

MOL Group

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# Environmental Vision 2.2

- Our BLUE ACTION for Net Zero-

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April 2023





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

In June 2021, MOL announced the "MOL Group Environmental Vision 2.1," which set a target of achieving net-zero emissions by 2050.

This time, we have updated the vision from version 2.1 to the "MOL Group Environmental Vision 2.2." In addition to showing steady progress since the announcement of version 2.1, we have formulated concrete action policies. We are enhancing the effectiveness of our actions by adding and updating KPIs and milestones as important indicators for achieving ours. We also drew a clear path for reducing emissions toward achieving net zero, and quantified and visualized the contributions that each action should make toward reducing emissions.

The Group has positioned environmental strategy as one of its main strategies in our group management plan "BLUE ACTION 2035." Additionally, "conservation of the marine and global environment" is one of our sustainability issues (materiality). Initiatives to address environmental issues are at the core of our efforts to improve corporate value and realize the Group's vision.

The MOL Group will work as one to reduce the burden on the global environment, not only to combat climate change but also to protect natural capital and biodiversity, while earning the trust of a wide range of stakeholders.



**Takeshi Hashimoto**  
President  
Representative Director



**Tatsuro Watanabe**  
Chief Environment &  
Sustainability Officer (CESO)  
Executive Officer



# What We Should Do Now to Curb Global Warming

## - Background of the Update to the Environmental Vision -

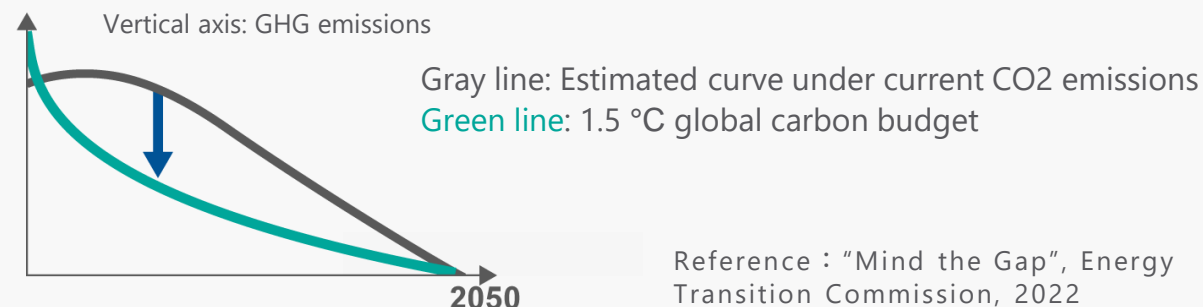
Setting a target of achieving net-zero by 2050 has become the norm for businesses.

Under such circumstances, we will lead the global movement toward decarbonization by prioritizing measures that can reduce emissions immediately without postponing measures that can be achieved prior to 2050.

We will promote emission reductions that can be implemented now, such as immediately starting the use of LNG, a low-emission alternative marine fuel, and setting a quantitative contribution target for the short to medium term for carbon dioxide removal (removal of CO<sub>2</sub> from the atmosphere).

### Contributions with an awareness of carbon budgets

In order to limit the rise in global temperature to a certain level, there is an upper limit to the cumulative amount of GHG (the sum of past and future emissions) that can be emitted globally, and not much of the carbon budget is left to achieve the 1.5 °C target. It has been indicated that if emissions are not reduced sufficiently, they will possibly exceed the upper limit before 2050.



## Changes from Environmental Vision 2.1

1. Clarified MOL's Pathway to Net Zero Emissions (⇒P.13)
2. Established milestones at midway points to 2050 to increase the effectiveness of actions for net zero (⇒P.14)

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**You can also refer to the following web pages:**

- ❑ [Integrated Report - MOL Report](#)
- ❑ [Management Policy](#)
- ❑ [Management Plan](#)
- ❑ [Sustainability Management](#)
- ❑ [Environment \(Conservation for Marine and global environment\)](#)
- ❑ [Sustainability Data](#)



## Section 1

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# Commitment to the Environment

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# Sustainability Management of MOL Group

## - Positioning of Environmental Vision 2.2 -

1. Commitment to the Environment

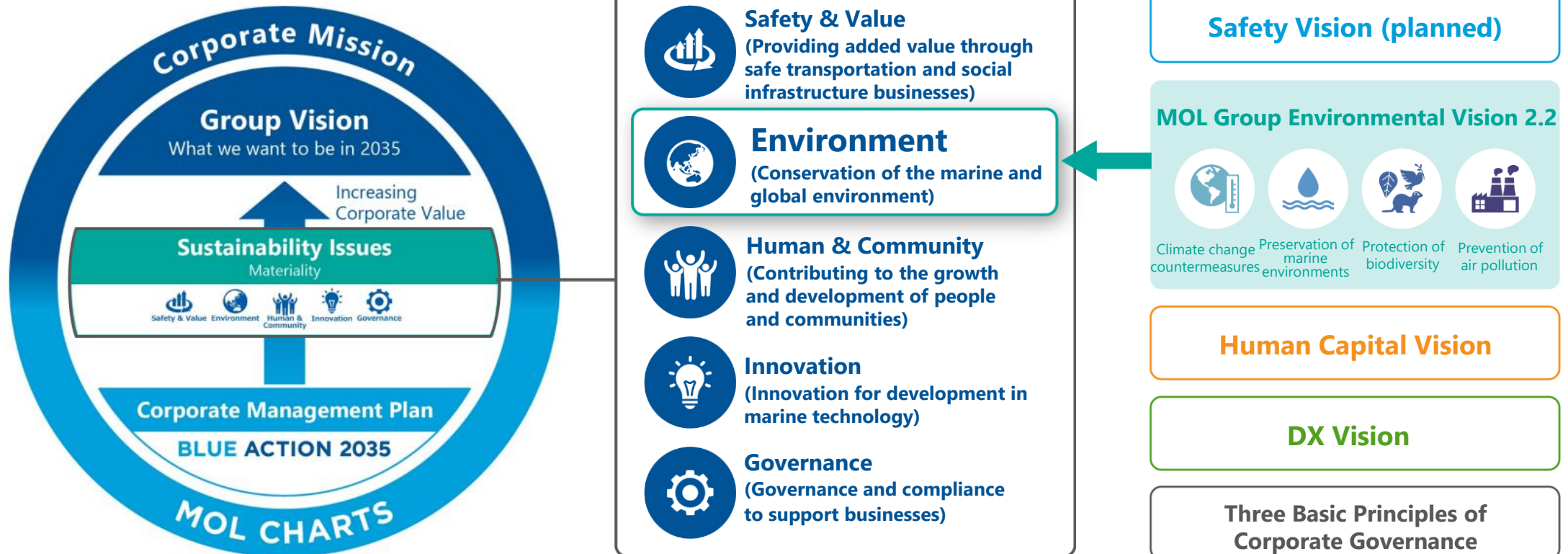
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- The MOL Group has identified five Sustainability Issues, and established the "MOL Sustainability Plan (MSP)," a plan for specific actions we will take on those issues, as a part of our management plan "BLUE ACTION 2035".
- Our Environmental Vision 2.2 sets forth the vision (targets and actions) for "conservation of the marine and global environment," one of the sustainability issues.

Overview of Sustainability Management





# Commitment to the Environment In Our Management Plan

1. Commitment to the Environment

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- Conducting environmental investment to reduce emissions for the 1.5 °C target -

- Based on our belief that the execution of the management plan will resolve the sustainability issues, thus increasing corporate value, we have incorporated initiatives on the sustainability issues into our management plan "BLUE ACTION 2035."

## Overview of BLUE ACTION 2035



**Investments in environment : 650 billion yen over the three years from FY2023 to FY2025**

\*The amounts are estimates and may change in future.

	Estimated investment* (FY2023-FY2025 total)
Reduction of the Group's GHG Emissions	¥350 billion
Expansion of low-carbon and decarbonization energy projects	¥300 billion
<b>Total environmental investment</b>	<b>¥650 billion</b>

### Examples

- Alternative fuel vessels (LNG, methanol, biodiesel, ammonia, hydrogen, etc.)
- Equipment to use wind power (e.g., Wind Challenger)
- Boosting operation efficiency

### Examples

- Offshore wind power-related business
- Clean energy production (ammonia, hydrogen, e/bio-methane/methanol, etc.)
- Clean energy transportation (liquefied CO2/ammonia/liquefied hydrogen, etc.)
- Carbon dioxide removal projects, etc.

**50% or more**

of the total investment of ¥1,200 billion

Actively implement capital expenditures to reduce emissions in line with the 1.5°C target

# Risks and Opportunities Related to Climate Change

1. Commitment to the Environment

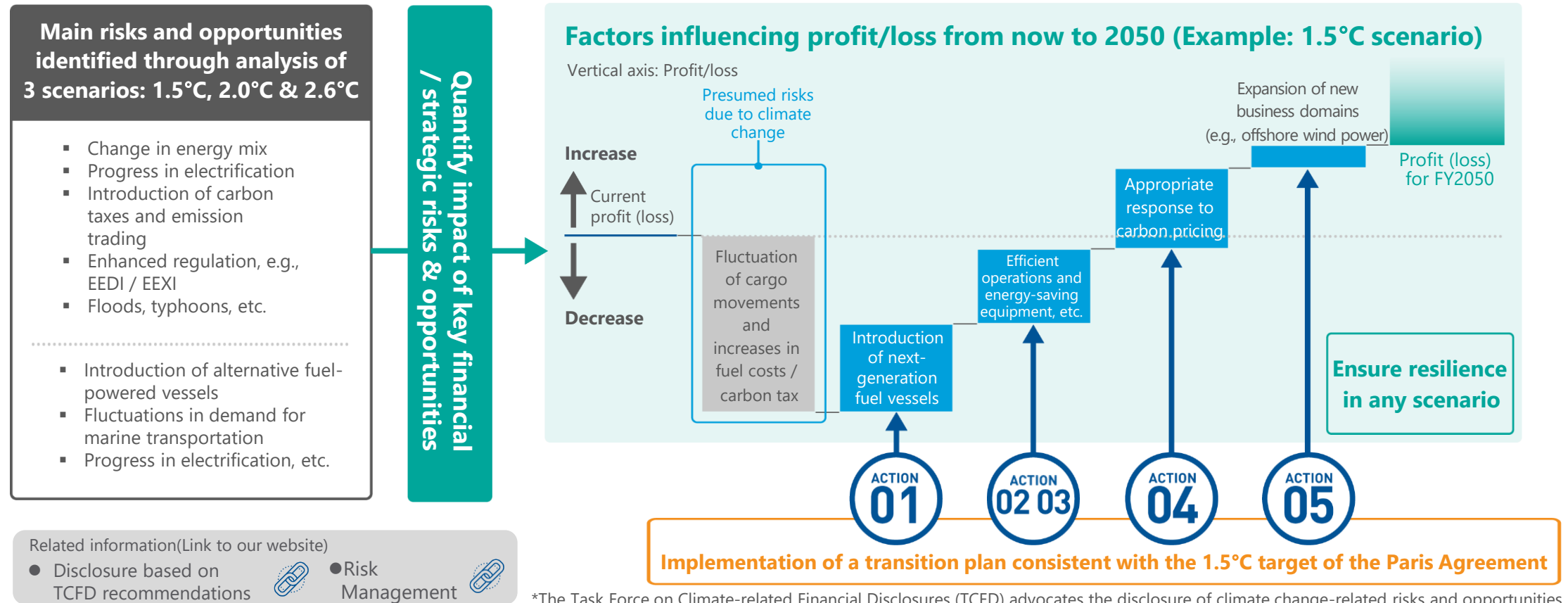
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We conduct scenario analyses of an ultra-long term up to 2050, assess the myriad risks and opportunities presented by climate change, and integrate the results of the analyses in our Environmental Vision updates and management strategies. The results are disclosed externally using the TCFD\* framework.

While the world could be heading in the direction of any of the 1.5°C, 2.0°C or 2.6°C scenarios, we have made it our basic policy to implement a transition plan consistent with the 1.5°C target of the Paris Agreement and have verified that this transition plan ensures resilience in any of those scenarios.

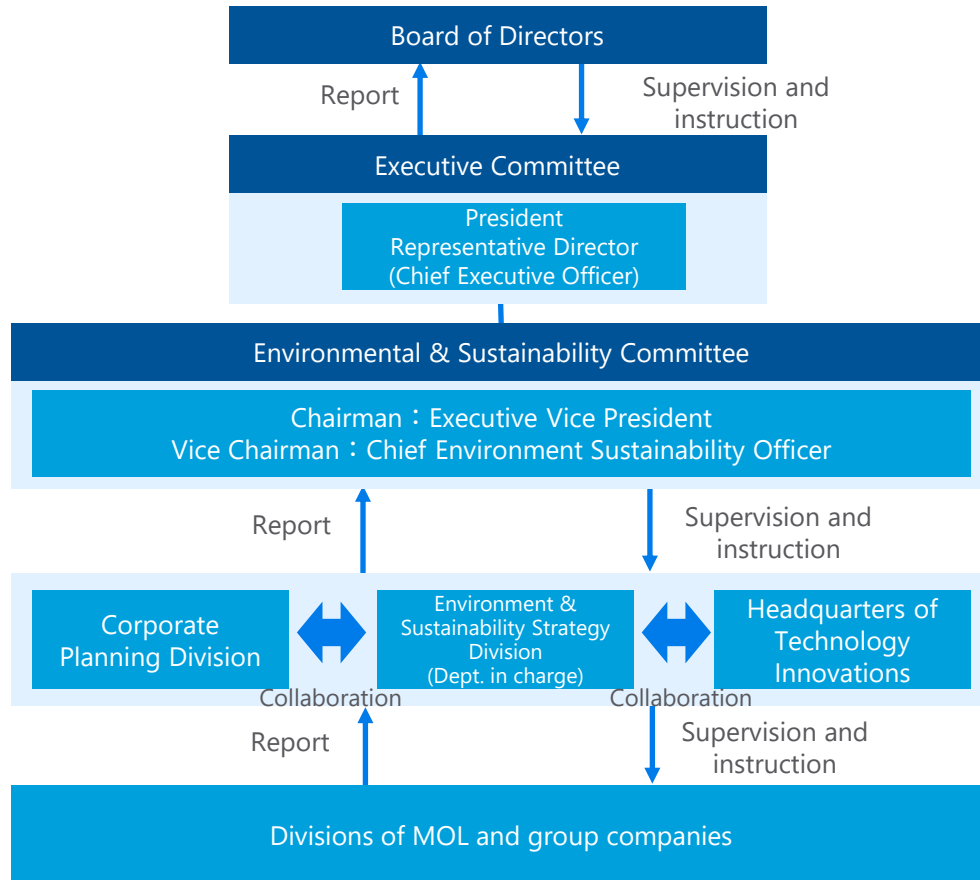


\*The Task Force on Climate-related Financial Disclosures (TCFD) advocates the disclosure of climate change-related risks and opportunities.



# Environmental Management System

- The MOL Group has established an environmental management system with the President & CEO as the chief executive officer.
- The degree of progress in our measures to counter climate change are reflected in part of the evaluation for determining compensation of the CEO and other executives.



(as of April 2023)

## Environmental Management System

- The Environmental and Sustainability Committee, a subordinate organ of the Executive Committee, serves as the main deliberative body on environmental initiatives, including not only climate change measures but also natural capital and biodiversity (⇒ from P.40).
- The Board of Directors is responsible for oversight of environmental initiatives and makes decisions on particularly important matters.

Related information (Link to our website)

● Environmental Management



● Risk Management



## Incorporation of Climate Change Factors into Executive Compensation

- The status of our measures to counter climate change and the degree of progress on other sustainability-related initiatives are reflected in part of the evaluation for determining the long-term contribution variable compensation portion (20% of the total) of remuneration for each executive director, including the CEO and CEO.

Related information

● Executive Remuneration



# Progress on Environmental Vision 2.1

1. Commitment to the Environment

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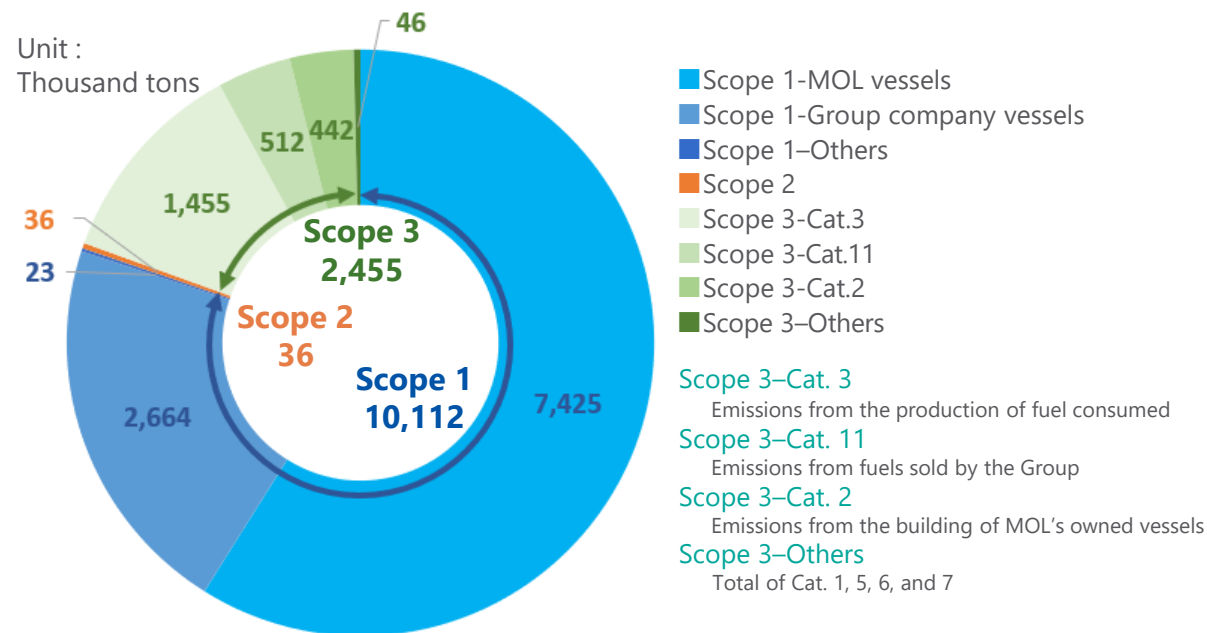
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■ In line with our Environmental Vision 2.1, we are steadily reducing both GHG emissions and GHG emissions intensity.

## GHG Emissions

FY2021 MOL group GHG Emissions



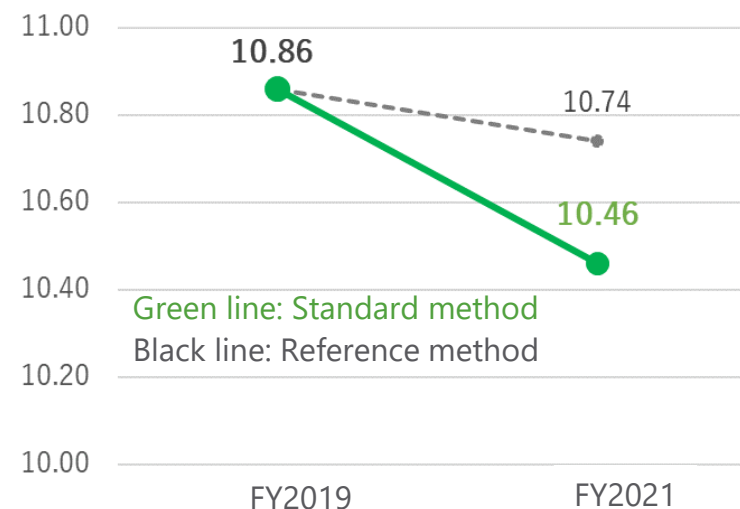
FY2019 (base year)  
**14,309**  
thousand tons

Down 12%

FY2021  
**12,603**  
thousand tons

## GHG Emissions Intensity

Unit: g-CO<sub>2</sub>e/ton mile



FY2019 (base year)  
**10.86**  
g-CO<sub>2</sub>e/ton mile

Down 3.7%  
(Yearly average:  
down 1.9%)

FY2021  
**10.46**  
g-CO<sub>2</sub>e/ton mile

For the methodology for calculating emissions and intensity, please refer to the Appendix (⇒P.45 and P.47).



Independent Assurance Statement



Appendix



## Section 2

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# Overview of Environmental Vision 2.2

- Updates from Environmental Vision 2.1 -

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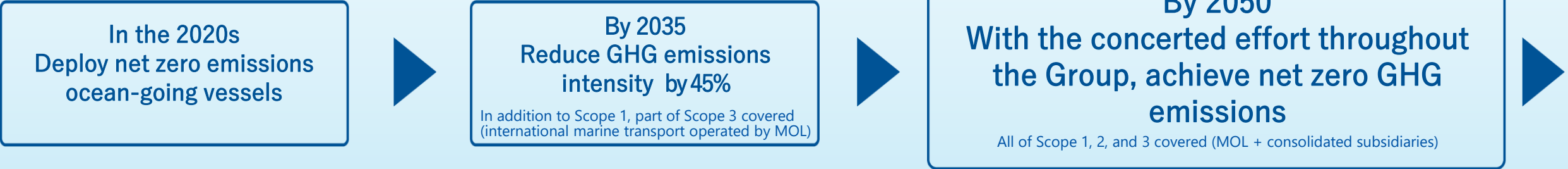


# MOL Group Environmental Vision 2.2



For the next generation on board this planet, the MOL Group will work collaboratively with our partners and stakeholders with creativity to resolve environmental issues. We will continue to provide solutions for issues of high importance such as the preservation of the marine environment, protection of biodiversity and prevention of air pollution, and in order to tackle climate change with utmost urgency, the MOL Group will make a concerted effort to achieve net zero GHG emissions by 2050. With these contributions for the sustainable development of our society and the preservation of nature, from the blue oceans, we sustain people’s lives and ensure a prosperous future.

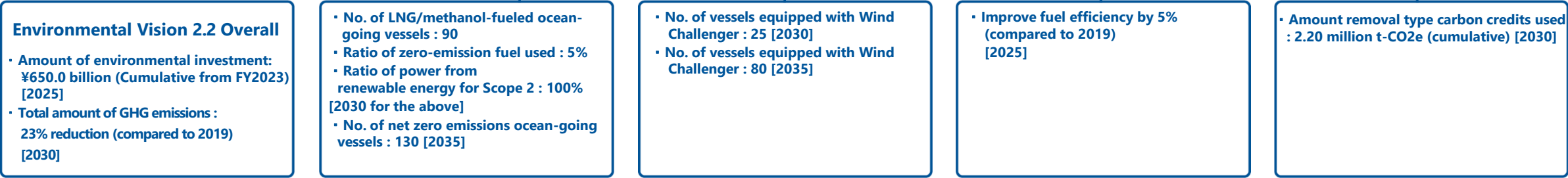
## Medium- to long-term targets



## Five actions to achieve medium- to long-term targets



## KPI & milestones measuring action progress





# Clarifying the “Pathway to Net Zero Emissions”

- MOL Group's Decarbonization Strategy in Accordance With the Pathway of Reduction for 1.5 °C -

1

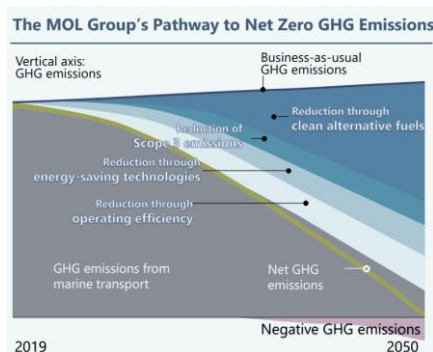
2. Overview of Environmental Vision 2.2

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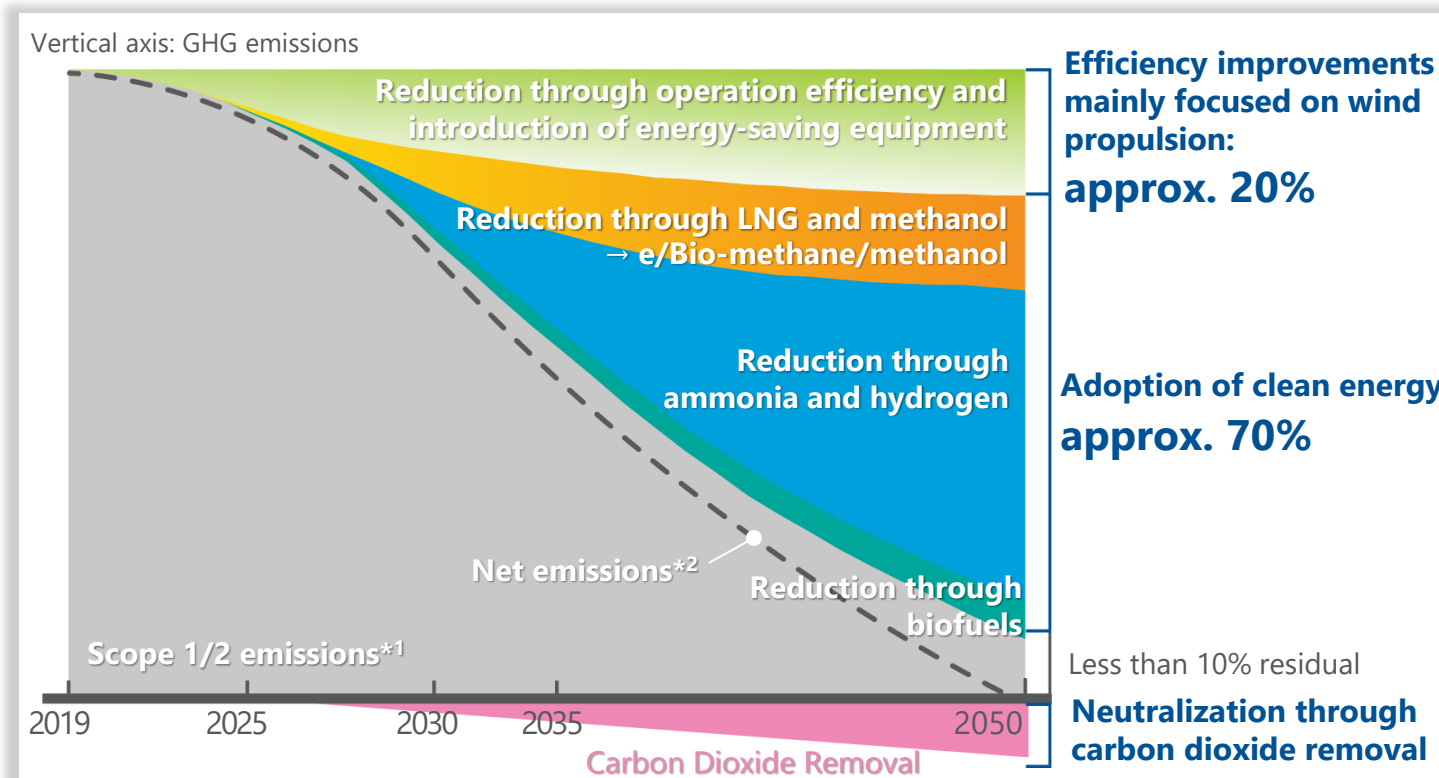
4

The “Pathway to Net Zero Emissions” specifically shows reduction pathways for achieving net zero by 2050. This time, we enhanced the resolution to visualize the degree of contribution of each action. By doing so, we present the transition plan for the MOL Group to achieve net zero more clearly .

## MOL Group's Pathway to Net Zero GHG Emissions



Enhanced resolution



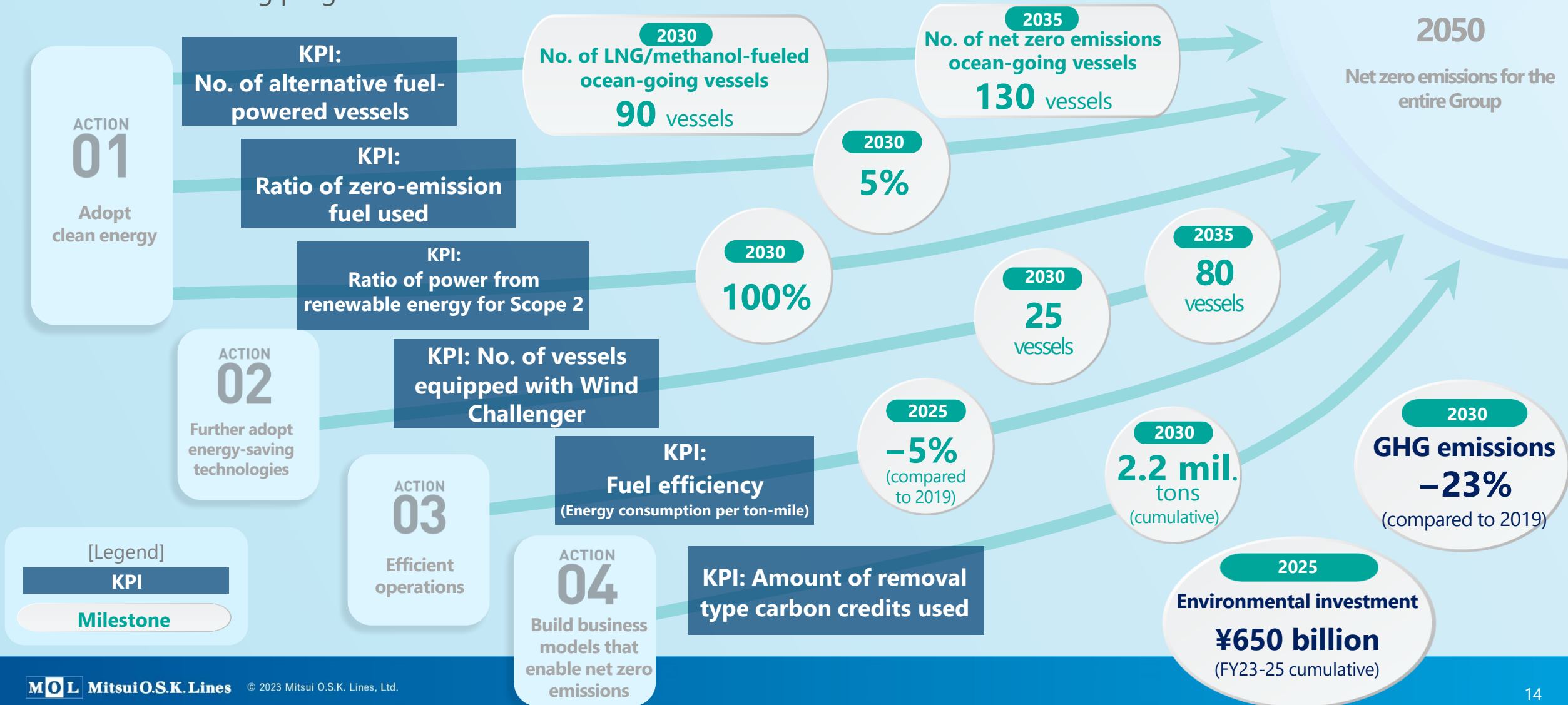
As of MOL Group Environmental Vision 2.1 (announced in June 2021)

\*1 Scope: MOL and all consolidated subsidiaries. Scope 3 emissions are also included in the 2050 net zero target.

\*2 For the calculation of emissions for years prior to the target year of 2050, emissions will not be offset with carbon dioxide removal. See the Appendix (⇒P.45) for details.

# Establishing KPI & Milestones

To ensure the achievement of net-zero emissions, we have set quantitative KPIs and milestones for measuring progress for each action.



## Section 3

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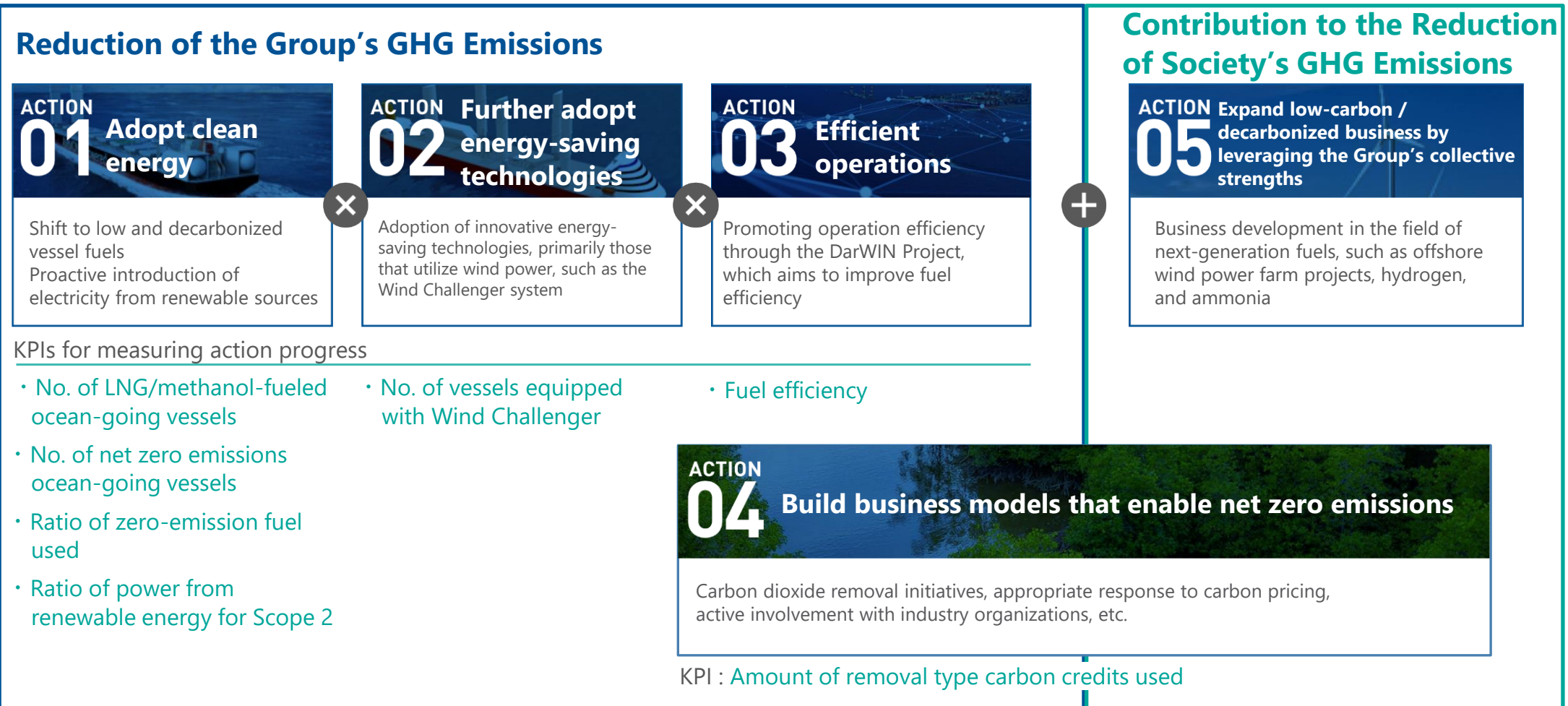
# Five Actions to Realize Net Zero

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We will take five actions to achieve our medium- to long-term targets.



## Action 1: Adopt Clean Energy

- MOL Group Approach -

1

2

3. Five Actions to Realize Net Zero

4

- We will phase out the usage of heavy oil, which is highly carbon-intensive, and shift to low-carbon and decarbonized fuels.
- Based on the premise that the optimal fuel differs depending on the type of vessel and shipping route, we have begun considering adopting a variety of fuels.
- In addition to preparing alternative fuel-powered vessels, we will take measures to procure clean-energy fuels.

### Introduction of alternative fuels Milestones

**2030 Ratio of zero-emission fuel used: 5%**

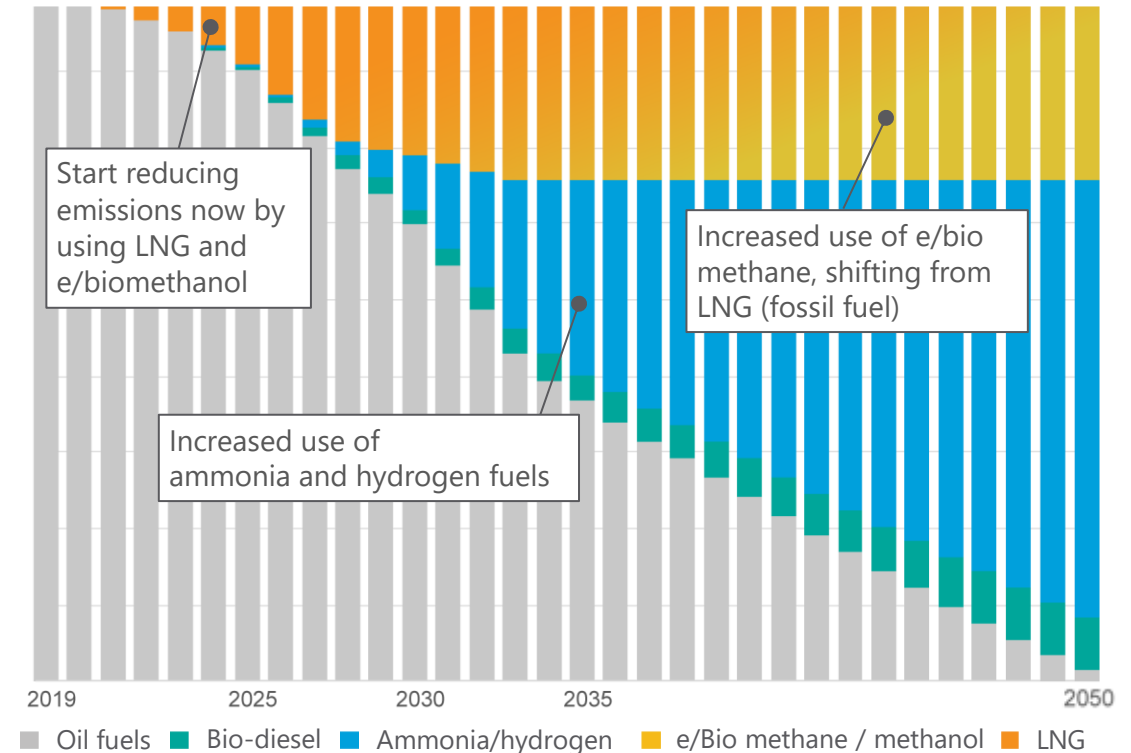
**2030 No. of LNG/methanol-fueled ocean-going vessels: 90**

**2035 No. of net zero emissions ocean-going vessels: 130**

For details of the milestones, see the Appendix. (⇒P.45)

### Composition of MOL's Ocean-Going Fleet by Fuel Type

Vertical axis: No. of vessels



# Shift to Alternative Marine Fuels

## - Development and introduction of alternative fuel-powered vessels (1) -

1

2

3. Five Actions to Realize Net Zero

4

### Action 1: Adopt clean energy

- For a general shipping company such as MOL, which operates various types of vessels, there is no single solution for vessel fuel. We will promote the adoption of optimum fuels for each business on the premise of achieving net zero in 2050 and our interim milestones.

### LNG

We are proactively using LNG, a low-emission fuel that is available for immediate utilization as a way of contributing to the carbon budget. As of April 2023, we operate 16 LNG-fueled ocean-going vessels, including car carriers and large bulk carriers (including those under construction).

LNG-fueled "BLUE" series car carrier  
(Eight vessels are slated to be completed by 2025)



In terms of coastal ships, 2 LNG-fueled ferries have commenced operation. We plan to enter two more LNG-fueled ferries into service in the future.

Japan's first LNG-fueled ferry "Sunflower Kurenai"



### Reducing methane slip

We are making multiple efforts to further reduce a trace amount of unburned methane emitted from LNG-fueled engines (methane slip).

- Joint projects with Japanese companies to develop technology to reduce methane slip by improving catalysts and engines
- We are a member of The Methane Abatement in Maritime Innovation Initiative, a group which promotes the development of methane slip reduction technology through collaboration among global companies

### Methanol

We own one of the world's largest fleets of methanol-fueled transport vessels (5 vessels). We plan to use our know-how to expand methanol fuel to other types of vessels.

Completed methanol transport vessel  
which uses primarily methanol fuel



### Biodiesel

We promote the use of biodiesel as a "drop-in fuel" which can be used with conventional petroleum-fueled equipment.

MOL completed the first biodiesel  
bunker operation for a vehicle  
carrier in Singapore.





# Shift to Alternative Marine Fuels

- Development and introduction of alternative fuel-powered vessels (2) -

1

2

3. Five Actions to Realize Net Zero

4

Action 1: Adopt clean energy

## Ammonia

We are developing multiple types of vessels. One of them is scheduled to be completed and put into operation around 2026 as the first net zero emissions ocean-going vessel.



We obtained Approval in Principle (AiP) for an ocean-going liquefied gas carrier fueled by ammonia.



We obtained Approval in Principle (AiP) for an ammonia-fueled large bulk carrier.

## Hydrogen

We are building a coastal passenger ship propelled by hydrogen and biofuels.

The ship will start operation in the Kanmon area of Japan in FY2024.



Rendering of an electric-propelled hybrid vessel that uses hydrogen and biofuels.



MOTENA-Sea

Planned to be owned and utilized by MOTENA-Sea (Largest shareholder : MOL Techno-Trade, Ltd., our subsidiary)

## Battery

The pure battery coastal tanker "Asahi," powered by large-capacity lithium-ion batteries, is scheduled to enter operation in spring 2022. The second ship "Akari" put in service in April 2023, and the delivery of hybrid EV bulk carrier "Asuka" is scheduled in May of the same year.



"Asahi," the world's first EV tanker

### e5 Project

By bringing together technical capabilities and networks related to electric vessels, e5 will establish a standard for sustainable marine transport.



# Shift to Alternative Marine Fuels

## - Efforts to Procure Alternative Fuels -

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3. Five Actions to Realize Net Zero

4

Action 1: Adopt clean energy

- In addition to working on the development and operation of vessels from the perspective of fuel users, we will work with diverse partners to urge upstream players of the fuel supply chain to join our efforts to expand the use of new fuels.

### e/Bio-methanol

With our long-standing partnership with Methanex, the world's largest methanol supplier, we conducted the world's first net-zero voyage of a methanol dual-fuel vessel fueled by bio-methanol. We will also pursue the viability of e-methanol in the future.

Partnership with



Methanex and MOL conducted the world's first net-zero voyage using bio-methanol.

### Ammonia

Together with ITOCHU Corporation, Total Energies, Pavilion Energy, and Vopak, we are involved in a joint development project on the ammonia fuel supply chain in Singapore.

Partnership with



We obtained Approval in Principle for an ammonia fuel supply vessel to realize an ammonia fuel supply business in Singapore.

### e/Bio-methane

We promote efforts to procure e/bio-methane produced in Japan and overseas. We aim to test liquefied bio-methane, produced by Air Water in Hokkaido's Tokachi area, for a MOL group coastal LNG-fueled vessel in the first half of FY2023.

Meeting society's needs with nature's blessings.



We launched a joint study on the use of liquefied bio-methane as marine fuel.

### Advanced Initiatives to Promote the Use of Clean Alternative Fuels - First Japanese Shipping Company to Join First Movers Coalition in the Shipping Sector(Jan.2023) -

Member shipping companies have set a target of using zero-emission fuels for at least 5% of their deep-sea shipping by 2030.



# Utilization of Clean Energy Outside of Marine Shipping

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3. Five Actions to Realize Net Zero

4

Action 1: Adopt clean energy

- We are also promoting the use of clean energy in businesses such as real estate and logistics.

## Utilization of power derived from renewable energy

Power from  
renewable  
energy  
Milestone

### Increase the ratio of power from renewable energy for Scope 2 to 100% by 2030

KPI: Ratio of power from renewable energy for Scope 2

We will promote the use of renewable energy for power through the introduction of renewable energy generation systems, CO2-free power, the acquisition of environmental certificates, etc.



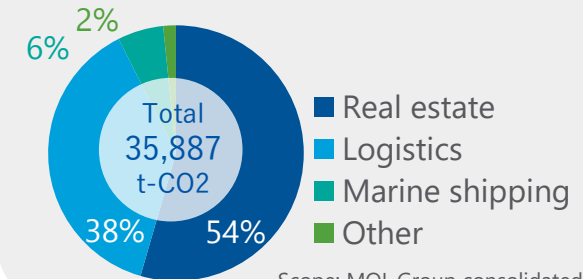
Solar power system at Tokyo International Container Terminal



Daibiru office building with solar power generation and CO2-free electricity



#### Ratio of Scope 2 Emissions by Segment



## Utilization of hydrogen fuel for port cargo handling equipment

In anticipation of the proliferation of hydrogen supply infrastructure in the future, we introduced a "Near Zero Emission Transtainer<sup>®</sup>," a port cargo handling machine that can achieve zero emissions by changing the power source from diesel engines to hydrogen fuel cell power units.



Image of "Near Zero Emission Transtainer<sup>®</sup>", delivered to Kobe International Container Terminal in August 2022 and scheduled to be delivered to Yokohama Port around October 2023.

For details of the milestone, see the Appendix. (⇒P.46)



## Action 2: Further Adopt Energy-saving Technologies

- MOL Group Approach -

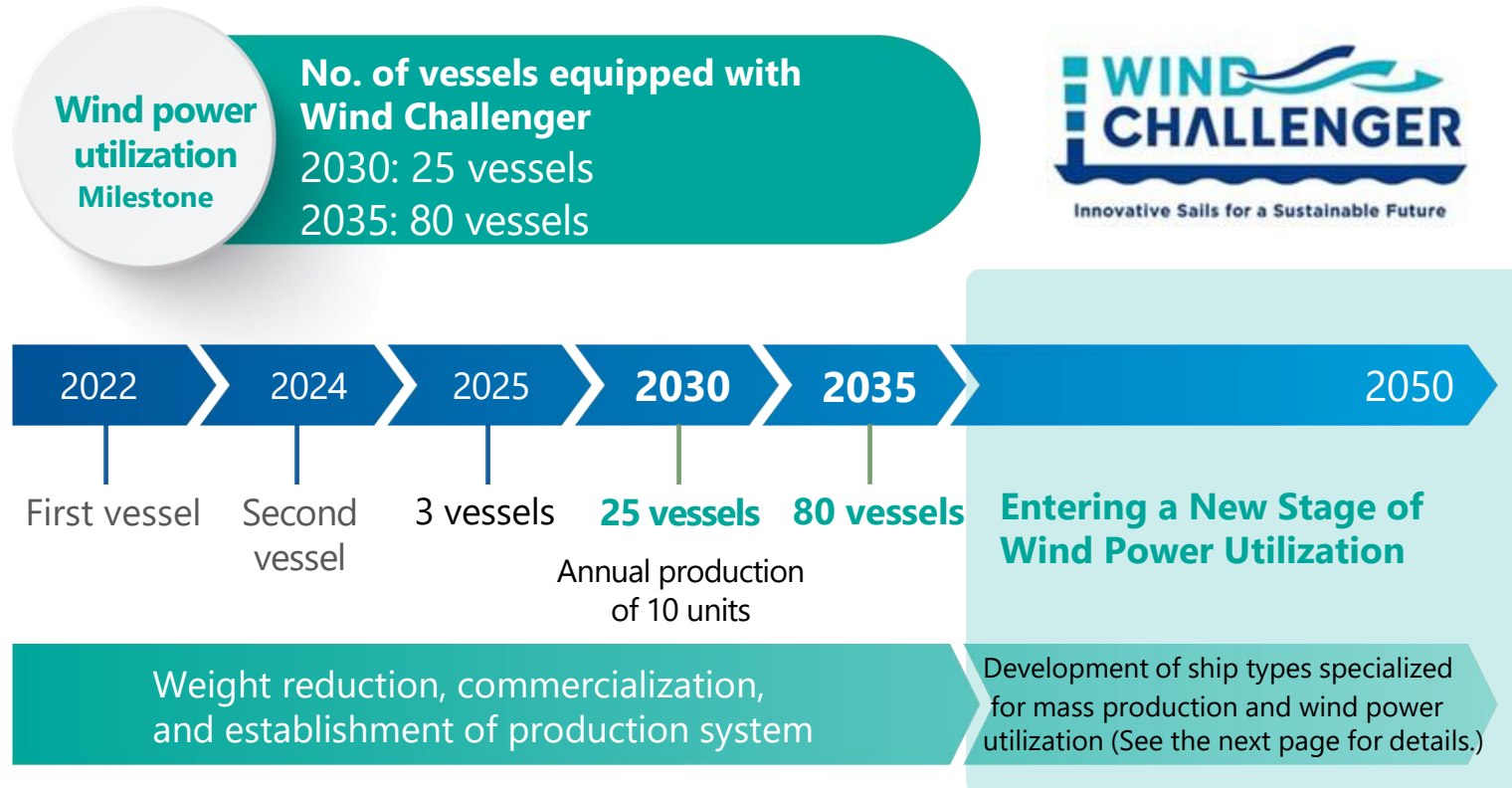
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3. Five Actions to Realize Net Zero

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- We will focus on wind, a clean and inexhaustible form of energy that we can begin utilizing immediately.
- Under the banner of Wind Challenger, we aim to be the leader in the use of wind power for vessels.



### What is Wind Challenger?

- A wind propulsion device developed by MOL
- First vessel to start operation in the fall of 2022
- We expect the first vessel to cut emissions by 5 to 8%



- We are considering installation on various sizes of bulk carriers, LNG carriers, tankers, and clean energy carriers.
- In addition to the Wind Challenger, we introduced optimal technology that includes other wind power devices such as rotor sails, taking into account the characteristics of each vessel.

For details of the milestone, see the Appendix. (⇒P.46)

# Future Vision of Wind Power

- New era's sailing vessel which continues evolving -

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3. Five Actions to Realize Net Zero

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Action 2: Further adopt energy-saving technologies

- From 2035, while mass-producing Wind Challenger, we will aim to develop next-generation vessel models specialized in utilizing wind power to become a forerunner in a world where fuels are transitioning to clean energy.

**ONE MILE  
AHEAD**

This MOL Group technology development slogan expresses our intention to move steadily forward "one mile" at a time, aiming to be "one mile" ahead in technology.

**Bridge positioned at  
the bow ensures  
visibility**

**Equipped with Wind  
Challenger with  
multiple sails**

- It is a mission of the shipping industry to reduce the fuel consumption of vessels by using natural energy. We will utilize wind power while shifting fuels to clean energy.
- In the development of vessels that run on next-generation clean energy such as liquefied hydrogen, we aim to maximize the utilization of wind power, or in other words, to develop fundamental ship models with the aim of equipping multiple sails as well as adopting autonomous navigation technology.

## Action 3: Efficient Operations

- MOL Group Approach -

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3. Five Actions to Realize Net Zero

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- We will improve fuel efficiency by promoting operation efficiency (the DarWIN project) and pursue measures that we can take immediately to reduce GHG emissions.

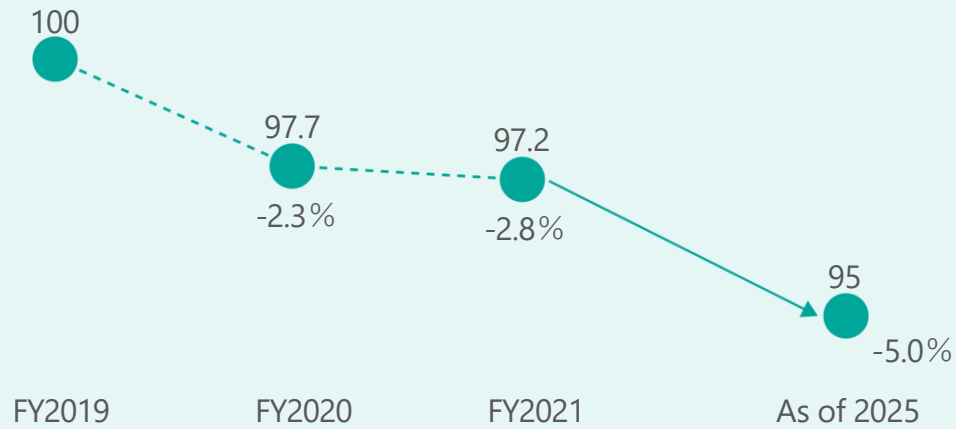
Improve fuel  
efficiency  
Milestone

**Improve fuel efficiency by 5% as of 2025 (compared to 2019)**

KPI: Fuel efficiency (unit: megajoules/ton-miles)

### Progress toward the milestone

[Changes in Fuel Efficiency Improvement Index]  
Progress with FY2019 as 100



For details of the milestone, see the Appendix. (⇒P.46)

### DarWIN Project Overview

#### Digital Approach to Reduce GHG With Integrated Network

This project was named after Darwin's theory of evolution in reflection of how our initiatives are constantly evolving and adapting to an environment that is dramatically changing.



#### Specific initiatives (details on the next page onwards)

- Pursuit of optimal operations
- Active investment in and installation of energy-saving technologies and equipment
- Steady promotion through collaboration with other companies
- Participation in Consortiums (Blue Visby Consortium)



Related information  
● DX Vision  
(Link to our website)



- We pursue optimal operations based on the three pillars of systems, structures, and processes.
- By 2025, we will invest approximately 10 billion yen in energy-saving technologies and equipment to reduce GHG emissions.

## Pursuit of optimal operations

### Systems

Obtain high-granular data through the FOCUS Project



Visualize vast amounts of fleet data

### Structures

In addition to a dedicated team, we established a new company in the Philippines.



Analyze data and secure resources to put efficient operations into practice

### Processes

Processes for achieving optimal operations



Promptly share and request action by the vessel to ensure optimal route and output

## Active investment and installation of energy-saving technologies and equipment

Combining a wide variety of measures that are expected to reduce GHG emissions by 1% to 10%, we will implement optimal improvement measures for each vessel.

### Example of measures

Hull attitude optimization during navigation	Fuel-efficient and environmentally friendly hull coatings
Replacement with energy-saving propellers "Example 1"	Devices to improve propeller propulsion performance "Example 3"
Improved propulsion performance via hull surface blasting treatment "Example 2"	Energy-saving steering system
Improved propulsion performance by cleaning the vessel bottom and propellers	Other energy-saving propulsion equipment



Example 1



Example 2



Example 3

# Collaboration with Other Companies to Realize Efficient Operations

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3. Five Actions to Realize Net Zero

4

Action 3: Efficient operations

- Through collaboration of 11 companies and utilizing the strengths of each company, we will improve fuel efficiency and reduce GHG emissions steadily.
- We will participate in consortium and contribute to the realization of a low-carbon society by working to reduce GHG emissions.

## Steady promotion through collaboration with other companies



We systematically introduce and evaluate energy-saving equipment to improve fuel efficiency and reduce GHG emissions steadily.

### Overall Supervision of DarWIN Project



AKISHIMA LABORATORIES (MITSUI ZOSEN) INC.

Advanced analysis capabilities  
utilizing vessel technology research  
and engineering methodologies



MOL Techno-Trade, Ltd.

Technical resources backed  
by a wide variety of services

### Provision of optimal measures for improvement



## Participation in Consortiums



MOL is a member of the Blue Visby Consortium, which comprises 24 organizations (as of February 2023) from industry, government, academia, NGOs, NPOs, etc., in order to support the development of a system to optimize vessels' arrival times at their destinations.

By adjusting (slowing) the sailing speed of vessels, we aim to optimize and disperse the arrival times of vessels heading to the same destination port, thereby reducing fuel consumption and GHG emissions.\*

### Simulation of the number of waiting vessels



\*Analyzing 150,000 voyages made by 13,000 vessels in 2019, the Consortium found that waiting time could be reduced for approximately 87% of the voyages by adjusting (slowing) the sailing speed.

## Action 4: Build Business Models that Enable Net Zero Emissions

- MOL Group Approach -

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3. Five Actions to Realize Net Zero

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- In addition to making every effort to reduce the Group's emissions (See Actions 1, 2 and 3.), creating mechanisms which enable net zero is highly meaningful for the purpose of enhancing the effectiveness of those actions.
- For this reason, we are pursuing a variety of initiatives for Action 4 as described below.

### Carbon Dioxide Removal(CDR) Initiatives

We are actively participating in projects to remove and sequester CO2 from the atmosphere. (⇒P.28-30)

### Engagement with Policymakers and Industry Organizations

We take an active role in international marine transportation by submitting our opinions through industry organizations to the International Maritime Organization (IMO), a regulatory authority. (⇒P.31)

### Collaboration with Value Chain Partners

We work to reduce Scope 3 emissions through active supplier engagement.

<The Group's main Scope 3 emissions>

Category 3: Emissions generated in the production process of fuels consumed

Category 11: Emissions from marine fuels sold by the Group

Category 2: Emissions from the building of vessels owned by MOL

### Appropriate Response to Carbon Pricing

Since the introduction of carbon pricing is anticipated for international shipping in the 2020s, we are making preparations to ensure we can respond smoothly. (⇒P.31)

### Participation in International Initiatives

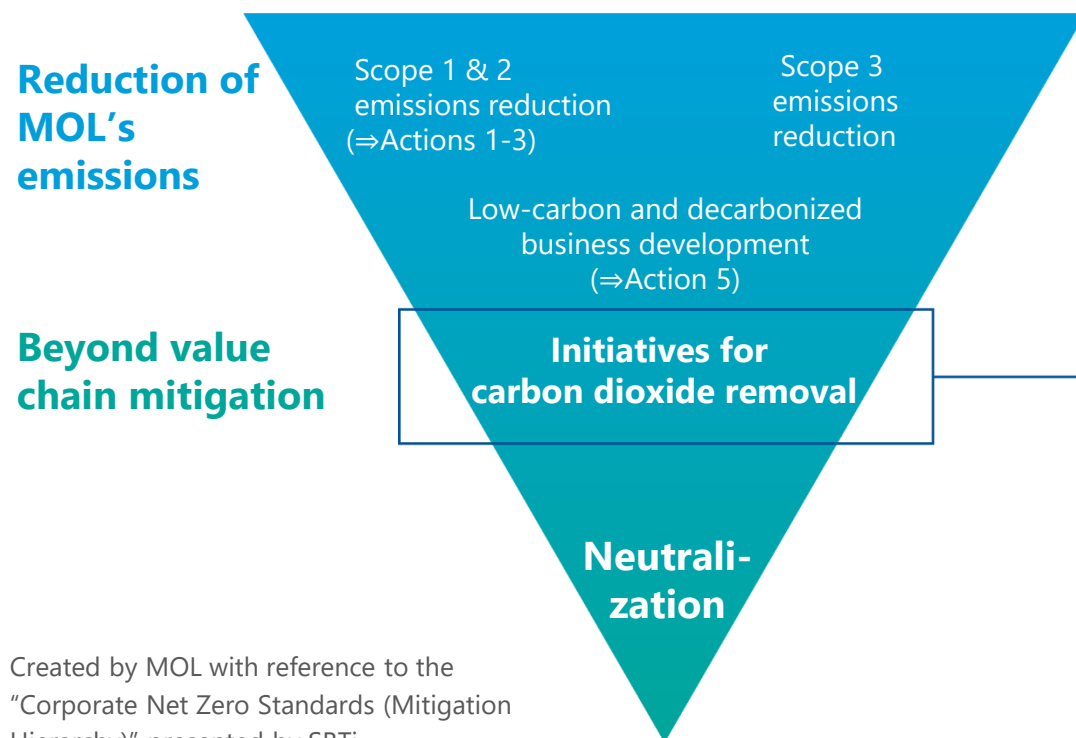
We aim to collaborate not only with the shipbuilding and maritime industries, but also with other industries such as the energy industry, and we actively participate in international initiatives. (⇒P.31)



Accelerating Shipping Decarbonization and the Global Transition session at the Davos Forum  
MOL President Hashimoto on stage as a panelist (second from right)



- In addition to reducing emissions from the value chain, including MOL, we engage with CDR to contribute to the mitigation actions beyond the value chain (BVCM\*1).
- In order for society as a whole to achieve net zero, CDR needs to be significantly scaled. Our direct involvement in CDR ensures the neutralization of our future residual emission\*2 and contributes to the broader adaptation of CDR projects across our society.



### MOL initiatives for carbon dioxide removal

Carbon Dioxide Removal(CDR) refers to the removal and sequestration of CO<sub>2</sub> from the atmosphere and can be divided into two broad categories: nature-based solutions, which increase CO<sub>2</sub> absorption by forests and other natural carbon sinks, and technology-based ones, which remove CO<sub>2</sub> from the atmosphere using chemical/engineering technologies. We are proactively involved in both solutions. (⇒ P. 30)

Created by MOL with reference to the "Corporate Net Zero Standards (Mitigation Hierarchy)" presented by SBTi

\*1 Abbreviation of Beyond Value Chain Mitigation (⇒P.46)

\*2 MOL aims to reduce those emissions to less than 10% of those of 2019, the base year. (⇒P.46)

## Quantitative Milestones

- Our contribution to society through CDR-

1

2

3. Five Actions to Realize Net Zero

4

Action 4:  
Build business models that enable net zero emissions

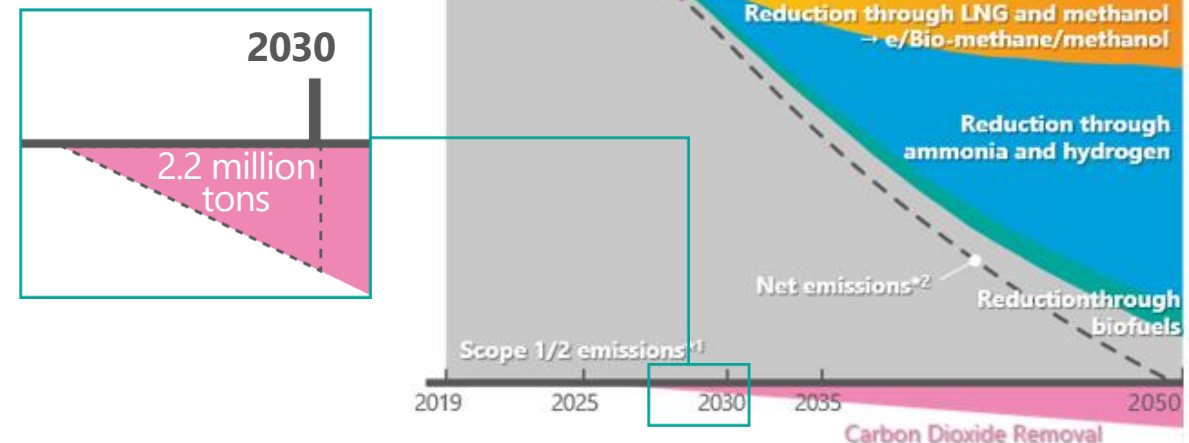
- Given the limited remaining carbon budget, we believe it is important to engage with CDR from now, without delay, in order to support the scaling of CDR (⇒P.3).
- Therefore, we have set an interim milestone to achieve by 2030 and will promote related initiatives.

### Carbon Dioxide Removal Milestone

**We will contribute to the removal of a cumulative 2.2 million tons of CO<sub>2</sub> by 2030.**

KPI: Amount removal type carbon credits used

We will reduce our emissions based on the scientific abatement-curve. Additionally, we take the initiatives to contribute to the society's mitigation actions and do not use them to counter-balance our own emissions.



# Initiatives for Carbon dioxide removal

- Major initiatives -

1

2

3. Five Actions to Realize Net Zero

4

Action 4:  
Build business models that enable net zero emissions

## Nature-based Solutions

By supporting projects such as forest and mangrove restoration, we will contribute not only to decarbonization but also to other co-benefits, such as the protection of biodiversity and the improvement of livelihood of local communities.

### Mangrove Restoration & Conservation Project

[Link to related releases](#)



Since January 2022, we have been participating in a blue carbon project aimed at restoring and conserving mangroves in South Sumatra, Indonesia. The project aims to reduce CO2 emissions by about 5 million tons through forest conservation activities and to absorb/store another 6 million tons of CO2 through afforestation of mangroves and other plants on about 9,500ha of bare land in the next three decades.



## Technology-based Solutions

By engaging with CO2 removal technology projects now, we will contribute to innovation and cost reduction of underfunded elements of nascent technologies.

### Effort to scale up and catalyze the market

[Link to related releases](#)



In May 2022, we participated in the NextGen CDR Facility, which aims to proliferate and promote carbon removal technologies, as a founding buyer. We are committed to purchasing at least 50,000 tons of CO2 removals utilizing CDR technologies by 2030.





# Build Business Models that Enable Net Zero Emissions

1

2

3. Five Actions to Realize Net Zero

4

**Action 4:**  
Build business models that enable net zero emissions

- In the shipping industry, carbon pricing is expected to be introduced in the 2020s.
- In order to realize the introduction of a truly effective mechanism for the decarbonization of the shipping industry, we will promote dialogue with industry organizations and regulatory authorities to fulfill our responsibilities as a leading company in the industry.

## Involvement with Policymakers and Industry Organizations / Participation in International Initiatives

- Regarding the question of how we can smoothly introduce a carbon pricing system that takes into consideration the actual state of the shipping industry from the perspective of shipowners and operators, we are engaged in continuous dialogue with the IMO by providing opinions via industry organizations.
- At events hosted by the Getting to Zero Coalition\* etc., we continue to actively express our intention to strive for decarbonization.
- We are actively participating in international initiatives to collaborate widely with not only the maritime industries but also other industries to achieve net zero.

### Examples of Initiatives We Are Participating in (Year of participation)

- World Economic Forum (September 2021)
- First Movers Coalition – Shipping (January 2023)
- First Movers Coalition – Carbon Dioxide Removal (June 2022)
- Getting to Zero Coalition (June 2020), etc.

\*A coalition of companies aiming to decarbonize shipping, with members from a wide range of sectors such as maritime, energy, infrastructure, and finance.

## Appropriate Response to Carbon Pricing

### Internal Carbon Pricing (Introduced in FY2021)

By quantitatively evaluating the impact of carbon prices and incorporating them into management decisions such as investments, we are promoting low-carbon and decarbonization projects as well as low-carbon / decarbonized services.

Related information (Link to our website)

- Internal Carbon Pricing System



### EU-ETS Compliance

We quantitatively evaluate the financial impact of the introduction of the EU-ETS and disclose the results within the TCFD framework. In addition, we are collaborating with local subsidiaries in Europe to develop practical systems after this is introduced.

Related information  
(Link to our website)

- Disclosure based on TCFD recommendations



# Expand Low-carbon and Decarbonization Projects - MOL Group Approach -

1

2

3. Five Actions to Realize Net Zero

4

Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths

In addition to steadily reducing MOL Group's emissions (Actions 1, 2 & 3) and creating mechanisms to improve the effectiveness of those actions (Action 4), we will also contribute to the reduction of emissions in society through our business.

**Responding to and leveraging the global shift in energy sources, we aim to realize a "Green Ocean Shift" and contribute to clean energy supply chains from upstream to downstream.**

Global economic development driven by fossil fuels

Increased LNG use particularly in emerging countries / Increased use of renewable energy / Popularization of electric vehicles / Increased use of hydrogen / Higher percentage of electric furnaces and rise in hydrogen-reduced iron / Spread of carbon dioxide removal technologies

**Global shift in energy sources**

**"Green Ocean Shift" of MOL**

Existing marine transportation, etc.

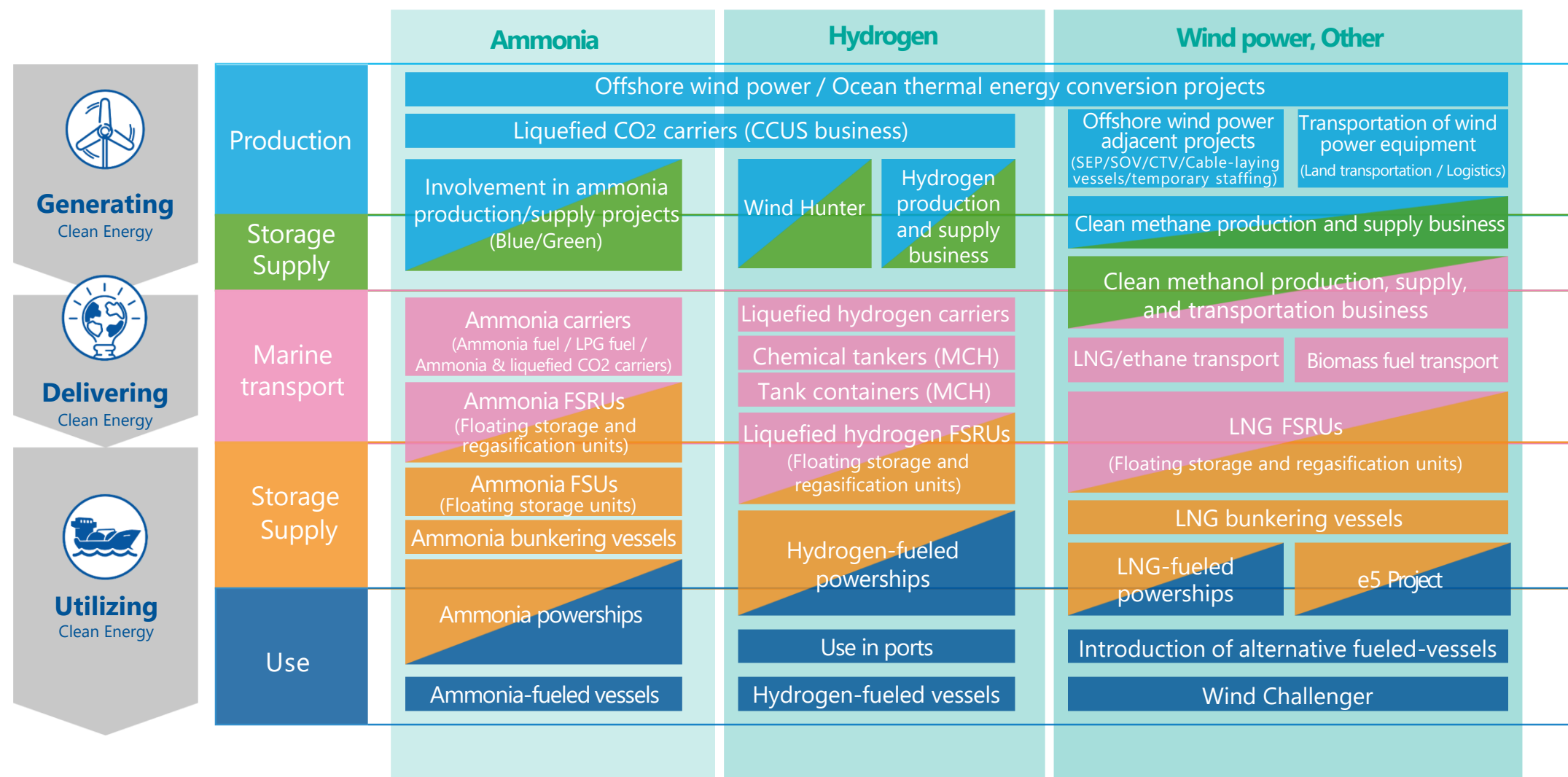


**New business domains - Ocean Clean Energy Business**

Building Ammonia & Hydrogen supply chains / Offshore wind power business / Involvement in CCS/CCUS projects / LNG powerships / Ocean thermal energy conversion, etc.

# Overview of Ocean Clean Energy Business

Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths





# Constructing Supply Chains for Ammonia & Hydrogen - Major Initiatives -

1

2

3. Five Actions to Realize Net Zero

4

Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths



**Generating**  
Clean Energy

## MOL Concludes MoU on Building Hydrogen/Ammonia Value Chain in Thailand

Collaboration with the Electricity Generation Authority of Thailand, Mitsubishi Company (Thailand) and Chiyoda Corporation



**Delivering**  
Clean Energy

## MOL Teams up with JERA Co., Ltd. to Study Transport of Ammonia Fuel

Considered developing large ammonia carriers and establishing a safe transport system



**Utilizing**  
Clean Energy

## MOL Participates in a Project to Explore Development of Infrastructure for Supplying Liquefied Hydrogen in Singapore

Evaluated and considered an infrastructure project which includes liquefied hydrogen transportation, import terminals, storage units, regasification facilities, etc.



## MOL Demonstrates Ammonia Supply Chain Linking UAE and Japan

Demonstrated power generation using clean ammonia that the UAE produced and exported to Japan



## Offshore Hydrogen Production and Supply - SeaEra Project -

Investigated the introduction of coastal ships that can use renewable energy to both produce and supply hydrogen offshore

## Started joint development on construction of a net-zero emission ocean-going vessel



Began joint development for construction of an ocean-going liquefied gas carrier fueled with ammonia

Partnership with



## MOL Signs Deal for Construction of LPG Fueled CVLGCs for LPG/Ammonia Transport



## MOL to Start Development of Large-size Ammonia Carrier Powered by Ammonia Fuel



## MOL Completes Concept Study of 'Ammonia/Liquefied CO2 Carrier'



Rendering of LPG/ammonia carrier  
Designed by Mitsubishi Shipbuilding Co., Ltd



Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths

## Overview of the Offshore Wind Power Business Value Chain and MOL Group Initiatives

### Investment in Power Generation Business

- Develop a floating offshore wind power project generating a total of 2GW.(Collaborate with Flotation Energy)
- Acquisition of shares of the company operating the Formosa 1 offshore wind farm.
- Made an investment related to the Kitakyushu Hibikinada offshore wind farm. (Collaborate with Hokutaku)

### Personnel Development and Supply for Wind Power Maintenance

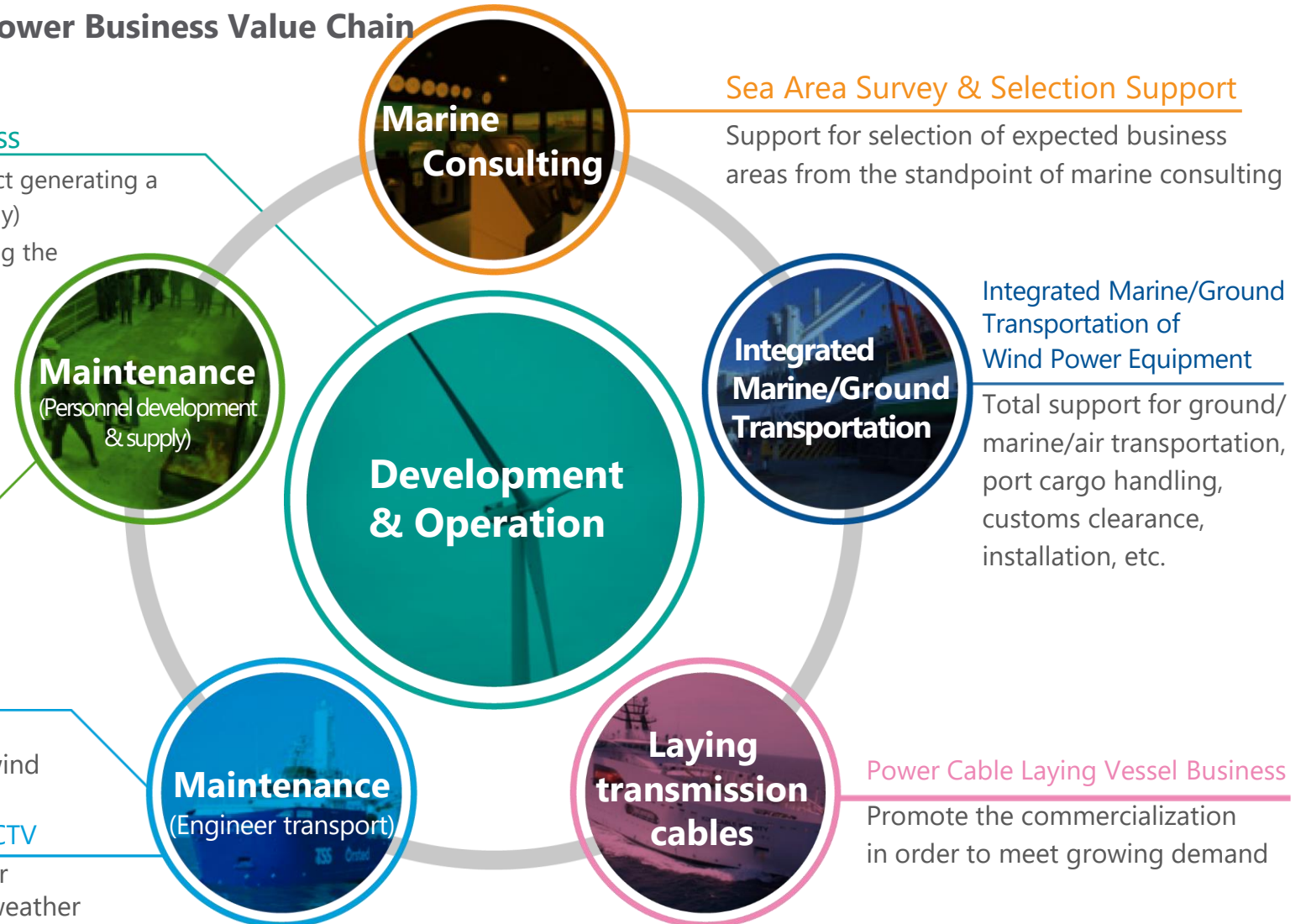
Established a personnel consulting company in cooperation with Magsaysay Group (Philippines)

### Asia's First SOV Business

This business is involved in operation and maintenance support work for an offshore wind farm in Greater Changhua (Taiwan)

### Ownership, Management and Operation of CTV

Involved in development to provide engineer transportation services adapted to sea and weather conditions unique to Japan



# Involvement in CCS/CCUS Projects

## - Major Initiatives -

1

2

3. Five Actions to Realize Net Zero

4

Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths

### MOL Initiatives for the Development of Liquefied CO2 Carriers

Completion of concept study of liquefied CO2 carrier that can be the mainstream carrier in the market (Nov. 2021)

MOL and Mitsubishi Shipbuilding obtain Approval in Principle (AiP) for liquefied CO2 Carrier (Sep. 2022)



Rendering of a liquefied CO2 carrier

### CCS/CCUS Value Chain Construction Projects

#### MOL Signs MoU to Study Ocean Transport for Development of CCS Value Chain

Study of marine transportation of liquefied CO2 to potential storage sites, targeting CO2 emitted by The Kansai Electric Power Co., Inc.'s thermal power plants

#### Involvement in R&D

We started R&D of a large-scale liquefied CO2 carrier and obtained Approval in Principle as part of the NEDO demonstration project entrusted by Japan CCS Co., Ltd.

#### Cross-industry Initiatives to Establish a Supply System for Synthetic Methane

Led the Ship Carbon Recycling Working Group of the Carbon Capture & Reuse (CCR) Study Group

#### Collaboration in liquefied CO2 marine transportation business in the Asia-Pacific region

Collaboration for business development to transport CO2 emitted in Singapore via ship to a storage site off the coast of Australia, with Chevron

Collaboration for development of a liquefied CO2 marine transport business to realize CCUS, with Petronas

#### Participation in the Australian offshore CO2 capture and storage hub project "deepC Store"

We are participating in this project which captures, liquefies, and ships CO2 generated from industrial facilities in Australia and the Asia-Pacific region for long-term underground storage.



Signing ceremony with Chevron



Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths



Generating  
Clean Energy

### Ocean Thermal Energy Generation Project

#### - Toward the Realization of a Decarbonized Society and a Symbiotic Sphere of Regional Circulation -

Together with our partners, we are participating in the operation of an ocean thermal energy conversion (OTEC)\*<sup>1</sup> demonstration test facility on the island of Kumejima, Okinawa Prefecture. OTEC is characterized by the fact that the deep ocean water used for power generation can be reused for purposes other than power generation, such as fisheries and agriculture.

In addition to deploying the Kumejima Model, which combines OTEC with the reuse of deep ocean water, to the world, we aim to start operation of the world's first commercialized OTEC on a 1 MW scale by around 2026.



OTEC Demonstration Facility  
(Kumejima)



Rendering of floating OTEC



Delivering &  
Utilizing  
Clean Energy

### LNG Powership - Contributing to the Energy Transition of Emerging Countries -

MOL has partnered with Turkish firm Karpowership to deploy an LNG powership business. LNG powerships supply gas to powerships through FSRU\*<sup>2</sup> and provide power generated at sea to land facilities. Taking advantage of the mobility of these vessels, we will contribute to the supply of low-environmental impact power sources to regions where it is difficult to build onshore power plants, etc. through LNG power generation.



KARMOL LNGT POWERSHIP AFRICA deployed  
to Senegal LNG powership project

\*1 A method by which power is generated using the difference in temperatures between upper and lower layers of seawater

\*2 Floating LNG Storage Regasification Unit

# Shape the Future With Wind and Hydrogen.

1

2

3. Five Actions to Realize Net Zero

4

- Wind Hunter Project - The ultimate zero-emission project

Action 5: Expand low-carbon/decarbonized business by leveraging the Group's collective strengths

**Powered by the wind and produce hydrogen. Dream vessels that don't need bunkering start moving toward realization.**



- The Wind Hunter project is the ultimate zero-emission project combining sail technology, which uses offshore wind energy, and stable energy utilization technology, which leverages hydrogen generated by wind energy.
- By pursuing the potential of offshore wind power, we will actively participate in the development of clean energy supply chains and contribute to the realization of a decarbonized society.

Yacht "Winds Maru" sailing in Omura Bay, Nagasaki Prefecture.

A demonstration using a yacht was completed in December 2021. A 60-70m-class hydrogen-producing vessel with multiple sails is planned to be constructed as early as 2024.



At sea | Hydrogen production/storage



- When the wind is blowing strongly, the vessel navigates by wind power while using wind power to spin turbines in the water to generate electricity and produce hydrogen which is then stored.
- When the wind is weak, the vessel uses that stored hydrogen as a fuel cell generating power for the propellers.



At ports | Hydrogen supply



- We are also considering supplying hydrogen produced and stored on board for onshore use in the future.



## Section 4

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# Natural Capital /Biodiversity

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# MOL Group Approach

- Living in Harmony with Nature\* -

1

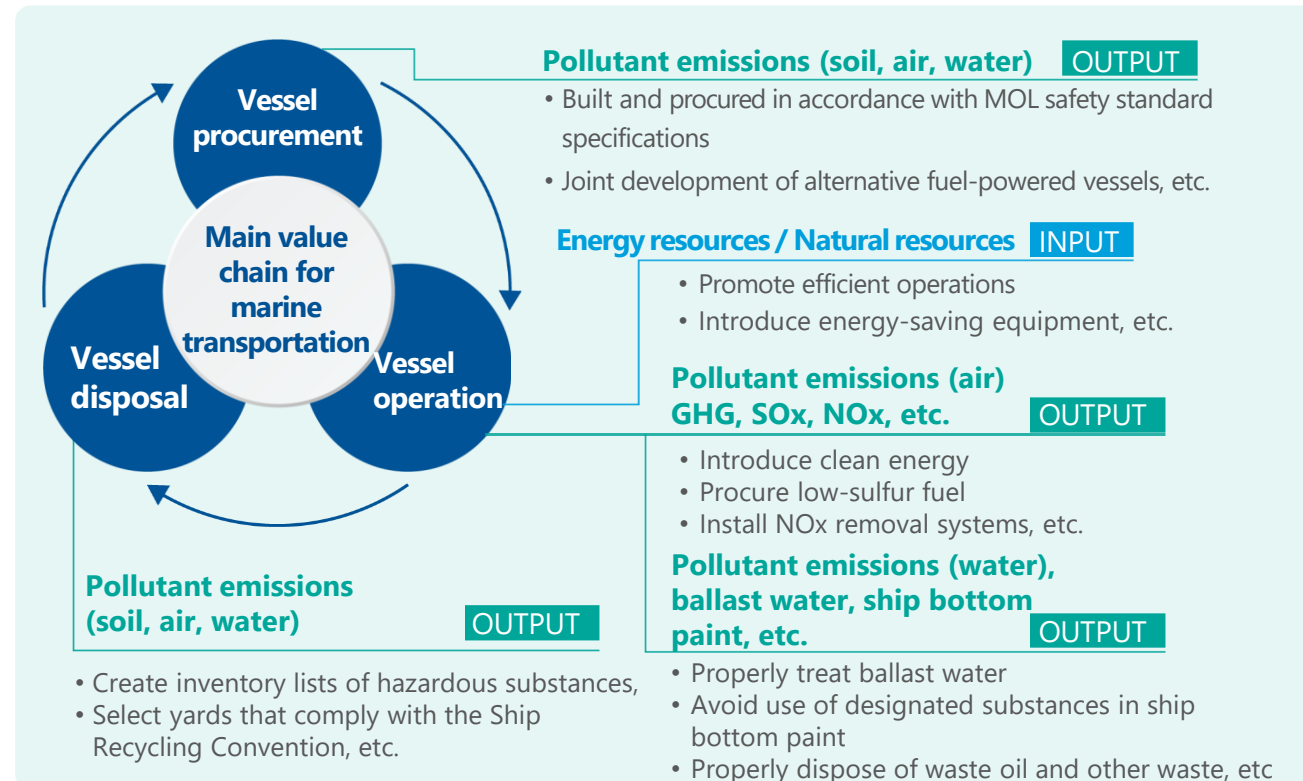
2

3

4. Natural capital/biodiversity

- Recognizing the impact of our business on nature, we regard not only climate change but also biodiversity, air pollution, and the marine environment - which is closely tied to marine transportation, our primary business - as broad environmental issues.
- We will also discuss and deliberate on natural capital and biodiversity in a similar way to climate change (⇒P.9).

## Map of the Relationship Between MOL Group and Biodiversity (marine transportation)



## Current Initiatives and Policy Going Forward

- Utilizing the TNFD\* framework and other resources, we began analyzing our dependencies and impacts on nature, as well as nature-related business risks and opportunities.
- We are implementing multifaceted efforts that can be taken immediately to reduce our business impacts on nature (⇒P.42).
- We have established quantitative milestones (⇒P.41), and will continuously improve our targets and KPI based on the latest international dialogues.

Related information (link to our website)

● MOL Sustainability Plan



See the Appendix (⇒P.46) for terms marked with an asterisk (\*).

Created by MOL with reference to the "Business & Biodiversity Interrelationship Map®" developed by the Japan Business Initiative for Biodiversity (JBIB)

## Quantitative Milestones

1

2

3

4. Natural capital/biodiversity

### Reduction of air pollutants

#### Reduce SOx\* emissions intensity by 14% by 2030 (compared to 2020\*)

KPI: SOx emissions per ton-mile (g-SOx/ton-mile)

SOx emissions intensity results  
⇒P.49

- In addition to complying with international regulations\*, we have voluntarily set a milestone for reducing air pollutants.
- We aim to achieve this by promoting the reduction of fuel consumption through efficient operations and by shifting to fuels with low sulfur content, such as LNG and ammonia.

### Resource use and energy use efficiency

#### Improve fuel efficiency by 5% by 2025 (compared to 2019)

KPI: Fuel efficiency (energy consumption per ton-mile)

Fuel efficiency results  
⇒P.49

- Recognizing that marine fuel is a valuable energy resource, we aim to effectively utilize fuel as an energy resource and improve energy efficiency through operation efficiency (⇒from P.24) and introducing energy-saving equipment (⇒from P.22).

### Biodiversity index

- We manage the ratio of vessels equipped with ballast water management system, and disclose the progress on this on our website.
- As of FY2021, that ratio was 91%, and we will complete equipping 100% of MOL Group-owned vessels in FY2023.

See the Appendix (⇒P.46) for terms marked with an asterisk (\*) and each milestone.

## Specific Efforts to Reduce Impacts

1

2

3

4. Natural capital/biodiversity

- We have already begun implementing initiatives to reduce impacts on nature in our value chain.
- We will continue improving and deepening our efforts while referring to the AR3T framework\* provided by SBTN\*, etc.



SBTN AR3T

### Avoid

- Promote the adoption of clean energy including zero-emission fuels (⇒from P.17) ▪ Strengthen systems to prevent oil spills
- Dialogue with shipyards to prevent environmental pollution in the ship-recycling process (impact avoidance/reduction program for the value chain).

### Reduce

- Introduce energy-saving equipment (⇒from P.22) ▪ Promote efficient operations (⇒from P.24) ▪ Properly manage ballast water
- Properly manage biofouling on vessels ▪ Install onboard SCR (selective catalytic reduction) systems
- Install onboard EGR (exhaust gas recirculation) systems

### Restore & Regenerate

- Participate in mangrove restoration and conservation project (South Sumatra, Indonesia)
- Purchase "J Blue Credits" to support seagrass restoration and conservation (Japan: Port of Yokohama, Port of Tokuyama Kudamatsu, Hyogo Canal)
- Develop green spaces in Daibiru buildings (Osaka, Japan) ▪ Install microplastic collection devices on vessels
- Install Seabin, a floating garbage collection device (Hiroshima Port, Japan) ▪ Collect marine debris (Indonesia) ▪ Coastal cleanup activities (offshore of Kashima, Japan)

### Transform

- Participate in initiatives (TNFD Forum, 30by30 Alliance for Biodiversity established by the Ministry of the Environment, etc.)
- Contribute to the development of meteorological service by continuously providing maritime meteorological data to the Japan Meteorological Agency, etc.
- Contribute to an environmental restoration and conservation project and local communities in Mauritius (⇒P.43)
- Have dialogue with shipyards, ship owners, customers, etc. to promote the adoption of alternative fuel-powered vessels

See Appendix (⇒P46) for terms marked with an asterisk (\*).

Related information (link to our website)

● Preservation of marine environments / Protection of biodiversity





# Initiatives in Mauritius

- Environmental Restoration and Conservation Project and Contribution to Local Communities -

1

2

3

4. Natural capital/biodiversity

- Since the 2020 oil spill incident by WAKASHIO, a vessel chartered by MOL, we have been carrying out activities to restore and conserve the environment in the Republic of Mauritius and to contribute to local communities.
- We will continue to support long-term environmental conservation activities and the development of local communities through the two funds established for the purpose of supporting the resolution of societal issues.

Related information

Initiatives in Mauritius are updated on our website from time to time.

● MOL for Mauritius



## MOL Mauritius International Fund (Established in Japan)

- Support for large-scale project for up to five years
- Since the establishment in 2021, we have been calling for grant projects every year.
- Disclose reports based on social impact assessments
- Funded a total of 11 projects in the first year



Contribution of a total of  
¥800M planned

## MOL Charitable Trust (Established in Mauritius)

- Support for projects that consider the people of Mauritius
- In addition to the environment, we call for more detailed projects every year in cooperation with the local community, such as education and employment support.
- Our activities are disclosed in quarterly publications and website
- We funded a total of 22 projects in the first year



## Restoration and conservation of nature and ecosystems Mangroves & coral reefs



- Support mangrove and coral reef survey projects by experts and NGOs
- Support environmental restoration projects by local NGOs, etc.



## Biological protection and research Wild birds and rare organisms, including endemic species



- Implement impact surveys on birds
- Support waterfowl research projects in collaboration with local residents
- Support projects to restore the ecosystems of rare species on the island, etc.



## Support for the development of local communities Industrial support and education



- Support fisheries workers and fishery development projects in collaboration with local NGOs
- Support educational facilities and donate picture books and gifts to children

## Stakeholder engagement related to natural environment restoration and social contribution in Mauritius

- The steering committee of both funds is made up of experts
- Cooperation with the governments of Mauritius and Japan
- Roundtable discussions with environmental NGOs and experts

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# Appendix

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# Notes on Methodology and Data

## P.10 FY2021 MOL Group GHG Emissions

- Scope: Mitsui O.S.K Lines, Ltd. and its major Japanese and overseas consolidated subsidiaries (coverage ratio in terms of consolidated sales: 96%), calculated based on control-approach. Scope 2 emissions are location-based.
- Subject period: Based on the fiscal year (April to March)
- Conversion factors: IMO 4th GHG study (2018); Ministry of the Environment, Japan, The Calculation, Reporting, and Publication system & Emissions Intensity Database for Calculating Greenhouse Gas Emissions of Organizations Throughout the Supply Chain; IDEA v.2; IEA Emissions Factors (2021); etc.

## P. 10 GHG Emissions Intensity

- Scope: Mitsui O.S.K Lines, Ltd. and its major Japanese and overseas ocean-going vessel operators
- Definition of "GHG emissions intensity": The definition used is in accordance with the Energy Efficiency Operational Indicator (EEOI). It refers to GHG emissions per unit of transport (ton-mile \*1) (g/ton-mile). GHG emissions are converted under the GLEC Framework (\*2) and include emissions from the combustion stage (Scope 1) and emissions from the manufacturing stage (Scope 3/ Category 3).

(\*1) Ton-mile: A unit of business volume commonly used in the shipping industry. Calculated as the volume of cargo transported (tons) x the shipping distance (miles).

(\*2) GLEC Framework: A framework for calculating supply chain emissions in the logistics sector provided by the Global Logistics Emissions Council (GLEC).

- Company-wide total intensity calculation method: Calculated using the following two methods.
  - 1) Standard method: A method designed to correct the impact of difference in absolute value of the intensity derived from the business characteristics of each sector on the calculation of the company-wide total value, and to properly reflect the efficiency performance of each sector in the company-wide total value. The total value is calculated by the following method.
    - For the base year: Calculated by dividing the total GHG emissions of all sectors by the total ton-miles of all sectors.
    - For target years after the base year: Calculate the EEOI reduction rate compared to the base year for each sector. Then, each sector's contribution ratio to the overall is calculated

according to the business scale calculated based on the energy consumption of each sector, and the group total EEOI reduction rate is calculated by weighted average using the contribution ratio of each sector.

- 2) Reference method: Calculated by dividing the total GHG emissions of all sectors by the total ton-miles of all sectors (calculated using the same method for both the base year and the target year).

Note: For other detailed environmental data, please refer to the Sustainability Data page of our website ([link](#)).

## P. 12 & 14 Total GHG Emissions Milestones

- Scope: Mitsui O.S.K Lines, Ltd. and its major Japanese and overseas consolidated subsidiaries (Scope 1 & 2 emissions)

## P.13 Counting of carbon dioxide removal in Medium- to Long-Term Emission Reduction Targets

In the net-zero target year (2050), net emissions will be calculated by offsetting the remaining gross emissions with carbon dioxide removal(CDR). However, in calculating annual emissions for terms prior to that, gross emissions will be used, and CDR will not be used to make offsets.

## P.17 Milestones for Adopting Alternative Fuels

- Scope: Ocean-going vessels operated by the Group
- "Ratio of zero-emission fuel used: 5%": Clean ammonia, e-methanol, e-LNG, and other fuels are envisioned as candidates for zero-emission fuels.
- "No. of LNG/methanol-fueled ocean-going vessels: 90": This is the number of vessels fueled by LNG or methanol. LNG carriers and methanol carriers are not included.
- "No. of net zero emissions ocean-going vessels: 130": Number of vessels with engines that can use fuels recognized as zero-emission. Clean ammonia, e-methanol, e-LNG and other fuels are envisioned.

## P.17 Change in Composition of MOL's Ocean-Going Fleet by Fuel Type

- "e/bio methane and methanol": e-Methane and e-Methanol is methane/methanol produced by synthesizing CO<sub>2</sub> and hydrogen produced from renewable energy. Bio-methane/bio-methanol is methane/methanol produced from biomass such as food residues and livestock manure.



# Notes on Methodology and Data

## P.21 Power from Renewable Energy Milestone

- Scope: Scope 2 power emissions for all group business segments on a consolidated basis
- "Ratio of power from renewable energy for Scope 2": The ratio of power from renewable sources to power consumption. In addition to power supplies from renewable energy power generation facilities, CO2-free electricity and environmental certificate arrangements are also included.

## P.22 Wind Power Utilization Milestone

- Scope: Ocean-going vessels in which the MOL Group is involved (including vessels that are owned but not operated by MOL in addition to MOL-operated vessels).

## P. 24 Fuel Efficiency Improvement Milestone

- Scope: Ocean-going vessels operated by the Group
- "Fuel efficiency": Energy consumption per ton-mile, measured in MJ (megajoules) per ton-mile. Since the purpose of operation efficiency is not only to reduce GHG emissions, but also to "reduce fuel consumption" and "minimize energy used", energy consumption per ton-mile (MJ) was set as a KPI. In order to measure efficiency improvement performance in the same way whether the fuel used is heavy oil or a low-emission fuel, the same index is used instead of the GHG emissions intensity.

## P. 28 Initiatives for Carbon Dioxide Removal

- "BVCM": Beyond Value Chain Mitigation. The basic concept in this document conforms to the framework presented in the "SBTi Corporate Net-Zero Standard" (Oct, 2021). BVCM refers to mitigation actions or investments that fall outside of a company's value chain. While not accounted for reductions in emissions within the value chain (Scope 1, 2, and 3 emissions under the GHG Protocol), BVCM is considered an important climate responsibility as it will add to our chances of keeping 1.5°C within our reach.
- "Future MOL Residual Emissions": Based on the methodology set forth in this Standard, it is assumed that we will aim for zero gross emissions in the net zero target year (2050), and if residual emissions occur in the same year, we will neutralize them via permanent carbon removal and sequestration from the atmosphere.

## P. 40 Natural Capital / Biodiversity

- "Living in Harmony with Nature": A global goal adopted at COP15 in December 2022, following its adoption as an Aichi Target

- "TNFD": Taskforce on Nature-related Financial Disclosures. An international initiative that calls on companies to disclose information on business opportunities and risks from the perspective of natural capital and biodiversity.

## P. 41 Air Pollutant Reduction Milestone

- Scope: Ocean-going vessels operated by the MOL Group.
- "SOx": Sulfur oxide (SOx) is generated when sulfur contained in marine fuel binds to oxygen in the atmosphere during combustion. It is believed that when this is dissolved in, e.g., rain, it causes acid rain, melting the surfaces of buildings and causing adverse impacts on plants and underwater life.
- Reason for setting 2020 as the base year: Regulations on the maximum sulfur content in marine fuels was tightened and the upper limit was significantly lowered in January 2020. We set 2020 as the base year.
- "International regulations": Regulations that control the maximum sulfur content in fuel oil in order to limit the amount of SOx in exhaust fumes. The regulation values have been gradually tightened. In January 2020, the regulation value for the maximum sulfur content in general sea areas was lowered to 0.5%.

## P. 41 Milestone for Resource Use and Energy Use Efficiency

- Scope: Ocean-going vessels operated by the MOL Group.

## P. 41 Biodiversity Index

- "Ballast Water Processing Equipment": In order to minimize the cross-border movement of marine organisms due intake/release of ballast water when loading and unloading cargo, MOL has been installing ballast water processing equipment since FY2014, before international regulations came into effect.

## P. 42 Specific Efforts to Reduce Impact

- "SBTN": Science Based Targets Network. Initiatives to develop methods for setting science-based targets for a sustainable global system.
- "AR3T Framework": A series of actions put forward by SBTN for companies to take to first avoid damages to the natural environment (Avoid), reduce these when these damages cannot be avoided (Reduce), contribute to restoring and regenerating nature (Restore and Regenerate), and transform fundamental systems (Transform)

# Notes on Methodology and Data

## Rationale for the GHG emissions intensity calculation method for the company-wide total value

In calculating the company-wide total value for GHG emissions intensity (EEOI), we use the two methods previously mentioned, and we have adopted the "standard method" as the MOL standard for calculation. The approach behind this is explained below.

Comparing standard EEOI values for each vessel type shows that there are significant differences in the values depending on the characteristics of the cargo that is subject to calculation. For example, if you compare a vessel carrying heavy cargo per volume (e.g., a dry bulk carrier) with a vessel carrying relatively light cargo (e.g., a vehicle carrier), there will naturally be a significant difference in ton-miles between the two vessels. As a result, the EEOI value of vehicle carriers may be several to ten times or more than that of dry bulk carriers of the same size and same fuel consumption. In reality, even two vessels with the same level of environmental performance will have an extreme difference in their EEOI evaluation due to the characteristics of the cargo they carry.

These differences in EEOI values due to characteristics of the cargo cause issues with calculating the company-wide EEOI value. If we simply divide the total emissions of all sectors by the total ton-miles ( $\Rightarrow$  the "reference method"), a change in the ton-miles of a vessel carrying lighter cargo per volume will cause a bigger change in the company-wide EEOI value.

This is a serious problem for a general shipping company like MOL, which operates various types of vessels. The EEOI is a widely used metric of business volume in the shipping industry, but the nature of this metric creates such distortions when evaluating across different vessel types.

If the reference method is used, companies operating two or more vessel types with significantly different EEOI levels can improve their emissions intensity by changing their business portfolios. Following the above example, if we reduce the ratio of car carrier business and increase the ratio of dry bulk business, that alone will greatly improve our EEOI value. However, we believe that this is not a legitimate representation of the company's decarbonization performance.

As a member of the shipping industry, which itself is a part of society's infrastructure, we are committed to our mission of contributing to the development of the world and sustaining people's lives. Rather than turning to the approach of reducing the ratio of car transportation to reduce our emissions intensity, we believe that it is in the true public interest to achieve emissions reductions by improving the efficiency of automobile shipping itself while fulfilling our social responsibility by responding to the demand for automobile shipping, which is a key business for society, as long as that demand exists.

In accordance with this approach, we have adopted the "standard method" as our standard calculation method in order to appropriately reflect the rate of change in emissions intensity for each business division in the company-wide total value of emissions intensity.



# Track Record of Environmental Impact Reduction

Related information

● Sustainability data (link to our website)



		FY2019	FY2021	Remarks
GHG emissions	Scope1+2+3 (ton)	14,309,091	12,603,384	
	Scope1 (ton)	11,136,501	10,112,053	
	Scope2-Location-based (ton)	45,116	39,018	
	Scope2-Market-based (ton)	-	35,887	Started the calculation of market-based from FY2021.
	Scope3 (ton)	3,127,474	2,455,444	
	GHG emissions intensity (g-CO2e/ton-mile)	10.86	10.46	Standard method (⇒P.47)
	GHG emissions intensity (g-CO2e/ton-mile)	10.86	10.74	Reference method (⇒P.47)
Air pollutant emissions	SOx emissions (thousand tons)	130	28	The upper limit of sulfur content ratio in fuel was lowered from January 2020. (⇒P.46)
	NOx emissions (thousand tons)	272	231	
Energy consumption	Total (thousand GJ)	158,105	146,748	
	HFO (thousand tons)	3,273	2,925	
	MDO/MGO (thousand tons)	255	282	
	Electricity (MWh)	86,924	80,475	
	(Electricity derived from renewable energy)	(237)	(3,532)	

## Environmental Management System

MOL group has built the environmental management system called "MOL EMS21," and been struggling for the reduction of environmental burden, not only the appropriate collection, management, and disclosure of various environmental data. We have been upholding the qualification of ISO14001 since 2003 and working for continuous improvement activity with using PDCA cycle. Please refer to our website for more details ([link](#))



# KPI Results

Division	KPI (Key Performance Indicator)	FY2019	FY2021	Milestones
ACTION 01	Ratio of zero-emission fuel used (%)	0	0	2030 : 5%
	No. of LNG/methanol-fueled ocean-going vessels (Already in service)	2 (0)	6 (0)	2030 : 90 vessels
	No. of net zero emissions ocean-going vessels	0	0	2035 : 130 vessels
	Ratio of power from renewable energy for Scope 2 (%)	0.3	4.4	2030 : 100%
ACTION 02	No. of vessels equipped with Wind Challenger	0	0	2030 : 25 vessels 2035 : 80 vessels
ACTION 03	Fuel efficiency (Energy consumption per ton-mile)	0.1273	0.1237 (▲2.8% compared to 2019)	2025 : ▲5% compared to 2019
ACTION 04	Amount of removal type carbon credits used (t-CO2)	0	0	2030 : 2.2 million t-CO2
Climate change measure	GHG emissions (thousand tons) Range of consolidation : Scope1+2	11,182	10,148 (▲9% compared to 2019)	2030 : ▲23% compared to 2019
Climate change measure	GHG emissions intensity (g-CO2e/ton-mile) Standard method (⇒P47)	10.86	10.46 (▲3.7% compared to 2019)	2035 : ▲45% compared to 2019 (Medium- to long-term targets) Reduce 1.4% per year (compared to 2019, average through 2030)
Climate change measure	Environmental investment (billion yen)	-	76.1	FY2021-23 in total : Approximately 200 billion yen *1
Prevention of air pollution	SOx* emissions intensity (g-SOx/ton-mile)	0.0223 (No. of FY2020)	0.0252 (compared to 2020+13.0%) *2	2030 : ▲14% compared to 2020
Efficient utilization of Energy & resources	Fuel efficiency (Energy consumption per ton-mile)	0.1273	0.1237 (▲2.8% compared to 2019)	2025 : ▲5% compared to 2019

\*1 This is the milestone of "MOL group Environmental Vision 2.1(announced in June 2021). We have set the new milestone in the vision 2.2 : "Investments of 650 billion yen over the three years from FY2023 to FY2025"

\*2 Because of the increase of averaged sulfur content in fuel.

