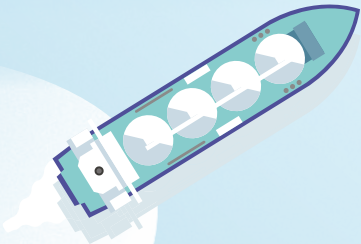




SECTION

# 04 | Environmental



## Environmental Management

### "K" LINE Group Environmental Policy

#### "K" LINE Group Environmental Policy

The "K" LINE Group is aware that our business activities can have an impact on the global environment, and we therefore set forth in our environmental policy our determination and commitment to minimize the impact of our business activities on the global environment.

So that we can successfully promote our environmental activities in accordance with the environmental policy, the Corporate Sustainability Management Committee, which is led by the president & CEO, discusses and develops policies for promoting the sustainability activities of the entire "K" LINE Group with two subcommittees: the Sustainability Sub-Committee and the Environmental Sub-Committee. The Environmental Sub-Committee

meets twice a year, bringing together top management, environmental managers, and assistant environmental managers from each division of the Company to prepare basic plans and set targets on environmental matters for the Group, monitor progress toward these targets, evaluate the results, and reconfirm or review the targets.

In addition, all Group companies come together so that the entire staff working for the "K" LINE Group unites to promote environmental activities, and we hold a Group Environmental Conference every year to discuss and share awareness of current environmental issues.

### "K" LINE Group Environmental Policy

#### ► Core Concept

The "K" LINE Group is aware and recognizes that addressing environmental concerns is an issue shared by all humankind. Therefore, the "K" LINE Group is taking proactive measures as an essential condition for its existence and for conducting a business enterprise, striving to reduce the environmental impact of its business activities and seeking to contribute to the development of a sustainable society.

#### ► Conduct Guidelines

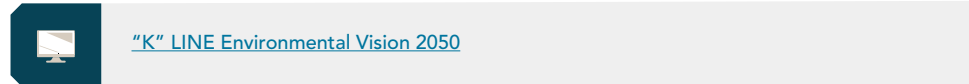
1. We are setting objectives and targets for environmental preservation and making improvements on an ongoing basis to reduce the impact on the environment from our business activities. Furthermore, we are complying with all environmental treaties, laws, and regulations as well as policies and voluntary standards to which the "K" LINE Group has consented.
2. We are striving to protect the global and marine environment through fleet-wide implementation of safe operation practices and are establishing the organizations and structures necessary for such implementation.
3. We are promoting research, development, and introduction of ship facilities and equipment to improve ship energy efficiency and operating efficiency, which results in the reduction of greenhouse gas emissions and the prevention of atmospheric pollution.
4. In consideration of biodiversity, we are maintaining an awareness of the impact that the transport of ballast water and living organisms that attach to ship hulls have on ecosystems and are working to protect those ecosystems.
5. We are contributing to establishing a recycle-based society by promoting the 3Rs (reduce, reuse, and recycle) and the effective re-use of resources, including ship recycling.
6. The entire "K" LINE Group is and will continue to support and participate in social contribution activities intended to protect the environment.
7. We are conducting education and training programs to elevate awareness and understanding of environmental preservation issues among each member of the entire "K" LINE Group.

Revised in August 2012

**"K" LINE Environmental Vision 2050: Long-Term Environmental Guidelines for 2050**

**Revised "K" LINE Environmental Vision 2050: 2050 Goals and 2030 Interim Milestones**

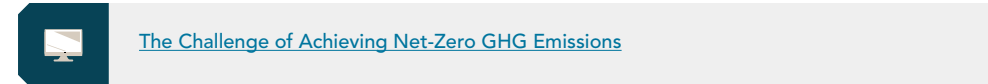
We successfully achieved most of the 2019 interim milestones of the "K" LINE Environmental Vision 2050, which was formulated by the "K" LINE Group in March 2015. At the same time, we recognize that the business environment and demands of customers have changed since the formulation of the vision and there is a need to respond to the impact of climate change and the increasing demands for decarbonization. Accordingly, in June 2020, we announced our revised "K" LINE Environmental Vision 2050, with targets reorganized around the two issues of decarbonization and the aim for zero environmental impact. This vision shows the formulation of new 2050 goals and 2030 interim milestones.



["K" LINE Environmental Vision 2050](#)

**Revision of 2050 Targets: The Challenge of Achieving Net-Zero GHG Emissions**

In November 2021, we revised the 2050 goals for decarbonization in the "K" LINE Environmental Vision 2050. Reinforcement of global climate change countermeasures has become an urgent issue and the drive to achieve net-zero greenhouse gas (GHG) emissions by 2050 is gaining momentum in every country and every industry. Amid these circumstances, the Group is also taking on the challenge of raising its target even further to net-zero GHG emissions by 2050.



[The Challenge of Achieving Net-Zero GHG Emissions](#)

**System**

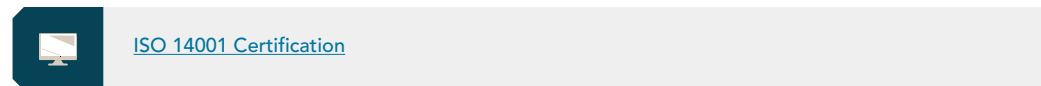
**Environmental Management System**

**► Establishment of an Environmental Management System (EMS)**

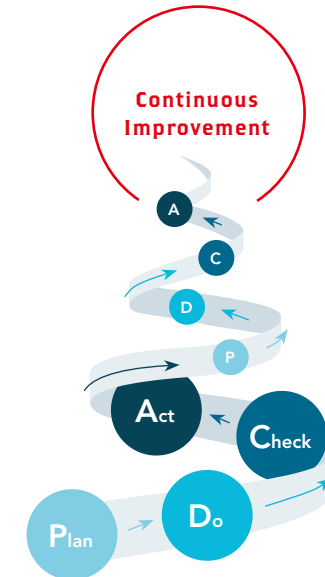
We have established an EMS based on ISO 14001\*1 and operate it to make constant improvements by identifying environmental impacts and minimizing them. We implemented the EMS in February 2002, after obtaining certification from a third-party organization. Since then, we have been striving to enhance our environmental activities by using annual reviews and renewal periods to check and ensure that our EMS complies with the ISO 14001 standard, is conducted in line with the PDCA cycle,\*2 and is improved and corrected accordingly.

\*1 ISO 14001 is an international EMS standard set by the International Organization for Standardization (ISO). Requirements for the EMS are stipulated in ISO 14001.

\*2 Processes are separated into four steps: plan, do, check, and act (PDCA). Following this cycle is one management method to continuously improve business activities.



[ISO 14001 Certification](#)



### ► Acquisition Status of Environmental Certification

"K" LINE Group companies have acquired various environmental certifications, including ISO 14001, and we are making a Groupwide commitment to environmental protection. Group companies that have acquired ISO 14001 certification account for around 79% of our Groupwide net sales.



[Acquisition Status of Environmental Certification](#)

## Environmental Targets and Results

### Action Plan / Environmental Targets

Based on our EMS, we continuously run our PDCA cycle. We have set our environmental targets for the year in line with the "K" LINE Environmental Vision 2050 and "K" LINE Group Environmental Policy. We have appropriately reviewed our achievements and have used these outcomes to set our targets for next year. These environmental targets include not only measures related to ship operations but also specific measures for office sites, such as the reduction of both water consumption and waste.



[Environmental Targets for 2023](#)

### ► DRIVE GREEN NETWORK

Guided by "K" LINE Environmental Vision 2050, our long-term environmental management vision, we are building and operating DRIVE GREEN NETWORK, a framework to promote environmental management for the entire Group.

We are using DRIVE GREEN NETWORK to centrally control our environmental management initiatives (such as setting environmental policies and targets and working to achieve them) through internal audits and the like. We aim to continuously pursue environmental protection activities by actively using the PDCA cycle while ensuring environmental compliance across the entire Group.

The name DRIVE GREEN NETWORK reflects our desire of inheriting the spirit put into the construction of the DRIVE GREEN HIGHWAY, our environmentally friendly next-generation flagship completed in 2016 under the concept of getting one step ahead for the future.

### Results of Our Environmental Activities



[2022 Results](#)

## Response to Climate Change

### Approach

#### Environmental Initiatives and Response to the TCFD

Climate change is expected to expose humankind to major physical risks, such as serious natural disasters.

In June 2020, we reviewed our “K” LINE Environmental Vision 2050, and based on the results of the scenario analysis proposed by the Task Force on Climate-related Financial Disclosures (TCFD), we identified issues to be addressed and revised some targets.

Furthermore, in November 2021, we recognized global climate change countermeasures as an issue that must be strengthened by the entire international community, and we therefore set a higher challenge of net-zero GHG emissions by 2050.

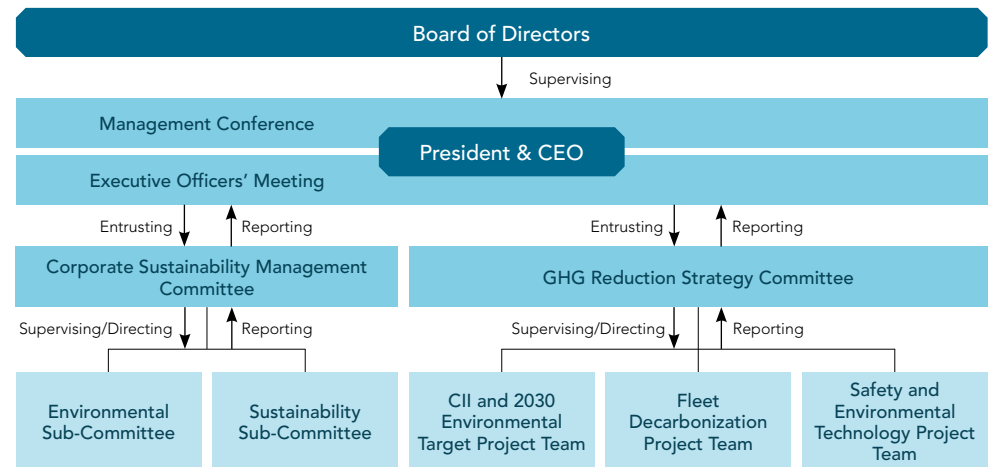
In addition, as a long-term vision in our medium-term management plan announced in May 2022, we are committed to smoothly switching to other forms of energy for our company and society. We will promote the realization of a low-carbon and carbon-free society.

### Environmental Governance

#### Governance System for Environmental Risks and Opportunities

In April 2021, the “K” LINE Group restructured the existing organization and reformed the promotion system for sustainability to ensure it is a key management objective. The Corporate Sustainability Management Committee, chaired by the president & CEO, is enhancing corporate value by reviewing and formulating a promotion system for the “K” LINE Group’s sustainability management. Additionally, in October 2021, we established the GHG Reduction Strategy Committee by integrating the Alternative Fuel Project Committee, which is in charge of accelerating initiatives for conventional vessels fueled by liquefied natural gas (LNG) and the LNG fuel supply business and examining next-generation fuel and new technologies, with the Environment / Technology Committee, which formulates measures for compliance with environmental regulations, including technical aspects. Each of these two committees functions as a forum for strategic discussions.

The Environmental Sub-Committee, a subcommittee under the Corporate Sustainability Management Committee, is responsible for operating the environmental management system (EMS) formulated in accordance with the “K” LINE Group Environmental Policy and the standards of the International Organization for Standardization (ISO). The subcommittee is also responsible for promoting other environmental activities.



Risks and Opportunities

Implementing Scenario Analysis

The Paris Agreement sets out a long-term target to pursue efforts to limit the average global temperature rise to 1.5°C, well below 2°C, compared with preindustrial levels.

In the spirit of the Paris Agreement, the International Maritime Organization (IMO), a specialized United Nations agency for maritime issues, has set targets and measures for international shipping activities. We are working to reduce the GHG emissions from our business activities in line with the IMO's policies, but we recognize that efforts to reduce

GHG emissions may be insufficient, and that the 4°C warming scenario and the intensification of physical risk is a possibility. The Group must build the resilience to adapt to those conditions to ensure that its business operations will continue. We have formulated road maps for how the Group should prepare for the anticipated negative (risks) and positive (opportunities) aspects of both the below 2°C warming scenario and the 4°C warming scenario.

**Scenario 1** Mainly transition risks related to the shift to a carbon-free society

- Stricter regulations, such as a carbon tax
- Customer actions to realize low or zero-carbon emissions
- Carbon capture and reuse, hydrogen, and other technologies enabling low-carbon and carbon-free energy
- Need for new low-carbon and carbon-free energy supply and transportation

**Scenario 2** Mainly physical risks due to climate change

<p><b>Natural disasters (acute risk)</b></p> <ul style="list-style-type: none"> <li>• More typhoons and cyclones</li> <li>• Intensifying natural disasters</li> </ul>	<p><b>Changes in the natural environment (chronic risk)</b></p> <ul style="list-style-type: none"> <li>• Rising sea levels</li> <li>• Changes in the land environment</li> <li>• Changes in the ocean environment</li> </ul>
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**What We Must Do**

**Hardware**

- Install energy-saving equipment to improve ship operating efficiency
- Launch ships with low-carbon or new zero-emission fuels and propulsion technologies
- Make ships physically stronger

**Software**

- Enhance digital and automation technologies to make operations safer and more efficient
- Raise employee awareness and provide training in new technologies
- Construct a corporate structure capable of flexibly responding to needs, such as for reconstruction assistance

**Business activities**

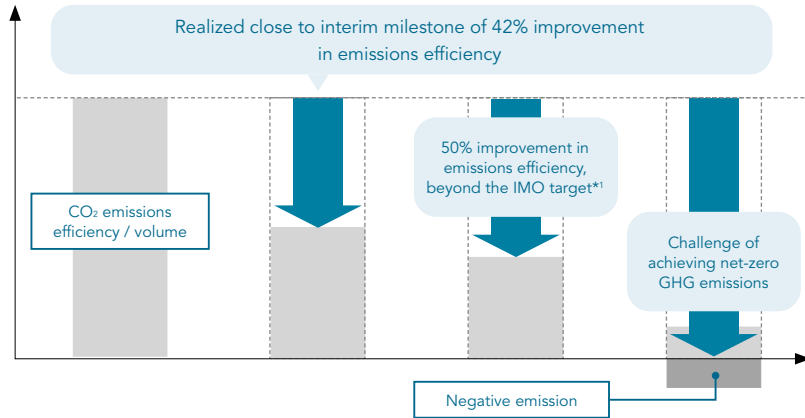
- Develop and enter new energy supply and transportation businesses
- Prepare fleet for new transportation technologies
- Increase capability for green ship recycling
- Participate in collection and study of marine plastic pollution
- Increase dialogue with administrators involved in improving port facilities, roads, and other infrastructure
- Increase involvement in policy-making with governments, the United Nations, and NGOs

Indicators and Targets

Aim for Net-Zero GHG Emissions

We will steadily promote an action plan for achieving the interim milestones for 2030 that have been set out in our “K” LINE Environmental Vision 2050.

We will take on the new challenge of achieving net-zero GHG emissions as a target for 2050. We will aim to help enrich the lives of people by also promoting support for the shift to a carbon-free society.



	2008 (Base year)	2022 Present	2030 Interim milestone	2050 Target
CO <sub>2</sub> emissions efficiency*2	7.21	4.20	3.61	-
CO <sub>2</sub> emissions total volume*3	13.68 million	6.66 million	-	Net zero

\*1 IMO has set the target of 40% or more CO<sub>2</sub> emissions reduction by 2030 (per transport volume vs. 2008), a 5-10% ratio for zero-emission fuel usage by 2030, and net-zero GHG emissions by or around 2050.

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

\*3 Total volume of Scope 1 + 2, unit: ton

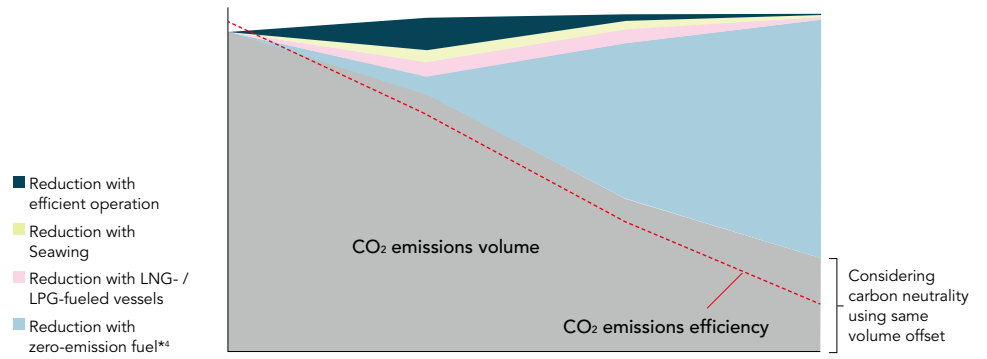
2030 Interim Milestones

“K” LINE low-carbon transition: Improve CO<sub>2</sub> emissions efficiency by 50% compared with 2008 levels  
 Support development of a low-carbon society: Transport and supply new energy for a low-carbon society

2050 Targets

“K” LINE decarbonization: The challenge of net-zero GHG emissions  
 Support the shift to a carbon-free society: Be the transporter and supplier of new energy

“K” LINE CO<sub>2</sub> emissions (Scope 1 + 2)



	2022	2030	2040	2050
LNG- / LPG-fueled vessels	1	45	40	10
Zero carbon emission vessels	0	20	130	200-250

\*4 Ammonia, hydrogen, methanol, and biofuel, etc.

Note: The road map is based on “K” LINE’s assumption on the development of related technology and infrastructure, related regulation, and economics as of today and is subject to change depending on future trends.

Strategies and Initiatives

Summary of Low-Carbon and Carbon-Free Initiatives

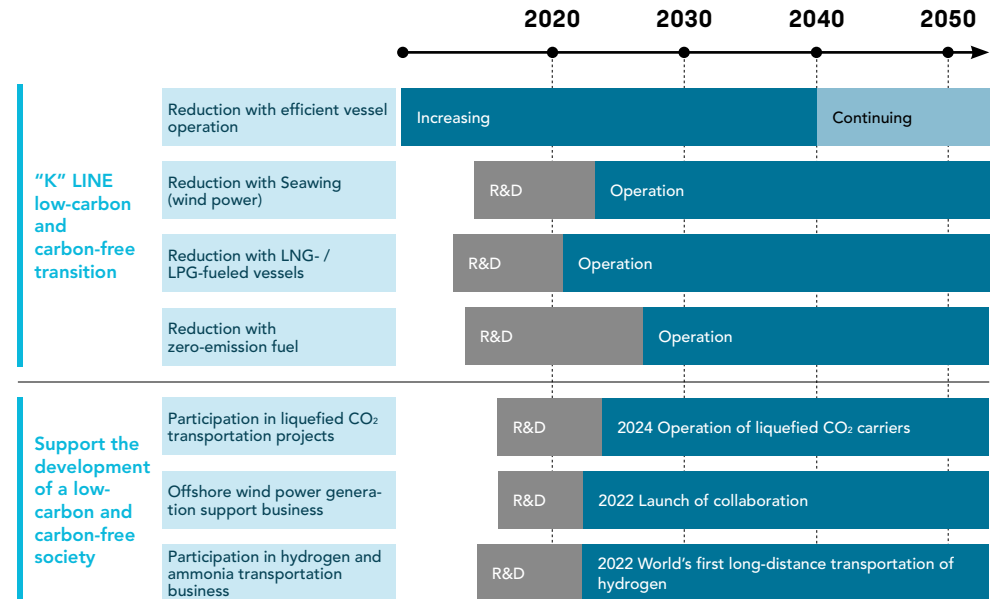
The "K" LINE Group is taking steps to reduce GHG emissions in order to achieve low-carbon and carbon-free itself and throughout society and will invest a total of ¥375 billion by 2026.

		Investment amount (-2026)	GHG emissions reduction effect	KPI for measuring progress
"K" LINE low-carbon and carbon-free transition	Fuel conversion (use of clean energy)	¥320.0 billion	20-30% reduction vs. previous vessels	Number of LNG- / LPG-fueled vessels
	LNG- / LPG-fueled vessels			
	Zero-emission vessels		Zero emission	Number of zero-emission vessels
	Environmentally friendly equipment (use of wind power, etc.)	¥17.0 billion	20% reduction vs. previous vessels	Number of ships with Seawing (-50 ships, 2030)
Development and demonstration of environmental technology	Installation of Kawasaki Integrated Maritime Solutions (operation efficiency)	¥10.0 billion	3-5% reduction vs. previous vessels	100%* installation of Kawasaki Integrated Maritime Solutions on owned / medium- to long-term chartered vessels
	Hybrid EV tugboats, etc.		-	
Support the development of a low-carbon and carbon-free society	New business that promotes low-carbon achievement	¥28.0 billion	-	Consider based on business characteristics (as of 2023, two liquefied CO <sub>2</sub> vessels have been decided on to be operated)
	Liquefied CO <sub>2</sub> transport			
	Support for wind power generation installations, etc.			

\* Already installed on owned vessels in operation. Kawasaki Integrated Maritime Solutions is planned to be basically installed on all newly built vessels. By the end of fiscal 2023, Kawasaki Integrated Maritime Solutions will be installed on all medium- to long-term chartered vessels (excluding short-term chartered vessels).

Note: KPIs are based on "K" LINE's assumption on the development of related technology and infrastructure, related regulation, and economics as of today and are subject to change depending on future trends.

Road Map for "K" LINE Low-Carbon and Carbon-Free Initiatives





## "K" LINE Low-Carbon and Carbon-Free Transition

While taking on the challenge of achieving net-zero GHG emissions in 2050, we will first work toward achieving the 2030 interim milestones set out in the "K" LINE Environmental Vision 2050 by making the shift toward ships fueled by LNG, ships fueled by liquefied petroleum gas (LPG), and ships that use new zero-emission fuels such as ammonia and hydrogen, from the perspective of achieving a low-carbon and carbon-free transition at "K" LINE. Additionally, we will promote initiatives for reducing CO<sub>2</sub> emissions, such as using the Seawing automated kite system (wind propulsion) and Kawasaki Integrated Maritime Solutions (integrated vessel operation and performance management system).

### ► 1. New Fuels (Fuel Conversion)

#### Expand introduction of LNG- / LPG-fueled vessels

- Expanding introduction of LNG- / LPG-fueled vessels in the 2020s, investing in approximately 45 vessels by 2030

#### Introduce LNG-fueled vessels

- Delivered "K" LINE's first LNG-fueled car carrier, CENTURY HIGHWAY GREEN, in March 2021
- Plan to deliver "K" LINE's first LNG-fueled cape-size bulk carrier in 2024
- Decided to invest in a further eight LNG-fueled car carriers between 2023 and 2025



CENTURY HIGHWAY GREEN

Approximately 25% to 30% reduction in CO<sub>2</sub> emissions compared with heavy-oil fueled vessels

#### Introduce LPG-fueled vessels

- A very large gas carrier (VLGC), which is capable of carrying LPG or ammonia, with a view to transporting ammonia in the future, was delivered in 2023.

Approximately 20% reduction in CO<sub>2</sub> emissions compared with heavy-oil fueled vessels

#### Introduce zero-emission vessels that use new fuels such as ammonia and hydrogen

- Plans to introduce about 20 vessels by 2030
- Considering the introduction of zero-emission fuels, such as ammonia and hydrogen, and carbon-neutral fuels, such as bio-LNG and synthetic fuel
- Implementing trial voyages using biofuels for vessels
- In 2022, Kawasaki Kisen Kaisha, Ltd. ("K" LINE), together with ITOCHU Corporation, Nihon Shipyard Co., Ltd., MITSUI E&S Co., Ltd., and NS United Kaiun Kaisha, Ltd., obtained an Approval in Principle (AiP) from Nippon Kaiji Kyokai (ClassNK) for the design of an ammonia-fueled vessel (200,000 deadweight ton class bulk carrier). The acquisition of the AiP is an important milestone for the social implementation of ammonia-fueled vessels, a new challenge for the maritime industry, and also an important step toward the further promotion of the integrated project being advanced by partner companies to develop ammonia-fueled vessels and create a global ammonia supply chain. "K" LINE and partners aim to take delivery of the vessel and begin its social implementation in 2026.
- Considering the target of commercialization and the introduction of zero-emission vessels in the second half of the 2020s
- Launching collaborative research on decarbonization with JSW STEEL
- Launching collaborative research on decarbonization with Emirates Global Aluminium
- Confirming construction of hybrid EV tugboats equipped with large-capacity lithium-ion batteries and generators

Zero CO<sub>2</sub> emissions



Photograph provided by Kawasaki Heavy Industries, Ltd.



Image of an ammonia-fueled vessel

## ▶ 2. Seawing Automated Kite System That Utilizes Wind Power Propulsion

- Developed in collaboration with French company Airseas, a spin-off from Airbus
- Considering expanding the use of this new technology, which can be installed on any type of vessel, including existing ones, to all vessels



LNG-fueled cape-size bulker

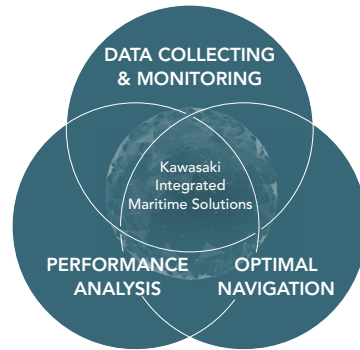
Expecting a reduction in CO<sub>2</sub> emissions of more than 20%

Pursuing a 45% to 50% reduction in CO<sub>2</sub> emissions through the synergistic effect of installation on LNG-fueled vessels

## ▶ 3. Improvement of Operational Efficiency

### Kawasaki Integrated Maritime Solutions (Integrated vessel operation and performance management system)

- Collects vessel operation data in real time, including fuel consumption, output power, and ship speed, and pursues the improved operational management of the vessel by using an optimal navigation system that calculates safe and fuel-efficient recommended routes
- Recently achieved visualization of performance degradation and impact of external disruption for each individual vessel using AI data analysis technology to further maintain and improve operational efficiency



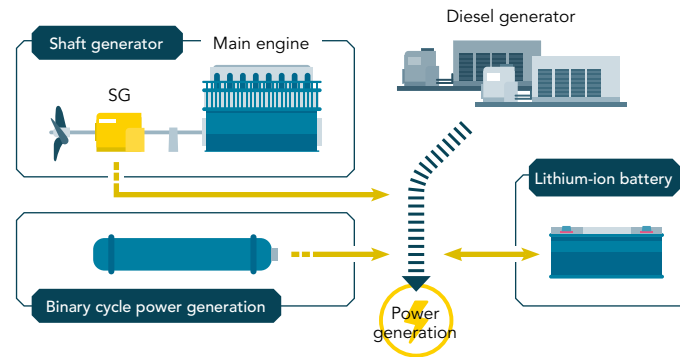
Approximately 3% to 5% reduction in CO<sub>2</sub> emissions through installation of Kawasaki Integrated Maritime Solutions

## ▶ 4. Other Energy-Efficient and Decarbonization Technology and Equipment

### Hybrid propulsion system

- Considering a hybrid propulsion system that combines a shaft generator, binary cycle power generation,\* and lithium-ion batteries

\* A method of generating electricity by heating and evaporating a working fluid with a low boiling point through low-level heat sources, such as warm water, low-pressure steam, or air, and using the steam to turn a turbine



### CO<sub>2</sub> capture plant on a vessel

- World's first CO<sub>2</sub> capture plant on a vessel installed on coal carrier CORONA UTILITY as part of demonstration projects for Carbon Capture on the Ocean (CC-OCEAN), an offshore CO<sub>2</sub> capture and storage plant, together with Mitsubishi Shipbuilding Co., Ltd., and Nippon Kaiji Kyokai (ClassNK)
- CC-OCEAN project wins Marine Engineering of the Year (Doko Memorial Award) 2021



## ▶ 5. Raising Funds through Climate Transition

- Raised funds through Japan's first climate transition loan (purpose-specified finance) for the LNG-fueled car carrier, CENTURY HIGHWAY GREEN, in March 2021
- Raised approximately ¥110 billion through Japan's first transition-linked loan (TLL) (purpose-unspecified finance) in September 2021. Funds to be used to finance a range of environmental countermeasures aimed at decarbonization

### ▶ 6. Launch of Internal Carbon Pricing

- Full-scale internal launch of operation in April 2021. From fiscal 2023, this has been calculated with reference to an economic index that takes into account a future earnings contribution of ¥14,000 per ton of CO<sub>2</sub>.
- Promote low-carbon transition and decarbonization projects by using them as an indicator for the evaluation of investment projects

## Supporting the Development of a Low-Carbon and Carbon-Free Society

We will promote initiatives, such as supporting the offshore wind power business, participating in and creating a fuel supply network for the hydrogen and ammonia transportation business, and participating in the CO<sub>2</sub> transportation business, as a target for supporting the development of a low-carbon and carbon-free society set out in the “K” LINE Environmental Vision 2050, which aims to achieve net-zero GHG emissions by 2050.

### ▶ 1. Support Offshore Wind Power Business

- Establishment of “K” Line Wind Service, Ltd., together with Kawasaki Kinkai Kisen Kaisha, Ltd., and provision of offshore support vessels and transport vessels for offshore wind farm businesses
- Supporting of target set by the Japanese government for the introduction of offshore wind power generation of 30 gigawatts to 45 gigawatts by 2040 from an operational and transportation perspective
- Launching of collaboration with Penta-Ocean Construction Co., Ltd., on ship management and other activities in the field of offshore wind power construction and maintenance
- In 2022, “K” Line Wind Service, Ltd., along with Marco Polo Marine Ltd., an offshore support vessel operator based in Singapore, signed an agreement to begin examining joint business development in offshore support vessels for wind turbines.



Offshore support vessel

### ▶ 2. Participate in Transportation of Hydrogen and Ammonia, and Create Fuel Supply Network

- Acquire basic authorization for fuel supply ships and advance studies to make ammonia fuel supply for ships a reality in Singapore
- Three Japanese shipping companies—Kawasaki Kisen Kaisha, Ltd., Mitsui O.S.K. Lines, Ltd., and Nippon Yusen Kabushiki Kaisha—along with Japan Suiso Energy, Ltd. (JSE)\*<sup>1</sup>, agreed on capital participation through a third-party capital increase\*<sup>2</sup> in JSE Ocean, Ltd., a subsidiary of JSE. They will collaborate on the establishment of marine transportation of liquefied hydrogen (LH<sub>2</sub>) in a commercial-scale global hydrogen supply chain.



Concept image of a 160,000 m<sup>3</sup> liquefied hydrogen carrier provided by Kawasaki Heavy Industries, Ltd.

\*1 JSE was established in June 2021 with the main objectives of research, planning, management, and investment in the international supply chain of LH<sub>2</sub>.

\*2 A method of raising capital by issuing new shares to a specific third party

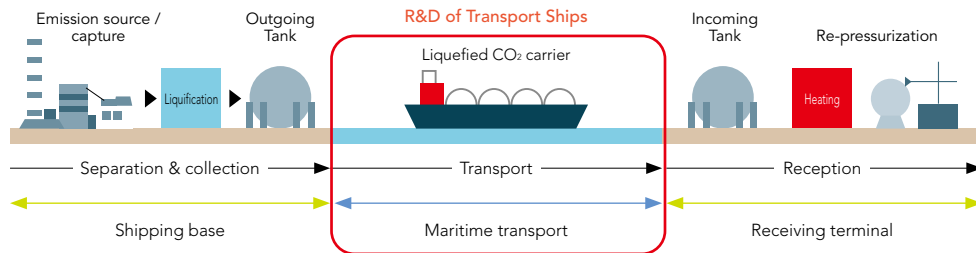
## ▶ 3. Participate in CO<sub>2</sub> Transportation Business

### Demonstration Test Ship for Liquefied CO<sub>2</sub> Transportation Launched in March 2023

- The “K” LINE Group is participating in the CCUS\*<sup>1</sup> R&D and Demonstration Related Project / Large-scale CCUS Demonstration in Tomakomai / Demonstration Project on CO<sub>2</sub> Transportation, which NEDO\*<sup>2</sup> opened to applications in fiscal 2021. The “K” LINE Group, along with ENAA, NGL, and Ochanomizu University, will engage in research and development and prepare to carry out transportation tests.
- Using its extensive experience in ocean-going liquefied gas vessels, and experience in the demonstration testing of liquefied hydrogen transportation ships, “K” LINE carried out a safety assessment of transportation and loading for the liquefied CO<sub>2</sub> demonstration test ship and created an operation manual. By analyzing this test data, “K” LINE will contribute to the establishment of technologies for the safe operation of liquefied CO<sub>2</sub> ships.
- The vessel EXCOOL was delivered in November 2023.



\*1 CCUS is an abbreviation for carbon capture, utilization, and storage. It refers to technologies for capturing, effectively utilizing, and storing emitted CO<sub>2</sub>.  
 \*2 NEDO is an abbreviation for the New Energy and Industrial Technology Development Organization. It is a national R&D institution that creates innovations through the development of technologies needed for a sustainable society.



Note: The above diagram is from Ministry of Economy, Trade and Industry materials.

### In December 2022, “K” LINE entered into long-term contracts with Northern Lights for two liquefied CO<sub>2</sub> vessels. —World’s First Full-Scale CCS Project—

- Kawasaki Kisen Kaisha, Ltd. (“K” LINE), and Northern Lights JV DA have signed Bare Boat Charter and Time Charter contracts for two 7,500 m<sup>3</sup> liquefied CO<sub>2</sub> ships. The ships will be delivered in 2024 and will contribute to the world’s first full-scale carbon dioxide capture and storage (CCS\*<sup>3</sup>) value chain.
- The London-based subsidiary “K” LINE LNG Shipping (UK) Ltd. will undertake the management of two ships transporting liquefied CO<sub>2</sub> from industrial emitters, including the Norcem Brevik and Hafslund Oslo Celsio carbon capture facilities, to the Northern Lights CO<sub>2</sub> receiving terminal in Øygarden, Norway.

\*3 Capture and storage of CO<sub>2</sub> emitted from industrial activities



Northern Lights liquefied CO<sub>2</sub> vessel  
 (Image provided by Northern Lights JV DA)



Northern Lights CO<sub>2</sub> receiving terminal  
 (Under construction in Øygarden, Norway)  
 (Image provided by Northern Lights JV DA)

## ▶ 4. Other Initiatives

- Collaborate with Chubu Electric Power Co., Inc., on a tidal energy project in Canada
- Looking into carbon credits, carbon offsets, etc.
- In September 2023, “K” LINE, along with Japan Petroleum Exploration Co., Ltd., and JGC Holdings Corporation, signed a basic agreement with PETRONAS CCS Ventures Sdn. Bhd., a subsidiary of Petroliaam Nasional Berhad, the state-run energy company in Malaysia, to examine the commercialization of CCS in Malaysia.
- In September 2023, “K” LINE, Sumitomo Corporation, Toho Gas Co., Ltd., and Woodside Energy Ltd signed an agreement to conduct a feasibility study to establish a CCS value chain between Australia and Japan.

## Related Data

CO<sub>2</sub> Emissions of "K" LINE Group

		(Tons)				
Category		2018	2019	2020	2021	2022
Scope 1		12,536,134	10,325,224	9,202,613	6,583,464	6,649,847
Scope 2	Location basis	27,306	26,397	25,191	13,769	11,556
	Market basis	23,135	26,220	21,780	13,515	10,472
Scope 3		1,424,198	1,304,803	1,219,525	4,566,051	4,506,111

Notes: 1. The scope of aggregation has been revised from 2021. Vessels not under our operations are excluded from Scope 1 and container vessels are included for Scope 3.  
2. In 2022, we reported 348 tons of biogenic CO<sub>2</sub> emissions from biofuel categorized in Outside of Scopes.



[Third-Party Verification Statement of Greenhouse Gas \(GHG\) Emissions Data](#)

## Fuel Oil Consumption

	(Tons)				
	2018	2019	2020	2021	2022
Fuel oil	3,823,776	3,140,039	2,809,074	1,980,630	1,923,950

Note: The scope of aggregation has been revised from 2021. Vessels not under our operation are excluded.

## Greenhouse Gas (GHG) Emissions per Deadweight Ton-Mile\*

	(g-CO <sub>2</sub> /ton-mile)				
	2018	2019	2020	2021	2022
All types of vessels	5.32	4.82	4.49	4.10	4.20

\* Index for transporting one ton of cargo one nautical mile (1,852 meters), based on deadweight tonnage (DWT).

Note: The scope of aggregation has been revised from 2021. Vessels not under our operation are excluded.

## Reducing “K” LINE’s Impact on the Sea and Air

### Approach

#### Basic Approach

Establishing and maintaining safe navigation is an unalterable mission in the marine transportation business. The “K” LINE Group states in its corporate philosophy and vision its aims “to provide safe and optimal services” and to contribute to society through safe vessel operations. At the same time, this means contributing to the reduction of the environmental impact on the oceans and atmosphere, and efforts to preserve biodiversity,

especially in the oceans, is an important theme for our business activities.

We will continue to strive to reduce the environmental impact of our vessel operations on the oceans and atmosphere by promoting initiatives, such as to eliminate oil pollution incidents, ballast water management, and SOx and NOx emissions reduction measures, and reducing the impact of vessel operations on marine mammals.

### Disclosure Based on the TNFD Framework

#### Implementation of the LEAP Approach

In November 2023, “K” LINE joined the Taskforce on Nature-related Financial Disclosures (TNFD) Forum.\*

Our business operations are dependent on natural capital, mainly marine resources, and we consider our efforts to address not only climate change issues but also biodiversity conservation, particularly in the marine environment, to be one of the most important themes in our business activities.

In conjunction with our participation in the TNFD Forum, we have recently implemented the LEAP approach proposed by the TNFD to assess environmental risks and the nature-related impacts of our operations and consider appropriate responses, as part of our information disclosure based on the TNFD framework.

The assessment and analysis were conducted with reference to the framework and with validation by Socotec Certification Japan Co., Ltd.

Based on a comprehensive understanding of climate change and natural capital, we will continue to assess, analyze, and disclose information with the aim of enhancing risk and opportunity management and building a sustainable future.

\* TNFD is an international initiative to establish a framework for the appropriate assessment and disclosure of risks and opportunities related to natural capital and biodiversity. The TNFD Forum is a group of stakeholders including companies, financial institutions, and research organizations.



[Disclosure in accordance with TNFD Framework](#)



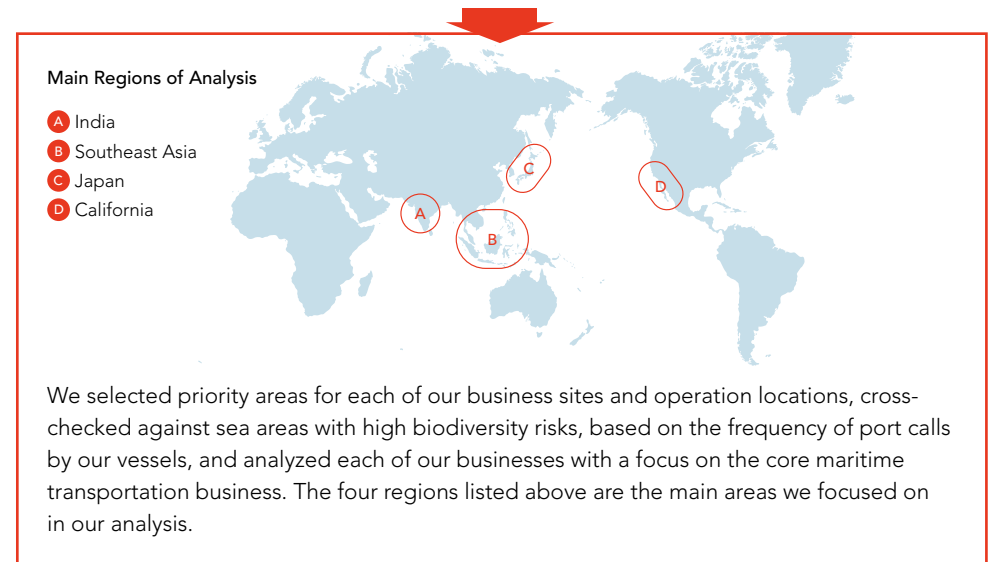
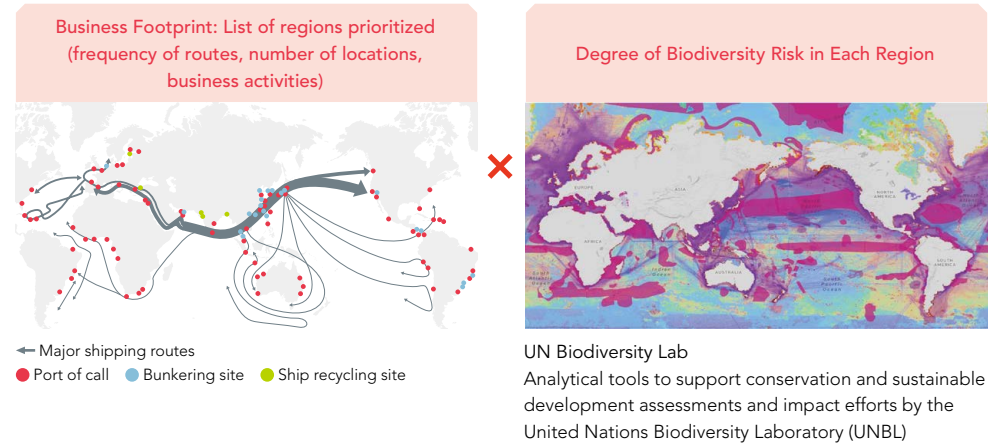
## Steps in the LEAP Approach



Our steps to disclosure in accordance with the LEAP approach are as shown above. At the Scoping / Locate steps, considering the footprint of our operations and their relationship to nature, we have identified regions for analysis in light of the importance of ecological integrity, biodiversity, and water stress (mainly the degree of marine pollution). In the Evaluate step, we used the "ENCORE"\* tool to analyze our dependency and impact on natural capital in these identified regions. In the Assess/Prepare steps, we identified risks and opportunities, while cross-checking our business activities with the key dependence / impact items identified in each region during the Evaluate step. We then revised our goals and strategies based on this evaluation.

\* In the natural capital field, the Natural Capital Finance Alliance, an international financial industry organization, jointly developed this analytical tool for assessing dependency and impacts on nature along with UNEP-WCMC (World Conservation Monitoring Center).

## 0. Scoping > 1. Locate Interactions between Our Business Activities (Shipping Business) and Nature



2. Evaluate Dependencies and Impacts

In each of the regions selected for Locate, we evaluated the degree of dependence and impacts of the nature-related aspects of our businesses.

Analysis of a company's dependence / impact on ecosystem services

The ENCORE tool was used to examine nature-related dependencies and impacts in the analyzed sectors and their potential dependencies and impacts on natural capital, and to analyze and evaluate the scope and degree of each dependency and impact and its details in relation to ecosystem services.

Analysis of the criticality of dependence / impact targets and identification of high priority dependence / impact targets

A detailed analysis of dependencies and impacts on nature in each region was conducted using the ENCORE tool filter for elements closely related to ecosystem services that are highly dependent and impacted by the project.

3. Assess 4. Prepare Assessments of Material Business Risks and Opportunities, and Preparations to Respond and Report

"K" LINE has identified four materialities, namely oil pollution, atmospheric impacts (GHG, SOx, and NOx), prevention of marine organism migration, and impact on mammals, as risks and opportunities related to its businesses that are shared across the selected regions. We have drawn up responses and targets for each of these materialities.

**Oil pollution**

Impacts: Water pollutants, Marine ecosystem use

It is necessary to provide compensation to fishery-related businesses and neighboring countries due to the occurrence of accidents in marine transportation, which cause oil pollution and affect the marine ecosystem and reduce the catch of fishery resources. Additionally, oil pollution associated with demolishing needs to be addressed.

Target

**Zero oil pollution accidents**

Reinforcement of safe operation measures, hull strengthening, human resource development, strengthening of safety measures, strengthening of green ship recycling response, etc.

**Atmospheric impacts (GHG, SOx, and NOx)**

Dependence: Climate regulation  
Impact: Emissions to the atmosphere

Increased GHG, SOx, and NOx emissions due to vessel operations and stricter emissions regulations at the operator level will result in increased response costs. Increased emissions of SOx and NOx, which cause photochemical smog and acid rain, will damage social reputations among suppliers and stakeholders.

Target

**Reduction and minimization of impact on the surrounding environment**

Promote initiatives to prevent air pollution and reduce GHG emissions: slow steaming, use of low-sulfur fuels, introduction of SOx scrubbers, introduction of NOx reduction equipment, etc.

**Prevention of marine organism migration**

Impact: Marine ecosystem use

The discharge of ballast water and the migration of organisms attached to the bottom of the vessel could affect the aquatic ecosystem of the area, leading to a collapse of the ecosystem of fishery resources and affecting the local fishing industry, which could result in the need for fisheries compensation. It could also create a threat to the conservation of endangered species and could result in lawsuits from the target countries and NGOs.

Target

**Reduction and minimization of impact on the surrounding environment**

Ballast water treatment system installation rate of 100% by June 2024, etc.

**Impact on mammals**

Impacts: Marine ecosystem use, Disturbances

Vessel operations may cause collisions with whales and other marine mammals, resulting in physical harm to the creatures. In addition, undersea noise can harm communication between marine organisms, cause stress, and adversely affect the ecosystem. In a worst-case scenario, if the noise causes harm or stress to marine organisms, resulting in death, the project may be sued by neighboring countries or NGOs, and public notoriety may be spread.

Target

**Reduction and minimization of impact on the surrounding environment**

Reducing the impacts of vessel operations on marine mammals: participation in California's Slow Travel Program to Protect Whales

We have been implementing concrete initiatives\* to preserve biodiversity in each region based on our environmental targets and action plans in the "K" LINE Environmental Vision 2050. Based on a comprehensive understanding of natural capital, we intend to strengthen the management of risks and opportunities through the introduction of the LEAP approach. While promoting coexistence with nature, we are stepping up our efforts to build a sustainable future. Referring to the beta version (version 4) of the framework, "K" LINE reflects in this documentation its current assessments, analysis, and information based on data verified by Socotec Certification Japan Co., Ltd. In order to respond to future changes, we are constantly evaluating and disclosing information.

\* For more details, please see the link below.

[Reducing "K" LINE's Impact on the Sea and Air](#)



Key Targets

Promoting Efforts to Reduce Oil Spill Accidents to Zero

- Strengthen safety in navigation (use the optimal navigation support system and develop automatic ship navigation for vessel steering and engine plant operation)
- Enhance ship resilience, such as seaworthiness, and maneuverability
- Strengthen all other safety measures, including safety training for staff

Reducing the Environmental Impact of Ship Operations

- Continue measures to manage ballast water, reduce emissions of sulfur oxide (SOx) and nitrogen oxide (NOx), and install equipment to comply with regulations
- Reduce the impact of shipping operations on marine mammals
- Increase staff environmental awareness

Initiatives

Safe Operations with Kawasaki Integrated Maritime Solutions (Integrated Vessel Operation and Performance Management System)

Kawasaki Integrated Maritime Solutions, which was rolled out across our fleet in March 2016, continues to focus on developing engine plant operation support and failure prediction and diagnosis. Together, these enhance our safety in navigation and environmental protection measures.



The "K" LINE Group Environmental Award

The "K" LINE Group Environmental Award recognizes Group officers and employees who take action to protect the environment and biodiversity and provide a significant contribution to the sustainability of our business operations.



Raising Environmental Awareness through E-Learning

The "K" LINE Group's environmental management system (EMS) provides education and training programs to maintain and raise the environmental awareness of Group staff.



## Related Data

CO<sub>2</sub>, SO<sub>x</sub>, and NO<sub>x</sub> Emissions from Vessels

	2018	2019	2020	2021	2022
CO <sub>2</sub> emissions	11,932,022	9,799,932	8,761,756	6,174,863	5,997,064
SO <sub>x</sub> emissions	188,102	129,786	35,983	30,166	29,272
NO <sub>x</sub> emissions	262,226	202,678	181,429	117,864	118,264

(Tons)

Note: The scope of aggregation has been revised from 2021. Vessels not under our operation are excluded.

SO<sub>x</sub> and NO<sub>x</sub> Emissions per Deadweight Ton-Mile

	Unit	2018	2019	2020	2021	2022
SO <sub>x</sub> emissions	g-SO <sub>x</sub> /ton-mile	0.080	0.067	0.022	0.020	0.020
NO <sub>x</sub> emissions	g-NO <sub>x</sub> /ton-mile	0.112	0.097	0.089	0.078	0.082

## Other Environmental Data of "K" LINE's Vessels

## ► Waste Generation, Etc. (All Types of Vessels)

	2018	2019	2020	2021	2022
Bilge	5.54	4.15	4.02	4.04	4.72
Sludge*	4.1	3.9	4.0	2.0	2.2
Garbage on board	4.0	3.5	3.5	5.4	3.7

(m<sup>3</sup>/ship-month)

\* The residue left over after cleaning and processing fuel and lubricating oil

## ► Gray Water from "K" LINE Vessels (Owned Ships)

	2018	2019	2020	2021	2022
All types of vessels (owned ships)	90,841.8	82,485.0	64,421.6	74,929.9	88,450.9

(Metric tons)

## Supporting the Environmental Activities of Society

### Approach

#### Basic Principle

To contribute to the realization of a sustainable future, we are reinforcing collaboration among industry, academia, and government, including the central government, local governments, and universities, to carry out various environmental preservation initiatives.

### Initiatives

#### Promotion of Volunteer Environmental Protection Activities

We engage in various activities to raise the environmental consciousness of our employees further, including initiatives to protect biodiversity and create pleasing landscapes. We also are collaborating with the NPO Chiba University Students Committee for Environmental Management System to protect community nature areas and to clean up business sites and seashores.



#### Key Targets

- Promote volunteer environmental protection activities
- Increase the capability to accommodate green ship recycling
- Participate in the collection and study of marine plastic pollution

#### Reinforcement of Response to Green Ship Recycling

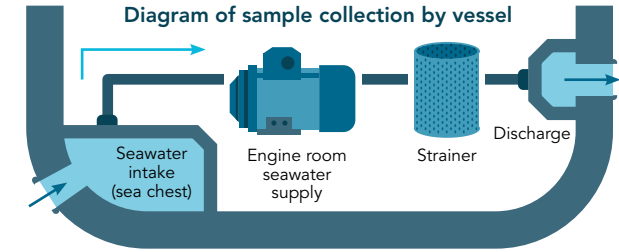
Ship dismantling enables the recovery of metals that can be recycled into new products and services and provides work and community economic activity. When disposing of our vessels, we follow our own environmental impact assessment checklist to select dismantling yards, taking into account occupational health and safety and environmental performance.



Participation in Collection and Research on Marine Plastic Waste

“K” LINE has signed an agreement with Tokyo University of Marine Science and Technology to start joint research on marine plastics. The joint research will evaluate how much plastic waste can be collected from common seawater intake that is filtered by ships on voyages. Specifically, “K” LINE vessels will take samples from the seawater intake line with a strainer while the ship is operating, and then the university will collect plastic particles from the samples and analyze their material, size, and other properties. The aim for this project is that it will lead to further research, such as the collection of microplastics in the open sea using ocean-going vessels and the establishment of a system for monitoring the density of microplastics in specific areas.

Proposed method for sample collection to be carried out by “K” LINE vessels



Related Data

Office Environmental Data

► Electricity

	2018	2019	2020	2021	2022
Annual consumption	821,109	789,971	736,212	708,811	907,221
Annual consumption per person	866	860	836	793	823

(kwh)

► Office Paper

	2018	2019	2020	2021	2022
Annual consumption	4,406,968	3,852,224	2,178,527	2,157,950	2,073,834
Annual consumption per person	4,649	4,196	2,473	2,414	1,882

(Sheets)

► Water

	2018	2019	2020	2021	2022
Annual consumption	546	509	318	313	403
Annual consumption per person	0.79	0.75	0.50	0.48	0.58

(m<sup>3</sup>)

Total Quantity of Recycling

► Ship Recycling

	2018	2019	2020	2021	2022
All types of vessels	5,923	13,774	114,055	0	21,695

(Tons)

Waste

► Waste

	2018	2019	2020	2021	2022
All offices	1,022	823	571	420	570

(Tons)

	2018	2019	2020	2021	2022
All vessels	9,110	7,477	6,361	5,192	6,858