MOL Mitsui O.S.K. Lines

Corporate Profile

MOL Group Corporate Mission

From the blue oceans, we sustain people's lives and ensure a prosperous future.

MOL Group Vision

We will develop a variety of social infrastructure businesses in addition to traditional shipping businesses, and will meet the evolving social needs including environmental conservation, with innovative technology and services.
MOL group aims to be a strong and resilient corporate group that provides new value to all stakeholders and grows globally.

MOL Group Values: MOL CHARTS

Challenge

Innovate through insight

- Proactively develop business opportunities by staying ahead of the curve.
- Make innovation for the further growth of the company.

Honesty

Do the right thing

- Keep compliance as a Top Priority.
- Ensure that actions comply with social norms and the highest ethical standards.

Accountability

Commit to acting with a sense of ownership

- Tackle tasks with a sense of ownership and in cooperation with stakeholders.

Reliability

Gain the trust of stakeholders

- See things from the customers' perspective, and deliver service that exceeds their expectations.
- Seize the initiative in social issues and take responsibility for your behavior.

Teamwork

Build a strong team

- Encourage open communication with mutual respect.
- Share knowledge, experience, expertise and skills, and foster the next generation.

Safety

Pursue the world's highest level of safety culture

- Maintain a safety-first attitude and strive to reinforce safety awareness.
- Return to basics by comprehending workplace safety.

Sustainability Issues

The MOL Group identifies social issues (materiality) to be prioritized through its businesses, with the goals of realizing a sustainable society and fulfilling the MOL Group Vision.

Five Sustainability Issues

Safety & Value

Provide added value through safe transportation and our social infrastructure business

Environment

Conservation for marine and global environment

Human & Community

Contributing to the growth and development of people and communities

Innovation

Innovation for development in marine technology

Governance

Governance and compliance to support businesses

Our Business

Supporting and Changing the World from the Blue Oceans

MOL develops various social infrastructure businesses by leveraging our knowledge and network cultivated over 130-plus years of experience in ocean shipping.
Through the expansion of our business domains, we are committed to creating a company that approaches and solves a wider range of social issues than ever before.

Looking Back, Looking Ahead

1878

The iron-hulled steamer *Hideyoshi Maru* begins ocean transport of Miike coal from Kuchinotsu, Japan, to Shanghai.

1884

Osaka Shosen Kaisha (OSK Line) is founded.

1930

The high-speed cargo ship *Kinai Maru* is launched, and covers the Yokohama-New York route in 25 days and 17.5 hours, well below the industry average of 35 days.

1939

The *Argentina Maru* and *Brasil Maru* are built and launched as cargo/passenger liners on the South America route.
These vessels represent the state-of-the-art in Japanese shipbuilding at the time.

1942

Mitsui & Co. spins off its shipping department to create Mitsui Steamship Co., Ltd.

1961

Delivery of the world's first automated ship, the *Kinkasan Maru*, with the main engine operated from the bridge, and the engine department monitored/controlled from the engine control room.

1964

Japan's shipping industry undergoes a major consolidation, with mergers creating six companies —
Mitsui O.S.K. Lines, Ltd. (MOL) through the merger of OSK Line and Mitsui Steamship, Japan Line, Ltd. (JL) through the merger of Nitto Shosen and Daido Kaiun, and Yamashita-Shinnihon Steamship Co., Ltd. (YSL) through the merger of Yamashita Kisen and Shinnihon Kisen.

1965

Japan's first specialized car carrier, the *Oppama Maru*, is launched.

1968

MOL, JL, and YSL launch the full containerships *America Maru*, *Japan Ace*, and *Kashu Maru*, respectively, on the Japan-California route.

1984

The LNG carrier *Senshu Maru* is launched.

1989

- Japan's first full-fledged cruise ship, the *Fuji Maru*, is launched, ushering in the era of leisure cruises in Japan.
- Navix Line is established through the merger of JL and YSL.

1990

The cruise ship *Nippon Maru* is launched.

1993

Crew training school is established in Manila.

1995

- Container route service through a strategic international tie-up, called The Global Alliance (TGA), begins.
- The first double hull very large crude carrier (VLCC), the *Atlantic Liberty*, is delivered.

1999

New Mitsui O.S.K. Lines is established through the merger of MOL and Navix Line.

Founding - Prewar — Expanding our shipping route network as a cornerstone to support the development of Japan's foreign trade

Postwar & High Economic Growth Period — Supporting Japan's rapid economic growth by quickly grasping and meeting the needs for specialized carriers and ever-larger vessels

Ahead of the times, continuing to challenge and reform

Throughout its more than 130-year history, MOL has played a leading role in ocean shipping in Japan and around the world, while carefully navigating rough seas.
We will continue to move forward with a spirit of challenge and reform, looking ahead to a new era.

2003

All departments at the Head Office and MOL-operated vessels acquire ISO14001

2007

- MOL Group logo mark is introduced.
- Safety Operation Supporting Center is established in the Head Office.

2014

130th Anniversary.

2015

The LNG carrier *Papua* is delivered. This is the first China-built LNG carrier ordered by non-China based shipping company.

2016

"ISHIN NEXT ~MOL SMART SHIP PROJECT~" is launched.

2018

The first in the FLEXIE series of next-generation car carriers, the *Beluga Ace*, is delivered. The series wins the Good Design Award 2018.

New MOL Magsaysay Maritime Academy in the Philippines opens.

- Container shipping joint venture, Ocean Network Express (ONE) starts business operation.
- MOL ice-breaking LNG carrier transports cargo by sailing eastwards (via the Bering Strait) along the Northern Sea Route from Yamal Peninsula, Russia.

2019

- MOL's first LNG-fueled vessel, the tugboat *Ishin*, begins operation.
- MOL establishes a joint venture to develop and promote the spread of zero-emission electrically powered vessels.

2021

MOL announces MOL Group Environmental Vision 2.1 and Corporate Mission.

2022

- MOL Sustainability Plan is established.
- A vessel equipped with the Wind Challenger (a hard sail wind power propulsion system) is delivered.

2023

LNG-fueled ferry enters service

Japan's first LNG-fueled ferry equipped with a dual fuel engine, the *Sunflower Kurenai*, which offers greater transport capacity and convenience for both cargo and passenger transport, enters service on the Osaka-Beppu route.

Large LNG-fueled coal carrier is delivered

World's first large LNG-fueled coal carrier the *REIMEI*, which transports coal from overseas to coal-fired power plants of Japanese electric power companies, is delivered.

2024

The First LNG-fueled car carrier has been delivered

The remaining 7,000-unit capacity car carriers, which utilize LNG as the main fuel, are in progress to be delivered starting in 2024.

2010s Becoming a world-leading player backed by remarkable growth in the resources and energy sector

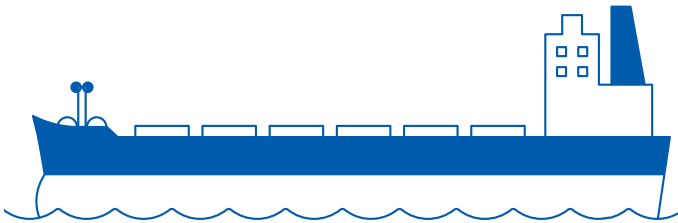
Present & Future Expanding business domains to meet the needs of the new era by leveraging accumulated strengths

MOL by the Numbers

Learn about MOL's business today

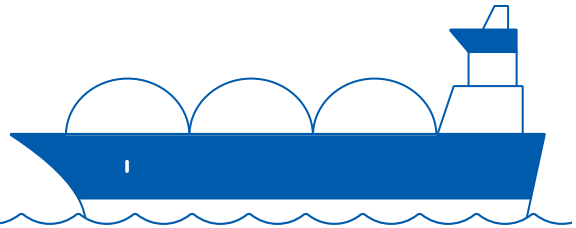
Let's take a look at MOL's standing
in the ocean shipping industry
in terms of numbers.
We offer a wide range of transport services,
all based on safe, reliable operation.

MOL Fleet Scale



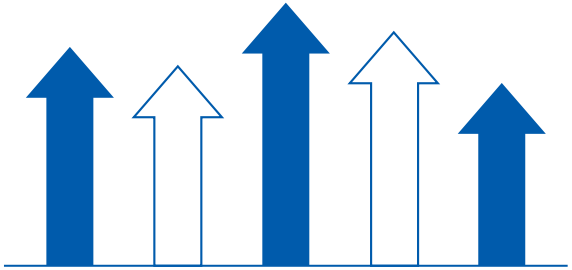
World's Second largest **935** vessels

Number of LNG carriers owned



World's largest **107** vessels

Consolidated ordinary profit



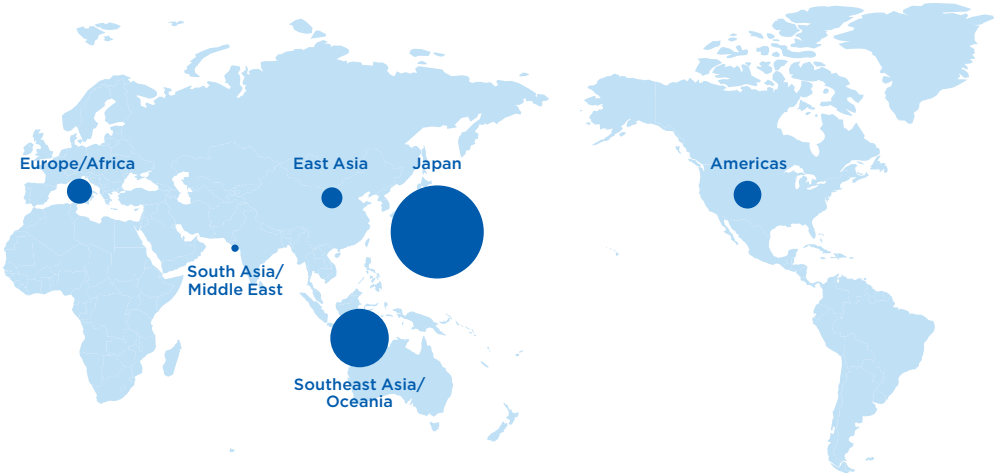
¥419.7 billion

Number of countries served by MOL-operated vessels [out of 145 sea-facing countries]

More than **100**

Global presence

*The size of the circles indicates the scale of business in each region.



27 countries

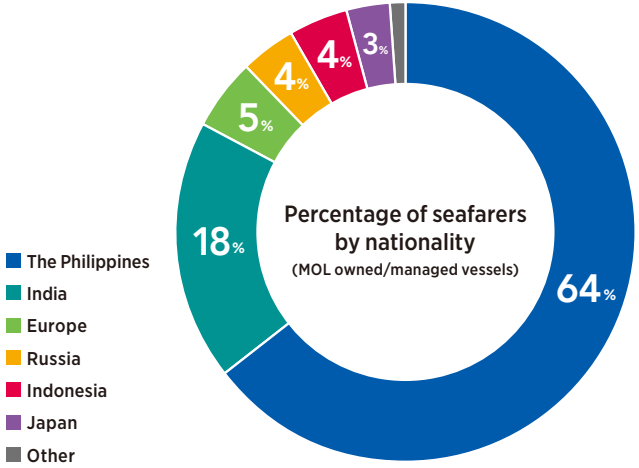
Safe operation ～Aiming at '4 Zeroes'～

Serious marine incidents: **0**	Fatal accidents: **0**
Oil pollution: **0**	Cargo damage: **0**

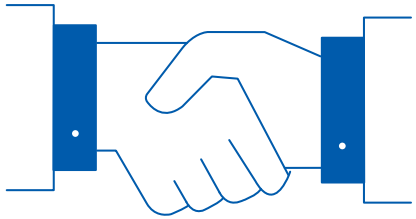
Number of MOL Group employees

10,500

Seafarers by Nationality



Number of group companies



579

Dry Bulkers

The World's Largest Fleet Delivers Top-quality Transport Services

The MOL Group transports a wide variety of dry cargoes, from resources such as iron ore, coal, wood chips, and biomass fuels to intermediate goods and products like fertilizer, grain, cement, salt, and steel products. Dry bulk transport not only to Japan but also to the rest of the world is becoming increasingly vigorous baked by global economic development and the international division of labor.

With 283 vessels, MOL operates the world's largest fleet of dry bulk carriers, providing stable transport services that meet a full range of customer needs, with versatile bulk carriers that can accommodate a wide variety of cargoes and various types of dedicated vessels built from the design stage for the most economical and efficient transport in consideration of the characteristics of the specific cargo and the conditions of the loading and unloading ports. Our vessels range in size, from small to ultra-large, according to the volume of cargo to be transported and the size of the port of call, and flexibly meet various trades around the world with high-quality transportation services.

As environmental issues take center stage around the world, MOL is actively engaged in research and development on next-generation vessels fueled by LNG, which has a lower environmental impact than conventional heavy oil.

Main cargoes

Iron ore | Coal | Grain | Wood chips

Dry bulkers

MOL and our customers determine the most suitable ship type for a specific task according to the required transport volume per voyage and the entry restrictions in loading and unloading ports, but there are some approximate trends for different cargoes. The table on the right shows standard combinations of cargo and ship type.

Ship type classification and main cargoes

Cargo / Ship type/Size	Iron ore	Coal	Grain Wheat, corn, soybeans, etc.	Others Minerals, metals, fertilizers, and Steel products, wood chips, etc.
Capesize 100K dwt ~	↕	↕		
Panamax 65-100K dwt	↕		↕	↕
Handymax 40-65K dwt		↕	↕	↕
Handysize 10-40K dwt			↕	↕

* dwt: Deadweight tonnage

* There are other combinations of ship type and cargo for each voyage than those listed in the table.

In Their Own Words

"More eco-friendly and safer transport of cargo that can only be handled by an ocean shipping company"

"I am in charge of sales activities and vessel operation for steel manufacturers. The best part of my business is that we are carrying cargoes—large steel products, machinery, and large volumes of coal—that can be transported overseas only by dry bulkers, so I can feel the mission that we can take on just because we are an ocean shipping company. Sometimes we transport windmills from overseas to Japan and train cars from Japan to overseas. One of our recent highlights as the steel cargo team was the development of a method to prevent cargo shifting by placing airbags around steel products during transport. I will contribute to society through operation of more eco-friendly and safer vessels, as we work not only to transport cargo but also to reduce our environmental impact."

Chisato Fujita

Steel Product Team (Asia), Steel Cargo Division
MOL Drybulk Ltd.

Tankers

Taking Pride in Our Extensive Experience and Expertise in Liquid Cargo Transport

MOL has a fleet of Very Large Crude Oil Carriers (VLCCs) and medium-sized crude oil tankers (Aframaxes), contributing to the stable supply of crude oil around the world. We also have an extensive fleet suited to the characteristics of different cargoes, including methanol tankers, product tankers, and liquid chemical tankers, with a total of 171 tankers in service worldwide. And we have introduced engines that can run on environmentally friendly methanol fuel that reduces nitrogen oxide (NOx) and sulfur oxide (SOx) emissions, in addition to conventional marine fuel oil. This is just one example of how we are moving ahead of other companies in adopting state-of-the-art technology.

Highly specialized transport of crude oil and petroleum products requires consolidated expertise, with a ship management company specializing in tankers within the group and a commitment to top-notch customer service, and safe, efficient transport. In addition, we implement seafarer education and training programs, which consolidate our knowledge of tanker operations and cargo handling, at our own training facilities, and have a well-developed, hands-on training system in place, which allows cadets to gain practical experience onboard tankers before obtaining their seamen's competency certificates.

Main cargoes

- Crude oil
- Liquid chemical products
- Liquefied petroleum gas (LPG)

Many vessels available to match every cargo

There are several sizes of oil tankers, and vessels can be equipped with different tanks to match the cargoes they transport, such as refined petroleum products, liquid chemicals, and liquefied petroleum gas (LPG), as well as separate pipelines and cargo pumps for each tank.

World's first methanol tanker equipped with a methanol-fueled main engine

Product tanker for refined petroleum products such as diesel oil, naphtha, and gasoline

Large crude oil tanker with one of the world's largest cargo capacities

In Their Own Words

Contributing to the sustainability of society through methanol transport

"I am in charge of the operation and management of methanol tankers. Methanol has traditionally been used primarily for chemical applications. However, it is attracting attention in recent years as a next-generation fuel that can reduce emissions of air pollutants such as NOx and SOx, compared to combustion of heavy oil, and we are gradually shifting to methanol fuel for our operated methanol carriers. In the future, we will contribute to sustainability, not only for our customers' businesses, but also on a global scale, through establishment of an environmental recycling business model in which the equivalent amount of CO_2 generated during transport is recovered and reused in methanol production, then used again as fuel, and transport using bio- and renewable-energy derived methanol."

Reita Iwai

Methanol Tanker Team, Tanker Unit, Integrated Tanker & Offshore Projects
Mitsui O.S.K. Lines, Ltd.

LNG Carriers

Stable Transport of Clean Energy with the World's Leading Fleet

Demand for liquefied natural gas (LNG) is increasing rapidly around the world as an environmentally friendly and clean energy source, and MOL is currently the world's largest operation of LNG carriers, with 97 in service. We have accumulated a great deal of know-how and experience since our entry into LNG transport in 1983, and take pride in holding the world's leading share in the ownership, management and operation of LNG carriers. We manage vessels from six locations around the world: Tokyo, London, Hong Kong, Jakarta, Muscat (Oman), and Arzew (Algeria), achieving safe operation with advanced transport technology and skilled personnel. We also have succeeded with cutting-edge initiatives, such as the launch of icebreaking LNG carriers in 2018.

Cargo

Liquefied natural gas

In Their Own Words

Contributing to society through long-term LNG transport to China

"The ocean shipping business is heavily influenced by market conditions, but in the LNG carrier business, we have a high percentage of long-term contracts and can expect stable profits. We achieve both safety and profitability in a drastically changing economic environment, acquiring and managing projects for China, while maintaining trusting relationships we have developed with our customers. We signed deals for nine new LNG carriers for Chinese customers in 2022. We will continue to make proposals that meet customer needs, appropriately grasp the increasing demand for LNG transport, and contribute to society through long-term stable transport."

Meiting Sun

LNG Carrier Team (C), Liquefied Gas Unit 2, Integrated Liquefied Gas Transport and Offshore Projects
Mitsui O.S.K. Lines, Ltd.

Offshore Business

Broadening Our Horizons by Proactively Expanding New Offshore Projects

MOL operates floating production storage and offloading (FPSOs) and floating storage and regasification units (FSRUs), which are used not as transport vessels but are anchored in specific locations. Deployment of FSRUs can save considerable time and expense compared to construction of shore-based receiving terminals. We also operate subsea support vessels that install, maintain, remove, and repair equipment for subsea oil and gas fields, and are active in the LNG-to-Power business, liquefied CO_2 ocean transport, and so on. We have a total of 15 vessels engaged in the offshore business, a sector where we expect further growth in the coming years.

Main roles

- LNG storage and regasification facilities
- Oil production and storage facilities
- Installation and maintenance of subsea facilities

In Their Own Words

"I want to contribute to the spread of environmentally friendly energy in more communities"

"The FSRUs I am involved with play a role in national and regional infrastructure and I believe I can contribute to the introduction and spread of LNG as a more environmentally friendly energy source. In addition, it is relatively new business field, and I find the process very rewarding, as members from a wide variety of backgrounds, both domestic and international, come together to discuss to find the optimal solution. I will also make every effort to expand the use of next-generation fuels such as liquefied hydrogen and liquefied ammonia to achieve carbon neutrality, through the FSRU business."

Tomohiro Mikuriya

Gas Value Chain Team(A), Liquefied Gas Unit 3, Integrated Liquefied Gas Transport and Offshore Projects
Mitsui O.S.K. Lines, Ltd.

Offshore Wind Power Generation-related Business

Contributing to the Offshore Wind Value chain, a Source of Clean Energy

MOL offers a wide range of services in associated business fields aimed at promoting the generation of clean energy through offshore wind power. Our services include pre-construction site surveys for offshore wind power facilities and marine consulting services to assist in the selection of potential project areas, as well as land, sea, and air transport and support for pier bridge cargo handling, customs clearance, and installation of power generation equipment and materials. We have also invested in Seajacks, which owns and operates five self-elevating platform (SEP) vessels used to install offshore wind turbines. In addition, we focus on operation and maintenance support services for facilities.

One facet of this is the development of a service operation vessel (SOV), which supports the operation and maintenance of wind power facilities.Ta San Shang Marine Co. Ltd., a joint company of MOL and Ta Tong Marine Co., Ltd., recently launched Asia's first newbuilding SOV. In terms of human resources development and supply of operation and maintenance (O&M) engineers, we have established a human resources consulting company with Magsaysay Group in the Philippines, and are engaged in determining human resource needs, local training, dispatching personnel, and follow-up services.

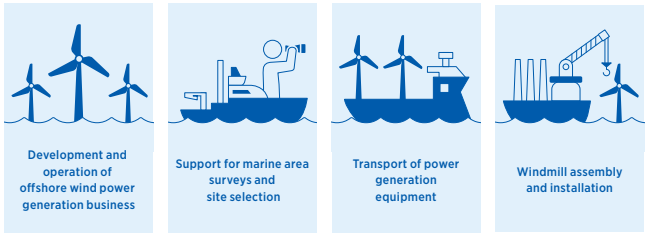
Main businesses

- Installation of wind power generation facilities
- Maintenance support for offshore facilities

Supporting Offshore Wind Farm Operations with Newbuilding SOV

Asia's first newbuilding SOV, which was constructed through Ta San Shang Marine, was delivered in March 2022. The SOV has accommodations for maintenance technicians working on the various wind turbines that make up an offshore wind farm, allowing them to stay on-site for extended periods. The new SOV is in service at the Greater Changhua offshore wind farm in Taiwan.

Offshore Wind Power Generation-related Business



*1 CTV:Crew Transfer Vessel

In Their Own Words

"I want to leverage our knowledge of the ocean for development of offshore wind energy business."

"I am mainly responsible for business activities related to offshore wind power generation and associated projects and the operation of Ta San Shang Marine. My duties are varied, from providing various work barges used in each stage of power plant construction, operation, and maintenance, to training and dispatching personnel. Through ongoing dialogue with stakeholders, I am always thinking about how I can contribute to the entire value chain of offshore wind power. MOL is the first company in the Japanese shipping industry to invest in an offshore wind power generation project, and owns and operates Asia's first newly built SOV for Ta San Shang Marine. I want to contribute to solving environmental issues by developing our business while leveraging the knowledge of the ocean we have accumulated over the years."

Kenta Kotogaoka

Project Team(A), Wind Power Projects Unit
Integrated Wind and Carbon Power Solutions, Mitsui O.S.K. Lines, Ltd.

Car Carriers

A Pioneer in Automotive Transport, Addressing Environmental Issues and Developing New Technologies

MOL launched first Japanese car carrier in 1965. Since then, we have anticipated and accurately responded to the needs of globalizing automobile manufacturers, and offered safe and stable transport services with our group fleet of 95 vessels. The vessels are designed to transport all types of vehicles, from passenger cars to construction machinery, and are capable of transporting about 5,000 standard-size passenger cars. The vessels, which operate under the unified brand of MOL Auto Carrier Express (ACE), are etched in the history of advanced exploration of new technologies and environmental protection. The MOL ACE banner also reflects our determination to further develop in the global market.

Main cargoes

- Automobiles
- Construction machinery
- Trucks

In Their Own Words

“Playing a role in the global automotive industry by delivering automobiles around the world”

“In addition to negotiating freight rates and coordinating schedules as the person in charge of European routes, I am also involved in safe operation and environmental compliance as an account executive serving a major automaker. I am also considering orders of new vessels with low greenhouse gas (GHG) emissions and optimum service life after construction, with the aim of more environmentally friendly transport. Because electric vehicles, which are expected to gain popularity in the future, are heavy in weight and require special care during transport, the study of more suitable hull structures is a key mission of the Car Carrier Division. I believe we play an important role in supporting the global automotive industry.”

Riona Saito

Europe Team, Car Carrier Division, Mitsui O.S.K. Lines, Ltd.

Ferries and Coastal RoRo Vessels

Building Regional Connections with Japan's Largest Ocean Transport Network

In the logistics business, MOL's ferries and coastal RoRo vessels, which are ideal for long-distance and high-volume transport, serve as the linchpins of the largest sea-land transport network in Japan, and play an indispensable role in transporting industrial raw materials and products, foodstuffs, and other goods. In recent years, these vessels have become increasingly important, leading the way in "modal shifts" that address a serious truck driver shortage and reduce environmental impact. In the cruise ship business, MOL offers facilities and services that allow passengers to easily experience an extraordinary trip under the "Casual Cruise" concept. Furthermore, Japan's first two LNG-fueled ferries enter service in the spring of 2023. We strive to meet customer needs and achieving the highest level of environmental performance.

Mainly transporting

- Automobiles
- Trucks and cargoes
- Passengers

In Their Own Words

Contributing to regional revitalization as an infrastructure supporting logistics and the movement of people

"I manage and support operations of ferries and coastal RoRo vessels and the group companies directly involved in these businesses. Ferries and coastal RORO vessels play a key role in regional revitalization as infrastructure that supports logistics and the movement of people in Japan, a country surrounded by oceans, enriching people's everyday lives. Among them, the cruise ship business is a rare B-to-C business for us. Recently, we have been focusing on this business with the aim of revitalizing the economy through the movement of people. For example, to promote the "Sunflower"*1 brand and reach out to potential customers, we are also carrying forward new initiatives such as operation of owned media."

*1 "Sunflower" is the name of a series of ferries operated by our group.

Rei Tomida

Ferry Marketing Team, Ferry and Associated Business Division, Mitsui O.S.K. Lines, Ltd.

Containerships

Swift and Efficient Containerized Transport, Linking Land and Sea with Intermodal Connections

Ocean Network Express Pte. Ltd. (ONE) was established by the integration of the container shipping operations of three Japanese ocean shipping companies, including MOL, and commenced services in April 2018. Currently, the company operates a fleet of 204 vessels, including 43 chartered from MOL, establishing a network covering more than 120 countries around the world. The fleet's capacity is 1.52 million TEUs, ranking the seventh highest in the world. A wide variety of cargoes, such as furniture, clothing, food, and appliances, is carried in standardized cargo containers. Containers can be easily transshipped to trucks and railroads, speeding up cargo handling and providing integrated sea-land "door-to-door" transport.

Main cargoes

In Their Own Words

"Proudly working on projects that support people's lives and society"

"I handle operations as an investor in ONE and asset management of vessels and containers on loan. Containerships are the infrastructure that supports the global supply chain, and support people's ordinary lives in a rapidly changing world. I can see containers even in town, and each time I see one, I realize the social contribution of my work. Demand for containerized shipping is expected to show continued growth in the future due to global population growth and other factors. I sincerely want to keep playing a role in supporting society while evolving in terms of environmental responsiveness and digitalization."

Chiaki Komatsubara

Liner Business Management Team, Liner Business Management Division
Mitsui O.S.K. Lines, Ltd.

Terminals

Developing Independent Terminals as a Key to International Logistics

The MOL Group operates its own terminals that are key to the container transport value chain in Japan and overseas. In Japan, as we operate five container terminals in Tokyo, Yokohama, Nagoya, Osaka, and Kobe, and offer cargo handling services for car carriers and other conventional vessels in various regions. We take a comprehensive approach to developing our port and terminal business. Overseas, we also operate container terminals in two locations in Vietnam, one in Thailand, and one in the Netherlands. At our facilities in Japan and overseas, we are converting to electrically powered or hybrid cargo handling equipment to achieve decarbonization. Thus, we are striving to operate in a way that is not only safe, but also environmentally friendly.

Logistics

Comprehensive Services Leveraging the Group's Networks

The MOL Group's logistics business has a network of 268 bases in 26 countries around the world. We offer a wide variety of logistics services, such as air and ocean forwarding, trucking, customs clearance, warehousing, inspection, heavyweight and oversized cargo transport, and buyers' consolidation*1 by taking advantage of the distinctive logistics services of our group companies. In addition, we have established a heavy cargo transport brand to meet a wide range of needs for heavy and oversized cargo transport, and offer one-stop services including container loading, coastal and land transport, customs clearance, and installation, in addition to optimal transport using various ship types. We have also developed an environmentally friendly steel coil-lashing method, and offer proposals for transport using this innovation.

*1 Buyers' consolidation: Loading and transporting cargo of multiple shippers together in the same container.

Cruise Ships

Create Relaxing Moments with Heartfelt Hospitality

The *Nippon Maru*, a cruise ship operated by Mitsui O.S.K. Passenger Lines, Ltd. (MOPAS), offers a wide variety of cruises in terms of number of days, ports of call, and themes, from one-night jaunts to round-Japan cruises and overseas voyages. It delivers a relaxing experience at sea and the finest cuisine featuring seasonal produce and local specialties of the ports of call, with more than a century of history and tradition in cruise service. In addition, the *Nippon Maru* celebrated its 30th anniversary in service in 2020 and was renovated with a focus on cabin upgrades. Passenger can enjoy a new and more comfortable cruise experience while maintaining the classic traditions. In November 2022, MOPAS announced plans to launch two new cruise ships in the next five years.

Tugboats

Moving with Precision to Escort Huge Vessels and Ships Loaded with Hazardous Cargo

Using tugboats, MOL conducts berthing and unberthing operation for large vessels entering and leaving port, route warning operations for vessels loaded with hazardous cargo such as LNG carriers and large cargo vessels, as well as towing operations for heavy loads and barges. We strive to improve equipment maintenance, tugboat crew skills, and safety training for the tugboats that we operate throughout Japan. Our fleet features high-quality tugboats, backed by an organizational structure designed to carry out every mission without accidents. In 2019, the LNG-fueled tugboat *Ishin* was delivered. We have also successively introduced new tugboats to enhance our fleet. In addition, we are striving to protect the environment by, for example, installing an automatic marine debris collection device at our tugboat terminal.

Real Property

Developing Building Management Expertise Overseas

With Daibiru Corporation, an MOL Group company, at the core of our business, we own and operate a large number of prime office buildings, commercial buildings, and hotel buildings, mostly in Tokyo and Osaka. The total floor area of our buildings in Japan and overseas is about 710,000m². Our properties meet various tenant needs based on a long history of trust, a wealth of expertise, and advanced capabilities to renovate classic older buildings to modern standards. Daibiru always seeks to deliver ever-increasing customer satisfaction with all of its services. Furthermore, the company is strengthening its overseas operations by leveraging the know-how cultivated in the group's domestic business and resources, and expanding to Vietnam, Australia, and the U.S. Daibiru reduces volatility in the group's business performance with its business characteristics and market cycles, which are different from those of the ocean shipping industry, and contributes to stable profits.

HR Consulting

Connecting Workers and Host Companies Across Borders

Filipinos, who make up the core of the world's seagoing workforce seafarers, accounting for about 95% of the total foreign nationals working in the world's merchant fleet, are fluent in English and have excellent communication skills. Building upon our experience in training Filipino seafarers, MOL established a global human resources (HR) consulting company with our local partner recruiting firm. We provide Japanese-language instruction and various technical training programs, using the company's own educational facilities. And we introduce personnel from a broad range of industries, such as building maintenance, nursing care, construction, and aviation, to Japanese companies, to help address the nation's labor shortage. We also support foreign nationals residing in Japan, especially foreign students, in finding employment and changing jobs. We even provide follow-up services after employment, creating opportunities for foreign nationals to play active roles in Japan.

To achieve safe operation

Safe Operation

Fostering a Safety Culture and Pursuing a Higher Level of Safety with Cutting-edge Technology

Each and every employee in the MOL Group is committed to pursuing the world's level of safety. This section introduces initiatives to foster a safety culture and measures to ensure safe operation.

Measures for Safe Operations

Safety Conference

Exchanging opinions with seafarers with the aim of safe operation

Every year, we host the "MOL Safety Conference" in major seafarer supply nations such as Japan, the Philippines, Croatia, and India. We use this event to introduce safety-related initiatives, review accidents, and exchange opinions with seafarers.

Safety Campaign

Providing opportunities to exchange opinions and strengthen operating safety

MOL holds a safety campaign in which onboard crewmembers and land-based employees exchange opinions and hold discussions about safety, with the objective of raising safety awareness and fostering a culture of safety among all employees, at sea and on land, in an integrated manner.

Operational Safety Workshops

Regular workshops to raise safety awareness among land-based executives and employees

We also hold regular "Operational Safety Workshops" for land-based executives and employees. We are working to further improve safety awareness and promote group-wide recognition that safe operation is not up to the crewmembers alone, but is the responsibility of every employee.

E-learning about Safety Culture

Providing safety education opportunities for all employees at MOL and its group companies

We provide e-learning courses on safety for MOL and Group company executives and employees, creating opportunities for everyone to repeatedly learn lessons gained from past serious accidents and safety culture initiatives to improve their safety awareness.

Safety Operation Support Center (SOSC)

To achieve the world's highest standards of safe operation

Under the motto, "Never leave the captain alone," MOL established the Safety Operation Supporting Center (SOSC) as an organization to monitor the movements of vessels 24 hours a day, 365 days a year and provide support to vessels from shore, serving as a help desk.

SOSC Channel

Understanding the work of SOSC through the portal site

The SOSC Channel, SOSC's in-house portal site, features videos that explain about typhoons and pirate attacks, as well as cases in which SOSC provided advice to help ships avoid risks, giving every MOL employee an inside look at SOSC activities.

Aiming for Safe Operation Backed by Ship Expertise and Cutting-edge Technology

Expertise × Safety

Tabletop drill

MOL conducts onboard training sessions assuming various situations such as fires and flooding. In addition, our Group companies engaged in ferry and cruise ship operations regularly conduct tabletop drills, including passenger evacuation guidance. Our president and executives from related divisions, as well as ship management companies jointly conduct an annual drill at the Head Office, simulating a serious marine incident.

Ship inspections

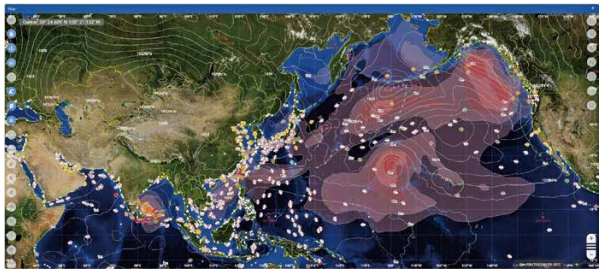
We regularly conduct ship inspections of all group-operated vessels based on our own quality standards. Two inspectors, who have a thorough knowledge of our quality standards, visit the vessel and inspect it based on a checklist of about 600 items. They request appropriate corrective measures for any unsafe or non-conforming items. The results of the inspection are also shared with relevant divisions to confirm the status of the vessel.

Maritime academy

We opened MOL Magsaysay Maritime Academy Inc. (MMMA), a self-operated merchant marine academy in the Philippines, in August 2018 with the aim of training Filipino seafarers who serve as the backbone of our seagoing workforce. We aim to become the world leader in safe operation by steadily hiring and training top-quality cadets.

Cutting-edge technology × Safety

ICT Supporting Safe Operation



Courtesy: Weathernews Inc.

Sustainable Platform with Intellectual Resource and Innovative Technology (SPIRIT)*1

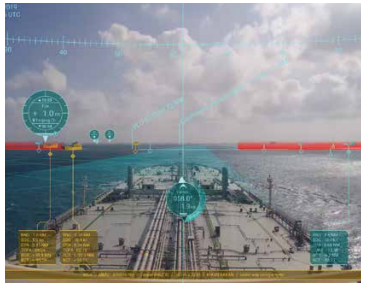
The system monitors where our company vessels are matter what the weather or sea conditions. Not only SOSC, but also personnel overseeing ship operation and related functions use the system to support vessels. It also monitors the movement of vessels, while assessing information on piracy risks, military exercises, and the voyage plans of the vessels in operation in an integrated manner.

Navigational risk monitoring system

By combining data sources such as vessel position, water depth, chart information, and so on, the system alerts the SOSC duty officer when a vessel is about to enter an area with elevated stranding risk. At the SOSC, which monitors vessels in operation 24/7/365, this system is constantly monitored, and SOSC personnel respond swiftly when an alert is triggered.

Introduction of VR/AR technology

We have introduced a virtual reality (VR) system to simulate training and experiences that are difficult to experience in real life to improve safety training for seafarers. We also developed the AR Navigation System, which uses augmented reality (AR) technology. The system provides visual support to crewmembers during their watch-keeping and ship operation by using AR technology to superimpose images taken from the bridge and voyage information.



*1 SPIRIT: Sustainable Platform with Intellectual Resource and Innovative Technology

Technological Innovation

Evolving marine safety through various technological innovations

MOL aims help address various social concerns, which tie in with our sustainability issues—"Provide added value through safe transportation and our social infrastructure business" and "Conservation for marine and global environment"—by enhancing technologies that use clean energy and ICT.

THEME 1

Promote wide adoption of clean energy

Target	KPI	Action Plan
Adoption/promotion of clean energy Numerical Targets ●Deploy net-zero emission ocean-going vessels in 2020s ●Deploy about 90 LNG-fueled vessels by 2030 ●Deploy about 110 net zero emission ocean-going vessels by 2035	**●Status of alternative clean energy-fueled vessels ordered, delivered, status of development**	**Promote development of relevant technology** Ammonia-fueled vessels, vessels that uses hydrogen as fuel, Wind Hunter, etc. **Expand introduction of LNG-fueled vessels** **Collect basic information on new alternative fuels**
Develop technologies that contribute to the spread of clean energy in society	**●Status of developing clean energy carriers** **●Number of LNG/ammonia bunkering vessels ordered/delivered**	**Promote relevant technology development** Liquefied hydrogen carrier, CO_2 carriers, etc. **Study maintenance of LNG/ammonia bunkering**

Ammonia-fueled vessels


Liquefied CO_2 carrier (LCO2 carrier)

THEME 2

Increasing energy efficiency of vessels

Target	KPI	Action Plan
Use natural energy and establish/promote energy-saving technologies that contribute to improved propulsion performance	**●Number of wind propulsion systems such as Wind Challenger adopted** **●Status of adoption/promotion of other currently available energy-saving technologies**	**Lighter weight sail, design for commercialization** **Study assembly of rotor sail** **Adopt energy-saving technologies**


The coal carrier *Shofu Maru* equipped with Wind Challenger (hard sail wind propulsion system)

THEME

3 Safe/efficient operation using ICT

Target	KPI	Action Plan
Establish and upgrade/expand platforms using big data related to vessels (FOCUS project)	●Progress of FOCUS project ●Number of vessels equipped with *Fleet Transfer* *1	Upgraded version of FOCUS Promote adoption of *Fleet Transfer* on chartered vessels Data analysis for fuel reduction Develop technology for equipment defect diagnostic applications
Establish autonomous sailing technology for vessels	●Status of developing autonomous sailing technology	Formulate development plan based on demonstration sea trials Select partners and conduct verification for commercialization

FOCUS


Autonomous sailing

*1 Fleet Transfer is a system that collects vessels' IoT big data in real time and transmits it to shoreside platforms.

THEME

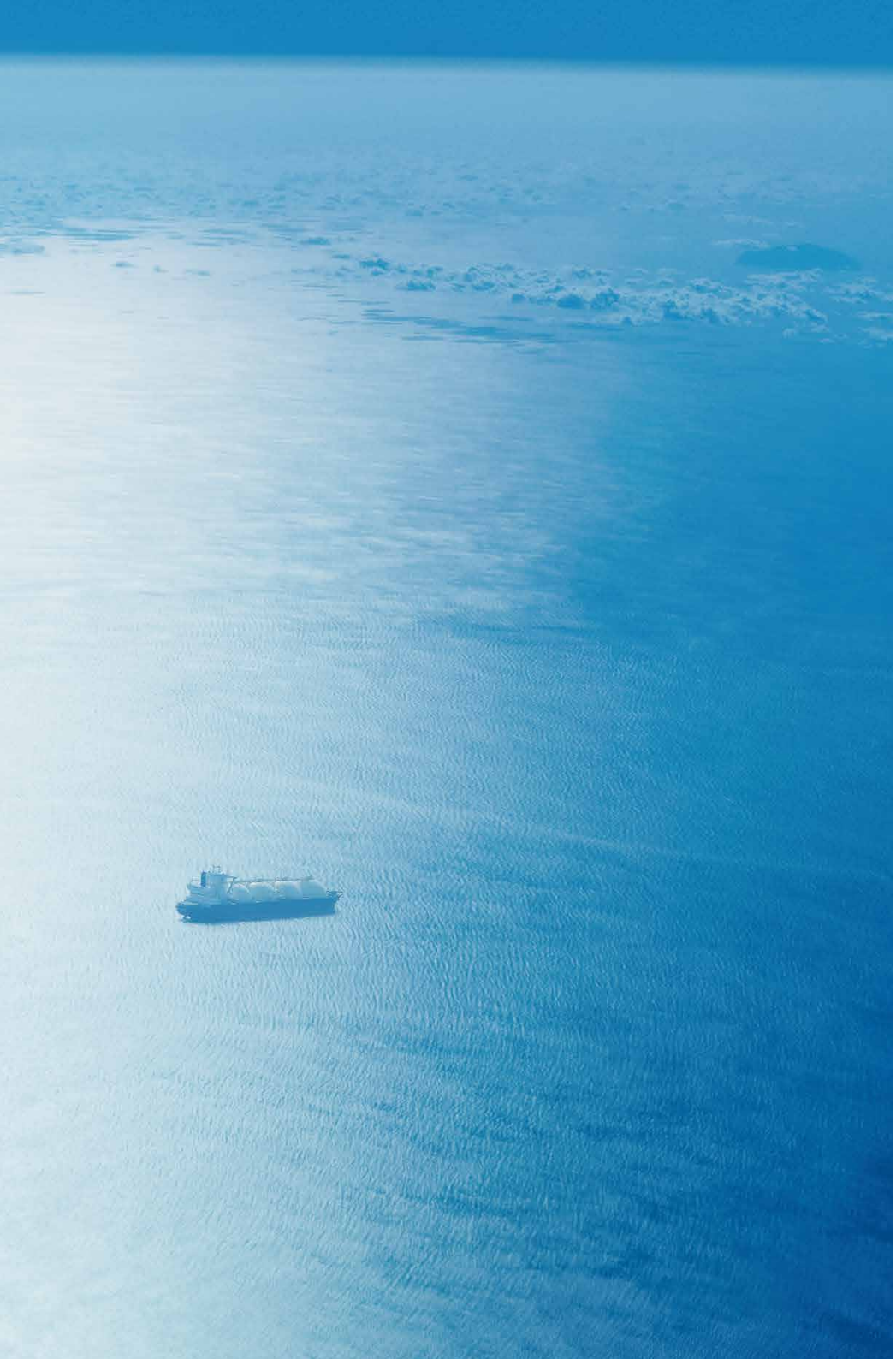
4 Frameworks for technology development and DX

Target	KPI	Action Plan
Establish organizational structure to develop sustainable technology to push innovation	●R&D expenditures	Enhance organizational structure for technology development Start new development projects that will lead to benefits in environmental protection/safety/labor saving, etc. Strengthen collaboration with group companies
Establish promotion framework to realize DX	●Amount of investment related to DX ●Number of DX personnel	Establish "MOL-DX Vision" Promote various DX projects in shipowner/ship management quality quantitative evaluation, etc. Establish and execute DX education/recruitment policy and measures

To the future,
with our “Ocean Planet.”

The sea occupies 71.1% of the earth's surface.
It connects countries around the globe and has given rise
to economic activities that have become
the foundation of humankind's development.
The earth's very potential lies in its oceans.
Our home is indeed an "ocean planet."
If you look at the world from an ocean perspective,
you can see a completely different future.
As a company that has always moved forward with the sea,
Mitsui O.S.K. Lines (MOL) believe its potential more than anyone.
As a Group, our mission is to draw forth this immense value
shared by humankind and create sustainable growth for societies.
Now is the time for us to think and act outside the box.
MOL will utilize the knowledge we have gained through shipping
to expand the field to social infrastructure companies that originate from the oceans.
When opportunity presents itself, we should take full advantage of it.
Let's build new hope for tomorrow, together.

BLUE ACTION MOL



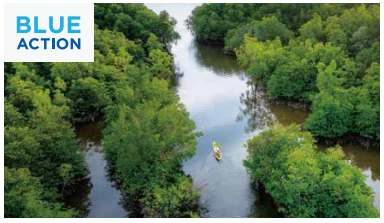
BLUE ACTION MOL

Sustainable Actions by MOL Group “BLUE ACTION MOL”

INTERVIEW
WIND CHALLENGER

INTERVIEW
WIND HUNTER

CROSS TALK
LNG-Fueled Ferry



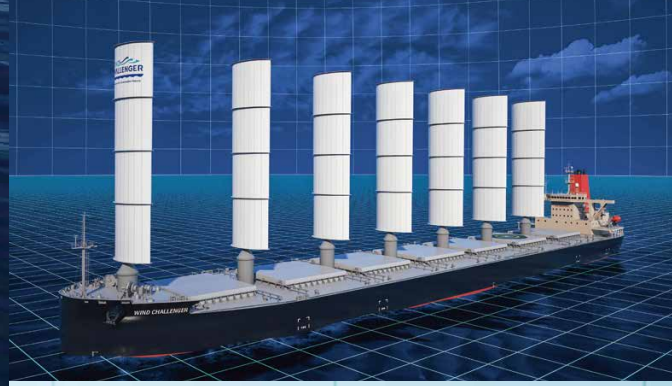
INTERVIEW
Mangrove Restoration & Conservation Project

* Interviews on page 30 - were conducted in November 2022 for this Corporate Profile.

BLUE ACTION MOL

WIND CHALLENGER

Sustainable Actions by MOL Group "BLUE ACTION MOL"



What is Wind Challenger?

This experimental project aims to reduce environmental impact by converting wind energy into propulsion using "hard sail" made of rigid, non-fabric materials, to reduce fossil fuel consumption without changing the vessel's speed. It started in 2009 as an industry-academia joint research project led by the University of Tokyo and was taken over by MOL and Oshima Shipbuilding Co., Ltd. in 2018.

INTERVIEW

Reducing GHGs with Next-generation Wind-powered Vessels

Kensuke Mizumoto
Zero-Emission Technology Innovation Team
Technical Division

Maximizing Wind Power with an Automatically Controlled Hard Sail

—— How will this project, which focuses on wind as a clean energy source, affect the ocean shipping business and help realize a decarbonized society?

Mizumoto: First, ocean shipping accounts for 2.5% of the world's emissions of greenhouse gases (GHGs) such as carbon dioxide (CO_2). While no other industry emits so much GHG, the ocean shipping industry is also an important transportation infrastructure. That's why the shipping industry as a whole must also fulfill its social responsibility, while the whole world strives to achieve carbon neutrality. If this project, which converts wind power into propulsion for the vessel with no GHG emissions, is realized, it is certainly a step toward decarbonization.

—— Specifically, how much can Wind Challenger reduce GHG emissions?

Mizumoto: One sail can be expected to reduce GHG emissions by about 5-8%. Furthermore, wind is an inexhaustible natural energy source and is unaffected by the type of fuel used on the vessel. The sail can continue to be used without modification, even while the energy shift is underway.

—— It's versatile and economical. Did you select the materials and specifications of the hard sail specifically to ensure the practicality of Wind Challenger?

Mizumoto: That is correct. To achieve significant weight reduction, we use glass fiber reinforced plastic (GFRP) for most of the surface, the first time in the world that such material has been adopted on a large scale for a large cargo ship. In addition, we built a fully automated system that telescopes' and rotates the sail by using sensors to detect the strength and direction of the wind. No specialized skills are required of the crewmembers, so it's easy to make the maximum use of wind power for more efficient propulsion.

—— And finally, the first vessel was delivered in October 2022 and entered service.

Mizumoto: The first vessel is just the first step. We hope to install the sail on multiple vessels by 2030, and achieve emission reductions of 20% and 30% reductions in combinations with other GHG emission reduction measures. And, we aim to have them installed not only on our own vessels but also on those of other companies.

BLUE ACTION MOL

WIND HUNTER

Sustainable Actions by MOL Group "BLUE ACTION MOL"

INTERVIEW

Capturing the Wind of the Sea Delivering Energy to Ships, to Land

Kentaro Shima
Technology Research Center
Technical Division

Achieving Zero Emissions with Wind × Hydrogen

—— Is Wind Hunter different from Wind Challenger?

Shima: The basic idea of converting wind power into propulsion is the same. Wind Hunter is a project that leapfrogs Wind Challenger. While Wind Challenger uses wind power to assist the main engine in power propulsion, Wind Hunter captures wind for propulsion, but at the same time produces and stores hydrogen, a clean energy source, onboard. It also uses stored hydrogen to provide propulsion when there is no wind. So it could achieve zero emissions without using any fossil fuels.

—— Why did you choose hydrogen from among the many alternative fuels?

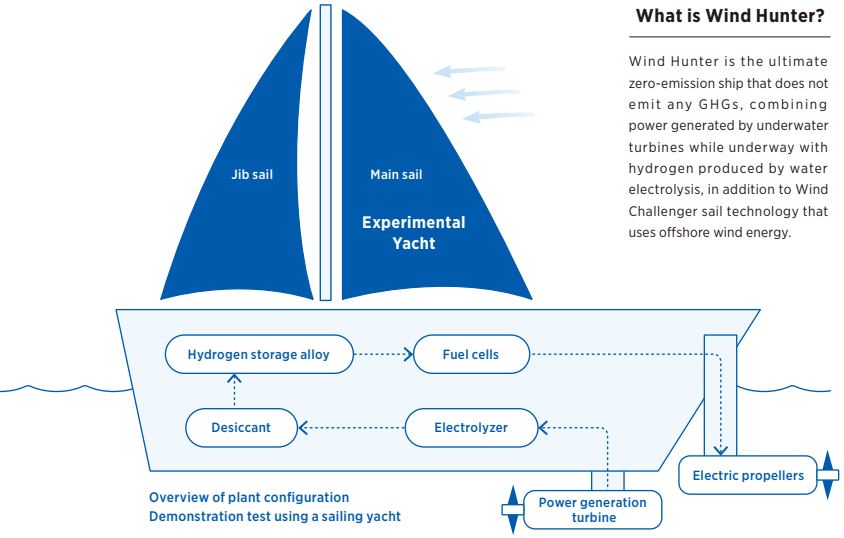
Shima: First of all, there are many types of hydrogen carriers (forms) with various characteristics, such as liquid hydrogen, high-pressure hydrogen, hydrogen storage alloys, ammonia, and so on. In Wind Hunter, we focused on methylcyclohexane (MCH), a liquid at room temperature and normal air pressure, which is produced by the chemical reaction of hydrogen with toluene. MCH requires no special tanks for storage and is relatively easy to handle. Wind Hunter also makes good use of reversible reactions, converting hydrogen to MCH and separating hydrogen from MCH.

—— I heard that a series of cycle experiments to produce, store, and consume hydrogen on an experimental sailing yacht were completed in March 2022. Now I understand that you are going to conduct a demonstration test of converting the hydrogen carrier from a hydrogen storage alloy to an MCH conversion and dehydrogenation system.

Shima: Yes. That project is scheduled to run from April to July 2023. Then, after 2025, we aim to build a 60m-70m LOA class hydrogen production ship equipped with multiple Wind Challenger hard sails. At the same time, we will jointly develop a wind observation system giving us the capability to actively hunt the wind, not just "Let the winds take their course." This system will be able to measure wind conditions in a radius of more than a dozen kilometers around the ship in real-time, with precision accuracy. Thus, if we can demonstrate a cycle of efficiently capturing wind, producing and storing MCH onboard, unloading it at ports, and supplying it as an energy source on land, I believe we can commercialize hydrogen production and supply.

—— I see. So what is the future you ultimately envision with Wind Hunter?

Shima: Our goal is to develop and build a commercial-scale zero-emission cargo carrier and hydrogen production ship by 2030. We face some hurdles in developing a value supply chain for hydrogen energy, but we are working to overcome them and contribute to the realization of a decarbonized society.



Overview of plant configuration
Demonstration test using a sailing yacht

What is Wind Hunter?

Wind Hunter is the ultimate zero-emission ship that does not emit any GHGs, combining power generated by underwater turbines while underway with hydrogen produced by water electrolysis, in addition to Wind Challenger sail technology that uses offshore wind energy.

BLUE ACTION MOL

Sustainable Actions by MOL Group "BLUE ACTION MOL"

LNG-Fueled Ferry

CROSS TALK

Creating Enjoyable Cruise Adventures While Reducing Environmental Impact

Ferry and Associated Business Division

Itto Kusui
Ferry Marketing Team

Wakoto Watanabe
Ferry Business Coordination Team

Two LNG-Fueled Ferries Are Set to Enter Service

—— Japan's first LNG-fueled ferries, the *Sunflower Kurenai* and the *Sunflower Murasaki*, are about to enter service. Please tell us the story behind the introduction of these two vessels?

Kusui: The idea of converting to LNG-fueled vessels has been around for about 15 years, but the project remained under consideration for a long time due to costs and other issues. However, The Paris Agreement took effect in 2016, raising awareness of the need to reduce environmental impact around the world. This triggered MOL's acceleration of the full-scale introduction of LNG-fueled vessels. Thus in 2019, Japan's first LNG-fueled tugboat, the *Ishin*, went into service, and two LNG-fueled ferries are scheduled to enter service in 2023.

Watanabe: The LNG-fueled ferries will replace the *Sunflower Ivory* and the *Sunflower Cobalt*, currently operated by our group company Ferry Sunflower Limited, on the Osaka-Beppu route. The teams involved in the ferry business started gathering information and holding repeated discussions since around 2016, and finally brought the project to fruition.

—— What difficulties and problems did you encounter during the five or so years of preparation?

Watanabe: The technology to convert from heavy oil to LNG fuel was already available, but fueling locations and mechanisms were not in place. We also faced the challenge of getting the world to accept the new technology of LNG-fueled vessels. And we had to address many other issues such as coordinating with related divisions and complying with various laws and rules, so it took a long time.

—— Why were ferries converted to LNG fuel before other vessels?

Kusui: The biggest challenge in introducing LNG-fueled vessels is a stable fuel supply. The primary reason is that ferries are liner vessels, so it was easy to establish a new fuel supply system.

Watanabe: Another major factor was that ferries are domestic vessels owned and operated by our group. I believe the group-wide support system was easy

to formulate during on-site visits, so we were able to smoothly collaborate and resolve various issues.

Kusui: From another perspective, there is the impact we have on the world. Ferries, as mass transit, are used by corporate customers such as shipping companies, as well as by the general public for travel and transportation purposes. Therefore, it's easier to familiarize more people with the fact that the MOL Group was one of the first to introduce vessels powered by environment-friendly LNG fuel, compared to introducing LNG fuel on merchant ships.

Watanabe: It is not easy to convert a ship to LNG fuel, and it costs more than a conventional vessel. However, the deployment of LNG on the ferries will help raise awareness of environmental issues among people around the world. And I believe the economic problems will also be improved, if that triggers more companies to adopt measures to reduce their environmental impact.

Enjoying a Sea Cruise While Caring for the Environment

—— What are the advantages of using LNG-fueled ferries other than environmental aspects, if any?

Watanabe: On conventional ferries, the smoke from burning fuel oil was visible from outside the vessel, but LNG-fueled ferries do not have this problem, so I think this gives passengers the impression of cleaner operation. In addition, new technology has been introduced to reduce the transmission of wave action and sound to the cabins, so passengers can now enjoy a more comfortable stay onboard. We increased the number of private rooms on the new ferries compared to earlier vessels and the room area per person is also larger. So more people can enjoy the comfort that only LNG-fueled vessels can offer. By the way, we introduced a projection mapping system in the three-story atrium to enhance entertainment, creating an even more special cruise experience in line with the "Casual Cruise" concept.

Kusui: For LNG-fueled ferries, we have received many inquiries not only from our direct customers, the shipping companies, but also from their shippers, the manufacturers, to the effect that, "If we don't raise awareness of environmental issues, we will fall behind in business."—I feel that we have entered that kid of an era.

—— Will there be more LNG-fueled ferries in the future? Will other vessels also be converted to LNG fuel?

Kusui: Two LNG-fueled ferries are scheduled to enter service in 2025 on the Tomakomai-Oarai route operated by MOL Group company MOL Ferry. In addition, MOL has developed other LNG-fueled vessels and set a target of owning a fleet of about 90 by 2030. However, though the LNG-fueled ferry service is a first step toward reducing environmental impact, we must do more to reduce emissions, considering that the CO_2 emission reduction is about 25% of the previous level. Conversion to LNG-fueled vessels is not necessarily the goal. We need continued initiatives to further reduce environmental impact and more advanced technologies.

Using Clean Alternative Fuels to Replace Conventional Fuel Oil for Other Types of Ships

In addition to LNG-fueled ferries, MOL plans to adopt LNG and other clean alternative fuels on a wide variety of vessels. Our goal is to own about 90 alternative-fuel vessels by 2030.

Examples

LNG-fueled Capesize bulker

LNG-fueled VLCC

LNG-fueled car carrier

LNG-fueled tugboat

EV tanker

CLEAN ENERGY

A sticker is on the hull of the vessel indicates that it uses alternative fuel.

INTERVIEW

Blue Carbon: A Step Forward in Solving the Climate Change Problem

Kazura Koda
Carbon Business & Project Team
Energy Business Strategy Division

Environmental Initiatives Increase Corporate Value

—— What is the Mangrove Restoration & Conservation Project?

Koda: It is a "Blue Carbon Project" that aims to absorb and fix CO_2 through regeneration and conservation of mangroves in South Sumatra, Indonesia. We began participating in the project in 2022. Blue carbon is carbon derived from CO_2 that is sequestered and stored by marine ecosystems such as mangroves. Negative emissions, which remove and fix CO_2 from the atmosphere, in addition to reducing GHG emissions, are considered essential as climate change measures, and an urgent environmental issue. The protection and increase of blue carbon ecosystems, typified by mangrove forests, is attracting attention as its specific measure. In this project, we teamed up with YL Forest Co. Ltd. (YLF), which has been engaged in mangrove conservation activities in the region since 2013, and have contributed financially, conserved existing mangrove forests, and planted new trees in areas where the number of mangrove forests is declining. Through the 30-year project, we aim to reduce CO_2 emissions by about 5 million tons through mangrove forest conservation and absorb and fix about 6 million tons of CO_2 by planting of 9,500 hectares of new trees.

—— It's been about a year since the project started. What is the current situation?

Koda: We are also promoting test afforestation through repeated site visits. In the future, we plan to introduce "Silvofisheries" that combine mangrove plantation and aquaculture at some of the project sites. This is a coined term that combines "silviculture" and "fishery," It is a natural symbiotic fishery system that uses nutrients from mangrove forests without the use of feed or chemicals, and also supports the livelihoods of the local people.

—— What kind of future do you envision for this project? And what is the significance of MOL's involvement?

Koda: I became keenly aware of the climate change crisis when I was in graduate school under the company's program. While emissions are mostly from developed countries and wealthy individuals, the impact of climate change has more manifestations in developing countries, among the poor, and among the younger generations who will live in the future. I began to wonder if I could take action against such irrationality. So, the company solicited new business from employees, and I made a proposal for the "Blue Carbon Project" through a program that allowed me to study the commercialization of the project exclusively for one year. I was able

to win approval because the timing was right to focus on solving environmental issues, as a company that emits a large amount of GHGs through transportation.

—— Apart from the social contribution perspective, what benefits of this business do you see for the company?

Koda: First, the creation of sufficient negative emissions, which is essential for our 2050 target (to achieve net zero GHG emissions by 2050), has great significance in itself. In addition, there is a limit to the carbon budget, the amount of CO_2 that can be emitted by the world as a whole if we are to achieve the 1.5°C goal (the goal set in the Paris Agreement to limit the temperature increase to 1.5°C or less). However, we can extend the time it takes to use up this budget by creating negative emissions with what we already have on our plate. And above all else, in the 2020s, a critically important decade for solving the climate change problem, we can show society how serious we are about our environmental efforts as a company, by taking specific actions ahead of regulations. Furthermore, in the future, I strongly believe that society will have a favorable view of such companies. Through this project, I believe we will make a significant contribution to MOL's corporate value.

Protecting the Global Environment for Future Generations

MOL Group Environmental Vision

For all life on Earth in the next generation, the MOL Group is committed to solving environmental issues through co-creation with stakeholders. We introduced the MOL Environmental Vision 2.0 in 2020, and continue to review and update it appropriately, outlining climate change measures requiring urgent action in addition to top priority management issues such as preservation of marine environments, protection of biodiversity, and prevention of air pollution. We aim to achieve "net zero GHG emissions by 2050" with concerted efforts throughout the Group, and contribute to the sustainable growth of people, society, and the Earth, opening a prosperous future from the blue oceans.

Climate Change Countermeasures	Preservation of marine environments	Protection of biodiversity	Prevention of Air Pollution

Medium- to long-term targets

1. Deploy net zero emissions ocean-going vessels in the 2020s
2. Reduce GHG emissions intensity by approximately 45% by 2035 (versus 2019)
3. With the concerted effort throughout the Group, achieve net zero GHG emissions by 2050

Mitsui O.S.K. Lines, Ltd.

2-1-1 Toranomon, Minato-ku, Tokyo 105-8688, Japan
https://www.mol.co.jp/en/