

Environment

Initiatives on the Environment

In April 2017, we formulated MOL Group Environmental Vision 2030 to present our cutting-edge initiatives for environmental preservation.

MOL Group Environmental Vision 2030

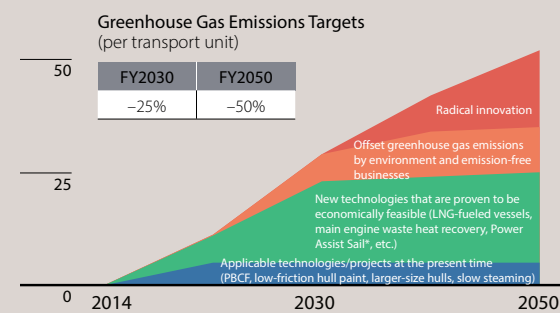
Shipping companies are responsible for undertaking the marine transportation vital to the infrastructure underpinning people's daily lives worldwide.

Meanwhile, the effectuation of the Paris Agreement on climate control has unified efforts by the international community to mitigate global warming. With this in mind, the MOL Group believes that it has a social obligation to take innovative steps to help solve environmental issues such as greenhouse

gas emissions, air pollution and biodiversity impediments. The MOL Group will grasp the environmental needs of customers and other stakeholders and provide solutions, in tandem with developing its environment and emission-free businesses into future core operations, with the aim of contributing to global environmental preservation.

The MOL Group targets reduction of greenhouse gas emissions per unit load by 25% by 2030 and by 50% by 2050 compared to fiscal 2014.

Roadmap to Reduce Greenhouse Gas Emissions (%)



* Power Assist Sail: Sailing rigs that provide supplementary propulsion force for the vessel by using the lift force of crosswinds, similar to the wings of an airplane, and drag from tailwind

Key Environmental Issues

In March 2014, we identified the highest-priority environmental issues and set about addressing those issues in a proactive manner. To identify these priorities, we analyzed issues from international conditions regarding environmental issues; the opinions of stakeholders including customers, investors, and so on; and our own internal viewpoints. Finally, we formulated the following eight action plans.

- Promote use and innovation of technologies for reducing environmental impact and advanced support technologies for safer vessel operation through the "ISHIN NEXT—MOL SMART SHIP PROJECT—"
- Participate in projects to build vessels that run on alternative fuels such as LNG and supply alternative fuels.
- Reduce greenhouse gas emissions by using ICT to optimize sailing even further.
- Utilize renewable energy such as wind and solar power for vessel propulsion and at Group-related facilities in Japan and overseas.
- Create environment and emission-free businesses.
- Investigate emissions trading as a way to achieve greenhouse gas reduction targets.
- Respond appropriately and proactively to air pollution prevention and the Ballast Water Management Convention.
- Promote modal shift in transportation by enhancing the ferry and coastal shipping business in Japan.

Environmental Investments

	(Billions of yen)		
	Fiscal 2015	Fiscal 2016	Fiscal 2017
Environment-related R&D activities	0.3	0.4	0.5
Utilization and expansion of existing environmental technologies	0.9	0.5	0.8
Responses to environmental regulations	2.2	3.1	3.1
Initiatives to save bunker fuel	1.0	1.1	0.8
Initiatives of Group companies	0.3	0.3	0.5
Total	4.6	5.4	5.7

Organizational Structure for Environmental Initiatives

Organizational reforms implemented on April 1, 2018 created a framework where the New & Clean Energy Business Division will take the lead in promoting new and clean energy business going forward. The division will conduct feasibility studies and actively promote the environment and emission-free businesses that should become a core business for MOL in the future. In addition, the division will also set the Company's environmental targets and review the status of achievement of these targets in order to steadily advance initiatives.

Moreover, ahead of stricter regulation on sulfur content in fuel oil scheduled for 2020, the SOx 2020 Regulation Compliance Committee established in November 2016 will collect information and work in collaboration with sales divisions to promote Company-wide initiatives taking into account customers' needs.

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Environmental Regulations

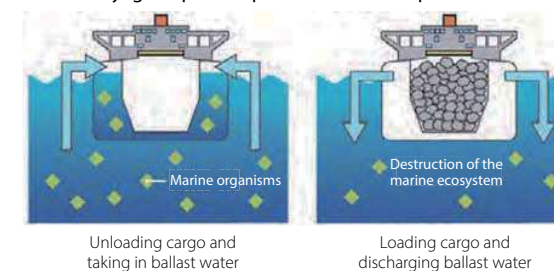
Schedule of Environmental Regulations by IMO, etc.

Ballast Water Management Convention

2016	2017	2018	2019	2020	2021
(Adopted in 2004)	Mandatory (For existing vessels: within five years from September 2019 For new vessels: completed from September 2017 onward)				

A convention to prevent cross-border transfer of foreign marine organisms through vessel ballast water was adopted by the IMO in 2004 and has been in effect since September 2017. Under the convention, vessels, including existing vessels, are mandated to install ballast water treatment systems, by September 2024.

Ballast voyage departure port Destination port



MOL's Initiatives

- In fiscal 2014, MOL set a Company-wide policy to install ballast water management systems on our vessels before the convention took effect.
- We have already completed installation on more than 114 owned vessels (as of April 2018).

Others

Regulations	2016	2017	2018	2019	2020	2025	
Tackling global warming	GHG emissions	EEDI* ¹	Phase 1			Phase 2	Phase 3
			SEEMP* ²				Mandatory
Preventing air pollution	NOx emissions* ³	General Sea Areas	Tier II				
		ECA* ⁴	Tier III				
Marine environment protection	Minimizing the transfer of invasive aquatic species by shipping* ⁵	(Guideline adopted in 2011)					
	Ship Recycling Convention* ⁶	(Adopted in 2009; not ratified)					

* EEDI (Energy Efficiency Design Index) is a measure of a ship's energy efficiency (g/ton-mile). The required EEDI of each Phase is as follows: Phase 0=0%, Phase 1=10%, Phase 2=20% (Applied to new ships)

*² SEEMP (Ship Energy Efficiency Management Plan) is required to be drawn up to show optimal measures of operation that should be adjusted to the characteristics of individual ships, and to be kept onboard a ship. (Applied to both new and existing ships)

*³ The regulation for reduction of NOx in exhaust gases: Tier I is applied to ships laid down in 2000-2010, Tier II to ships laid down in/after 2011, and Tier III to ships laid down in/after 2016.

*⁴ The existing ECAs (Emission Control Areas) are: 1. Within 200 miles off the coast of the USA and Canada (NOx/SOx) 2. The USA Caribbean Sea area (NOx/SOx) 3. The Baltic Sea and the North Sea areas (currently only SOx). (From 2021 onward, new shipbuilding will be subject to third-generation NOx regulations.)

SOx Regulation

2016	2017	2018	2019	2020	2021
Sulfur limit: 3.5%				Sulfur limit: 0.5%	

Regulate the sulfur content in fuel oil to control SOx volume in exhaust emissions. The sulfur limit will be tightened from 3.5% or less to 0.5% or less from 2020. Shipowners/operators have to choose a method from the following menu:

Method	Advantages	Disadvantages/Issues
Complied oil	No initial costs	• High fuel cost • Supply availability in question
SOx scrubber	Lower fuel costs	• High initial cost • Large space required
Alternative fuel (LNG, etc.)	Effective for other environmental regulations	• High equipment cost • Insufficient supply system • Difficult modifications

MOL's Initiatives

- MOL has been studying complied oil and SOx scrubbers as both are subject to future fuel prices.
- MOL teamed up with BHP Billion, Rio Tinto, etc., on a joint research project for an LNG-fueled capesize bulker.
- MOL took delivery of three methanol tankers equipped with dual-fuel, low-speed diesel engines that can run on methanol (a world first).
- In 2019, MOL will take delivery of a tugboat with a dual-fuel (bunker A/LNG) engine.