

Disclosure based on TCFD recommendations

Recognizing the enormity of the impact that climate change has on our stakeholders and our group, Toyobo group has identified the realization of a decarbonized and circular society among its important sustainability goals.

In January 2020, we endorsed the Task Force on Climate-related Financial Disclosure (TCFD) recommendations, and are moving forward with disclosure of our initiatives in keeping with the recommendations.

In May 2022, we published our Roadmap for Carbon Neutrality as part of Sustainable Vision 2030.

In keeping with the levels sought by the Paris Agreement, we aim to reduce emissions of greenhouse gases (GHGs) from our business activities (Scope 1 and 2) by 46% or more from the fiscal 2014 level by fiscal 2031, and to reach net zero emissions by fiscal 2051.

Moreover, we have set a goal for fiscal 2051 of avoided emissions in an amount that exceeds the GHG emissions of the entire value chain of Toyobo group.

Governance

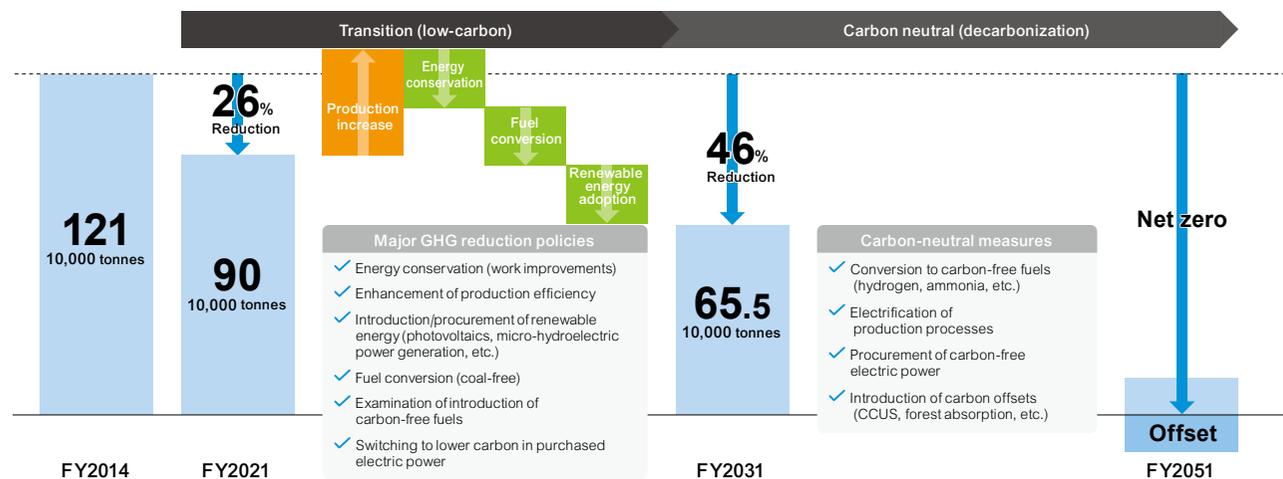
We have established the Sustainability Committee, chaired by the president who has the highest seniority regarding issues related to climate change. The committee deliberates the setting of high-level policies and targets for solving these issues. The Board of Directors receives the committee reports, approves important items such as high-level policies and targets, and monitors progress of the relevant activities.

We established the Carbon Neutral Strategies Council and the Carbon Neutral Strategies Cross-Functional Team (CN-CFT), and since fiscal 2022 have tasked them with formulating and advancing

strategies toward realizing carbon neutrality. To steadily address the realization of carbon neutrality, we also formed a working group within the CN-CFT comprising members from an organizational cross section of the whole company, and undertook initiatives including formulation of a roadmap for carbon neutrality and the introduction of internal carbon pricing.

We revised our structure in fiscal 2023, including establishment of the Climate Change and Biodiversity Committee. As we incorporate international sustainability standards, we are moving ahead with a company-wide response to climate change.

Roadmap for Carbon Neutrality



Promotion structure (after fiscal 2024)



*The president, vice-president, heads of divisions, executive officers in controlling supervisory positions, the chairperson, and corporate auditors may express opinions.

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Risk management

In fiscal 2022, our group set up a Risk Management Committee, which performs uniform group-wide management of risks including climate change issues. In addition to its overall administration of risk management activities (identification, analysis, assessment, and response), the committee formulates policy related to risk management for the whole group, builds and operates effective, sustainable organizations and systems by running the PDCA cycle, and works to strengthen the risk management system.

As our point of departure for risk management activities, we identify serious company-wide risks requiring intensive attention from the results of evaluations in terms of the two axes of severity of impact*1 and likelihood of occurrence*2 based on each risk scenario. Toyobo group manages its important risks based on a company-wide assessment of risks that include natural disasters such as flooding (floods, storm surges, etc.), which are increasing in severity due to climate change.

*1 Scope of impact, duration of business operation stoppage, personal harm, reputation, and financials are evaluated on a three-point scale that includes "major damage equivalent," "moderate damage equivalent," and "minor damage equivalent."

*2 Evaluations use a three-point scale including "occurs frequently," "occurs occasionally," and "occurs infrequently."

Strategy

In Sustainable Vision 2030, Toyobo group has identified the realization of a decarbonized and circular society among its important sustainability goals.

In keeping with the TCFD recommendations, we also analyzed and compiled future risks and business opportunities under climate change scenarios based on the Paris Agreement. After identifying the financial and other impacts of these risks and opportunities, we intend to boost the resilience of our business strategy by specifying countermeasures together with indicators and targets.

Scenario analysis

Although a wide range of scenarios are conceivable depending on how global warming countermeasures are implemented, we referenced the scenario shown in the diagram on the right as being typical. We considered the impact on our business and new opportunities for our group through 2050 under each of two scenarios: One in which the average global temperature increase is kept under 2°C, and one in which it rises by 4°C.

Summary scenario analysis

Specified scenario	Under 2°C scenario	4°C scenario
Description of society	Sweeping policies and technological innovations are advanced in efforts to keep the average atmospheric temperature increase by the end of the century to within 1.5°C, and to achieve sustainable development of society. We will have a society in which social changes accompanying a shift to a decarbonized society will be highly likely to impact business. Case example <ul style="list-style-type: none"> Introduction of a carbon tax and increased carbon prices Shift to vehicle electrification, spread of renewable energy 	Even with the implementation of intended nationally determined contributions established by Paris Agreement signatory countries in line with the agreement, average atmospheric temperature rises by as much as 4°C under business as usual by the end of the century. We will have a society in which changes in climate, including rising temperatures, will be highly likely to impact business. Case example <ul style="list-style-type: none"> Increase in flooding damage due to heavy rains
Reference scenarios	<ul style="list-style-type: none"> SDS (IEA WEO2021/ETP2020) NZE (IEA Net Zero by 2050 A Roadmap for the Global Energy Sector) RCP2.6 (IPCC AR5) SSP1-1.9 (IPCC AR6) 	<ul style="list-style-type: none"> RCP8.5 (IPCC AR5) SSP5-8.5 (IPCC AR6) STEPS (IEA WEO2022/ETP2020)
Risk and opportunity trends	In the transition, risks and opportunities emerge more readily	Physical risks and opportunities emerge more readily

Risks, opportunities, and their countermeasures under each scenario

Social change and its impact	Risks and opportunities			Measures taken by the Toyobo group
	Category	Period	Details	
Impacts of the transition to a decarbonized society (sweeping changes in policy, laws and regulations, technology, markets, etc.)	Transition and risk	Short Term	Introduction of carbon pricing	<ul style="list-style-type: none"> Advancement of GHG reduction plans (energy conservation, better production efficiency, fuel conversion, renewable energy adoption, etc.) Use of internal carbon pricing systems
		Medium to long term	Increase in raw material prices (carbon price pass-through, etc.)	<ul style="list-style-type: none"> Appeals to and collaboration with suppliers (low-carbon raw material development, production technology assistance, etc.) Diversification of raw material procurement methods (expanded multiple purchasing and local procurement)
			Increase in costs resulting from promotion of energy conservation, adoption of high-efficiency equipment, etc.	<ul style="list-style-type: none"> Innovation in production processes and pursuit of super-efficiency Greater efficiency of production throughout the value chain (affiliate integration, stronger partnerships, M&A, etc.)
			Cost increases due to adoption of renewable energy	<ul style="list-style-type: none"> Renewable energy procurement method selection
	Transition and opportunities	Medium term	Cost increases due to requirements for low-carbon and decarbonized product manufacturing	<ul style="list-style-type: none"> Expansion of renewable energy adoption and procurement Promotion of greater efficiency and energy conservation in production processes Fuel conversion for (coal-free) in-house power generation Study of carbon-free fuel utilization (hydrogen, ammonia, etc.) Study of adoption of CCU/CCS or other innovative technologies
			Increasing demand for petroleum-derived resource reduction and replacement	<ul style="list-style-type: none"> Acceleration in the shift in raw materials toward recycled and biomass-derived materials Study of withdrawal from general-purpose materials business that relies on petroleum-derived resources Acceleration in the shift in raw materials toward recycled and biomass-derived materials Addressing of procurement issues (shortages) with raw materials (recycled and biomass-derived materials) Advancement of development and planning of products with low-carbon and decarbonized materials Enhanced production and quality control systems for low-carbon and decarbonized products
Impacts from progressive climate change (direct damage to assets, indirect impact of supply chain fragmentation, changes in technology, markets, etc.)	Physical risks	Short to medium term	Stoppage of raw material supply due to natural disasters Facilities damage and operational shutdowns due to flooding (floods, storm surges, etc.)	<ul style="list-style-type: none"> Review of inventory levels and expansion of multiple purchasing BCP training implementation Enhancement of durability of production and power facilities, relocating or elevating them to higher locations Production site dispersal, relocation, and consolidation
		Medium term	Increase in demand for civil engineering work	<ul style="list-style-type: none"> Expansion of products used in disaster mitigation and restoration work Sand-proofing sheets, concrete delamination prevention sheets, soft roadbed improvement materials, etc.
	Physical opportunities	Medium term	Increased demand for seawater desalination due to water shortages and droughts	<ul style="list-style-type: none"> Expanded sales of (RO/FO, etc.) membranes for seawater desalination Energy-conserving and high-durability development for RO/FO membranes, etc. Strengthening of production and quality control system for RO/FO membranes, etc.
		Long term	Increased demand for (prevention and treatment) measures against infectious diseases associated with temperature increases	<ul style="list-style-type: none"> Expanded demand for products related to food packaging Promotion of research and development of products and technologies related to infectious diseases

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● Determining risks and opportunities under each scenario

We worked out the group's risks and opportunities focused on climate change in the under-2°C scenario and the 4°C scenario. Only the film business was under consideration in fiscal 2022, but the study was expanded to cover all group businesses in fiscal 2023. We compiled the specified risk and opportunity items, reclassified them from the standpoint of social changes, and then considered countermeasures proposed for each (diagram: "Risks, opportunities, and their countermeasures under each scenario"). Risks and opportunities we recognize as being particularly important upon evaluation along the two axes of severity of impact and likelihood of occurrence are described as follows.

We recognize GHG emissions reduction throughout the supply chain, including in raw material procurement, as a means of both reducing risk and creating opportunity. Specifically, through planned Scope 1 and 2 reductions, we will lighten the future burden of carbon pricing as we prepare to reliably meet our customers' requirements for decarbonization. In addition, shifting to recycled and biomass materials for our raw materials will lower our reliance on petroleum-derived resources, reduce future business risk, and lead us to obtain and expand business opportunities. With respect to the water shortage issue, which poses a growing worldwide risk, we intend to obtain and expand business opportunities through solving this social issue by selling membranes for seawater desalination, which enables low-energy fresh water production.

Risks and opportunities recognized as particularly important

● Important risk 1: Risk of damage to buildings and facilities due to flooding (floods, storm surges, etc.)

Our group's primary plants at Tsuruga, Iwakuni, and Inuyama, are all located near rivers and coastline and are situated in low-lying areas, which puts them at risk of flood damage. In the event that climate change progresses, we assume that rising sea levels and changes in rainfall patterns will further heighten the flood damage risk. Our estimate of asset decrease (the amount of damage to buildings and equipment) due to flood damage in the 2030s, calculated from book value, indicated a maximum total for all three plants of approximately ¥50 billion. To obtain our estimate of the

amount of asset decrease from flood damage at these three plants, we multiplied the book value of their buildings and equipment by the flood damage rate* published by the Ministry of Land, Infrastructure, Transport and Tourism.

Because our group understands the flood damage risk to our plants to be an important climate-related risk, we are implementing a phased reinforcement of our flood damage countermeasures that includes moving items such as our production and power facilities to higher locations.

**Flood Control and Economic Research Manual (Draft) (April 2020), Ministry of Land, Infrastructure, Transport and Tourism

● Important risk 2: Carbon pricing implementation

Under a business-as-usual (BAU*) scenario taking fiscal 2021 (actual 900,000 tonnes CO₂) as the base year, Scope 1 and 2 will increase to approximately 1.3 million tonnes CO₂ in fiscal 2031 as sales expand. Assuming that the unit price for carbon is ¥15,000 per tonne CO₂ in fiscal 2031, our annual cost would be approximately ¥20 billion under a BAU scenario.

Our group understands Scope 1 and 2 increases to be an important climate-related risk, and published Sustainable Vision 2030 in fiscal 2023, which includes our Roadmap for Carbon Neutrality through fiscal 2031. With the roadmap, we are targeting reductions in Scope 1 and 2 in fiscal 2031 to 655,000 tonnes CO₂ or less through energy optimization measures that involve energy conservation (including increased production efficiency), fuel conversion, and adoption of renewable energy. In such a case, our annual cost incurred from carbon pricing would be approximately ¥10 billion, resulting in the cost reduction effect of approximately ¥10 billion compared to under the BAU scenario. We plan to include the cumulative amount of investments through 2025 under our Roadmap for Carbon Neutrality in our investments in the environment, safety, and disaster prevention (approximately ¥33 billion).

*BAU: "Business as Usual," indicating a case in which no particular GHG emission reduction measures are taken.

● Important risk 3: Increase in demand for reduction and replacement of petroleum-derived resources

● Important opportunity 1: Increase in demand for low-carbon and decarbonized materials and products

Our group's core films and functional materials businesses represent more than 40% of total group sales. Amid the change (transition) of society into future decarbonization, we can expect to see increasing demands from society, including our customers, that we reduce or replace our use of petroleum-derived resources, and we acknowledge that this is an important climate-related risk. At the same time, we recognize that there are business opportunities in the simultaneous increase in demand for low-carbon and decarbonized materials and products.

Of our current film business sales, approximately 90%, or ¥120 billion, depend on petroleum-derived resources. In Sustainable Vision 2030, we have defined the technologies and initiatives* that bring about reductions in petroleum-derived resource use as "greening," and have set the goal of greening 60% of our film products by fiscal 2031. Film products that cut down on petroleum-derived resource use are also low-carbon or decarbonized products, and by promoting the greening of our film products, we intend to reduce risk while also obtaining and expanding business opportunities.

Of our film business sales target for fiscal 2031 of approximately ¥220 billion, approximately ¥130 billion is to come from obtaining and expanding these opportunities.

*Development of films using biomass raw materials, and films of thin, lightweight materials (strengthening), environmentally friendly design facilitating post-use film recycling (mono-materialization), development of films using recycled raw materials and of recycling technology

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● Important opportunity 2: Increase in demand for seawater desalination

Our group recognizes that the advance of climate change will increase the risks of water shortages and droughts worldwide. Securing water will become an issue in many regions, not just for industrial uses, but for domestic uses as well. This is expected to further intensify the demand for seawater desalination.

Our group's HOLLOSEP® hollow fiber reverse osmosis membrane module has characteristics that include resistance to contamination, giving it particular advantages in desalination of seawater in enclosed sea areas (such as in the Middle East) that are susceptible to proliferation of microorganisms. Since its superior chlorine resistance enables HOLLOSEP® to supply chlorinated raw water directly to the module, this controls microbial growth within the module at a relatively low cost, while easy maintenance also helps improve desalination plant operating rates.

As we work toward obtaining and expanding business opportunities through solving societal issues, our group set the goal in Sustainable Vision 2030 of using seawater desalination with membranes to produce a volume of tap water equivalent to the needs of 10 million people in fiscal 2031.

Indicators and targets

Our group has set targets with respect to climate change, and we are moving forward with measures for each of them. Our targets for Scope 1 and 2, as well as for Scope 3*, are based on levels sought by the Paris Agreement, and were certified as Science Based Targets under the SBT Initiative in December 2022.

Amid a 6.4% year-on-year increase in sales, we produced 894 thousand t-CO₂ under Scope 1 and 2 in fiscal 2023 (a 1% decrease from 903 thousand t-CO₂ the previous fiscal year).

*Indirect emissions other than Scope 1 and 2. This SBT certification concerns GHG emissions resulting from activities (manufacturing, etc.) related to the purchase of products and services, and to the use of sold products.

Indicators and targets

Category	Indicator	Target	Key measures
GHG	GHG emissions	FY2031: 27% reduction (SBT)* (From FY2014: Equivalent to a 46% reduction) *Base year: FY2021	<ul style="list-style-type: none"> Improved energy conservation, improved production efficiency, fuel conversion, adoption of renewable energy, etc.
		FY2051: Net zero	<ul style="list-style-type: none"> Adoption of carbon-free fuels, renewable energy procurement, production process innovation, etc.
	Scope 3 (Categories 1 and 11)	FY2031: 12.5% reduction (SBT)* *Base year: FY2021	<ul style="list-style-type: none"> Category 1*: Acceleration in the shift in raw materials toward recycled and biomass-derived materials *Emissions from activities (manufacturing, etc.) related to purchased raw materials and services Category 11*: Energy conservation with VOC recovery equipment, etc. *Emissions from the use of products sold
Climate-related opportunities	Green ratio of film products (Specified also as an indicator for transition risk reduction)	FY2031: 60% or more	<ul style="list-style-type: none"> Progress in material and chemical recycling, development and increased adoption of biomass raw materials, reduction of film thickness, etc.
	Seawater desalination with membranes	FY2031: Equivalent of tap water volume for 10 million people	<ul style="list-style-type: none"> Expansion of sales of (RO/FO, etc.) membranes for seawater desalination Energy-conserving and high-durability development for RO/FO membranes, etc. Strengthening of production and quality control system for RO/FO membranes, etc.
Capital allocation	Capital investment	FY2023-26 cumulative total: ¥33 billion (Total capital investment for environment, safety, and disaster prevention)	<ul style="list-style-type: none"> Carbon reduction for in-house power generation facilities, adoption of renewable energy facilities, etc.
Internal carbon pricing	-	<ul style="list-style-type: none"> Set an in-house carbon price of ¥10,000 per tonne CO₂ (revised annually as needed) Expansion of decision-making on capital investment and investment in development facilities which increase or decrease CO₂ emissions 	
Compensation	-	<ul style="list-style-type: none"> Consideration of officer's compensation set according to the state of GHG reduction 	