Planet

【Notes】As a result of the change in months in each fiscal year, the environmental data and information contained in this report including graphs are as follows.
・Before fiscal 2013: Actuals in 12 months from April to March of the following year
・Fiscal 2014: Actuals for 9 months from April to December + Actuals for January to March 2014 (or estimated value) [Partially overlaps with fiscal 2013]
・After fiscal 2015 : Actuals for 12 months from January to December

Global Warming Prevention

Initiatives of the Kuraray Group

The Kuraray Group in Japan has set annual targets for GHG emission reduction measures (13,000 tons-CO_2e/year or more) and GHG emission intensity index (an improvement of 1.0 percentage point or more from the previous fiscal year) in its three-year Medium-Term Environmental Plan starting from fiscal 2018. The results for fiscal 2020 are shown below.

> Link to Carrying Out the Medium-term Environmental Plan

In fiscal 2020, in addition to continued efforts to reduce GHG emissions at each production site, production activities were restricted due to a decrease in global demand caused by the impact of the COVID-19 pandemic. As a result, GHG emissions declined by 81,000 tons-CO_2e from fiscal 2019, to 1,229,000 tons-CO_2e. As for the target amount of measures to reduce GHG emissions, we exceeded the target by 14,000 tons-CO_2e (a cumulative total reduction of 68,000 tons-CO_2e since fiscal 2016) by improving the yield of each product, recovering and using raw materials and utilities, replacing them with energy-saving equipment, and implementing energy-saving activities (waste elimination activities). On the other hand, the GHG emission intensity index, another target, deteriorated significantly to -14.3 percentage points compared to fiscal 2019. This reflected the impact of COVID-19, which forced us to cut production of key products, resulting in energy-inefficient operation of many processes.

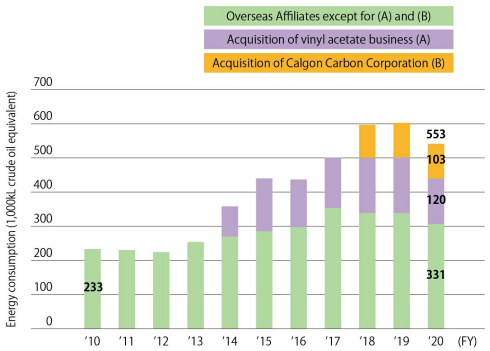
In the Kuraray Group outside Japan, GHG emissions totaled 1,816,000 tons-CO_2e, a decrease of 105,000 tons-CO_2e from fiscal 2019. This reflected the reduction in production volume at each production site due to efforts such as energy saving and product yield improvement as well as the impact of COVID-19, as was the case with the Kuraray Group in Japan. Since most of the electric power and steam at our production sites outside Japan are purchased, we have set annual targets (an improvement of 1.0 percentage point or more from the previous fiscal year) based on the intensity index using energy consumption rather than GHG emissions, which are affected by the utility supplier (a change in CO_2 emission coefficient), as an index to properly

evaluate the results of environmental improvement activities at our production sites. The energy intensity index for fiscal 2020 improved by 0.2 percentage points compared to fiscal 2019, a slight improvement but still short of the target. As in Japan, overseas production of many products fell due to the impact of COVID-19, resulting in operation with poor energy efficiency. However, we were able to minimize the impact because of strong demand for certain products for hygiene products with a relatively small energy intensity index.

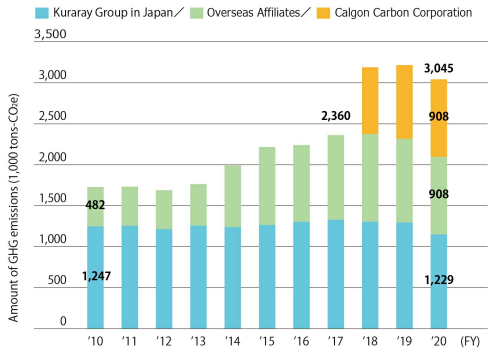
Since fiscal 2014, the Kuraray Group's total GHG emissions have increased due to the incorporation of businesses through M&A, such as the acquisition of the vinyl acetate business and the activated carbon business (Calgon Carbon Corporation). In particular, the acquisition of Calgon Carbon Corporation in 2018 resulted in a significant rise in the Kuraray Group's GHG emissions, from 2,360,000 tons-CO_2e in fiscal 2017 to 3,045,000 tons-CO_2e in fiscal 2020. The GHGs emitted by Calgon Carbon Corporation consist largely of the CO_2 generated as a byproduct in the process of producing activated carbon products. (Activated carbon is produced by burning a part of coal used in the process to form micropores on its surface. At this stage of the process, the carbon removed from the surface of the coal to form the micropores is released into the atmosphere as CO_2. In this way, activated carbon emits a large amount of CO_2 during production.) Activated carbon is widely used as an indispensable product for the adsorption and removal of hazardous chemical substances contained in factory exhaust gas and for the purification of industrial effluents and raw water for drinking. Activated carbon contributes greatly to improving the global environment and reducing the environmental impact. The Kuraray Group has evaluated the environmental impact and contribution of activated carbon throughout its life cycle, and has confirmed that the contribution to the environment exceeds the environmental impact of manufacturing.

			2016	2017	2018	2019	2020
Kuraray Group in Japan	GHG emissions (Scope1+Scope2)	1,000 t-CO_2e	1,303	1,330	1,320	1,310	1,229
	Scope1 emissions	1,000 t-CO_2e	1,128	1,147	1,138	1,121	1,067
	Scope2 emissions	1,000 t-CO_2e	175	183	182	189	162
	GHG emission intensity index	Target	Improve by 1% or more from the previous fiscal year				
		Result	–	2.9%	-3.5%	-1.7%	-14.3%
	Reduction (1,000 t-CO_2e)	Target	Implement measures to reduce GHG emissions by 13,000 tons-CO_2e or more from the previous fiscal year				
		Result	11	9	13	21	14
Kuraray Group outside Japan	GHG emissions (Scope1+Scope2)	1,000 t-CO_2e	933	1,032	1,868	1,921	1,816
	Scope1 emissions	1,000 t-CO_2e	76	93	862	939	978
	Scope2 emissions	1,000 t-CO_2e	856	939	1,006	981	838
	Energy consumption	crude oil equivalent, 1,000 kl	437	500	595	606	553
	Energy consumption intensity index	Target	Improve by 1% or more from the previous fiscal year				
		Result	–	-7.5%	9.1%	-5.9%	0.2%

Trends in Energy Consumption at Overseas Affiliates



Trends in GHG Emissions at Kuraray Group



Emissions of Scope 3 GHG

The GHG Protocol* classifies GHG emissions into three categories: Scopes 1, 2 and 3.

Scope 1: Direct emissions
GHG emissions generated by fuel combustion at the plants and other facilities of one's own company

Scope 2: Indirect emissions
GHG emissions generated by the use of purchased energy such as electricity, heat, and steam supplied by other companies

Scope 3: Other indirect emissions
The other indirect emissions. GHG emissions along the entire supply chain (from raw materials to product disposal.)

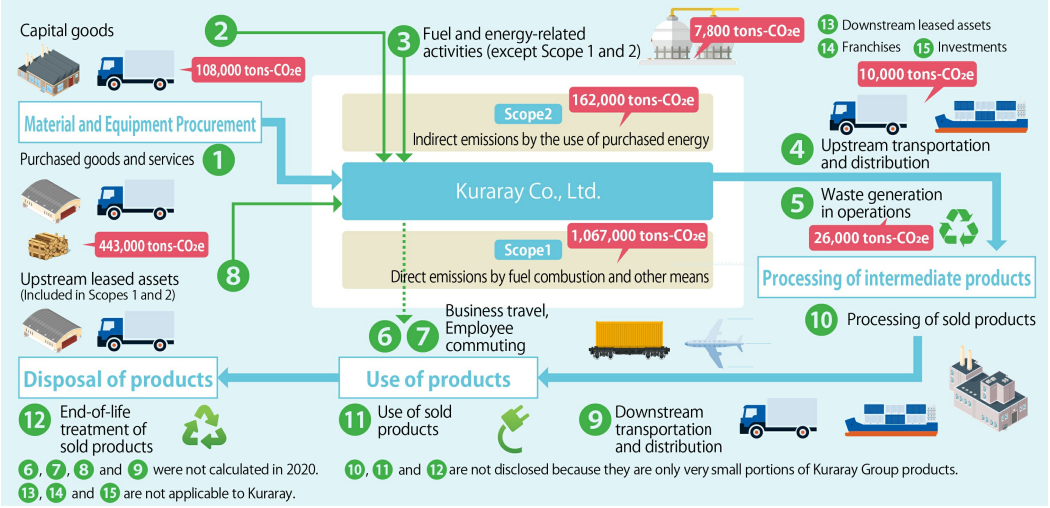
Mandated under the law by which businesses voluntarily calculate and report Scope 1 and Scope 2 to the government, we have been reporting these to the government and publishing the results mainly in the Kuraray Report and on the Kuraray Group's website.

On the other hand, Scope 3, which means the GHG emissions based on the entire supply chain related to us other than Scope 1 and Scope 2, is indirect GHG emissions generated from the viewpoint of a life cycle such as raw material procurement, product distribution, product use and disposal as well as the direct emissions related to our business activities. We have continued to make Scope 3 calculations since fiscal 2013.

Among the 15 categories in the total of Scope 3, we calculated actual values for fiscal 2020 for 5 categories [(1) to (5)] with a relatively large emission amount, excluding those not applicable to us and those having a limited calculation coverage in the products of the Kuraray Group. We will also continue to quantify our environmental contribution based on evaluations on the life cycle of our products.

* GHG Protocol (Greenhouse Gas Protocol) is an initiative to develop international standards and related tools on greenhouse gases and climate change led by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) and participated in by corporations, NGOs, government institutions and other organizations throughout the world.

Conceptual Image of Control on Emissions of Greenhouse Gases in Entire Scope 3 Supply Chain ((1) to (15) show categories of Scope 3) (Scope covered: Kuraray Co., Ltd.)



＜Scope3 GHG emissions[*1]＞

(Unit:1,000 t-CO_2e)

		2016	2017	2018	2019	2020
Upstream	Purchased goods and services[*2]	610	698	767	667	443
	Capital goods	97	92	121	170	108
	Fuel and energy related activities not included in Scope1,2	8.0	8.4	8.4	8.9	7.8
	Transportation and distribution	11	12	12	12	10
	Waste generation in operations	32	25	24	27	26
	Business travel	Not calculated				
	Employee commuting					
	Leased assets[*3]					
Downstream	Transportation and delivery					
	Processing of sold products	The Data is not disclosed because the scope of the calculation covers very limited Kuraray products.				
	Use of sold products					
	End-of-life treatment of sold products					
	Leased assets[*4]	0 (*4,5,6 Not Applicable)				
	Franchises[*5]					
	Investments[*6]					
Others [*7]		Not calculated				
Total		759	836	933	884	595

*1 Boundary is Kuraray Group in Japan. (Coverage：40%)
*2 Calculation method: Purchased amounts of major sixty two raw materials were multiplied by emission index(purchasing price and amount basis) of each raw material.
*3 Offices, electric appliances and company cars are leased. These are included in Scope 1, 2.
*4 No assets are leased to other company.

*5 Franchise system is not applied.
*6 Other company's stock was not held for investment purpose as reported in the security report.
*7 Optional category indirectly related to corporate activity except for Category 1 to Category 15

Response to TCFD Recommendations

In November 2020, Kuraray Group endorsed the recommendations of the Task Force on Climate-Related Financial Disclosure (TCFD)* in recognition of the importance of the climate change control as one of our high-profile issue. The Sustainability Medium-Term Plan, which started from 2022, includes measures to mitigate climate change such as reducing greenhouse gas (GHG) emissions, pursuing energy savings, expanding the products that contribute to improve the natural environment and responding to the Circular Economy. In addition to implement these measures gradually, we will enhance the disclosures of strategy, based on governance and scenario-based analysis, risk-management, indicators and targets which are recommended by TCFD.

※TCFD stands for “Task Force on Climate-related Financial Disclosures” which has been established under Financial Stability Board (FSB) to review how to correspond to climate change disclosures and requirements from the financial sector.

Governance

In Kuraray Group, Sustainability Committee, chaired by the president, promotes sustainability activities. Under the umbrella of this committee, we will establish several project teams to implement the global measures outlined in the Sustainability Medium-Term Plan and promote each projects. In addition to confirm the progress of the projects relates to climate change control, TCFD Promotion Project Team, which has been established under the umbrella of Sustainability Committee, will enhance the disclosure based on TCFD Guidance.

Topics discussed at Sustainability Committee are going to be reported to the Board of Directors and the feedback from them would be reflected in the future sustainability activities.

Strategy

The following table is a list of the risks and opportunities of the Kuraray Group for events that occur in the transition to a low-carbon society and physical events that occur due to climate change.

As a risk of the transition to low-carbon society, both of increase in the burden of a carbon tax and decrease in the use of plastic products would be considered. In order to reduce these risks, we will work together among Kuraray Group colleagues as well as our business partners to reduce GHG emissions. In addition, we will develop the products and technologies that contribute to the Circular Economy as well. Furthermore, we will take advantage of our customer’s products and end products to reduce GHG emissions and reduce the use of plastic products in the process of production, distribution and consumption by creating the products and technologies that contribute to the improvement of the natural environment.

In addition, we will prepare for business continuity by implementing measures against catastrophic disasters caused by climate change and aim to realize a society resilient to climate change through disaster countermeasures and products that contribute to securing water and food resources. In a future, we will identify scenarios of climate change and deepen our analysis of risks and opportunities,. Also at the same time we will analyze the impact on the Kuraray Group as well.

Table: Risks and Opportunities by Climate Change in the Kuraray Group

Items		Social changes caused by climate change	Business risks	Business opportunities
Transition Risk to Low-carbon society	Policies and Legal	Carbon Taxes and Carbon Emissions Targets at each countries Rising carbon prices, Energy mix changeRenewable energy subsidy policy and energy-saving policy	- Decrease in revenue from the burden of carbon taxes on GHG emissions and energy procurement - Strengthening CO_2 Emissions Reductions and Installing Emissions Trading - Introduction of Carbon Border Adjustment Mechanism	- Expand business of energy-saving, energy-storage, and energy-creation products - Development of technologies related to CO_2 capture, utilization and storage (CCUS) - Reducing Carbon Costs through Local Production
	Technology /Market	Decarbonize technologies Replacement with low-carbon products and renewable materialsCreating a circular economy	- Increase in manufacturing costs and a decrease in the use of plastic products due to changes to environmentally friendly designs that premise resource recycling in order to comply with plastic regulations - Decrease in internal-combustion engine related products due to increase of electric mobility ratio	- Expand business of products made by bio-materials - Expand business of renewable (recyclable) products - Expand business of high-functionality products that lead to plastic usage reduction - Expand business of electric mobility-related products
	Reputation	Changes in customers and investors behavior Increasing demand for climate change control	- Decline in competitiveness due to avoidance of high GHG emissions products - Divestment from companies who do not put an effort to tackle decarbonization	- Expand business of Environmental Contributing Materials
Physical Risk by climate change	Acute	Catastrophic disasters of weather conditions Increase in typhoons, heavy rain, sand, and cold wave	- Increased damage to plant and production capacity reduction or shutdowns due to flooding in areas nearby the oceans and rivers - Shutdown or decrease in revenue due to supply chain disruption	- Expand business of disaster countermeasure-related materials
	Chronic	Average temperature Increase Increase in heat wave and heat stress	- Decline in production efficiency due to unfavorable working environment caused by temperature rising	
		Changes in weather and rainfall patterns Occurrence of drought	- Decline in production capacity or shutdown due to rising water costs caused by drought - Revenue decrease in the agricultural business due to a decline in agricultural production caused by poor crop yield	- Expand business that reduce scarce water supply and food losses - Expand business related to plant factories that are less affected by climate change
		Sea level rise Occurrence of storm surges and high waves	- Decline in production capacity or shutdown due to flooding - Cost increase by water exposure prevention measures (breakwaters, raising, relocation)	

Risk Management

The Kuraray Group implements risk management in terms of both mitigating and adapting to climate change. Measures to mitigate climate change, such as reducing GHG emissions and expanding products that contribute to improve the natural environment, are mainly managed by the Sustainability Committee and promote to reduce the risk of transition to a carbon-free society.

Meanwhile, each organization conducts self risk assessments every year as a measure to adapt to climate change to strengthen disaster countermeasures and business continuity. The results of those assessments are discussed by the Risk Management & Compliance Committee (chaired by the director in charge of the Corporate Sustainability Division) and if countermeasures are necessary, the president will appoint a responsible person to pursue those countermeasures to improve the situation.

Indicators and Targets

As our long-term goal for mitigating climate change, we will target to reduce our own GHG emissions (Scope1 and 2) by 30% in 2030 compared with in 2019 and to achieve carbon net zero in 2050. In the Sustainability Medium-Term Plan, we have set the following targets for reducing GHG emissions related to climate change and for the Revenue ratio increase of natural environment contributing products.

Table: Measures and Targets Related to Climate Change in the Sustainability Medium-Term Plan

			Benchmarks	2024	2026	2027 and beyond
Planet	GHG emissions	Scope 1+2	Year 2019: 3.2 million tons	No increase in emissions compared to 2019		● 2030: 30% reduction compared to 2019 ● 2050: Carbon Net Zero
		Scope 3	Year 2019: 0.9 million tons (Japan)	● Target the entire Group and identify the category dominates for more than two-thirds of emission ● In fiscal 2023, formulate numerical reduction targets for fiscal 2024 and fiscal 2026		
Product	Revenue Ratio of Natural Environment / Living Environment Contributing Products (Of which, Revenue Ratio of Natural Environment Contributing Products)		Fiscal 2020: 46% (16%)	55% (23%)	60% (27%)	

Internal Carbon Pricing(ICP)

The Kuraray Group will use ICP to incentivize energy saving, identify revenue opportunities and risks, and inform investment decision making, aiming to realize a low-carbon society.

The Kuraray Group's ICP

Internal carbon price	¥10,000/t-CO_2 (calculated using internal exchange rates overseas)
Starting Date	January, 2022
Scope	Capital investment entailing a change in CO_2 emissions
Method of application	The costs of changes in CO_2 emissions will be calculated using the internal carbon price and used as a criterion for investment decisions

Utilization of Renewable Energy

At the Kurashiki Plant, we have installed a power generation system for biomass fuel* (wood chippings from construction debris and other sources). The system can generate electricity stably even when compared with other renewable energy sources. In fiscal 2020, 43,000 tons of biomass fuel was consumed, contributing to a reduction of about 64,000 tons-CO_2e in its emissions. Going forward, the Kuraray Group will continue its efforts to reduce CO_2 emissions through biomass fuel power generation.

* Biomass takes CO_2 in from the atmosphere as it grows, and can be considered to emit no CO_2 (carbon neutral) when the CO_2 that is generated when burning lumber using biomass as a raw material is subtracted from the CO_2 that is taken during its growth.

Reducing the Environmental Load during Product Transportation

The Kuraray Group is also reducing its greenhouse gas (GHG) emissions in the distribution stage of delivering its products to users, in addition to GHGs it emits during the manufacture of products at its production sitesand other facilities. Kuraray is continuously active in the “modal shift” in which the transportation means is changing from trucks to cargo trains, ships and other methods with less environmental impact. In addition, we endorsed the “White Logistics” movement promoted by the Japanese government and submitted a Declaration of Voluntary Action in 2019. As specific initiatives to improve transportation efficiency and reduce GHG emissions, we are steadily promoting the integration of product storage locations (warehouses) to transfer products shipped from multiple locations from one location, as well as the switching from the transportation of multiple trucks to one trailer, by increasing the size of one transport unit to a larger lot. As a result, GHG emissions from product transportation in fiscal 2020 were 10,000 tons-CO_2e.

Corporate Statements
Executives
Organization Chart
History
Awards and Accolades
Main Group Locations
Corporate Profile Video
covid19

Search by Key Word

Organization
Progress
Highlights

Conduct
Kuraray Group Human Rights Policy
TOP STATEMENT
Sustainability Long-term Vision and Sustainability Medium-term Plan
Materiality of Kuraray Group
Planet
Product
People
Governance
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Kuraray Report (integrated report) / Sustainability website
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