[Important Issues]
Reducing Energy Consumption and Greenhouse Gas Emissions

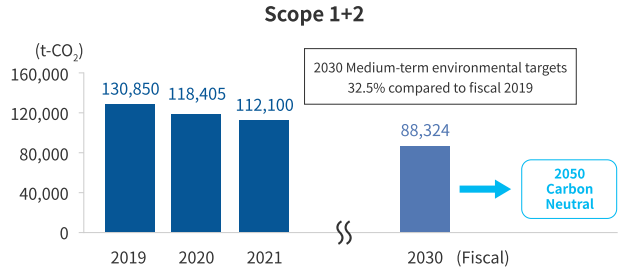
Policy and Basic Approach

In addition to the environmental targets of the new medium-term business plan for FY2030 that was established last year, the Nippon Kayaku Group set its sights further into the future and declared a final target of achieving carbon neutrality by FY2050. In recent years, we have been faced with a rising sense of crisis about climate change as we witness abnormal weather conditions and devastations of the natural environment in various parts of the world. This has resulted in an acceleration of the global trend toward decarbonization as seen at COP26 (26th UN Climate Change Conference), with the Japanese government declaring a growth strategy based on the Paris Agreement that seeks to achieve carbon neutrality by 2050.
Against this background, in order to make a significant reduction to our greenhouse gas emissions, the Nippon Kayaku Group will confront the issues of climate change not only by implementing comprehensive energy-saving efforts but also by installing power sources such as solar power that have low CO_2 emissions and by switching to power derived from recycled energy that has a low emissions coefficient. We also aim to achieve decarbonization throughout our value chain by providing products that contribute toward realizing a decarbonized society and by promoting supplier engagement to that end.

Reduction in the Amount of Greenhouse Gas Emissions

The Nippon Kayaku Group has been working on various measures to reduce its energy consumption, such as by improving the operation of our utility equipment, switching to high-efficiency equipment and using LED bulbs for lighting. Our Scope 1 and 2 emissions, which are used as metrics in our FY2030 medium-term environmental targets, have been diminishing every year as shown below.

Scope 1: Direct emissions of greenhouse gas generated from a source owned or managed by the business operator themselves (emissions from fuel usage, manufacturing processes, etc.)
Scope 2: Indirect emissions of greenhouse gas from the use of power, heat or steam supplied by another business (emissions from purchased power, etc.)



Responses to Climate Change

The Paris Agreement, adopted at COP21* held in 2015, binds each country at a national level to achieve its target for reducing CO_2 emissions, with the goal of preventing average global temperatures from rising by more than two degrees Celsius above pre-industrial levels, and urging efforts to limit the increase to 1.5 degrees Celsius. Previously, the Nippon Kayaku Group set a target range in its FY2020 medium-term environmental targets to reduce CO_2 emissions at the energy source for the parent company only. However, under the newly established medium-term environmental targets up to FY2030, the goal for reducing greenhouse gas emissions in our business activities has been expanded to include the entire Nippon Kayaku Group, with targets set for FY2030 to reduce emissions (Scope 1 and 2) resulting from our Group's business activities by 32.5% compared to FY2019. The consolidated results for Scope 1 and 2 emissions for FY2021 showed a decline of approximately 6% compared to the previous year.

* COP21: 21st United Nations Climate Change Conference. The conference was held in the outskirts of Paris, France, and the Paris Agreement was adopted by all 196 participating parties as a new framework to follow on from the Kyoto Protocol, which expired in 2020.

Disclosure of Data on CO_2 Emissions (Scope 3) Throughout the Supply Chain

In recent years, there has been an increasing tendency for companies to keep tabs on, manage and disclose information on indirectly emitted CO_2 throughout the supply chain. At the Nippon Kayaku Group, we are not only aggregating and managing Scope 1 and Scope 2 emissions as before, but are also calculating Scope 3 emissions within the supply chain.

Since FY2017, Nippon Kayaku has been calculating Scope 3 emissions on a non-consolidated basis, but from FY2019, this has been expanded to include both domestic and overseas Group companies. The Nippon Kayaku Group will continue to calculate and manage our data based on the General Guidelines on Supply Chain GHG Emission Accounting issued by the Ministry of the Environment, in order to systematically implement initiatives to reduce CO_2 emissions throughout the supply chain.

Scope 3: Indirect emissions other than Scope 2 (emissions from raw material procurement, employee commuting, business travel, waste processing consignment, product usage, disposal, etc.)

Category		Emissions (thousand ton-CO_2/year)		
		FY2019	FY2020	FY2021
1	Purchased products and services	243.6	237.3	294.5
2	Capital goods	42.7	42.9	26.8
3	Fuel- and energy-related activities not included in Scope 1 or 2	22.4	21.2	22.3
4	Transportation and distribution (upstream)	19.0	17.6	22.3
5	Waste generated in operations	26.5	28.8	31.8
6	Business travel	0.8	0.8	0.8
7	Employee commuting	2.5	2.4	2.4
8	Leased assets (upstream)	Included in scope 1 or scope 2		
9	Transportation and distribution (downstream)	1.0	1.0	1.6
10/11	Processing/usage of sold products	-	-	-
12	End-of-life treatment of sold products	15.4	23.2	26.4
13	Leased assets (downstream)	0.4	0.4	0.4
14/15	Franchise/investments	-	-	
Total of Scope 3		374.3	375.6	429.3
Scope1		36.2	35.3	37.4
Scope2		94.7	83.1	74.7
Total of Scope 1+2+3		505.2	494.0	541.4

Calculation method: As a rule, the amount of CO_2 emitted is calculated based on the General Guidelines on Supply Chain GHG Emission Accounting issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry, and the emission coefficient listed by the IDEA Research Laboratory at the National Institute of Advanced Industrial Science and Technology's Research Institute of Science for Safety and Sustainability.

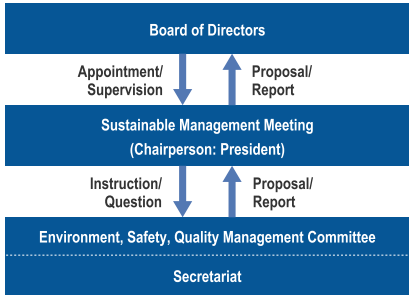
Supporting the Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

The Nippon Kayaku Group upholds a basic policy of sustainable management as described in the new Medium-term Business Plan **KAYAKU Vision 2025**, which came into effect from FY2022, and is striving toward the realization of a sustainable society and the further enhancement of our corporate value by seeking to achieve environmental, social and economic value in implementing efforts to deal with climate change.
Climate has a major impact on our society and, accordingly, we consider this to be a highly important issue. In March 2022, we declared our support for the recommendations made by the Task Force on Climate-related Financial Disclosures (TCFD). Going forward, the Nippon Kayaku Group will accelerate our efforts toward reducing greenhouse gas emissions and developing a recycling-oriented society in line with the TCFD recommendations.

Information Disclosure Based on the TCFD Recommendations

Governance

The Sustainable Management Meeting, chaired by the president, deliberates, reviews and evaluates the business plan and other items related to the Nippon Kayaku Group's future responses to climate change. The results of such deliberations, reviews and evaluations are reported to the Board of Directors and, under this structure, are subject to being observed and supervised by the Board.
Furthermore, the Environment, Safety, Quality Management Committee (chaired by the head of the Technical Operations Group) has been created as one of the specialized committees under the Sustainable Management Meeting to oversee the implementation of climate change initiatives. This committee delves deeper into issues related to climate change from a standpoint that extends across the entire Group.



Strategy

Nippon Kayaku has multiple businesses being deployed on a global scale, and is presented with various risks and opportunities depending on the business area. In order to identify the impact that climate change can have on each business, we evaluated the climate-related risks throughout the Group in accordance with the TCFD recommendations, and further considered the opportunities in each business area. In identifying the risks and opportunities related to climate change, the time period when the risks will emerge has been defined as follows.

	Period	Reason
Short-term	4 years up to FY2025	Period falling within the Medium-term Business Plan **KAYAKU Vision 2025** (**KV25**) that started in FY2022
Medium-term	Up to FY2030	In line with goals for FY2030 that are set in the Nippon Kayaku Group Environmental Targets of the Medium-term Business Plan
Long-term	Up to FY2050	In line with the year set as the goal for Japan's NDC target

◆ Climate-related Risks

Business risks related to climate change are based on the IPCC's Representative Concentration Pathway (RCP 2.6, 8.5) scenarios, IEA's Sustainable Development Scenario (SDS) and the Stated Policies Scenario (STEPS) for both the 2°C and 4°C scenarios.

◆ Risks and Opportunities in Transitioning to a Decarbonized Economy for the 2°C Scenario

Category	Major risks	Period of risk emergence	Financial impact	Major countermeasures
Policies & regulations	Increased operation costs from tighter emissions regulations	Short to long term	Medium	• Implement dispersed power for each site, such as solar power and high-efficiency cogeneration power generators • Reduce material loss by utilizing MFCA and implement comprehensive energy-saving activities
	Rising price of electricity, LNG, etc.	Short to long term	Medium	
	Increased raw material costs from tighter emissions regulations	Short to long term	Medium	• Encourage suppliers to reduce emissions through engagement activities
Market & reputation	Increased costs from disclosure of environmental information and LCA calculations, etc.	Medium to long term	Small	• Rationalize the emissions calculation method at each site and systemize the LCA calculations

◆ Physical Risks from the 4°C scenario

Category	Major risks	Period of risk emergence	Financial impact	Major countermeasures
Acute & chronic physical risks	Increased costs from flood damage caused by typhoons, heavy rain events, high tides, etc.	Short to long term	Medium	• When building new plants, account for the possibility of flooding when considering the geographical situation and the configuration and placement of equipment
	Impact on operations due to water shortage	Medium to long term	Small	• Strengthen efforts to save water used during production, and consider reusing and recycling water
	Reduced labor productivity due to increased temperatures	Medium to long term	Small	• Enhance the work environment such as by improving air-conditioning, and promote the automation of high-temperature work processes

◆ Opportunities in Each Business Area in Transitioning to a Decarbonized Economy for the 2°C Scenarios

Business area		Business environment		Opportunity	Period of opportunity creation	Financial impact*
Functional Chemicals	Functional Materials	Tightened regulations against greenhouse gas emissions in various countries & regions	• Advances in social changes, such as growth of smart cities • Heightened demand for increased energy efficiency of electronics products • Increased demand for storage batteries able to handle large output fluctuations in response to expanding use of recyclable energy • Global expansion of demand for mobility/transport methods that have relatively low emissions	• Increase in semiconductor materials from growth of smart cities and DX • Expansion of functional materials that help reduce energy consumption of display devices • Expansion of low-emission materials due to the increased shift in raw materials toward biomass feedstock • Expansion of resin materials that help make mobility frames more lightweight	Short to long term	Large
	Color Materials			• Expansion of ink for digital on-demand that enables low-carbon printing • Expansion of dimming glass/film that controls incident sunlight	Short to long term	Large
	Catalysts			• Growth of catalyst for producing green energy, such as hydrogen • Growth of catalyst for promoting the use of biomass-derived raw materials	Medium to long term	Large
	Polatechno			• Growth of safety display device components for sensors, HUD, etc. brought on by the development of EV and automated driving • Growth of polarizing plates that help reduce energy consumption of display devices	Short to long term	Medium
Pharmaceuticals			• Direct impact is limited	• Studying items within the entire range of business activities that will become opportunities	Short to medium term	Small
Safety Systems			• Global expansion of demand for mobility & transport methods that have relatively low emissions • Significant restrictions in sales of internal combustion engine vehicles, depending on the region	• Rise of EV and automated driving brings increased diversification in smallness of size, lightness of weight, and shape to automobile safety parts • Expansion of safety parts for unmanned aircraft such as drones	Short to long term	Large
Agrochemicals			• Direct impact is limited	• A certain level of temperature increase is expected even for the 2°C scenario, thus expanding the use of biostimulants that help maintain and improve agricultural productivity • Expanded use of existing agrochemicals to deal with new problems with pests	Medium to long term	Small

* Financial impact: Large = 2 billion yen or more; Medium = 0.5 to 2 billion yen; Small = 0 to 0.5 billion yen

Risk Management

The Nippon Kayaku Group identifies the reducing energy consumption and greenhouse gas emissions as a key sustainability issue related to climate change.
The M-CFT Mitigation of Climate Change Team was created to coincide with the start of the **KV25** under a governance system comprised of the Board of Directors, the Sustainable Management Meeting and the Environment, Safety, Quality Management Committee. This response team serves a central role in identifying and evaluating climate change risks, while also executing other specific measures such as actively implementing energy-saving efforts and pushing forward with environmental investments.

Metrics and Targets

As a metric against the risk of climate change, the Nippon Kayaku Group has established the target of reducing greenhouse gas emissions (Scope 1 and 2) for the entire Group by 32.5% in FY2030 compared to FY2019. In order to achieve this target, we are starting by aiming to reduce greenhouse gas emissions by 3% every year during the **KV25** period. We are also conducting advanced studies on making a shift to green energy such as hydrogen and ammonia in order to achieve carbon neutrality for Scope 1 and 2 by FY2050.
Also, in order to enable us to include Scope 3 in establishing future targets on reducing emissions, we have been working on enhancing the accuracy of our Scope 3 calculation methods in anticipation of being able to individually determine the amount of emissions for each product (carbon footprint). Our calculation results for Scope 1, 2 and 3 are scheduled to be examined by a third party during FY2022. In order to reduce Scope 3 emissions, we will work together with our business partners in reinforcing efforts to reduce environmental impacts throughout the entire supply chain.

› Environmental Data

Promoting the Adoption of Material Flow Cost Accounting (MFCA)

To date, the Nippon Kayaku Group has been striving to reduce its burden on the environment by making its production processes more energy-efficient and conserving resources. The Group is now working toward the adoption of material flow cost accounting (MFCA) by viewing its environmental burden-reducing initiatives as an opportunity for environmental management. Adopting MFCA helps us to identify energy losses and material losses in the production process, and by clarifying these losses it enables us to continuously reduce our impact on the environment such as by reducing CO_2 emissions in our production activities.
Since the second half of FY2018, Nippon Kayaku has been working on adopting MFCA for certain products at its Fukuyama Plant, which is achieving some positive results. In FY2019, we adopted MFCA at our Tokyo and Asa Plants, and in FY2020 we also introduced MFCA at our Kashima Plant. We plan to expand MFCA to other plants in the future so that we can further promote energy and resource conservation.

FY2021 Summary of Energy-saving Activities of the Nippon Kayaku Group

Since FY2011, Nippon Kayaku Group has been continuing to study and calculate energy-saving activities at each of our Group companies.

☀: Solar panel installation ／: Unrealized due to lease limitations -: Non-applicable
* High-load machinery: Refrigerators/freezers, blowers, steam management, etc.

Business site / Company name	Management of appropriate thermostat settings	Power-saving, water-saving, awareness-building activities	Reduction of fluorescent lights, switch to LED lights	Controlled operation of high-load machinery*	Heat barrier film, heat barrier paint, water sprinkler
Nippon Kayaku (Head Office)	●	●	●	-	-
Fukuyama Plant	●	●	●	●	●
Asa Plant☀	●	●	●	●	●
Tokyo Plant	●	●	●	●	●
Joetsu Plant	●	●	●	●	×
Takasaki Plant	●	●	●	●	●
Himeji Plant☀	●	●	●	●	●
Kashima Plant	●	●	●	●	●
Tokyo R&D Administration Office	●	●	●	●	●
MOXTEC	●	●	●	-	●
WUXI POLATECHNO OPTICS	●	●	●	-	-
Dejima Optical Films	●	●	●	●	×
NIKKA FINE TECHNO	●	●	●	-	／
Nippon Kayaku Korea	●	●	／	-	／
NIPPON KAYAKU AMERICA	●	●	／	-	●
Euro Nippon Kayaku	-	●	●	-	／
KAYAKU CHEMICAL (WUXI)	●	●	●	●	●
KAYAKU Advanced Materials	●	●	●	●	-
WUXI ADVANCED KAYAKU CHEMICAL	●	●	●	●	●
Shanghai KAYAKU International Trading	●	●	-	-	-
NIPPON KAYAKU FOOD TECHNO	●	●	●	-	●
Tumor Diagnosis Support	●	●	●	-	●
Taiwan Nippon Kayaku	●	●	-	-	-
Kayaku Safety Systems Europe☀	●	●	●	●	●
Kayaku Safety Systems (Huzhou)	●	●	●	●	●
Kayaku Safety Systems de Mexico☀	●	●	●	●	●
Kayaku Safety Systems Malaysia	●	●	●	-	●
Nishiminato Driving School	●	●	●	-	●
Okiura Golf Center	●	●	●	-	●
Kayaku (Shanghai)	●	●	-	-	-
JAPAN HUMAN RESOURCES MEDICAL SCIENCE RESEARCH INSTITUTE	●	●	●	-	-
Wako Toshi Kaihatsu	●	●	●	-	-
Kowa Sangyo	●	●	●	-	●
Gunnan Sangyo	●	●	●	-	●
Kayaku Japan (Head Office)	●	●	●	-	／
Kayaku Japan (Asa Plant)	●	●	●	●	●