Responses to climate change (TCFD)

Policy (our fundamental view)

Climate change is an urgent issue shared by the entire world. It poses various threats, including an increase in abnormal weather conditions, adverse effects on ecosystems, and a decrease in water resources. The NOF Group has set the reduction of greenhouse gas emissions as one of the goals of its responsible care (RC) activities, and has been working on various energy-saving measures. In view of the 2050 Carbon Neutral Declaration announced by the government in October 2020 and its new targets to reduce greenhouse gas emissions announced in April 2021, the NOF Group has decided to set new targets to reduce greenhouse gas emissions. By recognizing the risks and opportunities posed by climate change and promoting countermeasures, the NOF Group will co-create new value with the power of chemistry toward the realization of a prosperous and sustainable society as stated in the NOF VISION 2030.

Support for the TCFD recommendations

In April 2022, the NOF Group announced its support for the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). Based on the TCFD recommendations, the Group will work to reduce climate-related risks and create opportunities for growth, as well as expand our information disclosure.

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

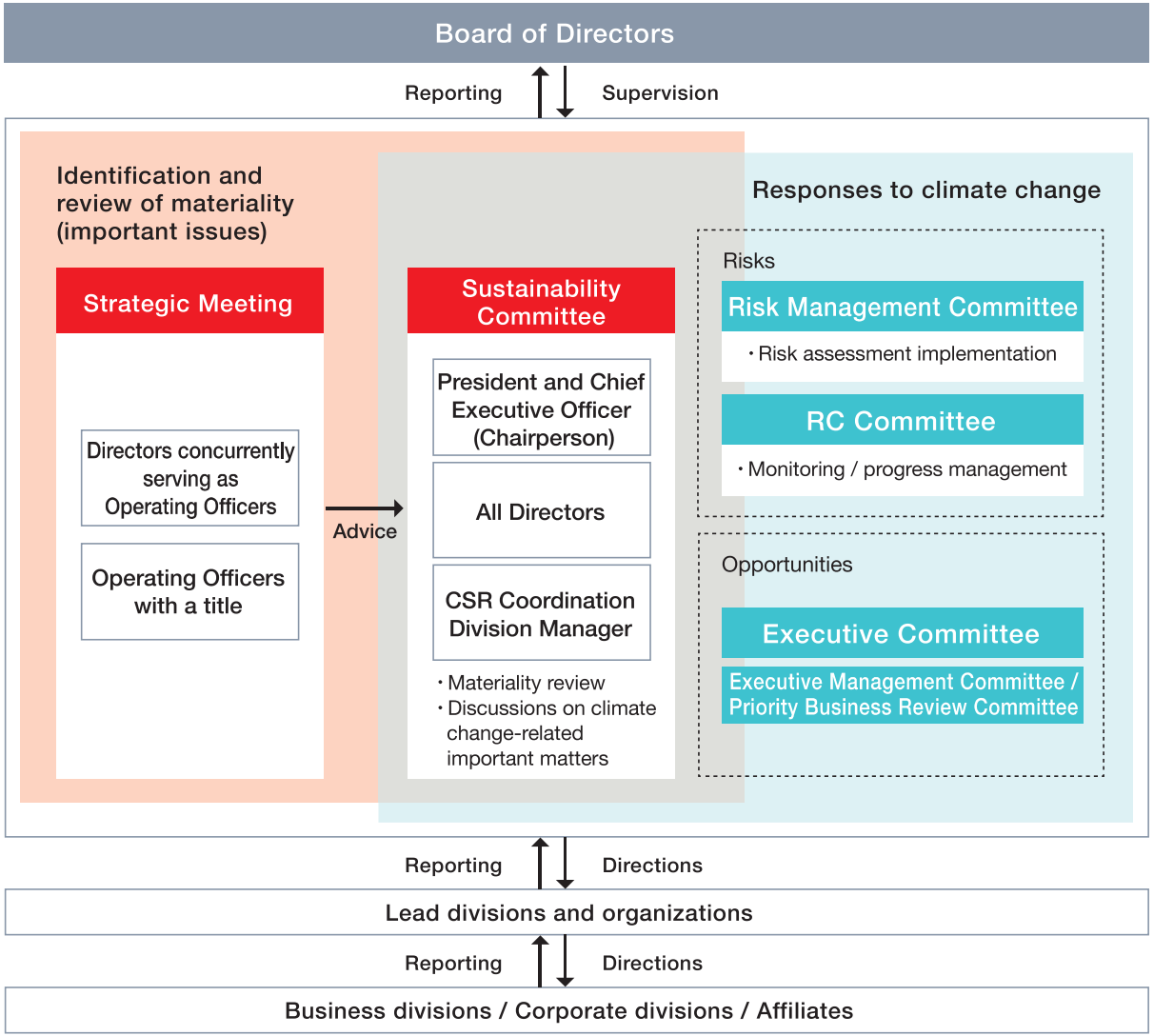
Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Governance

GRI 2-12

The NOF Group identifies materiality (important issues) related to sustainability through discussions in the Strategic Meeting, which is composed of Directors concurrently serving as Operating Officers as well as Operating Officers with a title, and the Sustainability Committee, which is chaired by the President. The Board of Directors then approves the materiality. For each materiality issue, KPIs and target values are set and activities are promoted by the supervising organization or department in charge. The progress and results are reported to the Sustainability Committee. The Sustainability Committee, chaired by the President and Chief Executive Officer, reviews materiality with the participation of all directors, and examines key issue items, KPIs, target values, and response policies in order to continuously improve the level of activities.

Response to climate change is identified as one of the materiality issues, and important matters including medium- and long-term targets are discussed at the Sustainability Committee. In regard to risks, the Risk Management Committee conducts a comprehensive assessment, and the Responsible Care Committee supervises monitoring and managing the progress of risk countermeasures and greenhouse gas emission reduction measures. In addition, opportunities are discussed by the Executive Management Committee and the Priority Business Review Committee, and important matters are deliberated by the Executive Committee. A system has been put in place in which the results of these committees and meetings are reported to the Board of Directors at least twice a year for supervision.

Governance structure for climate change response



Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Strategy

GRI 201-2

The NOF Group analyzes the risks and opportunities posed by climate change based on the 1.5°C and 2°C scenario as well as the 4°C scenario.
The key risks and opportunities are as follows.

Category	Scenario	Major risks and opportunities	Overview	Level of impact (2030)	Countermeasures
Transition risks	1.5°C 2°C	Tighter domestic and international regulations	Increased financial burden due to introduction of carbon tax, etc.	Large	● Promotion of measures toward reducing greenhouse gas emissions
		Sharp rise in raw material prices	Sharp rise in prices of raw materials such as petrochemicals and vegetable and animal-based oils due to a decrease in the supply of petroleum, etc. and an increase in demand for biofuels	Large	● Securing stable raw materials through multiple purchases and long-term contracts ● Switching from petrochemical-based raw materials to plant-based raw materials ● Utilization of biomass chemicals ● Carbon recycling (solvent recycling, etc.)
		Sharp rise in energy and transportation costs	Sharp rise in prices of oil and natural gas	Medium	● Introduction of energy-saving equipment, review of processes ● Promotion of joint delivery and modal shifts
		Changes in the sales destination environment due to the shift to a decarbonized market	Decrease in sales due to decline in market share of gasoline and diesel vehicles	Medium	● Strengthening our response to decarbonized markets, such as electric vehicles and renewable energy
		Deterioration of evaluation/ reputation	Deterioration of evaluation from investors in ESG investment and reputation among customers due to delay in climate change countermeasures	Small	● Active promotion of measures to reduce greenhouse gas emissions and information communication
Physical risks	4°C	Natural disasters such as torrential rains, floods, typhoons, storm surges, etc.	Increased risk of business interruption in production sites and supply chains due to increased torrential rainfall, sea level rise, and storm surges caused by stronger typhoons as a result of climate change	Large	● Rain water countermeasures and disaster prevention measures for buildings and facilities ● Review the business continuity plan (BCP) and conduct education, training, and audits ● Multiple purchases of raw materials
		High temperatures and heat waves	Impact of rising temperatures on refrigeration, air-conditioned storage, etc. in warehouses	Medium	● Ongoing review of facility investment plans
Opportunities	1.5°C 2°C	Growing needs for products that contribute to climate change solutions	Expanding needs for products that contribute to climate change mitigation and adaptation (see p. 111-113 for details)	Large	● Development and provision of products that contribute to climate change mitigation and adaptation
		Improvement of evaluation and reputation	Improve evaluation from investors in ESG investment and reputation among customers through active climate change countermeasures	Small	● Development and provision of products that contribute to climate change solutions and communication of information on promotion of greenhouse gas reduction

*1.5°C and 2°C scenarios: Decarbonization scenarios that assume that necessary measures will be implemented to limit temperature increase to 1.5°C or 2°C or less compared to pre-industrial times (International Energy Agency (IEA) "Net Zero Emissions by 2050" (NZE2050), "Stated Policies Scenario" (STEPS), etc.)
*4°C scenario: A scenario in which climate change has progressed to the point where the average global temperature has increased by 4°C at the end of the 21st century compared to pre-industrial times (UN Intergovernmental Panel on Climate Change (IPCC) "RCP8.5," etc.)
*Level of impact: **Financial amount of impact of risks** - over 1 billion yen (large), less than 1 billion yen and over 100 million yen (medium), less than 100 million yen (small)
Market scale of opportunities - over 30 billion yen per year (large), less than 30 billion yen and over 3 billion yen (medium), less than 3 billion yen (small)

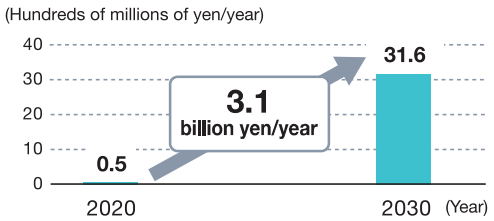
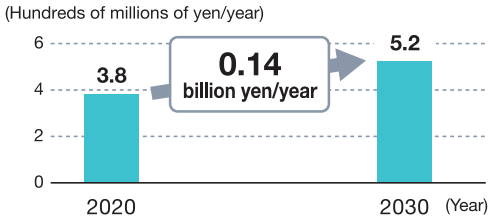
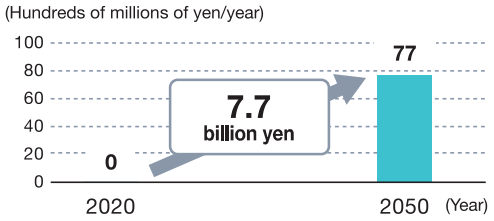
Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Strategy

GRI 201-2

Financial impacts (selected)

Steam, electricity, and other forms of energy are consumed mainly in the manufacturing processes of the NOF Group. As transition risks brought about by climate change, the financial burden is expected to increase due to rising carbon tax costs and higher unit prices of renewable energy charges,* and the total impact is estimated to be around 3.3 billion yen. In addition, the NOF Group has established a business continuity plan for physical risks with the 4°C scenario assuming 7.7 billion yen in facilities damage in the event that a major typhoon, which occurs once every 500 to several thousand years, breaks through embankments and floods our waterfront plants.

*Charges for promotion of renewable energy generation

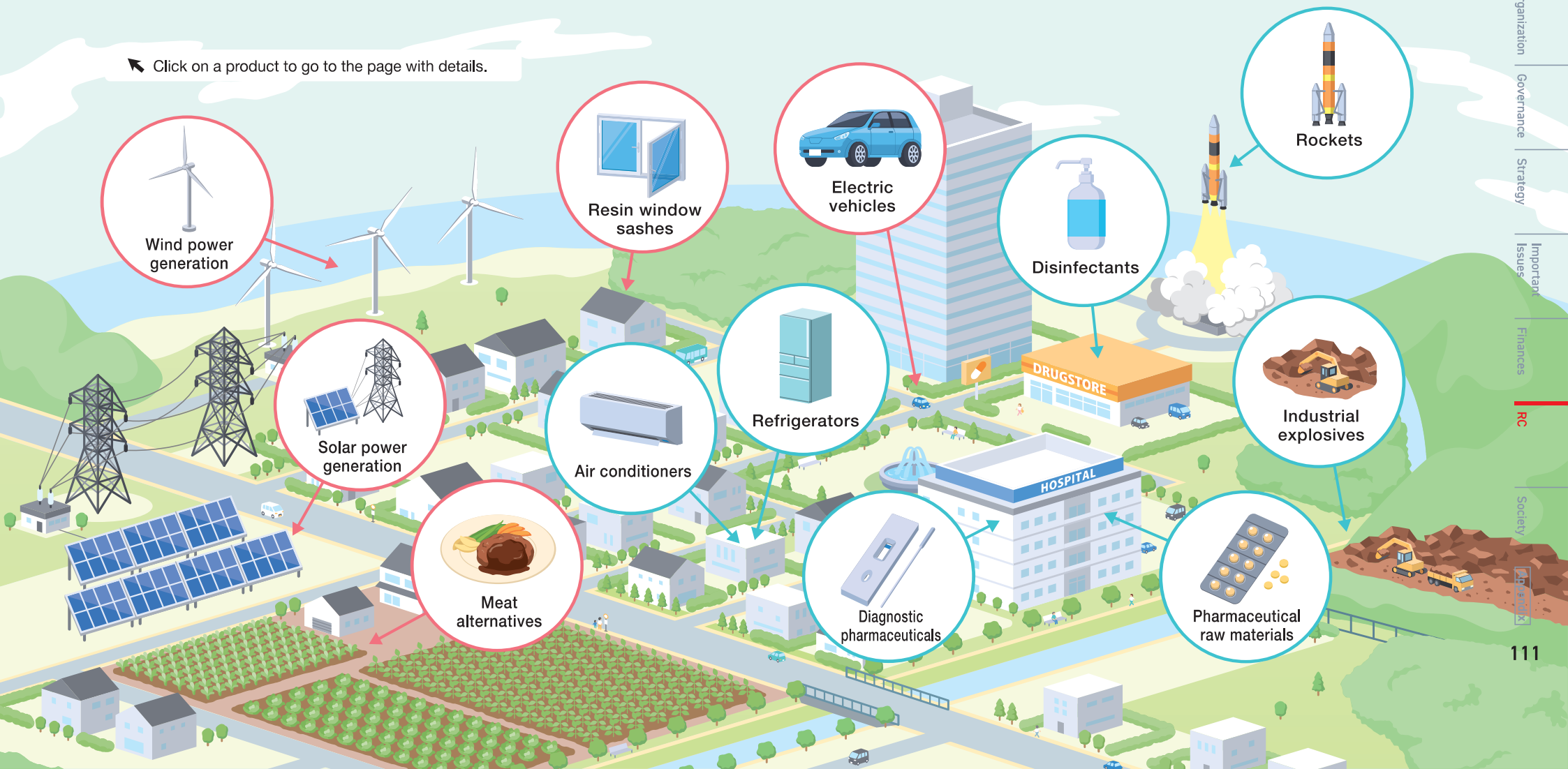
Category	Scenario	Risks	Details of risks	Financial amount of impact	Notes
Transition risks	1.5°C	Carbon tax	Financial burden from tax increases		Domestic Group CO_2 equivalent emissions in fiscal 2020, with a carbon price of 20,000 yen per ton of CO_2 in fiscal 2030.
		Renewable energy charges	Increased energy costs		Domestic Group The unit price of the renewable energy charge for fiscal 2030 is set at 4.1 yen/kWh based on fiscal 2020 electricity consumption.
Physical risks	4°C	Storm surges	Flooding of facilities due to storm surges		NOF Typhoons and embankment failures every 500 to several thousand years.

Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Strategy

GRI 201-2

Illustration of products that contribute to climate change

Based on the risks and opportunities posed by climate change, the NOF Group will co-create new value with the power of chemistry by working to develop and provide products that contribute to the reduction of greenhouse gases to mitigate the progression of climate change, and products that contribute to adaptation by reducing the impact of climate change.



Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Strategy

GRI 201-2

Mitigation: 1.5°C and 2°C scenario

*Mitigating the progression of climate change by reducing greenhouse gas emissions

Electric vehicles

Functional Materials business | Metal Coatings business

Market scale: Large

Compared to gasoline-powered vehicles, EVs are expected to cause increased demand for additives for in-vehicle electronic components, lubricants for electronic units, anti-corrosive coatings, and overcoat materials for LCD color filters due to the increase in electronic components (passive components) and electronic units, as well as more and larger LCD panels. In addition, because LED lights are effective in reducing power consumption of EVs, demand for anti-fog agents for LED headlamps is expected to increase. Furthermore, EVs will make vehicles quieter, which is expected to increase demand for resin additives, such as agents that prevent abnormal noises caused by resins rubbing against each other in interior parts.

End uses of the NOF Group's products

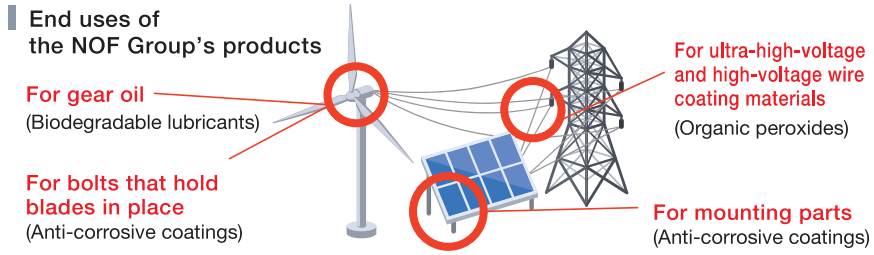
Wind / solar power generation

Functional Materials business | Metal Coatings business

Market scale: Medium

Demand is expected to increase for anti-corrosive coatings for bolts used in wind power generation blades and solar panel mounting parts, as well as biodegradable lubricant required for gear lubrication. Demand is also expected to increase for organic peroxides for cross-linked polyethylene, which is used as a coating material for ultra-high-voltage and high-voltage electric wires used to transmit electricity from wind and solar power generation sites.

End uses of the NOF Group's products



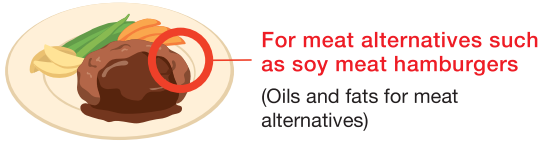
Meat alternatives

Functional Foods business

Market scale: Small

Demand is expected to increase for meat alternative oils and fats that help improve the flavor and texture of plant-derived meat alternatives that reduce environmental impact.

End uses of the NOF Group's products



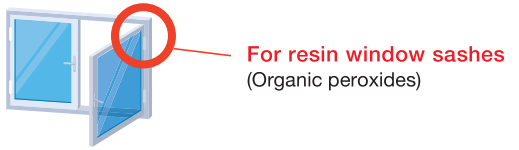
Resin window sashes

Functional Materials business

Market scale: Small

Demand for organic peroxides is expected to increase with the spread of energy-efficient housing because vinyl chloride resin is used in resin window sashes with high thermal insulation properties.

End uses of the NOF Group's products



Responses to climate change (TCFD) | Disclosure in line with TCFD recommendations: Strategy

GRI 201-2

Adaptation

*Reduction of climate change impacts through disaster prevention, etc.

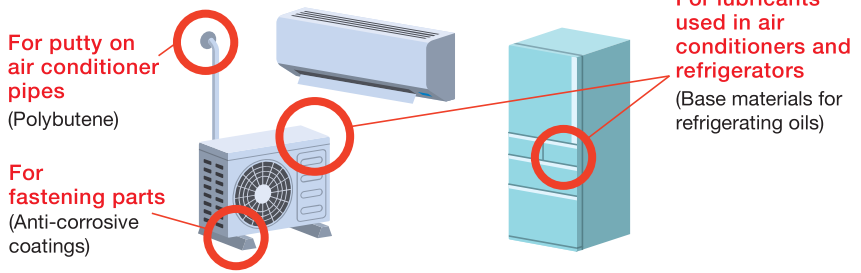
Air conditioners / refrigerators

Market scale Large

Functional Materials business | Metal Coatings business

Demand for refrigerating machine oil, a lubricant for refrigeration equipment, anti-corrosive coatings for fastening parts for external air conditioner units, and polybutene for air conditioner putty is expected to increase due to the increasing need for air conditioners and refrigerators accompanying rising temperatures around the world, including developing countries. The base materials for refrigerating oils sold by NOF are for alternative CFC refrigerants and contribute to climate change adaptation.

End uses of the NOF Group's products



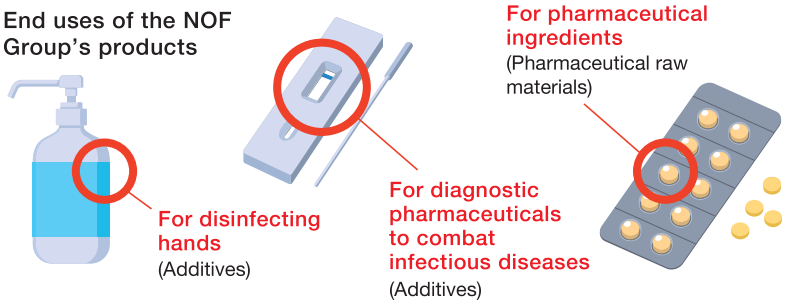
Diagnostic pharmaceuticals / Pharmaceutical raw materials

Market scale Large

Functional Materials business | Life Science business

Due to climate change, there are concerns about the spread of tropical infectious diseases and other diseases and disorders. Therefore, demand for pharmaceutical raw materials is expected to increase due to the rise in disinfectants and additives for diagnostic pharmaceuticals to combat infectious diseases as well as the number of pharmaceutical products against diseases and disorders.

End uses of the NOF Group's products



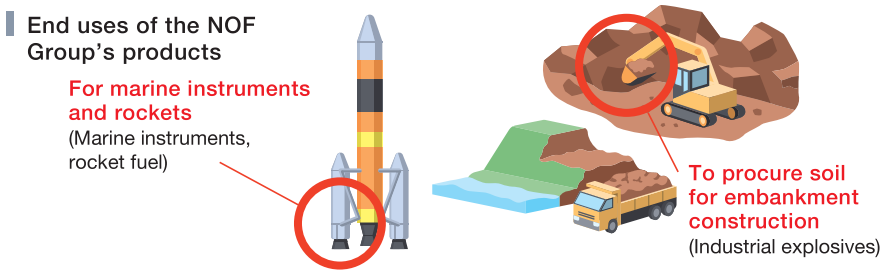
Environmental information / Disaster prevention and mitigation products

Market scale Small

Explosives & Propulsion business

As climate change progresses, the need to survey the entire world, including seawater temperatures, may increase, and the amount of marine instruments, rocket launches, etc., for research may increase. In addition, there may be increased applications for temperature indicator materials (labels, stickers, etc.) for temperature control that change color when a specific temperature is reached. Furthermore, with the increased risk of storm surges and other such conditions, there may be an increase in embankment construction using industrial explosives involving procurement of rocks and soil from mountainous areas.

End uses of the NOF Group's products

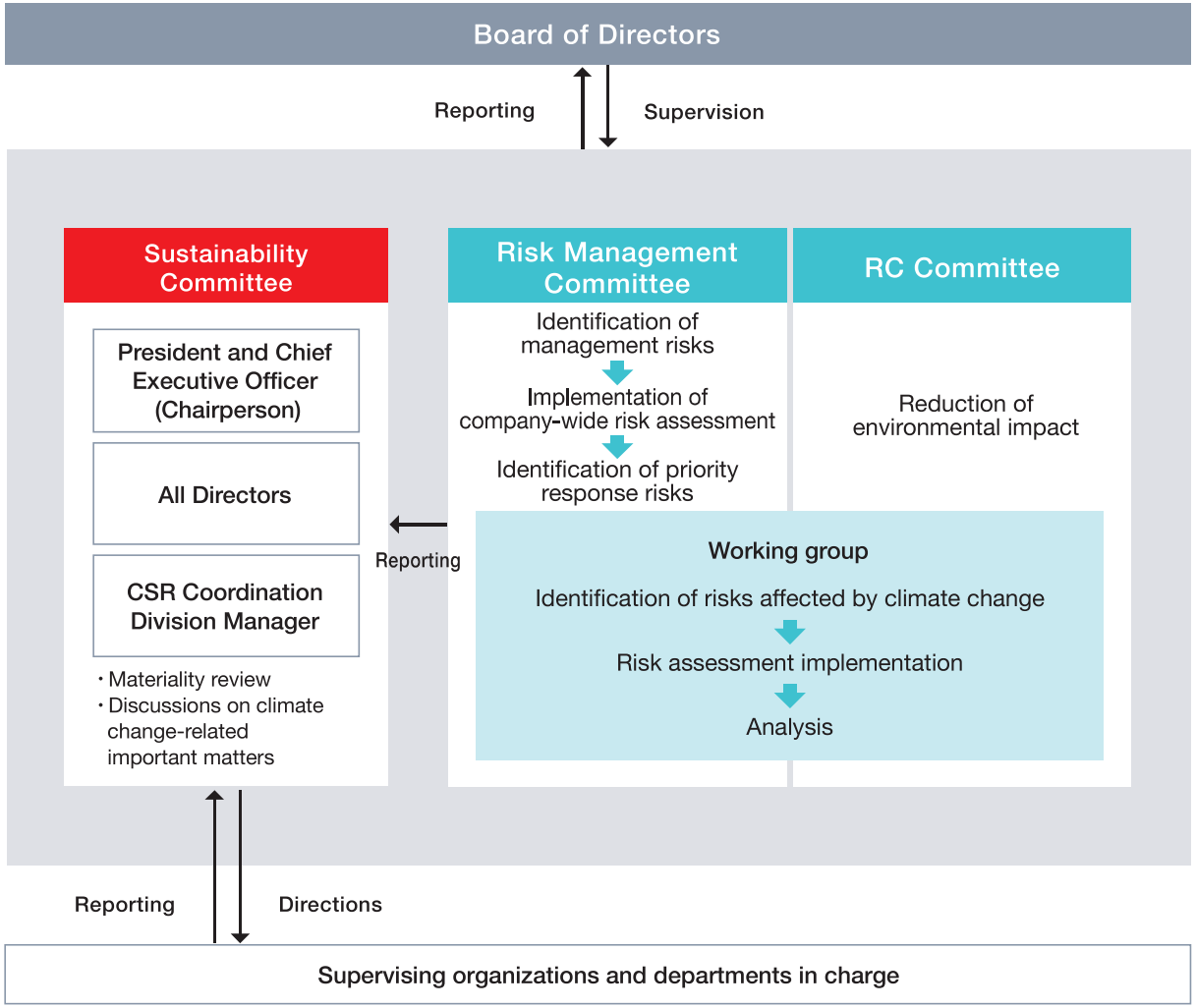


Response to climate change (TCFD) | Disclosure in line with TCFD recommendations: Risk management

GRI 2-12

Within the NOF Group, the Risk Management Committee comprehensively identifies various management risks surrounding its business, and conducts company-wide risk assessment on the level of impact and potential for occurrence of each risk item in order to identify risks that need to be addressed as a priority. In disclosing information based on TCFD recommendations, a working group consisting of members selected from the Risk Management Committee and the Responsible Care Committee plays the central role in identifying the risks that climate change will affect among the various management risks surrounding our business, and conducts risk assessments to determine the degree to which the impact will change in the future. The analysis results are reported to the Sustainability Committee, and important decisions are made related to climate change risk countermeasures.

Climate change-related risk management organization diagram

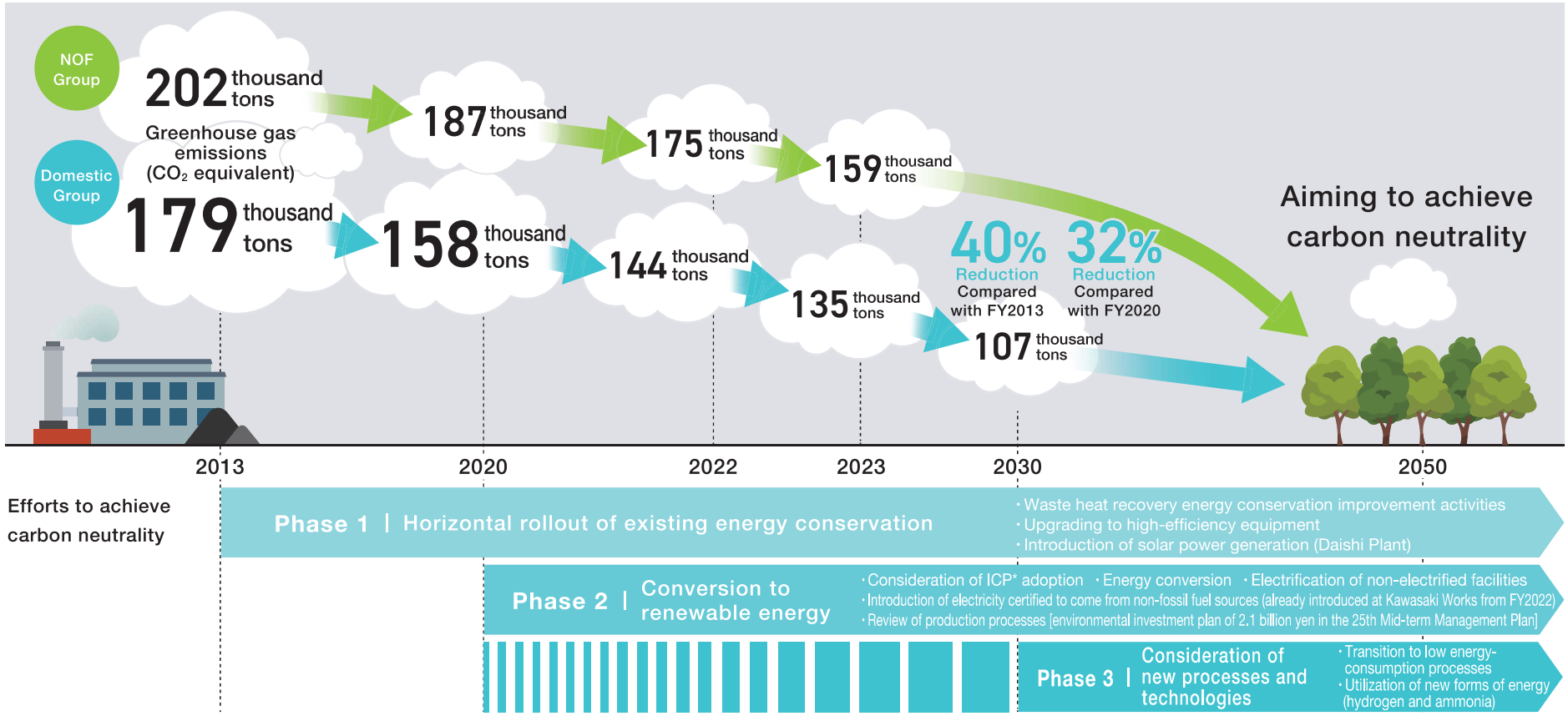


Roadmap toward reducing greenhouse gas emissions

The NOF Group has created a roadmap toward reducing greenhouse gas emissions and is working to mitigate climate change in its business activities. Considering the possibility of an increase in emissions due to business expansion, the Group will aim to become carbon neutral in 2050 by introducing renewable energy as the new Phase 2 and starting to consider new processes and technologies as Phase 3, while also reducing the financial burden associated with transition risks.

Reduction of GHG (CO_2 equivalent) generated by our business activities [Scope 1, 2]

NOF Group | Domestic Group



*Internal carbon pricing

Responses to Climate Change (TCFD) | Disclosure in Line with TCFD Recommendations: Metrics and Targets

GRI 305-1,2,3,5

Measures to meet greenhouse gas emission reduction targets

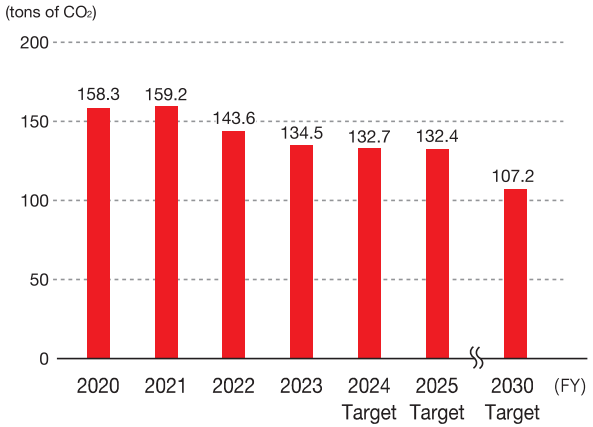
NOF has set a mid-term target of reducing greenhouse gas emissions by 40% from the fiscal 2013 level by fiscal 2030, and a long-term target of becoming carbon neutral. The 2025 Mid-Term Management Plan period is positioned as a period for building up reduction measures to be implemented in the next Mid-Term Management Plan period, and we will promote reductions while controlling the increase in emissions associated with the expansion of production facilities.

As a specific measure, in order to increase the use of renewable energy, we will promote the electrification of our facilities and reduce carbon emissions. Furthermore, we are reviewing our production processes and considering improvement measures to minimize environmental impact, such as reducing the amount of energy used, minimizing emissions, and utilizing renewable energy sources. We also plan to expand fuel conversion and the introduction of electricity certified to come from non-fossil fuel sources.

During the 2025 Mid-Term Management Plan period, we are planning a 2.1 billion yen environmental investment. Furthermore, in order to accelerate the conversion to renewable energy and to a business model aimed toward decarbonization, we have set up an experimental internal carbon pricing initiative to consider the introduction of internal carbon pricing, which will be used as a reference for economic feasibility decisions.

We will contribute to the mitigation of global warming by taking targeted actions to realize a sustainable future.

Greenhouse gas emissions Domestic Group



GHG reduction strategies, including for Scope 3

Along with the establishment of CSR guidelines, NOF has declared our commitment to greenhouse gas reduction measures throughout our supply chain. We promote sustainable procurement activities by making a Declaration of Partnership Building with our suppliers. We also assess our Scope 3 greenhouse gas emissions and are working to address them.

In addition, as a cleantech company, we also disclose our environment-related product line that contributes to climate change mitigation and adaptation. These products contribute to greenhouse gas reduction throughout the supply chain.

Furthermore, we have announced our support for the TCFD recommendations, and are striving to reduce climate-related risks and create growth opportunities. As part of our JCIA-recommended Responsible Care activities, we actively participate in dialogue activities with suppliers and local communities.

We are also working on decarbonization innovations for the supply chain. We are conducting research and development of biomass-derived raw materials and effective utilization of unused exhaust heat through industry-academia collaborative projects. This reduces Scope 3 greenhouse gas emissions and improves the sustainability of the entire supply chain.

Responses to Climate Change (TCFD) | Status of Greenhouse Gas Reduction Efforts/Emissions

GRI 305-1,2,3,4,5

Greenhouse gas reduction policy

The progression of global warming is arising from increased greenhouse gas emissions from the consumption of fossil fuels. The adverse effects of this climate change are posing major threats to our lives and ecosystems, including an increase in natural disasters such as heavy rains and floods, decreases in food and water resources, extreme heat, and outbreaks of infectious diseases.

NOF is actively working to mitigate climate change and achieve a decarbonized society. We support the goals set by the Paris Agreement, which include keeping the global average temperature rise well below 2°C (the 2°C target) and striving to limit it to 1.5°C as much as possible. To that end, we are committed to reducing our greenhouse gas emissions and aim to achieve carbon neutrality by 2050. In addition, we have set a target of reducing GHG emissions by 40% or more from the fiscal 2013 level by fiscal 2030 (mid-term target for GHG emission reduction).

We also began supporting the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) starting in 2022, and we disclose information transparently. From fiscal 2024, we will also participate in the GX League. We will not only focus on reducing our own greenhouse gas emissions, but also contribute to climate change mitigation by providing eco-friendly products and services. We are determined to take action and grow with society for a sustainable future.

Activities through industry associations

NOF is a member of and supports the efforts of the Japan Soap and Detergent Association (JSDA) and the GX League, which is organized by the Ministry of Economy, Trade and Industry. We will proactively incorporate the policies and the latest developments toward solving climate change issues discussed by each organization, and apply them to our daily activities. In addition to addressing the goals of each organization, we are also working to ensure consistency in our policies and strategies at NOF. Furthermore, a NOF director serves as chair of the JSDA Environmental Committee, and promotes industry-wide climate change measures.

Responses to Climate Change (TCFD) | Status of Greenhouse Gas Reduction Efforts/Emissions

GRI 305-1,2,3,4,5/306-1,3

Scope 1 and 2 CO_2 emissions (FY2023)

(Thousand tons of CO_2)

	Scope 1	Scope 2	Total (Scope 1+2)
NOF	44.4	78.2	122.7
Domestic Group	51.2	83.4	134.5
NOF Group	58.6	100.6	159.2

Scope 3 CO_2 emissions (FY2023) NOF Group

(Thousand tons of CO_2)

Category		FY2023	Calculating method
1	Purchased products and services	453.3	Calculated by multiplying the quantity and cost of each item of purchased raw materials, consumables, and repair materials by the emission intensity by division according to the guidelines Calculation scope: All of NOF, 8 domestic affiliate companies in Japan, and 2 major overseas affiliate companies
2	Capital goods	53.3	Calculated by multiplying acquisition cost of fixed assets by the emission intensity according to the guidelines
3	Fuels and energy-related activities not included in Scope 1 or 2	29.1	Calculated by multiplying the sum of electricity consumption and steam consumption by the emission intensity according to the guidelines
4	Transportation and distribution (upstream)	26.7	Calculated from ton-kilometers of transportation for purchased raw materials and ton-kilometers of transportation for delivered products for which the company is the consignor
5	Waste generated in business activities	9.7	Calculated by multiplying the weight of each type of waste generated at production sites by the emission intensity according to the guidelines
6	Business travel	0.5	Calculated by multiplying the number of employees by the emissions intensity according to the guidelines
7	Employee commuting	1.4	Calculated by multiplying the amount of commuting expenses by the emission intensity according to the guidelines
8	Leased assets (upstream)	-	Not applicable
9	Transportation and distribution (downstream)	-	Not applicable
10	Processing of sold products	17.8	Calculated by multiplying the sales volume of processed edible oils and industrial explosives by emission intensity according to the guidelines
11	Use of sold products	Not determined	Calculation is not possible because NOF products are mainly intermediate raw materials and the processing methods utilized by users after delivery are wide-ranging and undisclosed
12	End-of-life treatment of sold products	0.6	For packaging materials of shipped products, calculated by multiplying the weight of each type by the emission intensity according to the guidelines
13	Leased assets (downstream)	-	Not applicable
14	Franchises	-	Not applicable
15	Investments	-	Not applicable
	Total	592.4	

*From fiscal 2023, the scope of Scope 3 is calculated as a consolidated Group that includes major overseas affiliate companies (Categories 1, 2, 3, and 6)
*Guidelines utilized: “Emission Factor Database on Accounting for Greenhouse Gas Emissions of an Organization Throughout the Supply Chain (Ver. 3.4)” (issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry)

Responses to Climate Change (TCFD) | Status of Greenhouse Gas Reduction Efforts/Emissions

GRI 302-1,3,4/305-1,2,4,5

Energy consumption and CO_2 emissions

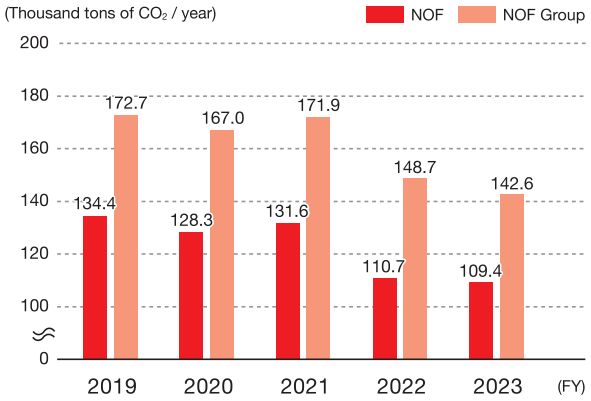
In fiscal 2023, energy consumption by the NOF Group decreased by 6.5% from the previous fiscal year, and by 4.5% on a non-consolidated basis. CO_2 emissions associated with energy use decreased 4.1% from the previous year to 143 thousand tons for the NOF Group, and decreased 1.1% to 109 thousand tons for NOF on a non-consolidated basis. Energy intensity per product increased 0.9% from the previous year to 13.9 GJ/t for the NOF Group, and slightly increased 0.4% from the previous year to 14.6 GJ/t for NOF. Going forward, we will continue to steadily implement energy conservation measures, including conversion to high-efficiency equipment.

CO_2 emissions other than from energy consumption

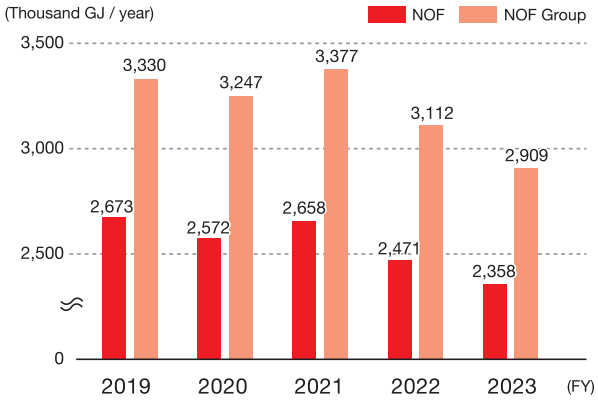
At the Aichi Works, NOF manufactures products for specific purposes using perfluorocarbon (PFC), which has a high global warming potential, as the diluent for organic peroxides.

In fiscal 2023, PFC emissions decreased approximately 37% from fiscal 2022, due in part to the effects of facility improvements. Going forward, we will aim to reduce emissions through efforts such as maintaining steady operation of recovery equipment and further promoting the use of alternative diluents.

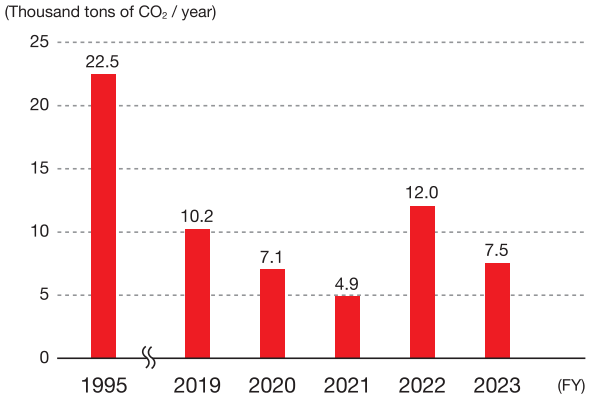
Changes in CO_2 emissions*1 by energy consumption



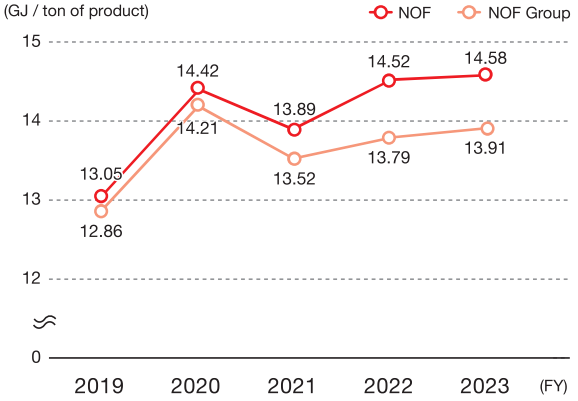
Changes in energy input*2



Changes in PFC emissions NOF



Changes in energy intensity per product



*1 The coefficient used in converting the electricity consumption into CO_2 emissions is the emission coefficient used by electric power supply companies in the fiscal year.

*2 The energy consumption is estimated using 9.76 MJ/kWh as the coefficient when converting electric power consumption into the calorific value.

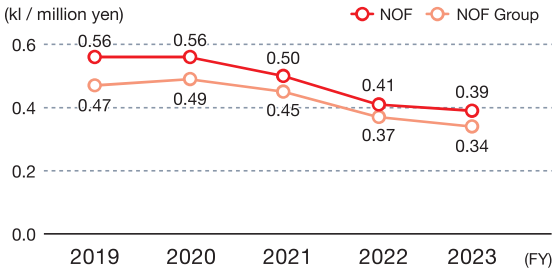
Responses to Climate Change (TCFD) | Status of Greenhouse Gas Reduction Efforts/Emissions

GRI 302-3,4/305-1,2,4,5

Energy-saving initiatives

The crude oil equivalent of energy consumption by the NOF Group in fiscal 2023 was 75,061 kl, down 6.5% from fiscal 2022. The crude oil equivalent of energy consumption per sales was 0.34 kl/ million yen, down 8.4% from fiscal 2022. We have been working on energy-saving activities such as process improvement and steam usage reduction through replacement of steam traps. In addition, we assess that the growth in net sales has had an impact on the improvement of crude oil equivalent of energy consumption per sales.

Changes in energy intensity related to sales



Renewable energy measures (domestic)

As for the NOF Group's initiatives in the area of renewable energy, solar power generation facilities were installed in the Kawasaki Works in 2018 and NiGK Corporation in November 2020 to use renewable energy to provide part of the electricity used in production activities in an effort to realize a low carbon society.

Track record of solar power introduction

Kawasaki Works

10.4kW×4.5H×365=17MWh/year

NiGK Corporation

12kW×4.5H×365=20MWh/year

Company housing in the Kansai area

10kW×4.5H×365=16MWh/year

DDS Aichi (Plan)

83 MW for manufacturing building + 11 MW for quality assurance building =94MWh/year

Initiatives to reduce CO_2 through the use of biomass fuels

PT. NOF MAS CHEMICAL INDUSTRIES, which is located in Indonesia where palm oil is produced, is working to reduce CO_2 emissions by utilizing palm kernel shells (PKS), a biomass fuel which is usually left as waste after oil extraction, as fuel for its boilers.

Biomass fuel (palm kernel shells)

Biomass-fueled boiler

Responses to Climate Change (TCFD) | Status of Greenhouse Gas Reduction Efforts/Emissions

GRI 302-3,4/305-1,2,4,5

CO_2 emissions per product by transportation

Starting the operation of an integrated delivery system in fiscal 2006, NOF has since been endeavoring for more efficient transportation. Additionally, NOF has also engaged in modal shifting* and joint delivery.

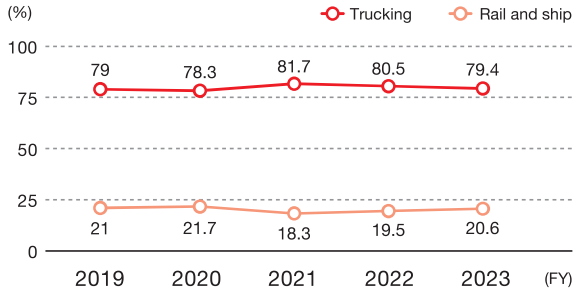
With regard to modal shifting, the percentage of rail or marine transport in the total volume of our product transport had been around 20.6%.

CO_2 emissions per product by transportation were reduced from 100 in fiscal 2006 to 44.0 in fiscal 2023.

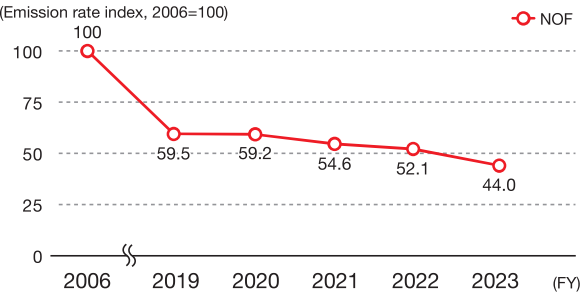
Modal shifting

$$\text{CO}_2\text{ emissions per product by transportation} = \frac{\sum(\text{CO}_2\text{ emitted by each means of transport})}{\text{Net sales}}$$

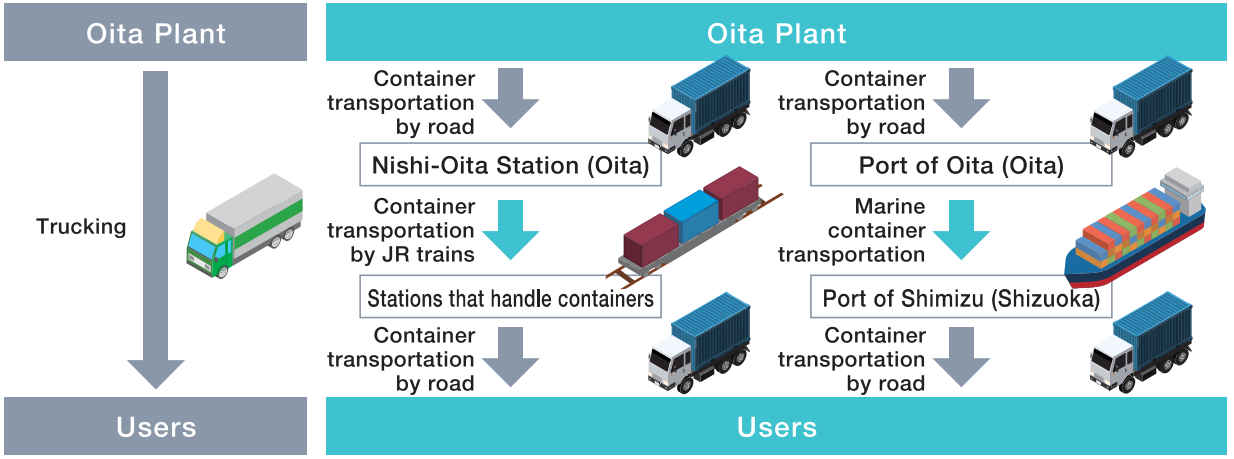
Modal shifting for transportation NOF Group



CO_2 emissions per product related to transportation NOF



Oita Plant modal shifting scheme



*Enhancing the efficiency of transport and at the same time reducing energy consumption and environmental loads by shifting the mode of transport to large per-unit capacity means such as cargo trains and ships.