-

pared with the amount of reducing agent necessary for a High-Pressure SCR. Even considering the deterioration of fuel efficiency during operation of the EGR, the High-Pressure EGR contributes more to the reduction of operation costs.

In addition, Mitsui E&S has participated in the development of a High-Pressure SCR made by licensor MAN Energy Solutions, and has already received orders. Mitsui E&S has built a structure to continue accommodating a wide range of requests from customers.

### Production and production plans of IMO NO<sub>x</sub> Tier III-compliant Mitsui-MAN B&W diesel engines

FY2018	2 units (High-Pressure EGR: 2, High-Pressure SCR: 0)
FY2019	14 units (High-Pressure EGR: 13, High-Pressure SCR: 1)
FY2020	81 units (High-Pressure EGR: 71, High-Pressure SCR: 10)



**EVER BLINK**

Owner: Lepta Shipping Co., Ltd.  
 Builder: Imabari Shipbuilding Co., Ltd.  
 Ship type: Container carrier  
 L (o.a.) x B x D: 171.9m x 28.4m x 14.5m  
 DWT/GT: 21,700t/19,000  
 Main engine: 6S60ME-C10.5 diesel x 1 unit  
 Speed, service: 20.0kt  
 Classification: ClassNK  
 Completion: October 10, 2019

**SUNDA**

Owner: Triton Navigation B.V.  
 Builder: Onomichi Dockyard Co., Ltd.  
 Hull No.: 753  
 Ship type: Product tanker  
 L (o.a.) x B x D x d (ext.): 219.00m x 38.00m x 19.50m x 12.00m  
 DWT/GT: 79,902t/44,400  
 Main engine: Mitsui MAN B&W 6S60ME-C8.5 diesel x 1 unit  
 Speed, service: 14.7kt  
 Classification: ABS  
 Registry: Panama  
 Completion: July 2, 2019

**IVS OKUDOGO**

Owner: IVS Bulk 3720 Pte. Ltd.  
 Builder: Shin Kurushima Toyohashi Shipbuilding Co., Ltd.  
 Hull No.: S-6013/S-3720  
 Ship type: Bulk carrier  
 L (o.a.) x B x D: 196.5m x 32.26m x 18.7m  
 DWT/GT: 61,331t/35,061  
 Main engine: 6S50ME-B9.5 diesel x 1 unit  
 Speed, service: 14.5kt  
 Classification: ClassNK  
 Registry: Singapore  
 Completion: August 8, 2019

**CRYSTAL LAVENDER**

Owner: Kumiai Navigation (Pte) Ltd.  
 Builder: Sasaki Shipbuilding Co., Ltd.  
 Hull No.: 705  
 Ship type: LPG carrier  
 L (o.a.) x B x D x d (ext.): 99.98m x 17.20m x 7.80m x 6.10m  
 DWT/GT: 4,920t/4,324  
 Main engine: Daihatsu 6DCM-32eL diesel x 1 unit  
 Output: 2,750kW x 750min<sup>-1</sup>  
 Speed, service: 13.20kt  
 Classification: BV  
 Registry: Singapore  
 Completion: August 30, 2019

**VENATOR**

Owner: EDO MARINE INC.  
 Builder: Tsuneishi Shipbuilding Co., Ltd.  
 Hull No.: 1564  
 Ship Type: Bulk carrier  
 L (o.a.) x B x D: 229.00m x 32.26m x 20.00m  
 Main engine: MAN B&W 6S60MEC-8.2 diesel x 1 unit  
 Speed, service: 14.50kt  
 Classification: ClassNK  
 Registry: Liberia  
 Completion: June 12, 2019

**Cover Photo**

"QUEEN ASHINOKO", owned by Hakone Sightseeing Cruise, started operating from April 2019. She has become a new symbol of Ashinoko Lake with her marvelous features of gold colored hull and classic design adorned with wooden materials. She was built at Ashinoko Lake by Tsurumi Works, Yokohama Shipyard of Japan Marine United.

