



Responses to Climate Change (TCFD)

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 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.

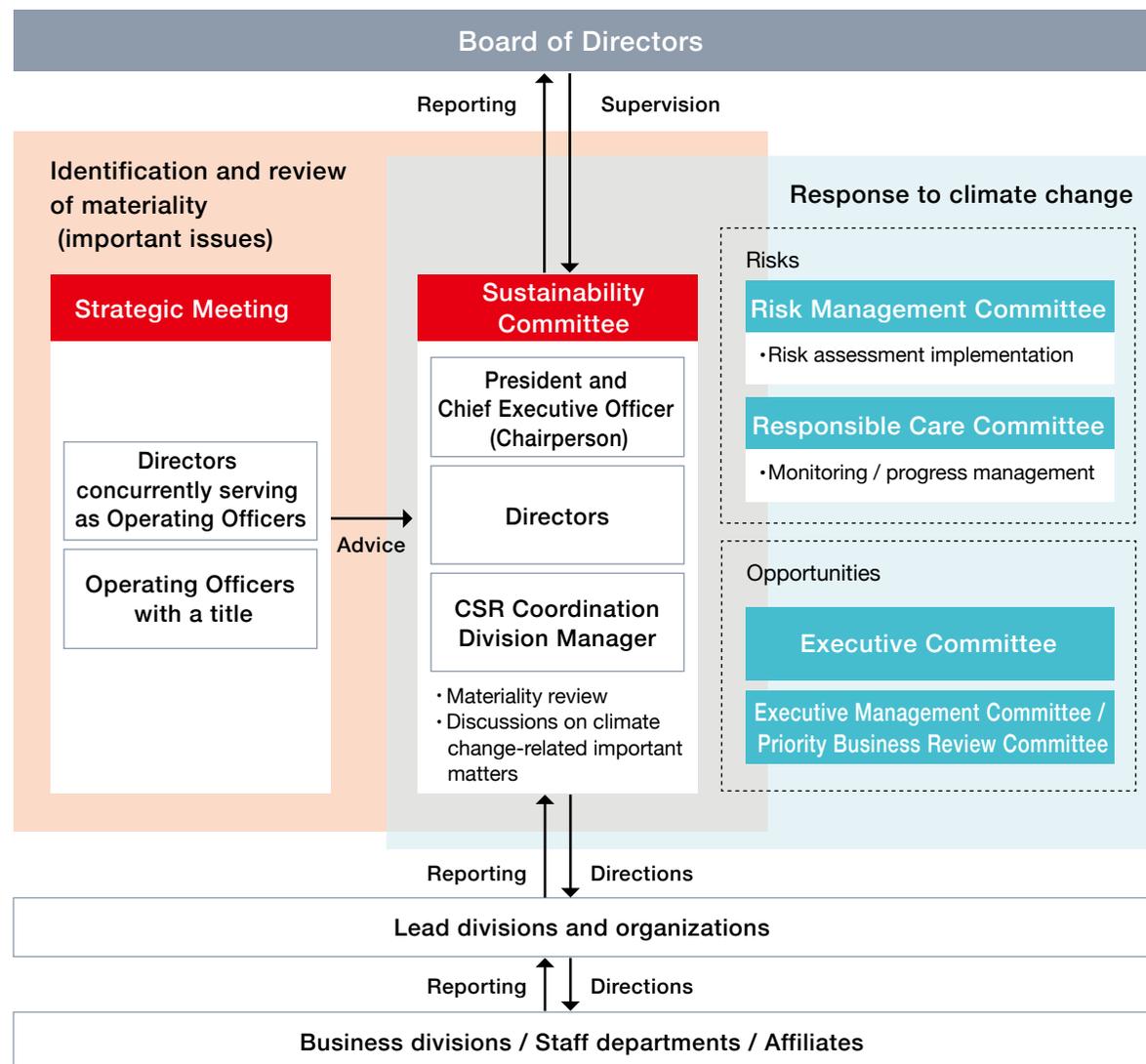




The NOF Group identifies materiality (important issues) related to sustainability through discussions in the Strategic Meeting, which is composed of Directors concurrently serving as Operating Officers as well as Operating Officers with a title, and the Sustainability Committee, which is chaired by the 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 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. 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: Governance

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	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.)
	2°C	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 capital investment plans
Opportunities	1.5°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. 092-094 for details)	Large	• Development and provision of products that contribute to climate change mitigation and adaptation
	2°C	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 scenario: A decarbonization scenario that assumes 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)



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 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

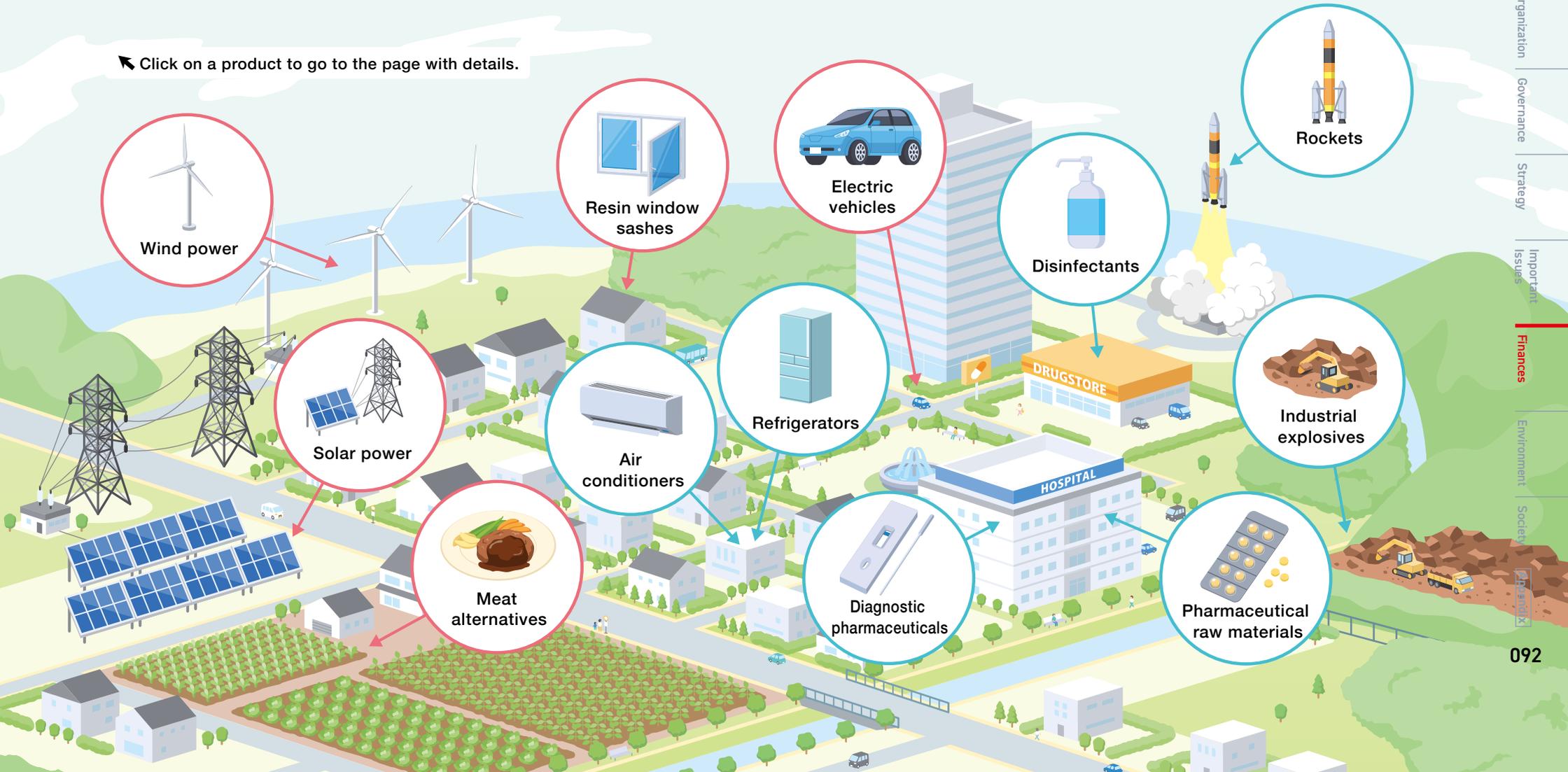
Category	Scenario	Risks	Details of risks	Financial amount of impact	Notes						
Transition risks	1.5°C	Carbon tax	Financial burden from tax increases	<p>(Hundreds of millions of yen/year)</p> <table border="1"> <tr><th>Year</th><th>Impact</th></tr> <tr><td>2020</td><td>0.5</td></tr> <tr><td>2030 (FY)</td><td>31.6</td></tr> </table>	Year	Impact	2020	0.5	2030 (FY)	31.6	CO ₂ equivalent emissions in fiscal 2020, with a carbon price of 20,000 yen per ton of CO ₂ in fiscal 2030. Domestic Group
		Year	Impact								
2020	0.5										
2030 (FY)	31.6										
Renewable energy charges	Increased energy costs	<p>(Hundreds of millions of yen/year)</p> <table border="1"> <tr><th>Year</th><th>Impact</th></tr> <tr><td>2020</td><td>3.8</td></tr> <tr><td>2030 (FY)</td><td>5.2</td></tr> </table>	Year	Impact	2020	3.8	2030 (FY)	5.2	The unit price of the renewable energy charge for fiscal 2030 is set at 4.1 yen/kWh based on fiscal 2020 electricity consumption. Domestic Group		
Year	Impact										
2020	3.8										
2030 (FY)	5.2										
Physical risks	4°C	Storm surges	Flooding of facilities due to storm surges	<p>(Hundreds of millions of yen/year)</p> <table border="1"> <tr><th>Year</th><th>Impact</th></tr> <tr><td>2020</td><td>0</td></tr> <tr><td>2050 (FY)</td><td>77</td></tr> </table>	Year	Impact	2020	0	2050 (FY)	77	Typhoons and embankment failures every 500 to several thousand years. NOF
Year	Impact										
2020	0										
2050 (FY)	77										



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.

Click on a product to go to the page with details.





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 electric units, anti-corrosive coatings, and overcoat materials for LCD color filters due to the increase in electronic components (passive components), electric units, and screws to hold the components in place, as well as more and larger LCD panels. In addition, because LED lights are effective in reducing power consumption of EVs, demand for antifogging 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

For capacitors and LCD panels
(Additives for electronic components /
Lubricants for electric units /
Overcoat materials)

For agents to prevent abnormal noises in door hinges and interior parts
(Resin additives)

For antifogging of LED headlamps
(Antifogging agents)



For bolts, nuts, and other parts that hold batteries in place
(Anti-corrosive coatings)

Wind power / Solar power

Functional Materials business | Metal Coatings business

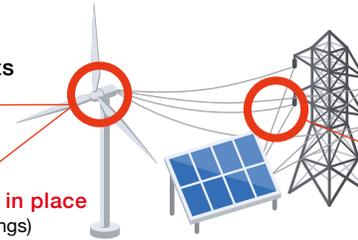
Market scale **Medium**

Demand is expected to increase for anti-corrosion coatings for bolts used in wind turbine blades and 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

For gear oil
(Biodegradable lubricants)

For bolts that hold blades in place
(Anti-corrosive coatings)



For ultra-high-voltage and high-voltage wire coating materials
(Organic peroxides)

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

For meat alternatives such as soy meat hamburgers
(Oils and fats for meat alternatives)



Resin window sashes

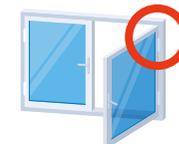
Functional Materials business

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

For resin window sashes
(Organic peroxides)





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

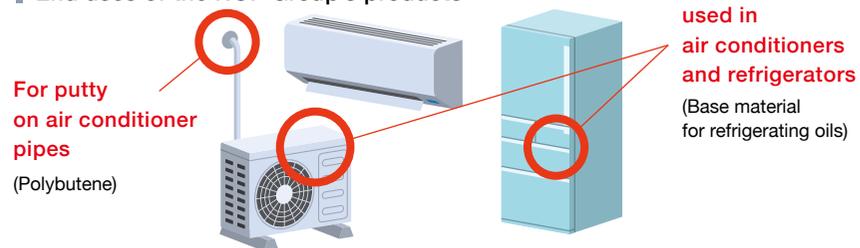
Air conditioners / Refrigerators

Functional Materials business

Market scale **Large**

Demand for base material for refrigerating oils, a lubricant for refrigeration equipment, and polybutene for air conditioner putty is expected to increase due to the global increasing need for air conditioners and refrigerators accompanying rising temperatures. The refrigerating machine oil sold by NOF is for alternative CFC refrigerants and contributes to climate change adaptation.

End uses of the NOF Group's products



Diagnostic pharmaceuticals / Pharmaceutical raw materials

Functional Materials business Life Science business

Market scale **Large**

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

Explosives & Propulsion business

Market scale **Small**

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.

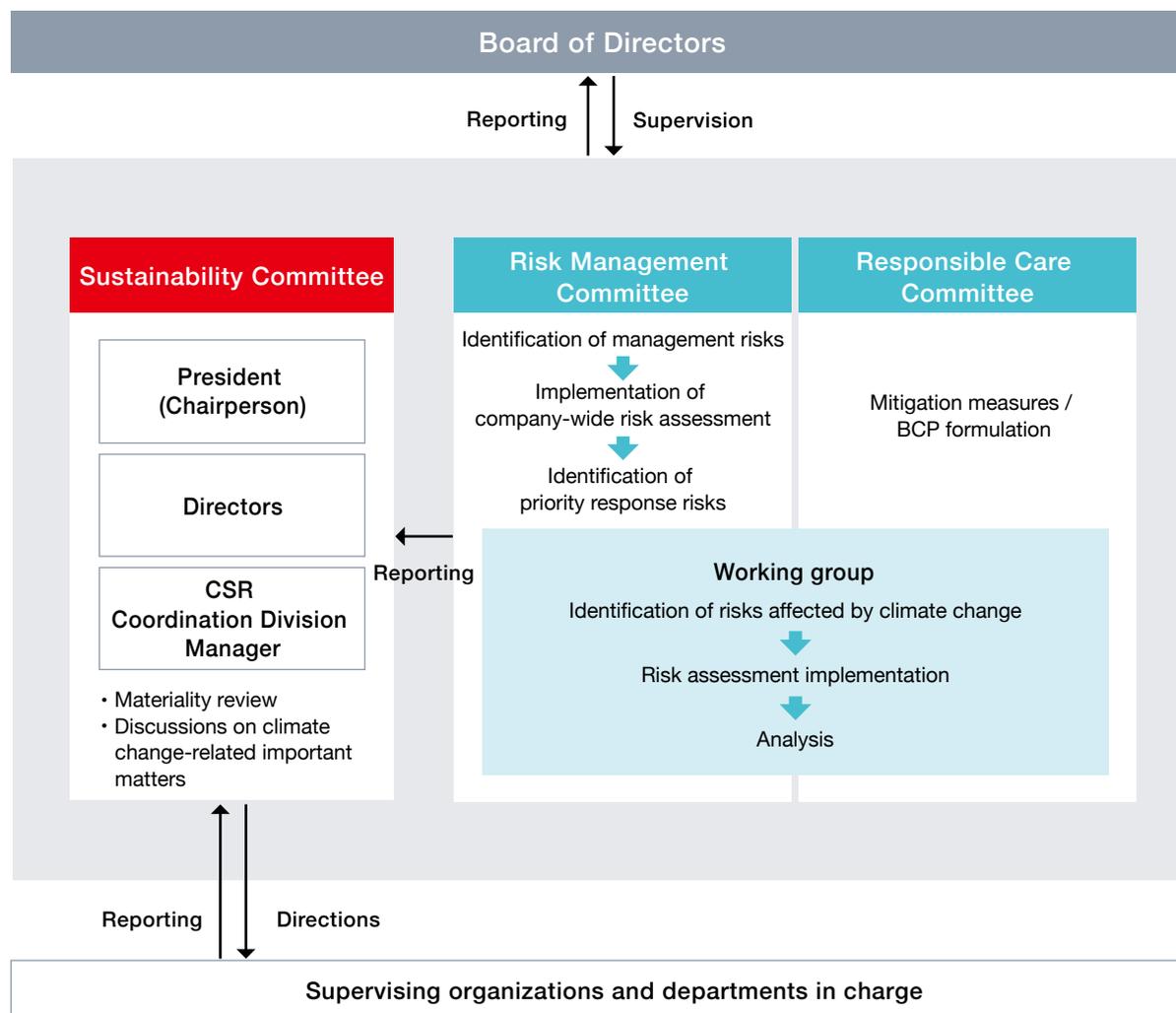
End uses of the NOF Group's products





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

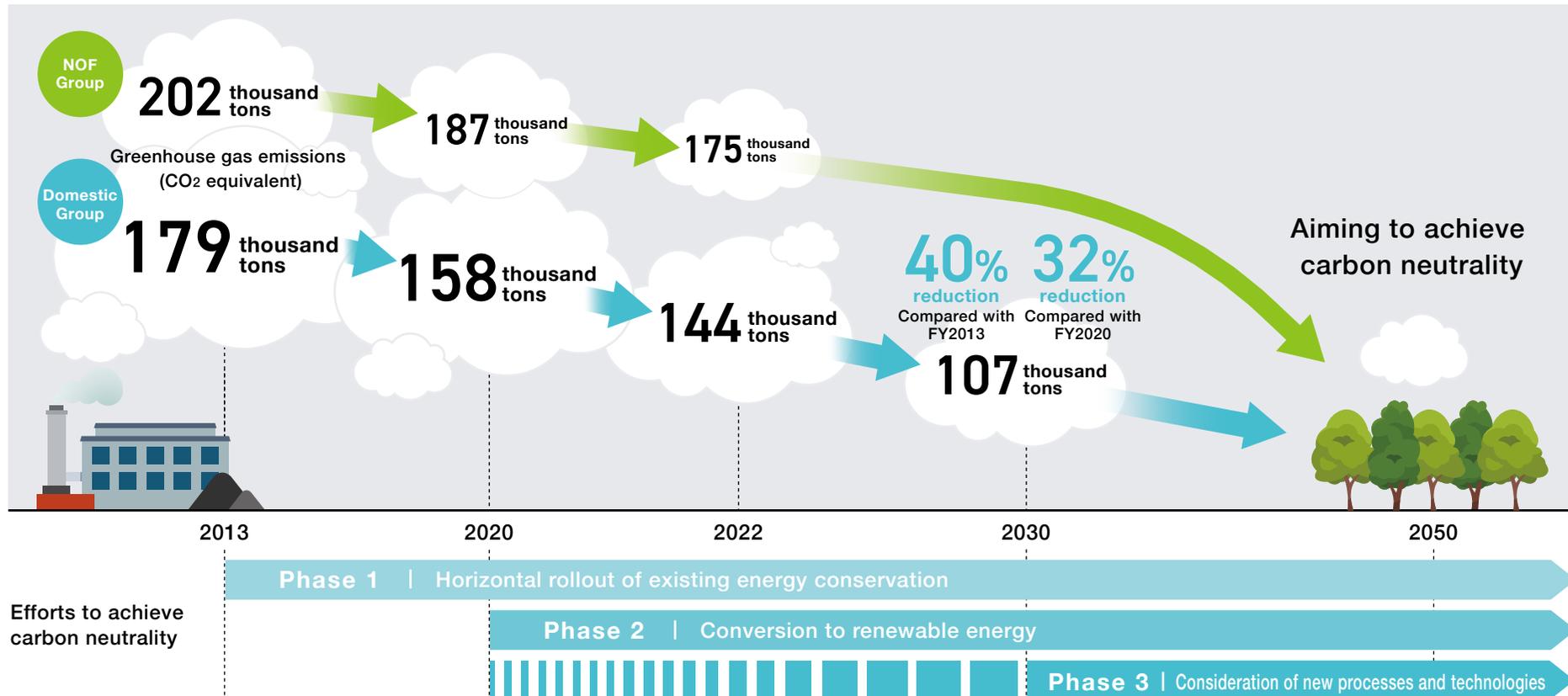




Roadmap toward reducing greenhouse gas emissions

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 for carbon neutrality 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 (CO₂ equivalent) generated by our business activities [Scope 1, 2] NOF Group Domestic Group





Greenhouse gas emissions

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 set a new target of reducing CO₂ emissions by 40% by fiscal 2030 compared to fiscal 2013. The Group had already reduced CO₂ emissions by about 20% (compared to fiscal 2013) in fiscal 2022, and is aiming to reduce greenhouse gas emissions and achieve carbon neutrality by 2050.

Scope 1 and 2 CO₂ emissions (FY2022)

(Thousand tons of CO₂)

	Scope 1	Scope 2	Total (Scope 1+2)
NOF	53.3	78.2	131.5
Domestic Group	60.1	83.5	143.6
NOF Group	71.9	103.3	175.3

Scope 3 CO₂ emissions (FY2022) Domestic Group

(Thousand tons of CO₂)

Category	FY2022	Calculating method
Purchased products and services	278.3	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
Capital goods	22.4	Calculated by multiplying acquisition cost of fixed assets by CO ₂ emission per product according to the guidelines
Fuels and energy-related activities not included in Scope 1 or 2	36.3	Calculated by multiplying the sum of electricity consumption and steam consumption by CO ₂ emission per product according to the guidelines
Transportation and distribution (upstream)	25.0	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
Waste generated in business activities	8.2	Calculated by multiplying the weight of each type of waste generated at production sites by CO ₂ emission per product according to the guidelines
Business travel	0.5	Calculated by multiplying the number of employees by CO ₂ emission per product according to the guidelines
Employee commuting	1.6	Calculated by multiplying the amount of commuting expenses by CO ₂ emission per product according to the guidelines
Leased assets (upstream)	—	Not applicable
Transportation and distribution (downstream)	—	Not applicable
Processing of sold products	20.6	Calculated by multiplying the sales volume of processed edible oils and industrial explosives by emission intensity according to the guidelines
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
End-of-life treatment of sold products	0.7	For packaging materials of shipped products, calculated by multiplying the weight of each type by the emission intensity according to the guidelines
Leased assets (downstream)	—	Not applicable
Franchises	—	Not applicable
Investments	—	Not applicable
Total	393.4	

Guidelines utilized: "Emission Factor Database on Accounting for Greenhouse Gas Emissions of an Organization Throughout the Supply Chain (Ver. 3.3)" (issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry), "IDEA (Ver. 3.1)" (issued by the National Research and Development Agency and National Institute of Advanced Industrial Science and Technology)



Energy consumption and CO₂ emissions

Energy consumption for fiscal 2022 decreased 7.8% from the previous fiscal year for the NOF Group, and decreased 7.0% from the previous fiscal year for NOF. The total volume of energy-derived CO₂ emissions decreased 13.5% from the previous fiscal year to 149,000 tons for the NOF Group, and decreased 15.9% from the previous fiscal year to 111,000 tons for NOF. Energy intensity per product increased 2.0% from the previous fiscal year to 13.8 GJ/t for the NOF Group, and increased 4.6% from the previous fiscal year to 14.5 GJ/t for NOF. NOF will continue to implement energy-saving measures to produce even greater results.

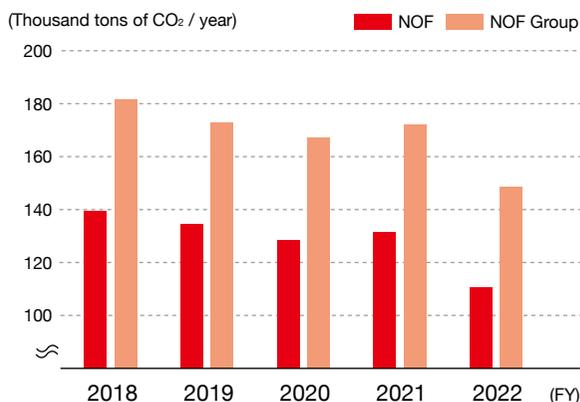
CO₂ emissions other than from energy consumption

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

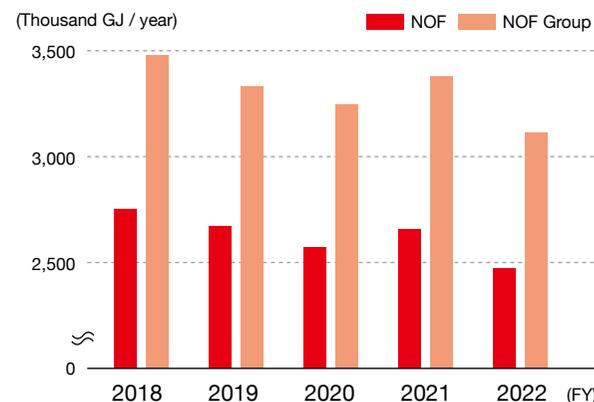
Efforts have been made to reduce PFC emissions by improving the manufacturing equipment on numerous occasions. As a result, PFC emissions have been reduced substantially compared with those in fiscal 1995 (the reference fiscal year for PFCs).

In fiscal 2022, emissions increased by 144% compared to fiscal 2021. However, we will continue our efforts to reduce emissions through stable operation of recovery equipment and promoting the use of an alternative diluent.

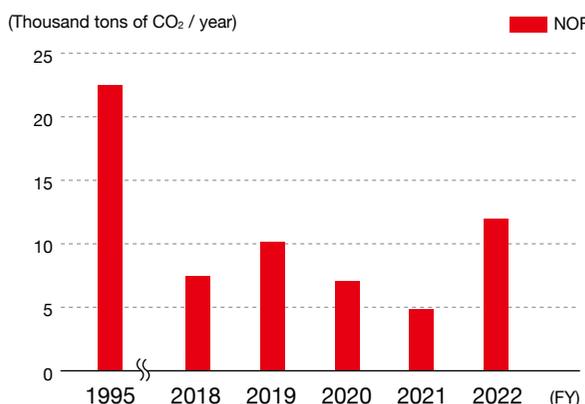
Changes in CO₂ emissions*¹ by energy consumption



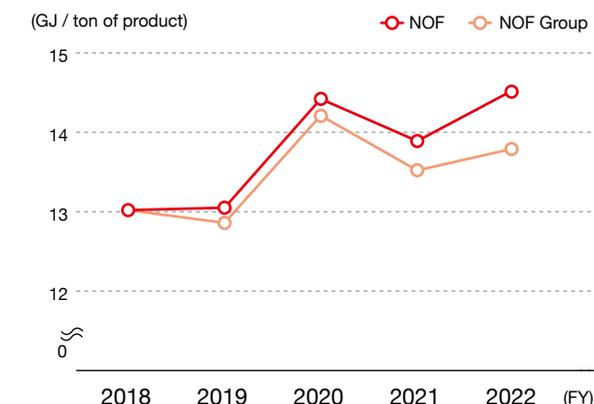
Changes in energy consumption*²



Changes in PFC emissions



Changes in energy intensity per product



*1 The coefficient used in converting the electricity consumption into CO₂ 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.



CO₂ emission 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.

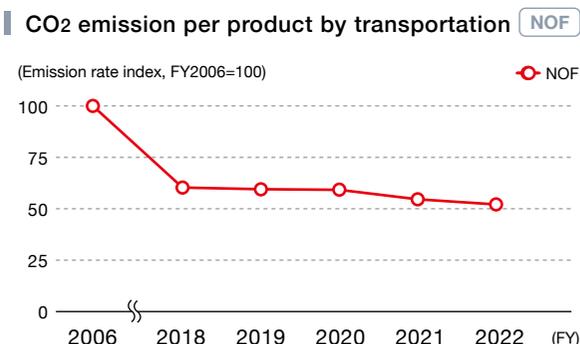
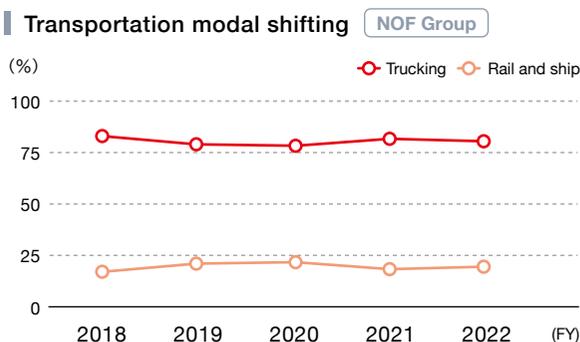
With regard to modal shifting, the percentage of rail or marine transport in the total volume of our product transport had been around 19.5%.

CO₂ emissions per product by transportation were reduced from 100 in fiscal 2006 to 52.1 in fiscal 2022.



Modal shifting

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



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.

In fiscal 2022, the Kawasaki Works generated 15 MWh/year and NiGK CORPORATION generated 19 MWh/year.



Solar power generation panels at Kawasaki Works



Solar power generation panels at NiGK Corporation

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