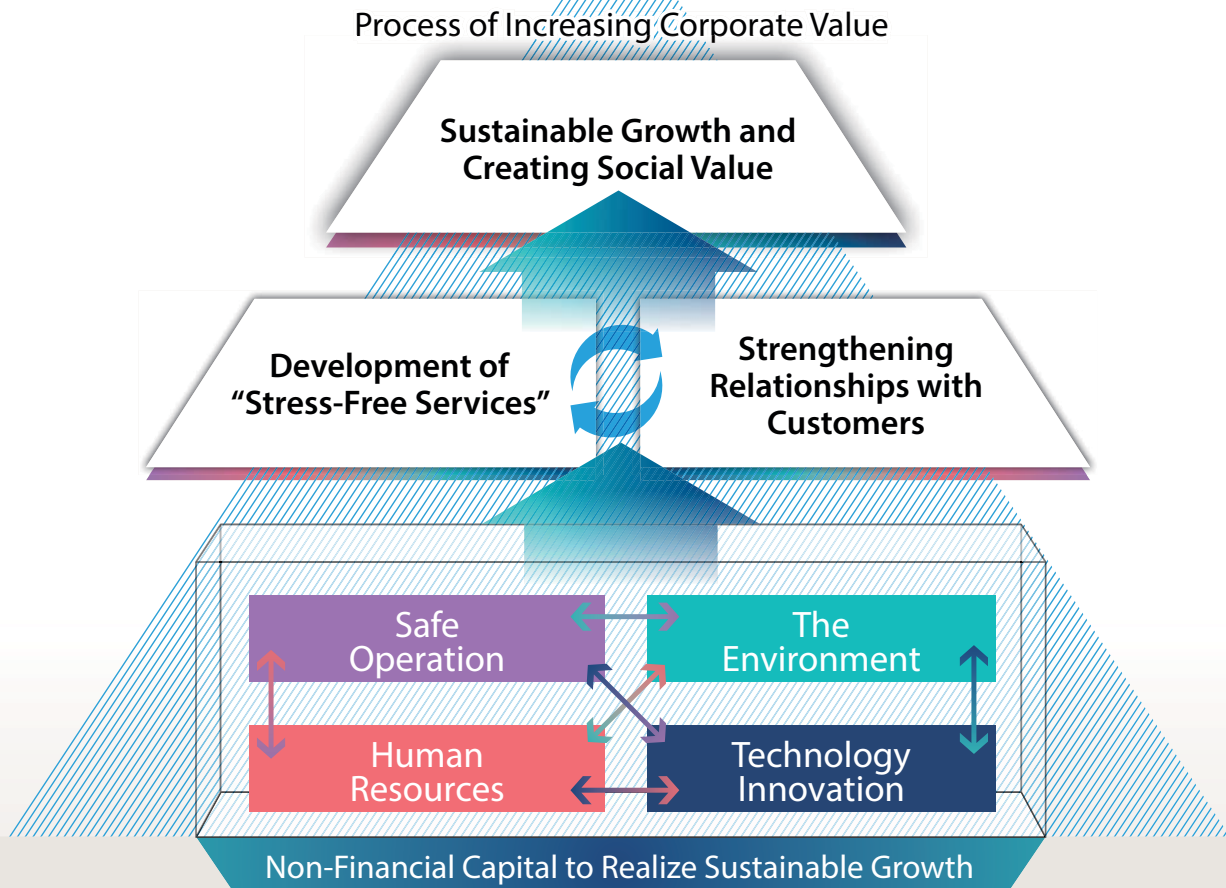


# Our Vessel & Value Creation



## ■ Implementing Four Initiatives to Achieve Sustainable Growth

MOL pursues the increase of its economic corporate value as well as the creation of social value, based on the four initiatives of safe operation, human resources, the environment, and technology innovation, in order to achieve stable growth through strengthening relationships with customers by providing the "stress-free services" as described in our management plan, and to realize sustainable growth that considers a wide range of stakeholders, such as employees and local communities, together with the global environment itself.

### Contributing to Sustainable Development Goals (SDGs)

The MOL Group, as one of the world's largest full-line marine transport groups, will contribute to realizing the Sustainable Development Goals (SDGs) in the resolution adopted by the UN General Assembly in September 2015, through the aforementioned four initiatives.



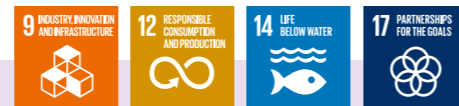
VLCC  
SHIZUKISAN

&

Safe Operation

- Undertaking various initiatives to forge ahead to become the world leader in safe operation
- Innovation in safe operations by applying ICT

Capture long-term contracts to create stable profits by earning customers' trust



Contributing to SDGs



Raise Individual Awareness of Safe Operation and Foster a Culture of Safety

SHIZUKISAN  
Captain Goichi Umezaki

Safe operations are crucial for any type of vessel, but VLCCs demand a higher level of tension because they handle and transport huge quantities of crude oil, a hazardous substance, meaning the risk of explosions, fire or environmental destruction from oil spills is constant.

MOL is engaged in various initiatives for safe operations from both hard and soft aspects. From a hard aspect, under our original MOL Safety Standard Specifications, we carry out numerous initiatives from the shipbuilding stage to respond to risks, such as installing security cameras in the engine room, which enable constant monitoring for fire from the bridge.

From a soft aspect, the annual MOL Safety Conference involves various types of rank-based training programs aimed at improving skills with seafarers on shore leave taking part and participants exchanging opinions on actual accidents to prevent their recurrence. Among the activities, simulations reflecting operations on seas of varying conditions in the BRM drill\* have proven to be an effective training method for VLCCs, of which maneuverability is markedly restricted compared to other vessel types.

The Safety Operation Supporting Center (SOSC) sends in a timely manner extremely useful information, such as data on weather and ocean conditions, piracy and political instability, to aid captains in determining ideal speeds and safer routes. In addition, when arriving in a discharging port in Japan, a marine superintendent and a technical supervisor are dispatched to confirm the unloading operation is conducted safely and that the entire ship is properly maintained. Detailed support provided by each supervisor collaborating closely with captains on the front lines goes a long way in building a relationship of trust with oil companies.

Those various initiatives are crucial for the Company, but, of course, the most important thing of all is for each and every seafarer on board to have the necessary expertise and to carry out their duties responsibly to ensure safe operations. I maintain my motivation by expressing gratitude to my crew for supporting safe operations on a daily basis, and striving to foster a culture of safety.

\* Bridge resource management drill: Simulating an incident on a vessel operation simulator to enable seafarers to acquire response techniques. It includes MOL's original programs.

SHIZUKISAN

The SHIZUKISAN was built in 2009 and is a Very Large Crude Carrier (VLCC) capable of delivering over 300,000 tons of crude oil in a single shipment (equivalent to about half of a single day's consumption in Japan). Since its delivery, the vessel has been operated under a long-term transport contract with a domestic customer, mainly contributing to the stable delivery of crude oil from the Middle East to Japan. As this is one of the largest of the many types of vessels, it takes longer to change navigating speed or course. Furthermore, operation of VLCCs requires an extremely high standard of safety as it carries vast quantities of crude oil, a hazardous substance, and must pass through the Strait of Malacca, one of the world's most congested seas.

Safety Operation Supporting Center (SOSC)

- Established in 2007 with the motto "Never let the captain get isolated."
- Staffed at all times by two marine technical specialists including an experienced MOL captain.
- Monitoring and supporting approximately 860 vessels operated by MOL and affiliated companies, 24 hours a day, 365 days a year.
- Collecting information on weather and ocean conditions (including abnormal weather and tsunamis) and security threats (including piracy and terrorism), and reporting in a timely manner to the relevant personnel.



"Visualization of Marine Operations"

- Provide visualization of the conditions of vessels and cargo at sea using ICT.  
→ Offer value-added services to customers including sharing operation information of vessels.
- Analyze big data on weather and ocean conditions gathered from MOL-operated vessels.  
→ Utilize for safe operations and reducing fuel consumption based on optimal routing.
- Make multidimensional analysis between actual operational stoppage accidents and causal correlations of data from multiple sources.  
→ Develop more effective measures to prevent accidents.
- Remotely monitor the operational status of engines and other machinery on board.  
→ Make necessary replacement of parts and maintenance arrangements well in advance.



Collecting data from MOL-operated vessels

Promotion of Autonomous Sailing

- Aiming to prevent human error and respond to a shortage of seafarers in the future.
- Set a goal of achieving autonomous sailing by 2025–2030.
- In December 2017, MOL signed a deal with Rolls-Royce Marine on the joint research of an advisory-type Intelligent Awareness System (IAS), which detects obstacles near vessels with new sensors and provides ship operational support information to officers onboard immediately.  
→ Install the IAS on a ferry in service operated by Ferry Sunflower Limited in the Seto Inland Sea.
- In December 2017, MOL agreed with Furuno Electric Co., Ltd. and MOL Techno-Trade to jointly develop a system that supports ship operation during voyages using augmented reality (AR) technology.



Image of IAS in use

For details of the safe operation ▶ PP.66–68.



Car Carrier

# VALIANT ACE

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## Human Resources

- Training top-quality seafarers through operation of training facilities
- Create environments where people want to work

Achieve safe and reliable transportation through top-quality seafarers and strengthen the MOL brand



### Continuing to Be a Proud Member of MOL

VALIANT ACE  
First Officer (Philippine nationality) **Louie John Q. Tuvillo**

I was born and grew up in Antique in the Philippines. I had my first experience onboard a passenger ship at age 10 and can remember seeing the crew members to this day. They were tall and proud, in pristine white uniforms with shoulder boards. I saw how people looked at them with admiration and respect. I told myself that someday I would become one of them. I had friends with brothers or fathers who were seaman, and seeing their abundant lifestyles strengthened my resolve. In addition to my childhood dream, I decided to aim for a seafaring career as it would help me support my parents, siblings and my own future family.

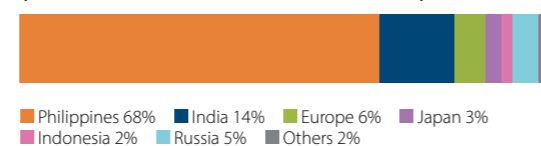
After secondary school, I entered maritime college where I was fortunately privileged to be a Magsaysay-MOL scholar upon being selected after stiff competition. Following graduation from maritime college, I advanced to the Officer Candidate Course at MIS\*, an MOL training facility. We not only gained knowledge and skill sets here, but also worked on physical conditioning, which gave me a sense of ease about my long-term onboard cadet training. During training, senior Filipino seafarers made quite an impression by mentoring newcomers with their knowledge and experience. I got a glimpse of how MOL maintains and improves its seafarers' marine technical skills.

I decided to enter MOL because I had been chosen for a scholarship. Once I started actually working for MOL, I saw that there is no compromise regarding the safety of lives, ships and cargo, as well as outstanding crew members' achievements and accomplishments do not go disregarded and after seeing these things in MOL, my motivation to continue as a member of the MOL family became even greater.

My current aim is to become a captain, with the trust of my peers to command a ship. My childhood memory of the seafarers remains as powerful as ever, and encourages me daily as I go about my work. I am proud to be a seafarer for MOL, one of the world's most prestigious shipping companies, and by becoming a seafarer with sufficient skills and expertise, I hope to contribute to further improving MOL's overall value and competitiveness.

\* Magsaysay Institute of Shipping  
MIS was jointly established by MOL and Magsaysay Maritime Corporation in 1993. The institute provides various types of practical and theoretical training to prepare students for careers at sea.

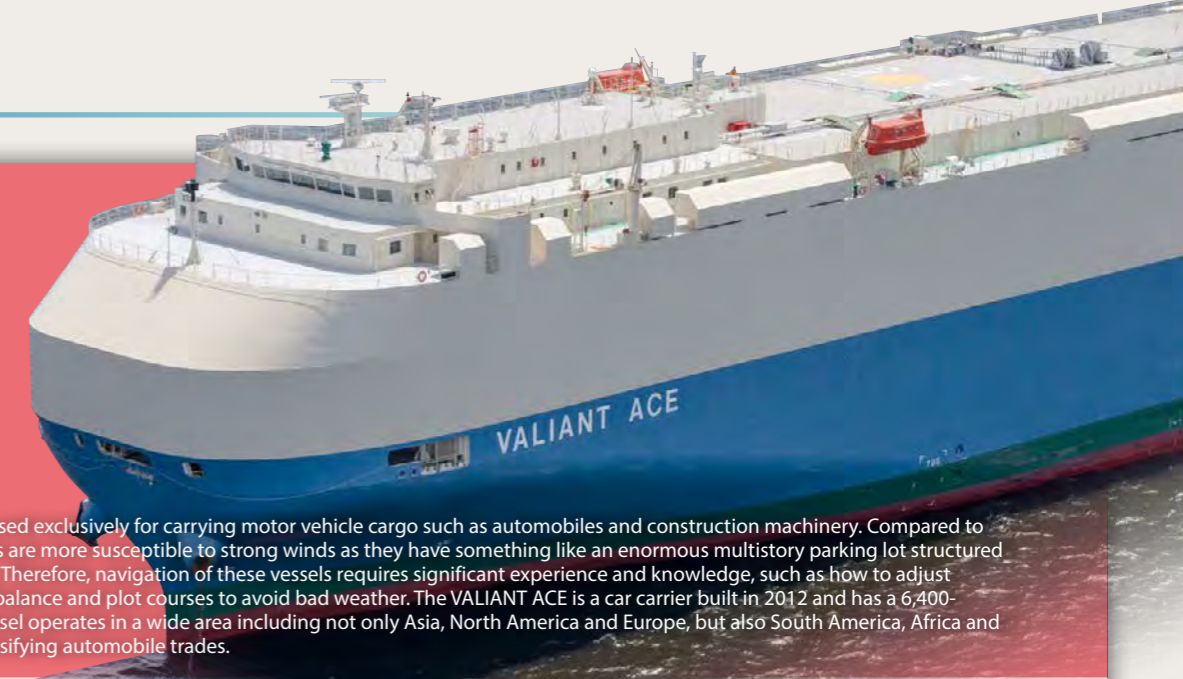
#### Nationality Ratio of Seafarers (MOL-owned vessels as of March 2018)



Contributing to SDGs

### VALIANT ACE

Car carriers are vessels used exclusively for carrying motor vehicle cargo such as automobiles and construction machinery. Compared to other vessels, car carriers are more susceptible to strong winds as they have something like an enormous multistory parking lot structured inside the box-like hulls. Therefore, navigation of these vessels requires significant experience and knowledge, such as how to adjust ballast water to control balance and plot courses to avoid bad weather. The VALIANT ACE is a car carrier built in 2012 and has a 6,400-vehicle capacity. The vessel operates in a wide area including not only Asia, North America and Europe, but also South America, Africa and Oceania, reflecting diversifying automobile trades.



### Training Highly Competent Seafarers on a Global Scale

- Since 2011, MOL has been providing education and training to Filipino cadets at an MOL training facility in the Philippines.
- In August 2018, MOL will open MOL Magsaysay Maritime Academy Inc. jointly with a local partner to take over from the abovementioned facility. The maximum number of students is 300 per year.
- MOL conducts a wide variety of training from lectures to learn theories to practical training using simulators at training centers in six countries including the Philippines.
- At each training center, MOL employs an advanced onshore simulator that perfectly recreates the bridge of a large vessel in operation. This simulator features concentrated real-life experiences of seafarers and enables an iterative approach under all weather and ocean conditions.



Training centers around the world



A new maritime academy training facility



Simulator

### Maintaining Motivation to Continue as an MOL Group Seafarer

- MOL has held the MOL Presidential Awards to Officers and Engineers ceremony annually since 2008.
- MOL has also held annual long-service award ceremonies for Filipino seafarers who belong to Magsaysay MOL Marine, Inc., an MOL Group seafarer dispatch company, as well as hosted family day events for seafarers' families every year.



Recipients from the 2017 MOL Presidential Awards to Officers and Engineers



Family day scene



Floating Storage and Regasification Unit

# MOL FSRU Challenger

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## The Environment

- World's largest fleet of LNG carriers
- Solid relationships with partners worldwide

Expanding business domains to capture growing demand for LNG, a fuel with a lower environmental burden



Contributing to SDGs



### Meeting Customer and Environmental Needs in the LNG Value Chain

Energy Business Strategy Division  
General Manager, Strategy Division Yusuke Hongo

Natural gas is a major primary energy source alongside petroleum and coal. It is produced primarily in the Middle East, the U.S., Australia and certain other regions, and exported to consumption regions such as Asia and Europe through onshore pipelines and via marine transport by LNG carriers after the gas is cooled and liquefied. It is the cleanest fossil fuel as its CO<sub>2</sub> emissions are lower than those of coal or oil. Demand for natural gas is thus expected to grow significantly in the years to come.

LNG requires advanced transport expertise because it has to be transported at -162°C. MOL has been involved in the marine transport of LNG since the 1980s, and currently has the world's largest fleet of LNG carriers, at 94 vessels (including outstanding orders) as of March 31, 2018. Through involvement in various projects over the years, we have been building up a solid base of expertise in the transport of LNG, as well as forming firm relationships with many local partners worldwide.

Previously, LNG receiving terminals had to be built onshore in order to receive LNG transported by LNG carriers. However, since the world's first FSRU entered service in 2005, FSRUs have been rapidly adopted globally as they can be set up in less time and with less cost than conventional onshore receiving terminals

and also they provide a means of addressing demand for smaller amounts of LNG imports. In fact, in the past 10 years, FSRUs have been adopted by around 60% of the countries introducing LNG for the first time. With the launch of MOL FSRU Challenger, MOL has taken a major first step into the FSRU field.

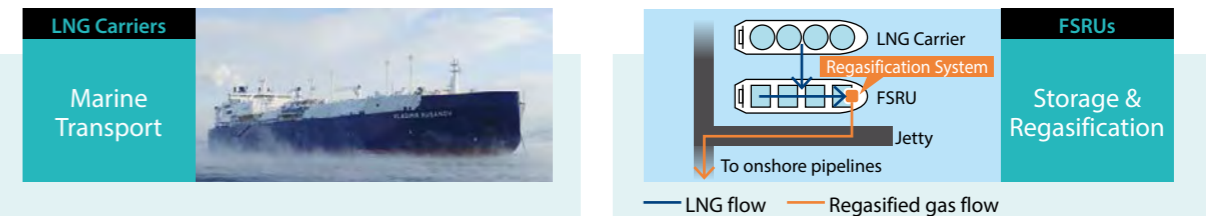
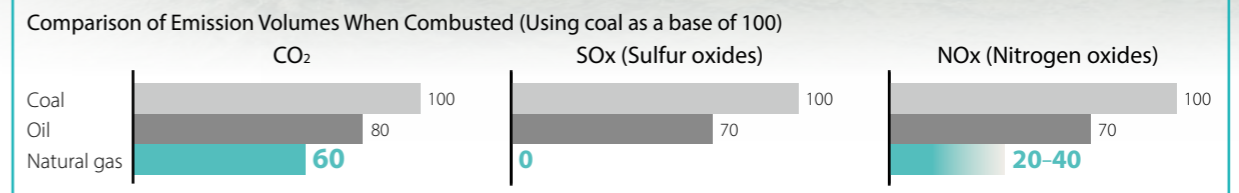
Going forward, environmental regulations will be tightened in order to curtail the amounts of SO<sub>x</sub> (sulfur oxides) and CO<sub>2</sub> in vessel emissions. In response, a growing number of shipping companies are introducing LNG as an alternative bunker fuel to conventional heavy oil. Against this backdrop, MOL is currently building an LNG-fueled tugboat that is scheduled for launch in 2019. We will further consider introducing LNG-fueled vessels for use in other vessel types as well. In addition, MOL has entered the LNG bunker fuel supply business. Notably, in February 2018, MOL signed a long-term charter contract with Total Marine Fuels Global Solutions for a large LNG bunker vessel to supply LNG fuel to mega containerships.

As environmental awareness rises around the world, MOL will expand its business domains from the conventional marine transport of LNG to its storage, regasification, and the use and supply of LNG as bunker fuel. By doing so, MOL aspires to fulfill both customer and environmental needs.



MOL FSRU Challenger

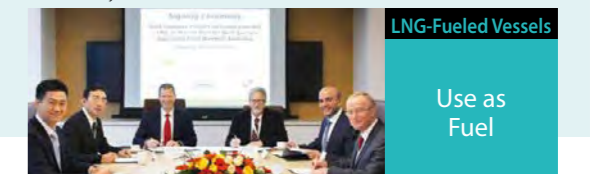
An FSRU (Floating Storage and Regasification Unit) is a ship-based offshore LNG receiving terminal. Its main roles are to store LNG received from LNG carriers in tanks and to regasify and send it out to onshore pipelines according to demand. FSRUs can be set up in less time and with less cost than onshore LNG receiving terminals. For this reason, plans to launch FSRUs have been progressing in various regions around the world, particularly in emerging countries. The MOL FSRU Challenger is the first FSRU to be independently built, owned and operated by an Asian shipping company. Following its delivery in October 2017, the vessel has been deployed to a project in Turkey. The MOL FSRU Challenger has the world's largest LNG storage capacity of 263,000 m<sup>3</sup>, and the ability to reship LNG in its original state, in addition to gas transfer capabilities, which enable the reexport of LNG to neighboring regions or supply of LNG as fuel for other vessels.



- MOL has been involved in the marine transport of LNG since the 1980s.
- Expanded up to current fleet of 94 vessels including outstanding orders as of March 31, 2018.
- The first of three ice-breaking LNG carriers was launched for use in the Yamal LNG project in Russia. (March 2018)
- MOL FSRU Challenger was delivered, and is the first FSRU independently built, owned and operated by an Asian shipping company. (October 2017)
- MOL participated in an FSRU & FSU project developed by Swan Energy Limited in India. (September 2017)

### Expanding Business Domains through the LNG Value Chain

- MOL made a decision to build an LNG-fueled tugboat in May 2017, and this will launch in Osaka Bay in April 2019.
- MOL, Tohoku Electric Power Co., Inc. and Namura Shipbuilding Co., Ltd. started joint development of an LNG-fueled coal carrier, and earned an Approval in Principle for design in December 2017.
- MOL teamed up with Rio Tinto, BHP Billiton and other partners including a shipbuilding company, on a joint research project for an LNG-fueled capesize bulker in January 2017. (Photo below)



For details of the environment ▶ PP. 71-72.



# Future Vessels

## & Technology Innovation

- Marine technical skills and sales capabilities cultivated over many years in the shipping industry
- Technological capabilities utilizing renewable energy and ICT

Identify and resolve issues related to social infrastructure and customers



Contributing to SDGs



### The Ultimate Goal Is to Bring About a Logistics Revolution

Senior Managing Executive Officer  
Director General, Technology Innovation Unit **Yoshikazu Kawagoe**

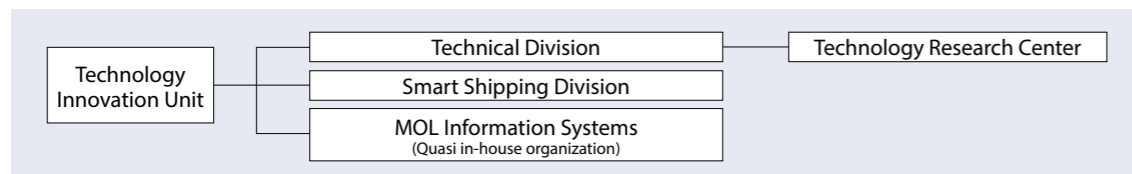
The Technology Innovation Unit was established in April 2018. The mission of the unit is to anticipate the needs of customers and the new era and bring about exciting logistics innovations. The three divisions, namely, the Technical Division handling the physical side of the vessels, the Smart Shipping Division handling maritime ICT, and MOL Information Systems, Ltd. taking responsibility for overall ICT will coordinate to promote the development of technology services while using ICT to strengthen MOL's competitiveness. In order to provide "stress-free services" under the Company's management plan, we aim to identify and resolve customers' issues by enhancing marine technical skills and sales skills which we have acquired and technologies in relation to natural energy.

In 2016, MOL launched the "ISHIN NEXT—MOL SMART SHIP PROJECT—," aiming to increase corporate value by developing two fields of technologies such as safer vessel operation and reduction of environmental impact. MOL will accelerate towards the realization of these existing initiatives through further deepening

creative collaboration across industries. In the safe operation field, MOL is focusing intensely on promotion of autonomous vessels and is working with multiple partners to verify automatic technologies, such as image recognition, giving way to other vessels at sea, as well as berthing and unberthing. The Company is aiming to achieve a practical demonstration around 2020. In the environment field, MOL is promoting the Wind Challenger Project (see P. 31) for next-generation sailing vessels, aiming to operate a first vessel in 2020, following selection of a vessel to be equipped and completion of a design during 2018.

The prime goal of the unit, as well as of MOL, is the aforementioned "provision of stress-free services." The Company will actively aim to start a logistics revolution to rival that of the home delivery services sector. This means not only promoting technological development, but service development collaborating closely with sales divisions.

#### Technology Innovation Unit Organization Chart



### Wind Challenger

MOL promotes the Wind Challenger Project, joint industry-academia research that began in 2009. This project aims to significantly reduce the amount of fuel consumed by large vessels currently dependent on oil fuels by maximizing the use of wind power for propulsion by attaching massive sail panels on vessels.



Scan here to see a video on the Wind Challenger Project



## Three Areas of Focus

### Wind Challenger

- The Wind Challenger Project research and practical demonstration phase finished in September 2017 and has now entered the application and commercialization phase conducted jointly with Oshima Shipbuilding Co., Ltd.
- Currently, with the aim of realizing a single sail, we are working on detailed design and selecting the vessel to be equipped with it.
- The aim is to select a vessel to be equipped with the sail in fiscal 2018, and start operations in 2020.

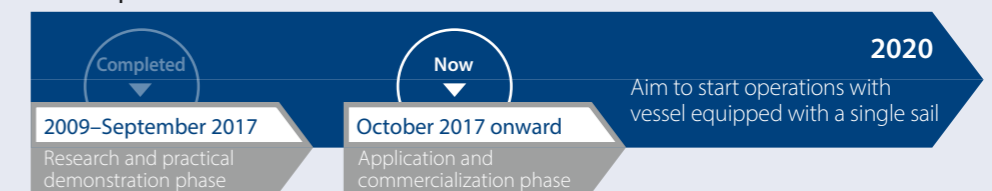


Conceptual image of the vessel equipped with a single sail while in full sail at sea

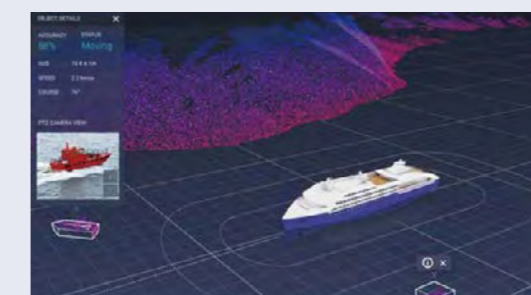


Sail demonstration unit

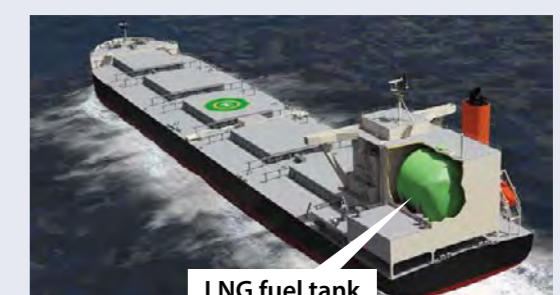
#### Roadmap So Far



### Autonomous vessels P. 25

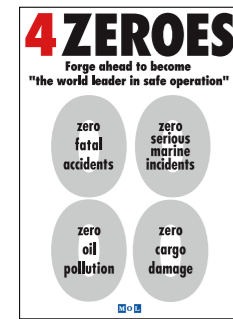


### LNG-fueled vessels P. 29



## Non-Financial Indicators

### Safe Operation



As MOL strives to achieve a global top-class level of operational safety, the Company has introduced targets for operational safety which we refer to as the Four Zeroes. The objective is to maintain a continuous record of safety, with zero serious marine incidents, zero oil pollution, zero fatal accidents and zero cargo damage. Data on the number of days that the Company has maintained this unblemished record is circulated among human resources, ensuring that every employee maintains a keen awareness of safety issues in all of their daily work activities.

**Number of days that MOL has maintained its Four Zeroes record for safety (as of June 30, 2018)**

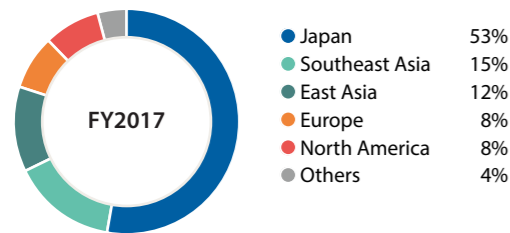
Zero fatal accidents	230 days	Zero serious marine incidents	1,839 days
Zero oil pollution	1,839 days	Zero cargo damage	1,839 days

For details of the safe operation ⇒ PP. 66-68.

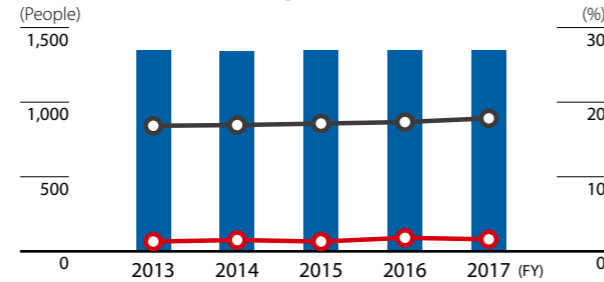
### Human Resources

MOL aims to cultivate a vibrant, energetic and diverse workforce, based on human resources from a multitude of countries, genders, cultures and backgrounds, who share the values of the MOL Group as expressed in MOL CHART (see page 2).

#### Breakdown of Group Employees by Region (Consolidated)



#### Number of Employees / Ratio of Females / Ratio of Females in Managerial Positions\*

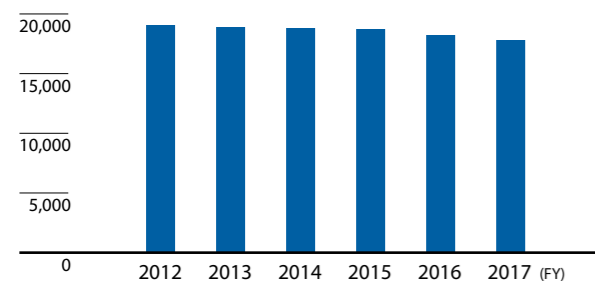


\* Unconsolidated basis excluding loaned employees, contract employees, part-timers, etc., but including expatriate employees

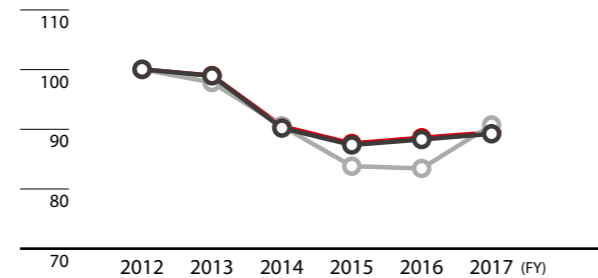
### Environment

Compared with other modes of transportation, shipping is the soundest method for transporting a large quantity of cargoes between two points, generating less CO<sub>2</sub> emissions and pollutants per cargo unit carried than any other form of transportation, but the impact of the environment from the absolute amount emitted cannot be ignored. As an ecologically conscious company, MOL is constantly seeking ways to reduce CO<sub>2</sub> emissions even more, to further reduce the impact of our operations on the planet.

#### CO<sub>2</sub> Emissions of MOL Fleet (Thousand tons)



#### MOL Group Emissions of CO<sub>2</sub>, SO<sub>x</sub> and NO<sub>x</sub> (per unit load) (%)



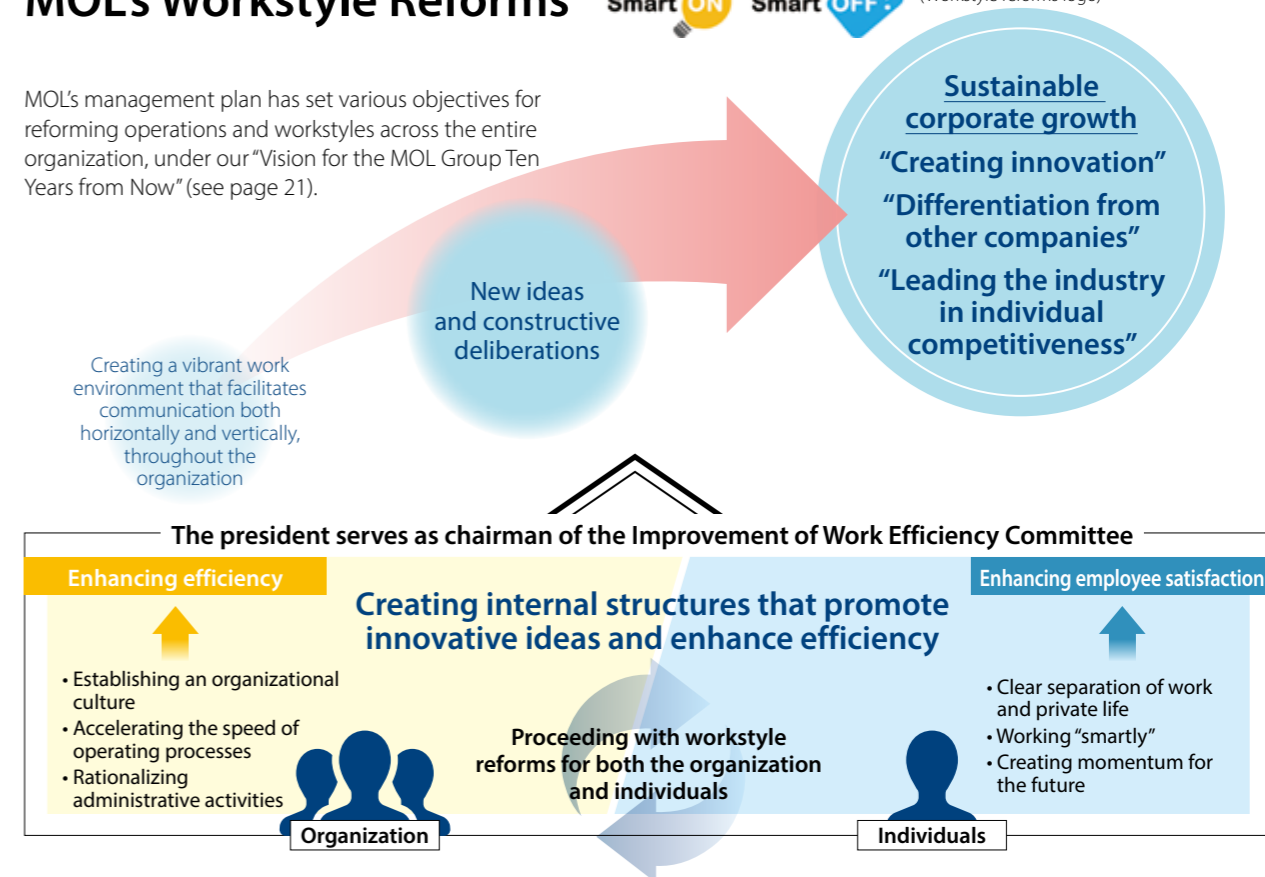
\* Emissions per unit (ton-mile) compared to fiscal 2012

For details of the environment ⇒ PP. 71-72.

## MOL's Workstyle Reforms



MOL's management plan has set various objectives for reforming operations and workstyles across the entire organization, under our "Vision for the MOL Group Ten Years from Now" (see page 21).



## Four areas of focus for reforming workstyles

### Personnel structure reforms

- Introducing a new structure for the personnel system in fiscal 2018 based on the following principles:
  - A structure that supports the process of early identification and cultivation of leaders who will increase organizational accountability and initiative
  - Hiring and training specialists, and diversifying the range of career paths to give employees greater scope and opportunity for accomplishment

### Organizational culture reforms

- Conduct HOT Dialogue to enhance communication between the CEO and each division as well as general managers and staffs in divisions
- Provide company support for employee gatherings and activities across divisions
- Stimulate and organize discussions involving all human resources, via in-house social networks
- Introduce Smart OFF! Day on Wednesdays, where all human resources are recommended to leave the office by 6 p.m.
- Launch the healthy breakfast campaign by serving breakfast in the Company cafeteria during the summer to promote health and improve work performance



HOT Dialogue



Set up conference rooms that can be used freely for non-conference matters

### Workplace reforms

- Introduced a remote work from home program (in August 2017)
- Space created by reducing paper documents was used to establish an employee lounge area
- Redesign the basic office layout based on Company-wide discussions about workstyles and offices

### Administrative reforms

- Provide facilitator training to teach employees the skills needed to manage meetings
- Introduce large touchscreen displays (Surface Hub) to improve meeting productivity
- Implement the Paper OFF! Project to promote the use of electronic (paperless) documents
- Promote the use of Robotic Process Automation



Conduct meetings using Surface Hub