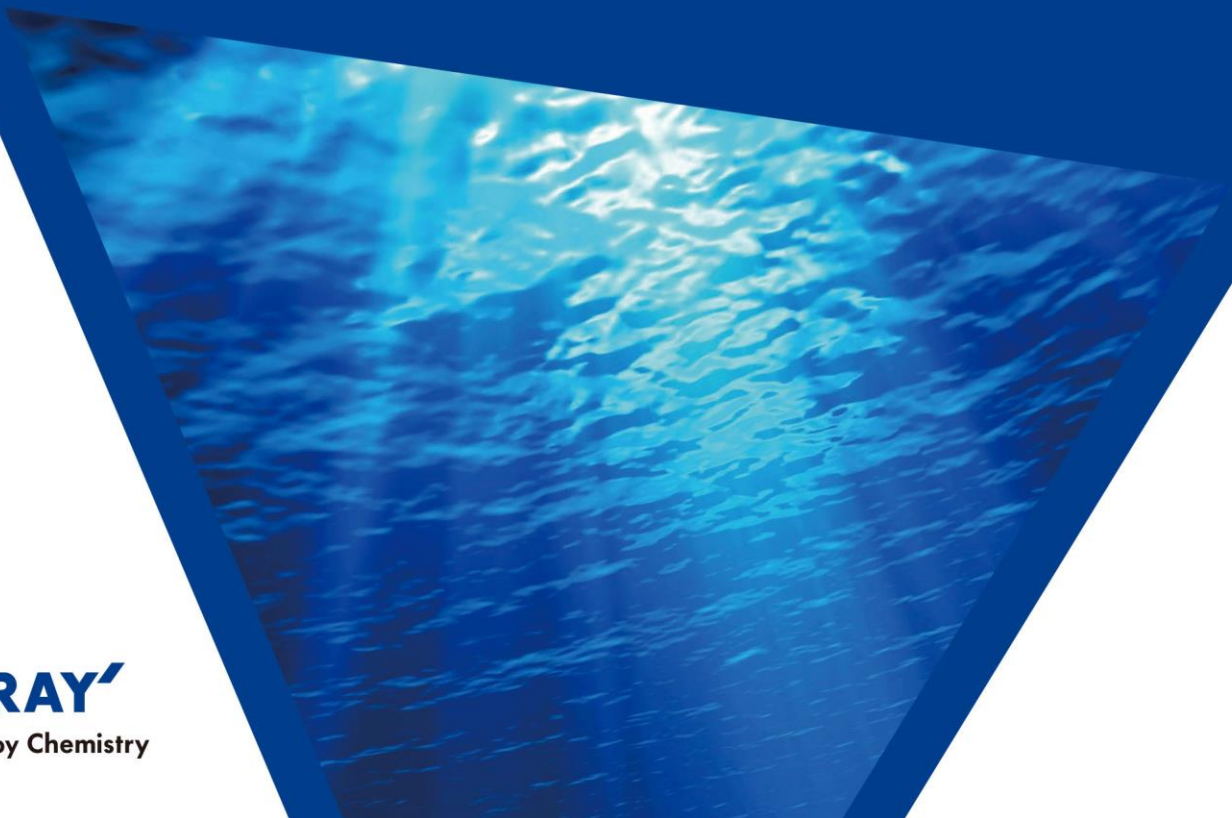
TORAY GROUP

TCFD REPORT VER.2.1

MATERIALS CHANGE OUR LIVES



'TORAY'
Innovation by Chemistry

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Details of June 2024 Update（Ⅲ. Disclosure Based on the TCFD Recommendations）

Page	Heading		Details of update
6-8	Governance System Related to Climate Change	Organizational Framework	Update of content due to changes in governance system
9		Activities of the Sustainability Committee	Update to details of activities in fiscal 2023
10-18	Strategy	Impact Analysis of Climate Change	Update with quantitative details for magnitudes of some opportunities and risks
32-36		Measures to Combat Climate Change in Production Activities	Update to details of activities in fiscal 2023
36-38		Engagement with External Partners	Update of some activity details
38-39	Metrics and Targets	Targets and Actual Results for Achieving the Sustainability Vision	Update to actual results for fiscal 2023

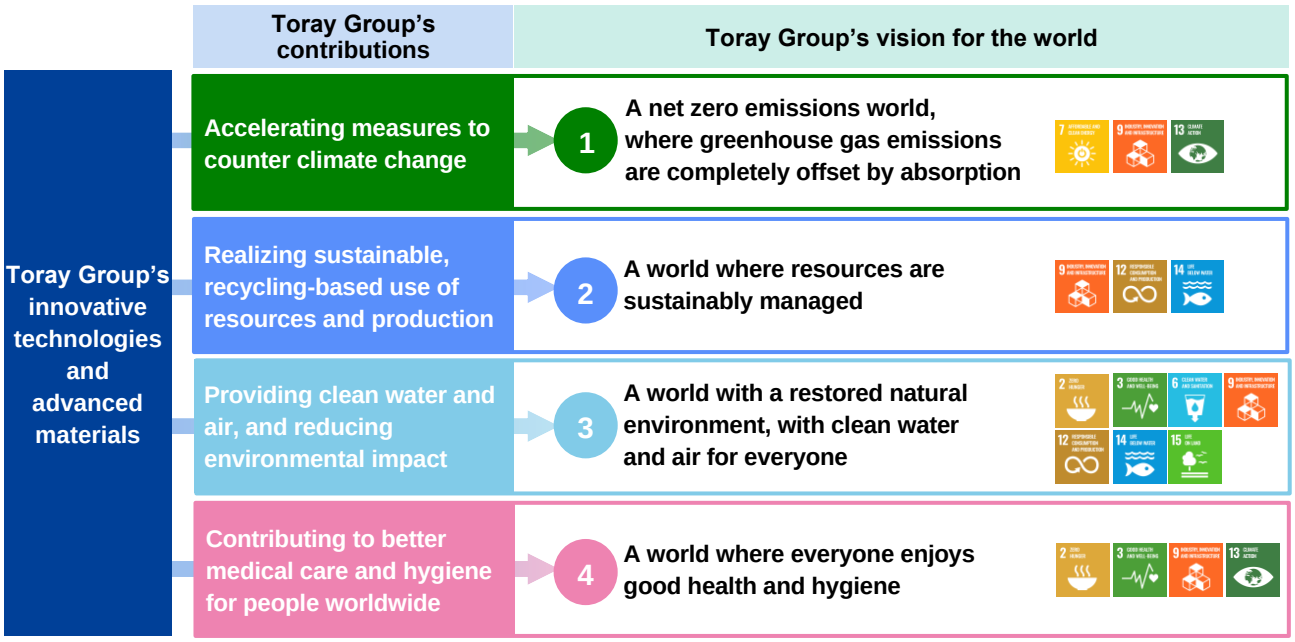
I. Achieving a World of Net Zero GHG Emissions in 2050

Toray Group was established in 1926, based on the principle of “realizing that corporations are public institutions of society and contributing to society through our business.” Since then, the Group has long sought to contribute to sustainable global development guided by this principle.

Toray Group established its current Corporate Philosophy of “contributing to society through the creation of new value with innovative ideas, technologies and products” in 1986. In 2020, the Group organized its corporate philosophy and other management principles—the principles it had upheld since its founding—into the form of the Toray Philosophy.

Based on this approach, Toray Group established the **Toray Group Sustainability Vision** in 2018. The Sustainability Vision indicates Toray Group’s long-term approach to deliver innovative technologies and advanced materials to help address global issues while balancing development and sustainability. These challenges include population growth, aging demographics, climate change, water scarcity, and resource depletion. As part of the Sustainability Vision, Toray Group has set out four perspectives of the world that the Group aims to realize by 2050: “a carbon-neutral world, where greenhouse gas (GHG) emissions are completely offset by absorption,” “a world where resources are sustainably managed,” “a world with a restored natural environment, with clean water and air for everyone,” and “a world where everyone enjoys good health and hygiene.”

Figure 1: Toray Group’s Vision for the World in 2050



Toray Group is working to help realize the carbon-neutral world focusing on the following two approaches. First, it is contributing to solving climate change issues through the value chain, including reducing CO_2 emissions throughout the product

lifecycle with the creation of innovative technologies and advanced materials. Second, the Group is driving climate change actions across its production activities by working to reduce GHG emissions in manufacturing of products (the **Scope 1 and Scope 2 emissions**[1]). The Group is also committed to promoting the reduction of **Scope 3 emissions**[1] in an effort to reduce GHG emissions throughout its entire supply chain.

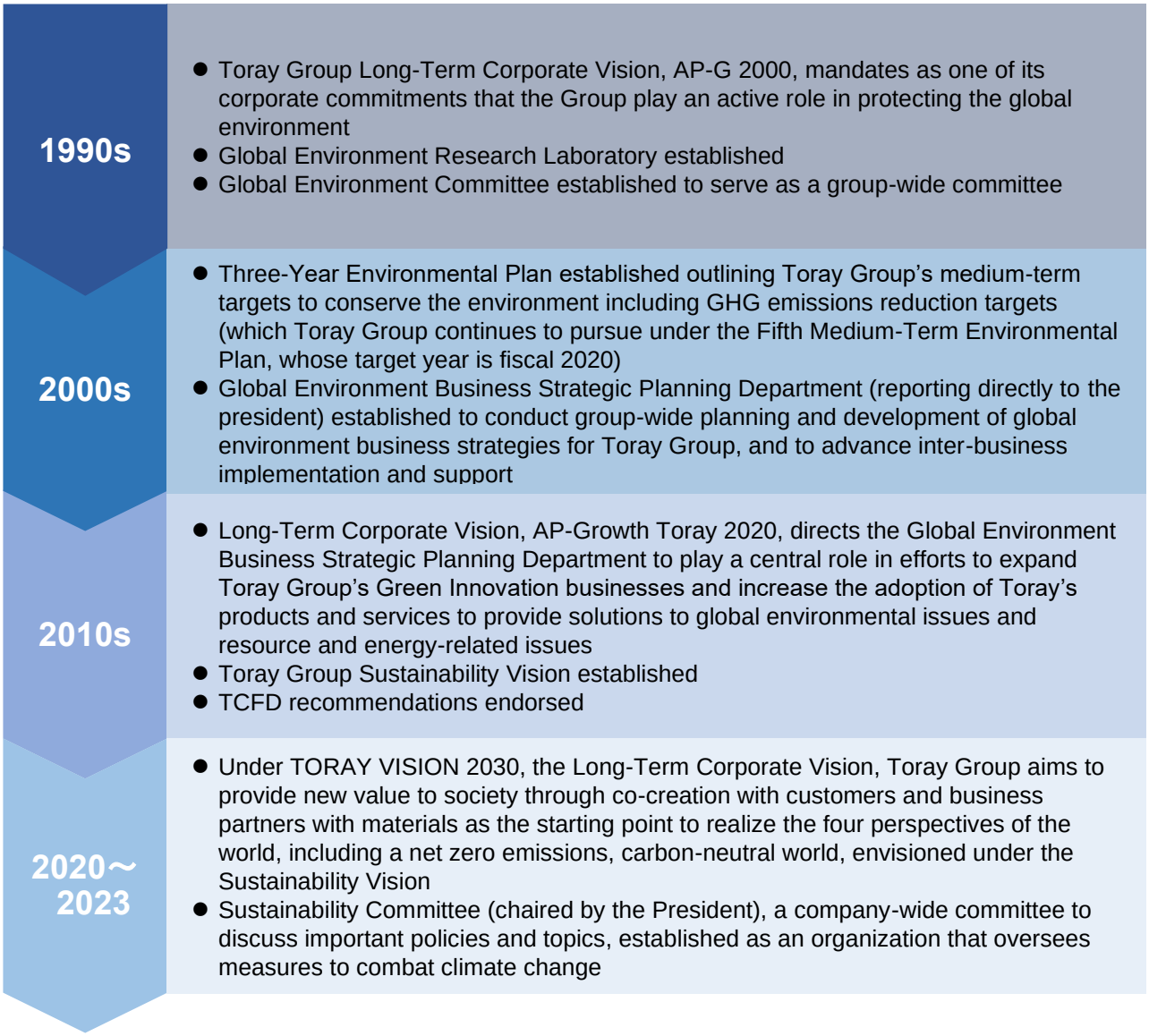
The Toray Group Sustainability Vision establishes quantitative targets for fiscal 2030 as milestones for realization of the world envisioned by the Toray Group. In 2023, the Group revised these targets upwardly to accelerate its efforts. In terms of contributing solutions for climate change issues through the value chain, the targets include **CO_2 emissions avoided in value chain,**[2] which the entire chemicals industry has long been seeking to improve. Targets for efforts to address climate change in production activities include the Scope 1 and Scope 2 GHG emissions per unit of revenue and GHG emissions of Toray Group in Japan. These quantitative targets are based on the fiscal 2030 targets set forth by the Government of Japan under **the targets of the Paris Agreement.**[3] (Refer to **4. Metrics and Targets** on page 38 of this report.)

The following discloses important information concerning climate change as per the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

II. Toray Group Efforts to Date

Figure 2 summarizes Toray Group's initiatives to address global environmental issues to date. (For more information, refer to **Toray Group's Approach to Climate Change** on the Company's website.)

Figure 2: Chronology of Toray Group's Initiatives to Address Global Environmental Issues



The **Long-Term Corporate Vision, TORAY VISION 2030**, commits Toray Group to achieving the quantitative targets for fiscal 2030 as outlined in the Toray Group Sustainability Vision.

Toray Group has also established a Medium-Term Management Program covering a three-year period for achieving "sound, sustainable growth" envisioned in the Long-Term Corporate Vision, TORAY VISION 2030, and realizing the four perspectives of the world envisioned under the Sustainability Vision.

The sustainability targets and actual results under **Medium-Term Management Program, Project AP-G 2022**, which covered the period from fiscal 2020 to fiscal 2022 are as shown below.

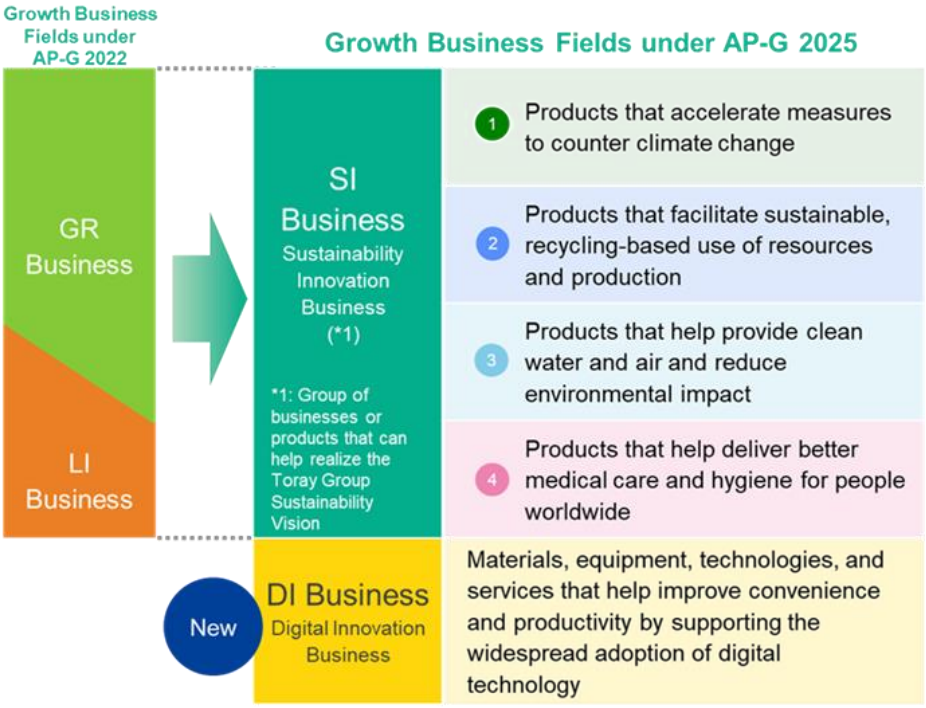
Figure 3: Toray Group's Sustainability Targets and Actual Results for Fiscal 2022

	FY 2013 Actual	FY 2022 Actual	FY 2022 Target
	(Baseline) (J-GAAP)	(Compared to FY 2013) (IFRS)	
Net Sales/Revenue of Green Innovation Businesses	463.1 billion yen	993.4 billion yen (2.1-fold)	1,000.0 billion yen (2.2-fold)
Net Sales/Revenue of Life Innovation Businesses	119.6 billion yen	369.6 billion yen (3.1-fold)	300 billion yen (2.5-fold)
CO_2 emissions avoided in value chain	38.45 million tons	365.72 million tons (9.5-fold)	5.3-fold
Water filtration throughput contribution by Toray's water treatment membranes	27.23 million tons	67.00 million tons (2.5-fold)	2.4-fold
Greenhouse gas emissions per unit of revenue in production activities	337 tons/100 million yen	233 tons/100 million yen (35% reduction) *	20% reduction
Water usage per unit of revenue in production activities	15,200 tons/100 million yen	10,030 tons/100 million yen (32% reduction) *	25% reduction

* The calculation of the figure for the baseline of FY 2013 includes data for companies that joined the Toray Group in FY 2014 or later.

Under **Medium-Term Management Program, Project AP-G 2025**, which covers the period from fiscal 2023 to fiscal 2025, the Green Innovation (GR) businesses that help solve global environmental issues and resource- and energy-related issues and the Life Innovation (LI) businesses that contribute to better medical care and long, healthy lives and promote public health and human safety—including measures to counter disasters and abnormal weather—were integrated and redefined as the Sustainability Innovation (SI) Business. By expanding the SI Business, Toray Group will contribute to the sustainable development of society through means such as greater CO_2 emissions avoided in the value chain, while also driving the growth for the Group's own. (For fiscal 2025 and 2030 targets, refer to **Figure 18** on page 39 of this report.)

Figure 4: Toray Group's Growth Business Fields and the SI Business



In the area of creating and expanding new businesses, Toray Group is implementing the Future TORAY-2020s Project (FT Project), a group-wide project. Under the project, the Group is addressing a range of themes to help solve global environmental problems and realize a society in which people enjoy safe, long, and healthy lives, on that includes hydrogen- and fuel cell-related materials, products and process technologies utilizing biomass, environmentally friendly printing solutions, next-generation medical care, and next-generation display solutions. The Group aims to generate revenue in the region of one trillion yen in the 2020s in new businesses overall. (Refer to **C. R&D and Capital Investment Strategy** on page 27 of this report.)

Toray Group also promotes innovation through its endorsement of the **Challenge Zero** initiative co-organized by the Japan Business Federation (Keidanren) and the Government of Japan. This initiative promotes innovation that seeks to build a decarbonized society.

Toray Group is committed to leveraging its strengths from having long been an active contributor to solving global environmental issues through its business, while continuing to direct its full energies toward creating innovative technologies and advanced materials that deliver fundamental solutions to climate change and other global environmental issues.

III. Disclosure Based on the TCFD Recommendations

1. Governance System Related to Climate Change

(1) Organizational Framework

To realize its Sustainability Vision, which includes addressing carbon neutrality, resource recycling, and a nature positive approach, Toray Group partially revised its implementation system in 2024 and promotes initiatives under the organizational framework shown in Figure 5. In order to help achieve carbon neutrality, Toray Group focuses on the following two projects: (1) the SI Business Expansion Project, which will contribute to reducing the greenhouse gas (GHG) emissions of society in general through its business, and (2) the Climate Change Action Project, which aims to reduce GHG emissions in its own business activities.

The Sustainability Committee previously operated as an organization that oversaw measures to combat climate change. It has been constructively dissolved and replaced with a system in which important issues such as basic strategies and capital investment in the activities of the SI Business Expansion Project and the Climate Change Action Project are deliberated as needed by the Executive Committee (a conference organ of the Board of Directors), in light of the constantly changing business environment. This system will allow the Group to accelerate action on climate change by increasing flexibility while maintaining existing functions.

In addition, activities to promote sustainability are closely connected to activities in the areas of corporate social responsibility (CSR), risk management, safety, health, environment, and research and technology development. Toray Group works to address Group-wide climate change-related issues through coordinated activities in these areas. The progress and results of sustainability activities are also reported to the Board of Directors at least once a year. The Board of Directors appropriately monitors action on climate change and provides oversight and comprehensive decision-making by considering climate change-related problems as one of the key factors when making management decisions.

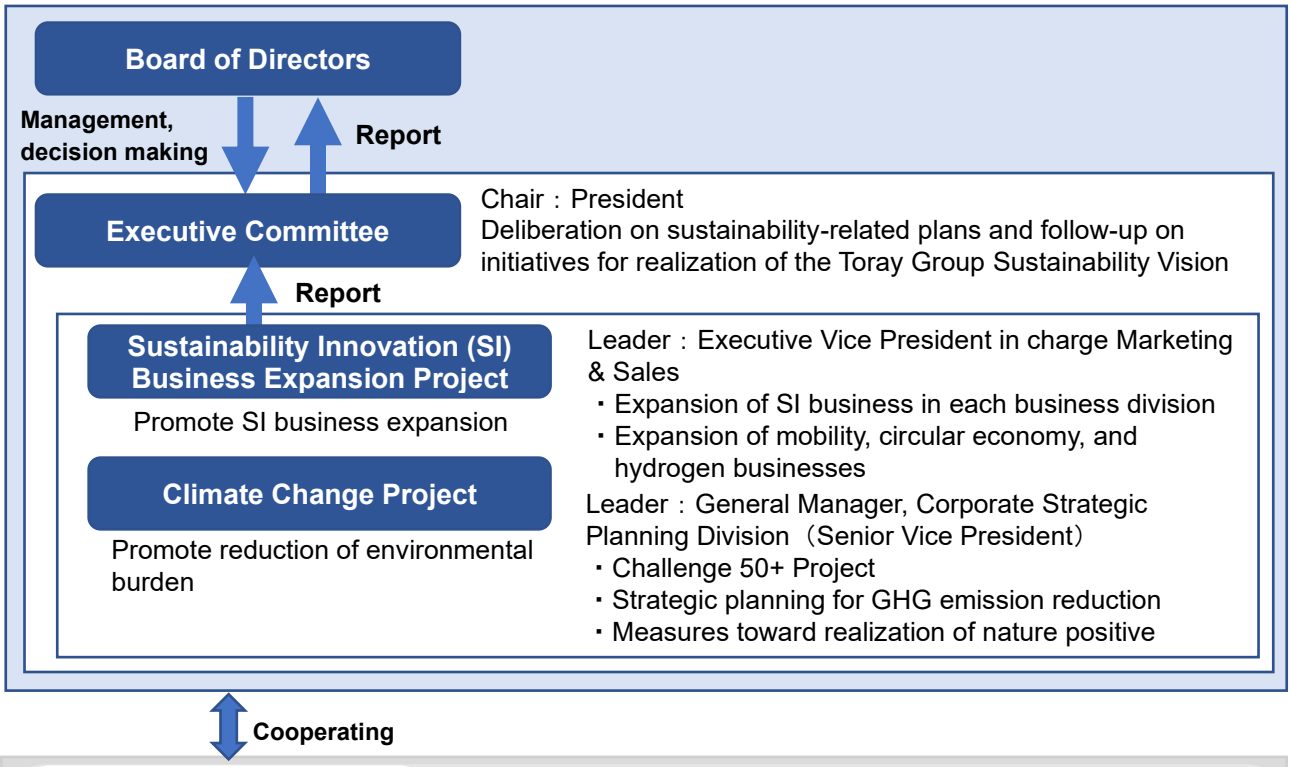
The SI Business Expansion Project is primarily promoted by each of the business divisions. Meanwhile, subcommittees have been established separately in cross-business areas such as mobility, circular economy*, and hydrogen, working together to expand the SI business.

The Climate Change Action Project promotes group-wide initiatives aimed at achieving the fiscal 2030 targets for Scope 1 and Scope 2 GHG emissions reductions as the Challenge 50+ Project. The project's GHG Reduction Subcommittee (formerly the Climate Change Subcommittee) discusses overall strategy for making further reductions in GHG emissions, reductions in Scope 3 emissions, external communications, carbon pricing, and other topics.

In its initiatives for carbon neutrality, Toray Group aims to achieve both business expansion and carbon neutrality. In terms of the GHG emissions associated with production activities, the Group targets to reduce its net contribution to GHG emissions, calculated by subtracting CO_2 absorption by businesses that contribute a carbon negative effect from Scope 1 and 2 emissions. The Group will drastically reduce Scope 1 and 2 emissions through reductions in GHG emissions per unit of revenue. For emissions that cannot be reduced, the Group utilizes CO_2 as a resource through CO_2 recovery and other methods, thereby aiming to achieve “net zero” by 2050. At the same time, the Group also promotes efforts in resource recycling, which will lead to reductions in Scope 3 emissions, as well as efforts in biodiversity and natural capital conservation.

* The Circular Economy Subcommittee began activities in advance in 2022.

Figure 5: Governance System for Climate Change Issues



CSR

Officer in charge：Chief CSR Officer (Senior Vice President)
Dedicated department：CSR Operations Dept.

The CSR Operations Department, a dedicated department, promotes Toray Group's activities on CSR in collaboration with related departments with regard to CSR issues in general, with a focus on ESG.

Risk Management

Officer in charge：General manager of the Corporate Strategic Planning Division (Senior Vice President, Chair of the Risk Management Committee)
Dedicated department：Corporate Strategic Planning Division

The Risk Management Committee discusses important risks that could impact Toray Group's management, including climate change, and implements risk management at Toray Group.

Safety, Health, and Environment

Officer in charge：General manager of the Manufacturing Division (Executive Vice President)
Dedicated department：Environment & Safety Dept.

With regard to Toray Group's policies and measures related to safety, health, accident prevention, and the environment, the Environment and Safety Department, a dedicated department, promotes the Group's safety, health, accident prevention, and environmental preservation activities, including action on climate change.

Research and Technology

Officer in charge：General Manager of the Technology Center (Executive Vice President)
Dedicated department：Technology Center

With regard to Toray Group's policies and measures related to research and technology development, the Technology Center serves as the administrative center and promotes research and technology development activities, including products that contribute to action on climate change.

(Positions are as of June 2024)

(2) Activities of the Sustainability Committee

In fiscal 2023, the Sustainability Committee deliberated on the status of progress and issues with implementation of the SI Business Expansion Project and the Climate Change Action Project.

Under the Climate Change Action Project, the committee held discussions and determined policies in areas including initiatives to reduce GHG emissions for the Group (Scope 1 and Scope 2) (refer to **A. Initiatives to Reduce Scope 1 and Scope 2 Emissions** on page 32 of this report), basic policy for ascertaining and reducing GHG emissions throughout the supply chain (Scope 3) (refer to **B. Initiatives to Reduce Scope 3 Emissions** on page 34 of this report). It also discussed and determined policy on the definition, calculation, and disclosure rules for environment-related indicators, the establishment of a new Environmental Indicator Subcommittee to promote integrated collection and management of data, CO2 capture and recycling initiatives in collaboration with the Circular Economy Subcommittee, and internal and external communication strategies.

The Circular Economy Subcommittee under the SI Business Expansion Project also deliberated on the status of progress toward the targets for fiscal 2030 shown in Figure 6, the issues to be addressed, and formulation of operational guidelines based on the mass balance approach, among other issues.

Figure 6: Sustainable, Recycling-based Resource Use and Production Targets

	FY 2030 Target
Revenue target for products that facilitate sustainable, recycling-based use of resources and production in the SI Business	400 billion yen
Target for percentage of raw materials sourced from recycling, derived from biomass, or produced with CO_2 recycling used in Toray core polymers*	20%

* Percentage of recycled, biomass-derived, and CO_2-based raw materials used in PET and nylon polymers.

The results of the deliberations are reported to the Board of Directors.

Concrete discussions on the status, issues and important measures for each project have further clarified what should be done to realize the four perspectives of the world envisioned by Toray Group under the Sustainability Vision. Toray Group will promote initiatives at each site based on the strategies in the Medium-Term Management Program, Project AP-G 2025, while considering increasing global awareness of sustainability and the speed of change in the business environment surrounding the Group.

As described on page 6, in 2024, the Sustainability Committee was constructively dissolved and replaced with a system in which important issues are deliberated as needed by the Executive Committee, a conference organ of the Board of Directors.

2. Strategy

(1) Impact Analysis of Climate Change

A. Relation to the Sustainability Vision and Long-Term Strategies

In 2020, Toray Group conducted a qualitative scenario analysis as per the TCFD recommendations in order to identify climate change-related opportunities and risks and determine how these opportunities and risks could impact Toray Group. The results of this analysis were disclosed as the information in the Toray Group TCFD Report 2021.

Moreover, Toray Group recently conducted a quantitative scenario analysis referring to the results of the previous qualitative analysis in order to ascertain the financial impact of opportunities and risks due to climate change. Based on this analysis, Toray Group reaffirmed the resilience of its long-term strategies (outlined in the Long-Term Corporate Vision, TORAY VISION 2030) for driving the achievement of the Toray Group Sustainability Vision.

B. Assumptions for Scenario Analysis

The Paris Agreement sets a goal of limiting the rise in average global temperatures due to climate change to well below 2°C above pre-industrial levels, with 1.5°C as an aspirational target. As was the case in the 2020 analysis, Toray Group primarily analyzed the 1.5°C increase scenario, but also considered the 2°C increase scenario, looking to achieve the Paris Agreement target and to build a carbon-neutral world by 2050. The Group also examined the 4°C increase scenario assuming insufficient progress on global efforts to ameliorate climate change.

The premises used for the scenario analysis are as outlined below.

Scenarios

Scenarios referenced in the recently conducted analysis

- For 1.5°C and 2°C increase scenarios: IEA NZE 2050, IEA SDS, IPCC RCP2.6 and SR1.5, WRI Aqueduct Optimistic, etc.
- For 4°C increase scenario: IEA STEPS, IPCC RCP8.5, IRENA, WRI Aqueduct BaU, etc.

Scope

In order to broadly ascertain the impact of climate change on the Group, the analysis was conducted with an emphasis on the businesses below, where the impact is thought to be particularly significant.

Synthetic fibers for apparel, electric vehicles, aircraft, wind power generation, lithium-ion batteries (including next-generation batteries), seawater desalination, biopolymers/recycled polymers (including films), and hydrogen-related products (hydrogen and fuel cells)

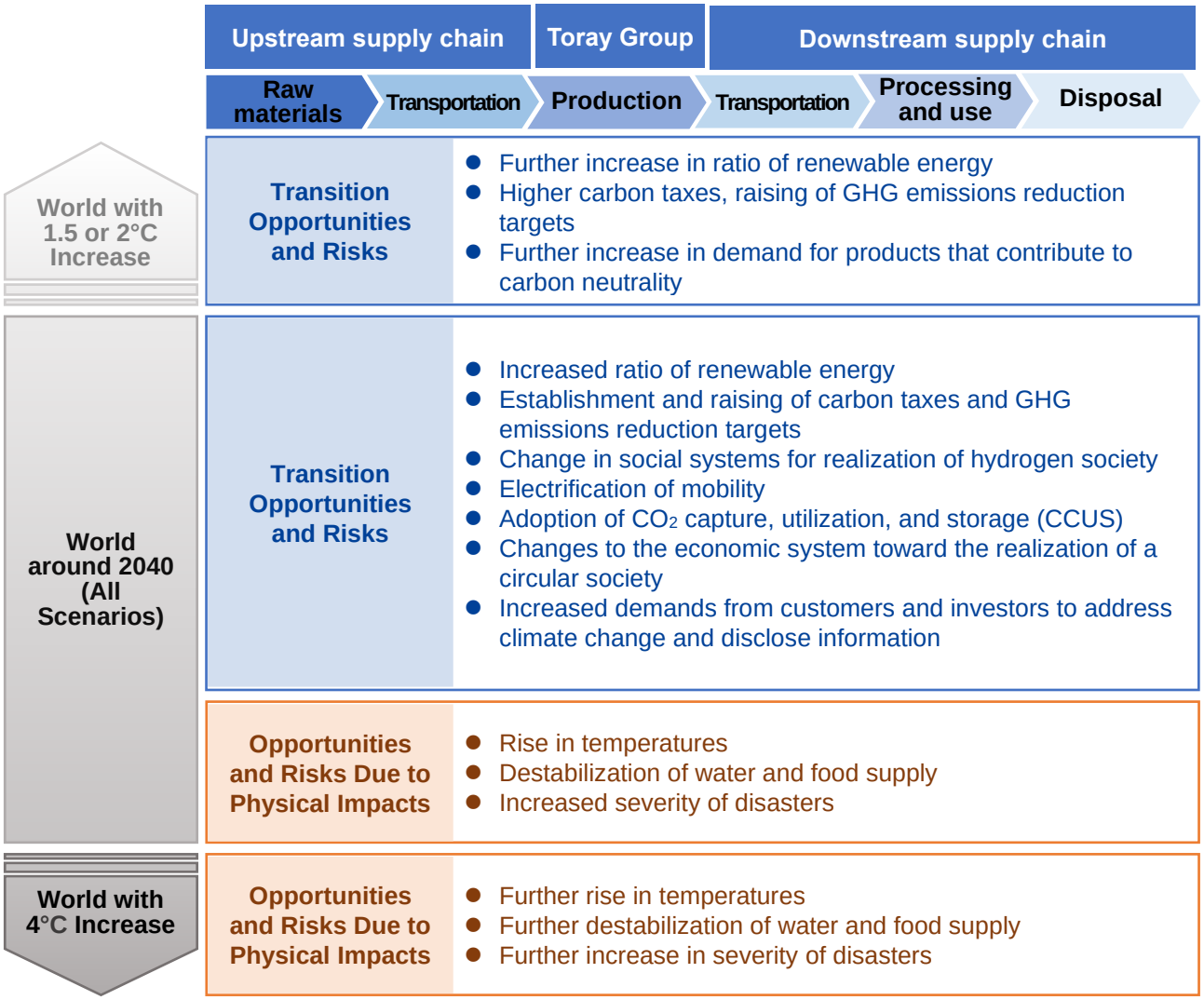
Moreover, in addition to Toray Group itself, the analysis also covered the supply chain from the upstream procurement of raw materials through to downstream processing, use, and disposal.

Timeframe

The qualitative analysis conducted in 2020 analyzed the period from 2030 to 2050 because the Sustainability Vision sets out the world envisioned by Toray Group in 2050 and establishes quantitative targets for fiscal 2030 as the milestones for the achievement of the vision.

In the recent analysis, a quantitative analysis was conducted on the impact on Toray Group's business assuming a near-2040 scenario.

Figure 7: Near-2040 Worldview under Each Climate Scenario



C. Main Opportunities and Risks Related to Climate Change and Response by Toray Group

(a) Results of Opportunity Analysis

Figure 8 summarizes the main business opportunities related to climate change, Toray Group's initiatives in response to the main business opportunities, and the magnitude of the impact on Toray Group in each scenario based on analysis conducted using the worldviews in Figure 7.

The impact of opportunities was calculated by estimating near-2040 revenues for each relevant Toray Group business and product, using current revenues for each relevant Toray Group business and product and current and near-2040 market forecasts.

Figure 8: Main Opportunities Related to Climate Change and Response by Toray Group

Expected climate change-related social changes	Main opportunities for Toray Group	Response to opportunities by Toray Group	Magnitude of Opportunity*		
			1.5℃	2℃	4℃
Increase in ratio of renewable energy	・Growth of renewable energy-related business ・Growth of storage battery-related business OPP (1) OPP (2)	・Carbon fiber for wind turbine blades	L	↘	↘
Establishment and raising of carbon taxes and GHG emissions reduction targets	・Growth of energy conservation-related business OPP (3)	・Lightweight materials (carbon fiber, resin) ・Insulating and heat shielding products (insulation, heat shielding fibers, films, etc.) ・Functional garments (cooling materials)	L	→	→
Change in social systems for realization of hydrogen society	・Growth of business related to hydrogen manufacturing, transport, storage, and use OPP (4)	・Gas separation membrane (porous carbon fiber) ・High-strength carbon fiber for hydrogen tanks ・Components and materials used in fuel cells	L	↘	↘
Electrification of mobility	・Growth of materials business for electric mobility OPP (5)	・Lightweight materials (carbon fiber, resin) ・Battery materials ・Materials for motors and hydrogen tanks	**400 billion yen (Revenue)**	↘	↘
Adoption of CCUS	・Growth of businesses related to CO_2 separation and recovery OPP (6)	・Gas separation membrane (porous carbon fiber)	M	↘	S
Changes to the economic system toward the realization of a circular society	・Growth of biomaterials business ・Growth of recycled materials business ・Growth of businesses contributing to waste reduction (emissions reduction, durability) OPP (7)	・Biopolymers ・Membrane bioprocess, biodegradable materials ・Recycled materials (Ecouse™, &+™, etc.) ・High-performance packaging materials ・VOC free waterless printing system for flexible packaging	**800 billion yen (Revenue)**	↘	↘
Increased demands from customers and investors to address climate change and disclose information	・Growth of customer base and increased investment due to climate change response ・Growth in need for products with small carbon footprints	・Growth of businesses contributing to efforts to address climate change and reduction of GHG emissions	L	↘	↘
Rise in temperatures	・Growth of businesses related to dealing with heat ・Growth of businesses related to infectious disease measures	・Functional garments (cooling materials) ・Insulating and heat shielding products (insulation, heat shielding fibers, films, etc.) ・Components and materials for health status monitoring devices ・Infectious disease protective wear and masks ・Materials for air purification products	S	↗	↗
Destabilization of water and food supply	・Growth of businesses related to water and food supply OPP (8)	・Water treatment ・Fertilizer and agricultural chemical ingredients	L	↗	↗
Increased severity of disasters	・Growth of businesses related to disaster mitigation OPP (9)	・Reinforcement materials and protection netting ・Water treatment	L	↗	↗

* In cases where it is difficult to make precise, quantitative calculations, the magnitude is determined based on the impact on revenues or business profits and classified into three levels; small (S), moderate (M), and large (L) as shown below.
  L: 50.0 billion yen or more impact on revenues or 5.0 billion yen or more impact on business profits
  M: 10.0 billion yen or more and less than 50.0 billion yen impact on revenues or 1.0 billion yen or more and less than 5.0 billion yen impact on business profits
  S: Less than 10.0 billion yen impact on revenues or less than 1.0 billion yen impact on business profits
  OPP: Opportunity
  The impact on revenues was analyzed in terms of sales and the impact on business profits was analyzed in terms of costs.
  Even when a classification is of the same magnitude for each climate scenario, if there is considered to be variation in degree within that classification, gradation is added using a darker color for scenarios under which the impact is judged to be large.
  Gradations represent variations within the same item under “social change,” and do not reflect differences in the magnitude of impact between one item and another.

The Sustainability Vision sets out to achieve the expansion of the supply of SI products and the resulting increase in CO_2 emissions avoided and contribution to water filtration throughput, as well as reduction in GHG emissions and water usage in the Group’s production activities.

As shown in Figure 8, there are significant opportunities for the SI Business and other businesses that help mitigate climate change, with the possibility that business opportunities will increase as efforts to address climate change continue to advance. In particular, new markets worth some 800 billion yen for bio-based and recycled materials are expected due to changes in economic systems associated with the transition to a circular economy. Furthermore, markets worth some 400 billion yen are anticipated due to the growing need for weight reduction materials such as carbon fiber and resin as a result of the accelerating electrification of mobility.

On the other hand, there are also significant business opportunities related to adapting to climate change as typified by water treatment. While there are greater opportunities in the 4°C increase scenario where efforts to address climate change make insufficient progress, there are expected to be ample business opportunities even in the 1.5°C or 2°C increase scenarios where progress is made on efforts to address climate change.

(b) Results of Risk Analysis

Figure 9 summarizes the main risks related to climate change, response by the Toray Group, and magnitude of impact on Toray Group in each scenario based on the same premises as in Figure 8.

The impact of risks was estimated by calculating Toray Group’s near-2040 revenues and costs, using current revenues for each relevant Toray Group business and product or Toray Group’s costs and current and near-2040 market forecasts.

Figure 9: Main Risks Related to Climate Change and Response by Toray Group

Expected climate change-related social changes	Main risks for Toray Group	Response to risks by Toray Group	Magnitude of Risk		
			1.5˚C	2˚C	4˚C
Increase in ratio of renewable energy	・Soaring energy costs ・Delay in energy conversion to secure suppliers RISK (1)	・Energy conservation efforts	60 billion yen (Cost)	↘	↘
Establishment and raising of carbon taxes and GHG emissions reduction targets	・Increased procurement costs of fossil resource-derived raw materials and fuels ・Criticism for fossil resource use ・Loss of competitiveness due to carbon tax disparity ・Decrease in existing users due to changes in the supply chain RISK (2)	・GHG emission reduction	85 billion yen (Cost)	↘	↘
Change in social systems for realization of hydrogen society	・Decline in material prices due to increased competition ・Securing suppliers due to delay in conversion to hydrogen	・Strengthening competitiveness	L	↘	↘
Electrification of mobility	・Decrease in demand for products related to internal combustion engines ・Decline in material prices due to increased competition RISK (3)	・Responding to demand for electrification ・Strengthening competitiveness	230 billion yen (Revenue)	↘	↘
Adoption of CCUS	・Thermal power generation electricity cost increase RISK (4)	・Energy conservation efforts	L	M	S
Changes to the economic system toward the realization of a circular society	・Increased waste disposal costs ・Shrinking materials market due to the shift away from mass production and mass consumption ・Opportunity loss due to delay in responding to a recycling-oriented society RISK (5)	・Strengthen waste management and promote recycling ・Responding to demand for bio-based materials and recycling, etc.	300 billion yen (Revenue)	↘	↘
Increased demands from customers and investors to address climate change and disclose information	・Increased demands to reduce GHG emissions ・Lost opportunities due to delays in reducing GHG emissions and carbon footprint RISK (6)	・Reducing GHG emissions	L	↘	↘
Rise in temperatures	・Less demand for warming materials and winter sports applications	・Meet demand for functional garments (cooling materials)	S	M	↗
Destabilization of water and food supply	・Water usage restrictions RISK (7)	・Reduce water usage	M	↗	↗
Increased severity of disasters	・Impact on raw materials procurement, plant operations, etc. RISK (8)	・Business continuity plan ・Strengthen supply chains	L	↗	↗

* With regard to the risk due to introduction of carbon taxes, since it is currently difficult to forecast Toray Group's GHG emissions in 2040, it was calculated by multiplying fiscal 2022 GHG emissions (5.12 million tons-CO_2, based on a calculation method that uses the degree of management control Toray Industries has over the individual subsidiary) by forecast carbon taxes in 2040 under the 1.5°C increase scenario (developed countries: USD110/ton-CO_2). Toray Group will continue working to reduce GHG emissions ahead of 2040.

Transition Risks

In terms of transition risks related to climate change, in particular, it was estimated there is a potential risk that near-2040 revenue could be about 300 billion yen lower than forecast due to loss of opportunities caused by delays in responding to the circular economy and a reduction in the use of plastic. In addition, there is a possibility of an approximately 230-billion-yen revenue contraction in internal combustion engine-related materials from the current level due to the impact from a lower percentage of such vehicles owing to the acceleration in the electrification of mobility. The burden of carbon taxes and GHG emissions regulations are also significant risks, and it was estimated that the impact of carbon taxes could be around 85 billion yen in the 1.5°C increase scenario.

Furthermore, it was found that energy costs associated with procurement of renewable energy could increase by around 60 billion yen.

Despite the significant risks due to these market changes, it is considered that business opportunities due to changes in the market are far greater for Toray Group as shown in Figure 8 on page 13.

Physical Risks

Toray Group is engaged in a wide range of businesses worldwide, and it is believed there is a significant potential impact on the Group’s operations and supply chains due to increased severity of disasters. There is also a possibility that some Toray Group business sites will be significantly impacted by water intake restrictions. However, approximately 80% of Toray Group’s total water usage is in Japan. The risk of water intake restrictions was estimated to be significant in the 2020 analysis, but this was revised to “moderate” in the most recent analysis.

These physical risks can be reduced by implementing the initiatives to achieve the GHG emissions and water usage targets outlined in the Toray Group Sustainability Vision. However, further initiatives may be needed depending on social circumstances going forward.

The recent analysis based on the TCFD recommendations estimates and summarizes the impact of climate change on Toray Group's business activities in the uncertain future of near-2040 in terms of opportunities and risks. Moreover, as the opportunities and risks are not necessarily independent of one another, and there may be overlaps or trade-offs between items, the intention is not to add up or subtract them from each other.

(c) Relation to Long-Term Strategies

Toray Group has partially revised the summary prepared in 2020 of the relationship between the Sustainability Vision and forecast social change related to climate change,

which has been re-summarized in Figure 10. Toray Group reaffirmed that the Sustainability Vision responds to the social change arising from climate change.

Figure 10: Correspondence with the Sustainability Vision

	Toray Group Sustainability Vision			
	A net zero emissions world, where greenhouse gas emissions are completely offset by absorption	A world where resources are sustainably managed	A world with a restored natural environment, with clean water and air for everyone	A world where everyone enjoys good health and hygiene
	Accelerating measures to counter climate change	Realizing sustainable, recycling-based use of resources and production	Providing clean water and air	Contributing to better medical care and hygiene for people worldwide
Increase in ratio of renewable energy	○	○		
Establishment and raising of carbon taxes and GHG emissions reduction targets	○			
Electrification of mobility	○	○		
Changes to the economic system toward the realization of a circular society	○	○	○	
Change in social systems for realization of hydrogen society	○	○		
Adoption of CCUS	○	○		
Increased demands from customers and investors to address climate change and disclose information	○			
Rise in temperatures	○		○	○
Destabilization of water and food supply			○	○
Increased severity of disasters	○		○	○

It was further confirmed that there is no need at this time to change the basic strategy of accelerating efforts to address climate change whereby Toray Group is aiming to achieve its fiscal 2030 targets to help shape a carbon-neutral world, as outlined in the Sustainability Vision, under the Long-Term Corporate Vision, TORAY VISION 2030. Therefore, the Toray Group will continue to implement the responses to the opportunities and risks shown in Figure 8 on page 13 and in Figure 9 on page 15. The progress of initiatives to date is presented in sections III. 2 (2) through III. 2. (4) on pages 18 through 38.

Nevertheless, there have been some major changes. In 2021, the Japanese government made a large upward revision to its 2050 target for reducing GHG

emissions from the previous 26% reduction compared to fiscal 2013 to a reduction of 46%, and the Russian invasion of Ukraine began in 2022 with a significant impact on energy markets, particularly natural gas. Going forward, it will be necessary to review the fiscal 2030 targets and continue to update the analysis of opportunities and risks regularly depending on major social changes and the progress of Toray Group's climate change-related initiatives.

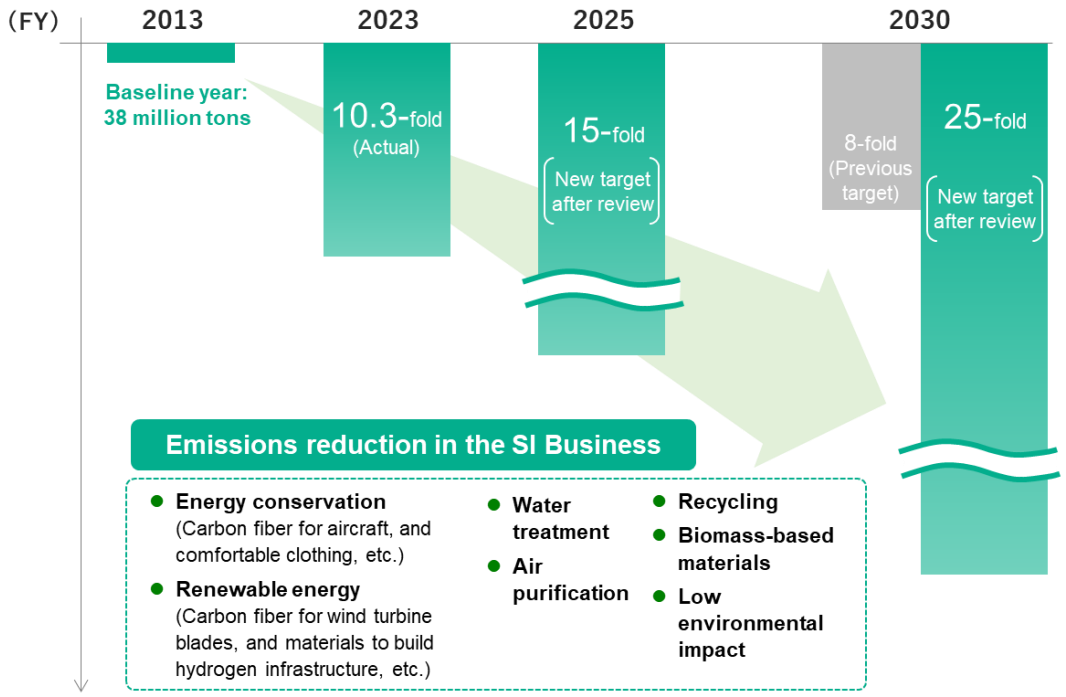
(2) Contribution to Solving Climate Change Issues through the Value Chain

A. SI Business Accelerating Measures to Combat Climate Change

(a) Products Contributing to the Achievement of Carbon Neutrality

Meeting the challenge of climate change requires the reduction of CO_2 emissions through the entire lifecycle of products and services. Toray Group has been implementing group-wide initiatives to reduce GHG emissions and has adopted measures early on to reduce CO_2 emissions across the entire value chain. Toray Group has reviewed its previous fiscal 2030 targets and set a new target to increase CO_2 emissions avoided in the value chain 25-fold (previous target: 8-fold) by expanding the supply of SI Business products.

Figure 11: CO_2 Emissions Avoided in Value Chain (Baseline: FY 2013)



Method of Calcuating CO_2 Emissions Avoided (Aircraft Case Study)

Basis of calculation

- Fuselage weight:
  Conventional aircraft: 60 tons/unit, Proportion of CFRP used: 3%
  CFRP aircraft: 48 tons/unit, Proportion of CFRP used: 50% (20% weight reduction as compared with the conventional aircraft)
- Fuel consumption:
  Conventional aircraft: Aviation of 103km per kiloliter of jet fuel
  CFRP aircraft: Aviation of 110km per kiloliter of jet fuel
- Lifetime aviation mileage: Assumes 10 years of use and completion of 2,000 flights/year between Haneda Airport and Chitose Airport (500 miles)
- Reduction in CO_2 emissions per unit adopted:
  Using one aircraft as the unit adopted, the reduction in CO_2 emissions per unit is calculated as the difference between the entire life cycle of a CFRP aircraft and the entire life cycle of a conventional aircraft (includes 20,000 flights over 10 years, does not include disposal).

For more information, refer to Innovations for Greenhouse Gas Reductions – Life Cycle Analysis of Chemical Products in Japan and around the World, Japan Chemical Industry Association:

https://www.nikkakyo.org/sites/default/files/2023-02/CaseStudy14_AircraftMaterial.pdf

Toray Group has integrated the Green Innovation (GR) businesses and the Life Innovation (LI) businesses, on which it previously focused, to create the Sustainability Innovation (SI) Business, where the Group will strengthen its initiatives as a growth area supporting the Toray Group's sound, sustainable growth. The revenues of products that contribute to achieving carbon neutrality account for approximately half of the SI Business. For more information about activities in the SI Business, refer to **Contributing Solutions to Social Issues through Business Activities** on the Company's website.

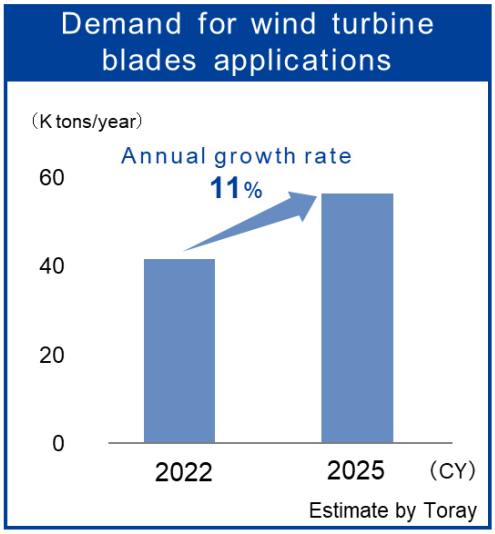
SI Business and its products related to measures that contribute to mitigating climate change are presented below.

Businesses Related to Renewable Energy

OPP (1)

In the field of wind power generation, large-scale installation projects are underway in various regions. Given the fact that installation locations are shifting to offshore and regions with low wind speeds due to site restrictions, power generation efficiency improvements are sought-after. Larger wind turbine blades are needed to improve the power generation efficiency, but making them with conventional fiberglass composites would leave them more vulnerable to sagging, creating a risk that the turbine blade will clip the tower and cause damage. Using stiff carbon fiber reinforced plastic materials will suppress sagging and reduce weight, making it possible to manufacture larger wind turbine blades and thereby contributing to further adoption of wind power generation.

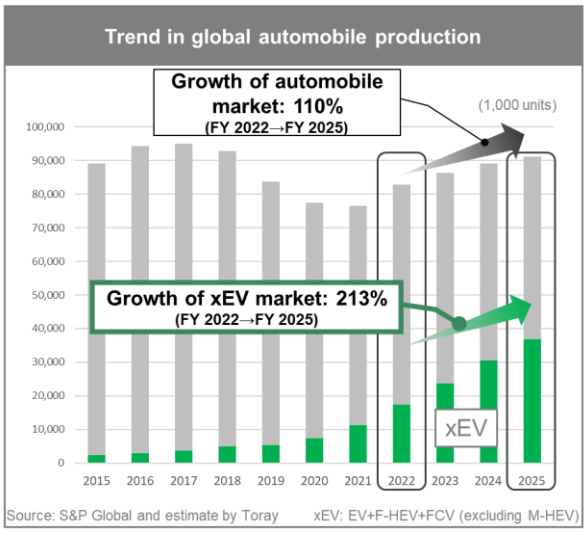
Toray Group company Zoltek has an approximately 50% share of the global market for the large-tow carbon fiber used in wind power turbine blades, on the strength of the cost competitiveness and high quality of Zoltek's products. Zoltek will increase capacity and facilities to meet growth of demand in the United States and Europe and aims to boost non-price competitiveness by enhancing technical services.

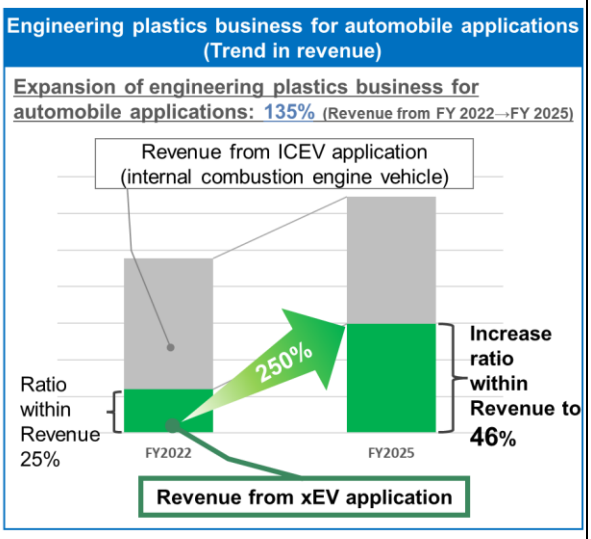


Materials Business for Electric Mobility

OPP (2) OPP (5) RISK (3)

Toray Group is contributing to the advance of next-generation electric mobility solutions by supplying resins and films for electrical components, weight reduction materials (resins, carbon fiber), resins and carbon fiber for hydrogen tanks, and separator films used in lithium-ion batteries.





Energy Conservation-Related Business

OPP (3)

Toray Group is contributing to energy conservation in a number of ways, including weight reduction using carbon fiber and resins, water treatment through membrane utilization, functional garments made from thermal insulation and cooling materials, and window films and sealant for double glazing glass.

Raising Energy Utilization Efficiency Using Carbon Fiber Reinforced Plastic

Carbon fiber reinforced plastic (CFRP) is both lightweight and strong, and its use in aircraft and automobile applications contributes to weight reduction and improved fuel economy. Life cycle assessments (LCAs) that assess the total environmental impact from materials manufacturing through disposal indicate that using CFRP contributes significantly to reducing CO_2 emissions. (The following estimates were made by the Japan Carbon Fiber Manufacturers Association.)

- Vehicle with 17% CFRP by car body weight
  → Compared with a conventional vehicle (no CFRP), using CFRP cumulatively saves five tons of CO_2 emissions per vehicle over 10 years due to improved fuel economy from weight reduction.
- Aircraft with 50% CFRP by fuselage weight
  → Compared with a conventional aircraft (3% CFRP by fuselage weight), using CFRP cumulatively saves 27,000 tons of CO_2 emissions per aircraft over 10 years due to improved fuel economy from weight reduction.

The mobility revolution, growth of new energy and environmental needs are expected to create new business opportunities for carbon fiber. Toray Group projects that demand for carbon fiber will grow by an annualized rate of 17% through 2025. In aerospace applications, Toray Group projects there will be new demand for carbon fiber for use in “flying cars” such as air taxis and large drones, in addition to commercial aircraft.

Urban Air Mobilities

Carbon Fiber Demand Scale in 2030 Compared to 2025

10X (2,000t)

©Joby Aviation, Inc.

Next-gen Aircraft

Carbon Fiber Demand Scale in around 2030

3,000t

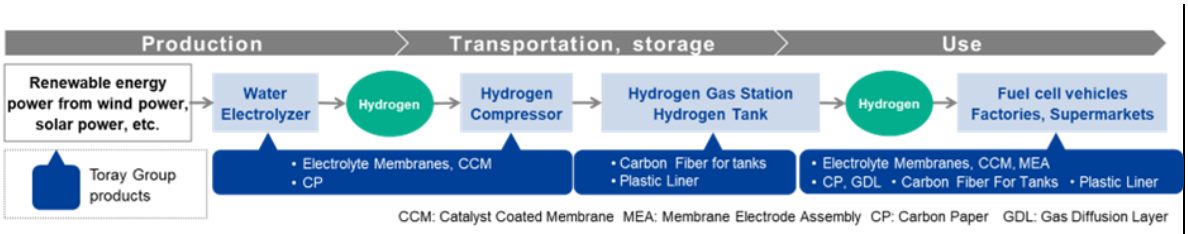
©The Boeing Company

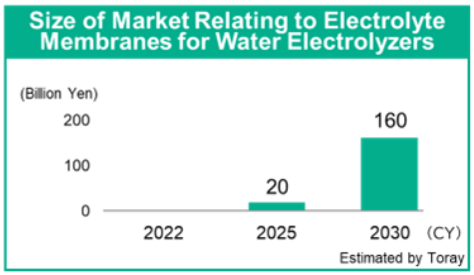
Hydrogen and Fuel Cell-Related Business

OPP (4)

Green hydrogen, which is produced through electrolysis of water using electricity derived from renewable energy such as solar or wind power, has been attracting attention as a clean energy that helps in achieving carbon neutrality. Its demand is expected to expand dramatically going forward. In addition, the use of hydrogen in fuel cells is steadily becoming more widespread, and significant growth is expected in the future.

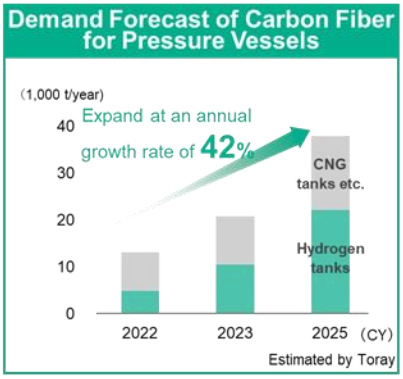
Toray Group has positioned hydrogen and fuel cell components as a key sector for future growth and is promoting business expansion with priority investment of management resources. In addition to catalyst coated membranes (CCMs) and membrane electrode assemblies (MEAs), Toray Group develops and manufactures a wide range of core materials for all areas of hydrogen production, transport, storage and utilization, including hydrocarbon (HC) electrolyte membranes with high proton conductivity and low gas permeability, high-strength carbon fiber and liner resin for high-pressure hydrogen tanks, carbon paper as electrode base material, and gas diffusion layers (GDLs).





Toray Group supplies carbon fiber for use in pressure vessels, such as compressed natural gas (CNG) and hydrogen tanks, allowing for weight reduction and increased burst pressure.

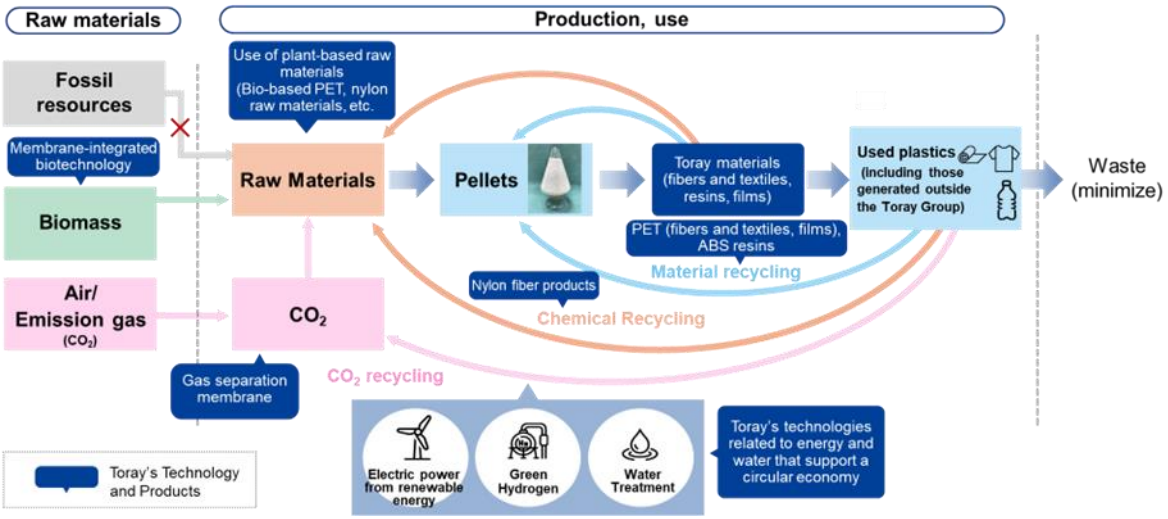
Demand for CNG tanks is increasing steadily for use in CNG vehicles for home delivery services and gas transportation tanks. Furthermore, with hydrogen tanks being increasingly adopted for passenger vehicles, trucks, railroads, and ships that use fuel cells, demand for carbon fiber for use in pressure vessels is also expected to rise in the future. Toray Group has maintained the top share of the global carbon fiber market for CNG and hydrogen tank applications.



(b) Businesses Contributing to the Realization of a Circular Economy

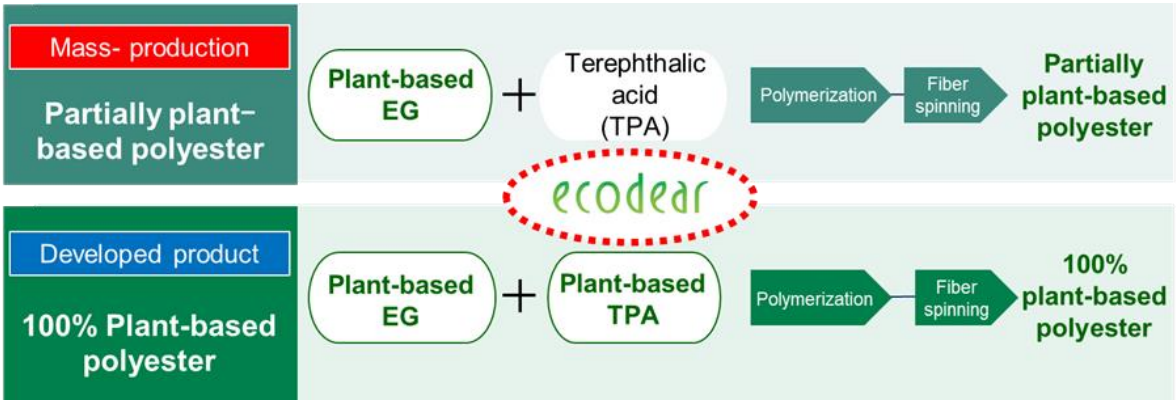
CO_2 Emission Reductions Made Possible by a Circular Society OPP (7) RISK (5)

Toray Group aims to help build a circular society through various technology developments including transitioning to bioplastics and recycled plastics, adoption of renewable energy and hydrogen, and water reuse as described in the following paragraphs, thereby contributing to reducing CO_2 emissions.



Biomaterials Business

Toray Group is developing materials made from plant-based raw materials instead of petroleum-based raw materials. For example, in the segment of biomass-based fiber, Toray Group mass produces partially bio-based polyethylene terephthalate (PET) fibers that are made from plant-based ethylene glycol, which is also used to make Ultrasuede™ PX, ultra-microfiber non-woven fabric with suede texture. Toray Group is also prototyping a 100% bio-based PET fiber and developing membrane bioprocesses. (For more information, refer to C. R&D and Capital Investment Strategy on page 27 of this report.)



Recycled Materials Business

At Toray Group, Ecouse™ is the unified brand for its recycled materials and products across a wide range of business segments including fibers, resins, and films. These products include fibers made by recovering and recycling discarded PET bottles and scrap ends generated from manufacturing processes, and films made by recovering and recycling films that have been used in customer processes.

In the fiber segment, Toray Group offers the CYCLEAD™ reclaiming system for the recovery and circulation of used fibers. Toray Group has also introduced the &+™ (“And Plus”) brand of recycled fibers that include Toray’s original traceability function. These fibers are made from discarded PET bottles and use filtering and cleaning technologies to remove foreign matter, resulting in a fiber with high whiteness that can be made into a wide variety of products. (For more information, refer to **Realizing a Circular Economy** on the Company’s website.)

TOKYO MARATHON

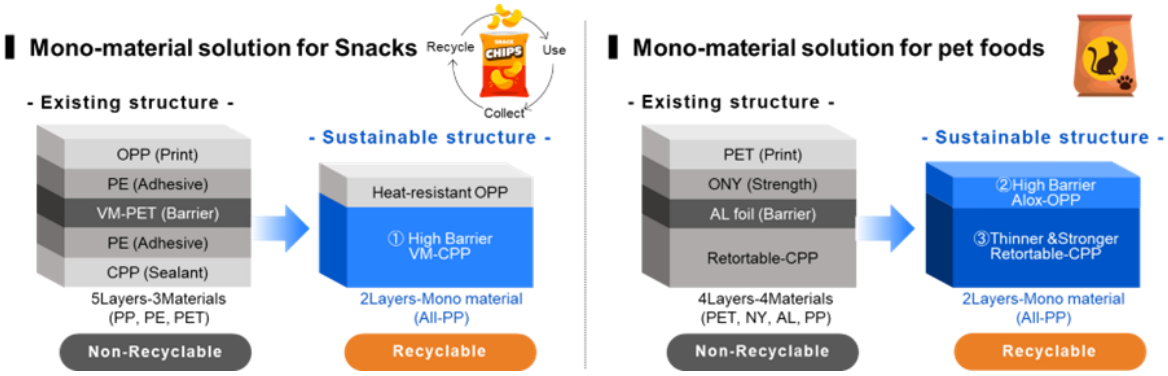
Activities to produce &+™ yarn from PET bottles collected at the venue and recycle it into volunteer wear for the next year onwards

Collecting PET bottles at Toray’s plants and offices in Japan

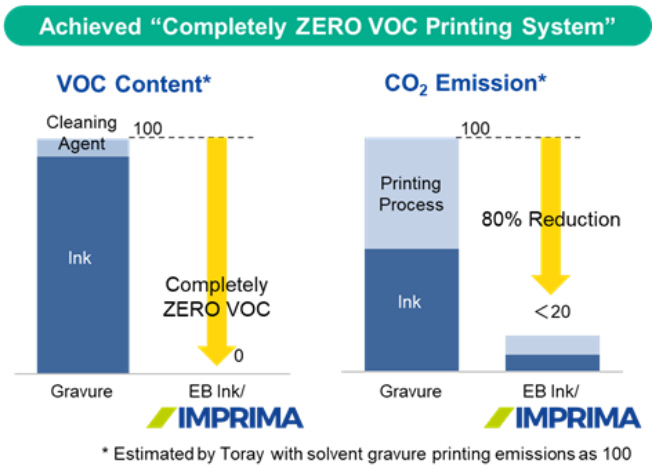
Activities to produce &+™ yarn from PET bottles collected from vending machines installed in the Company

Businesses Contributing to Waste Reduction

The food packaging market is currently diversifying and initiatives to reduce food loss are gaining traction, creating demand for packaging materials with advanced functionality and quality. Toray Group is combining film products and film processing technologies to supply products that are optimized for every kind of packaging application and contributing to longer food preservation.



Toray Group has jointly developed a volatile organic compound (VOC)-free waterless offset printing system for flexible packaging that fully eliminates VOC emissions. The system also greatly reduces CO_2 emissions from electricity usage. (For more information, refer to C. R&D and Capital Investment Strategy on page 27 of this report.)



B. SI Business Contributing to Climate Change Adaptation

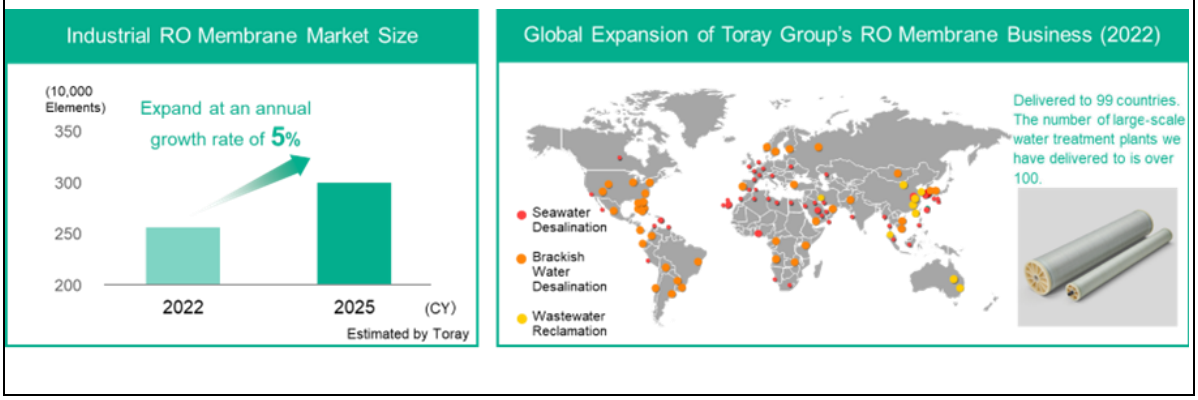
In addition to measures to mitigate climate change, Toray Group is also focusing on measures to adapt to climate change. In the SI Business segments, Toray Group is helping to solve global water shortages and water pollution with its water treatment business.

Contributing to Climate Change Adaptations and Greater CO_2 Emissions Avoided with the Water Treatment Business

OPP (8)

Rapid population growth and climate change are giving rise to global water shortages and water pollution. Today, approximatley 800 million people around the world lack access to basic water and sanitation services.[4] Furthermore, there is a risk that by 2050 the majority of the global population and approximately half of global grain production will face water stress.[5] Toray Group seeks to contribute solutions to water issues by promoting the use of its membrane treatment technologies, which are relatively low in CO_2 emissions.

Toray Group is developing a wide variety of high-performance membranes and globally proposing systems to secure sustainable sources of water. Seawater desalination technology using Toray's reverse osmosis (RO) membranes is estimated to result in 131.2 million tons of CO_2 emissions avoided compared with evaporation desalination methods that require steam and heating.[6] (Based on estimated CO_2 emissions avoided by seawater desalination plants constructed globally in 2030.)



Businesses Contributing to Disaster Damage Mitigation OPP (9)

Climate change is expected to bring more frequent and severe droughts, torrential rain, and flooding. Toray Group's water treatment business will contribute to providing irrigation and drinking water in these situations. Additionally, Toray Group will supply carbon fiber that can be used in structural reinforcement, and emergency desalinators and water purification equipment for disaster preparedness and disaster relief.

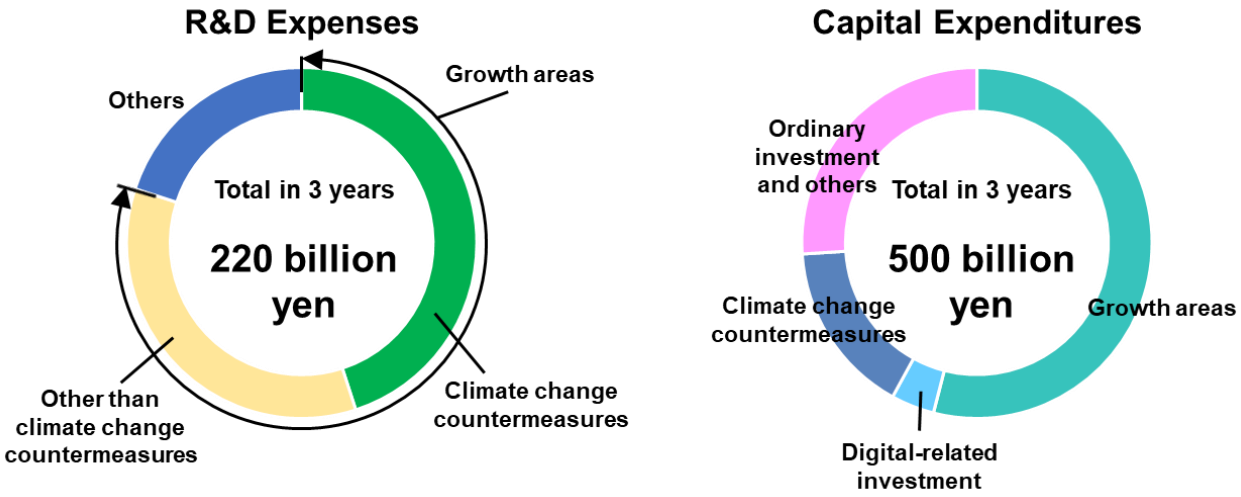
Moreover, Toray Group defines products that help improve the quality of health care and enhance public health as part of its SI Business. SI Business contributes to climate change adaptation by offering products that enhance public health, for instance products that help protect people from infectious disease, and disasters and abnormal weather events, which have been increasing in recent years.

C. R&D and Capital Investment Strategy

Under the Long-Term Corporate Vision, TORAY VISION 2030, Toray Group aims to expand its business in growth areas, such as SI Business.

In addition, under the Medium-Term Management Program, Project AP-G 2025, which covers the three years starting in fiscal 2023, Toray Group is allocating 220 billion yen for R&D expenses over this three-year period. Approximately 80% of this amount is allocated to growth areas (of which 45% is related to climate change countermeasures, such as carbon neutrality and the circular economy). Additionally, roughly 20% of Toray Group’s 500 billion yen in capital investment over the three years is being allocated to climate change countermeasure-related areas, mainly to carbon fiber composites, fibers, films, and resins.

Figure 12: R&D Expenses and Capital Investment for Fiscal 2023–2025



Toray Industries will also set up a new research facility at its Nagoya Plant in Aichi Prefecture, scheduled to be completed in the first quarter of fiscal 2026 to accelerate R&D for a green transformation (GX) and advanced mobility. The facility will leverage the concept of fusing green and nano-based technologies to develop materials by integrating diverse elemental technologies from within and outside Toray Group. It will also incorporate chemical engineering perspectives from the research stage and reinforce the company's ability to propose digital solutions. Through these measures, Toray Group will build a framework to bring together materials development, process design, and customer proposals in a drive to cut GHG emissions across the economy.

Figure 13: Exterior of New Research Building (artist's rendering)

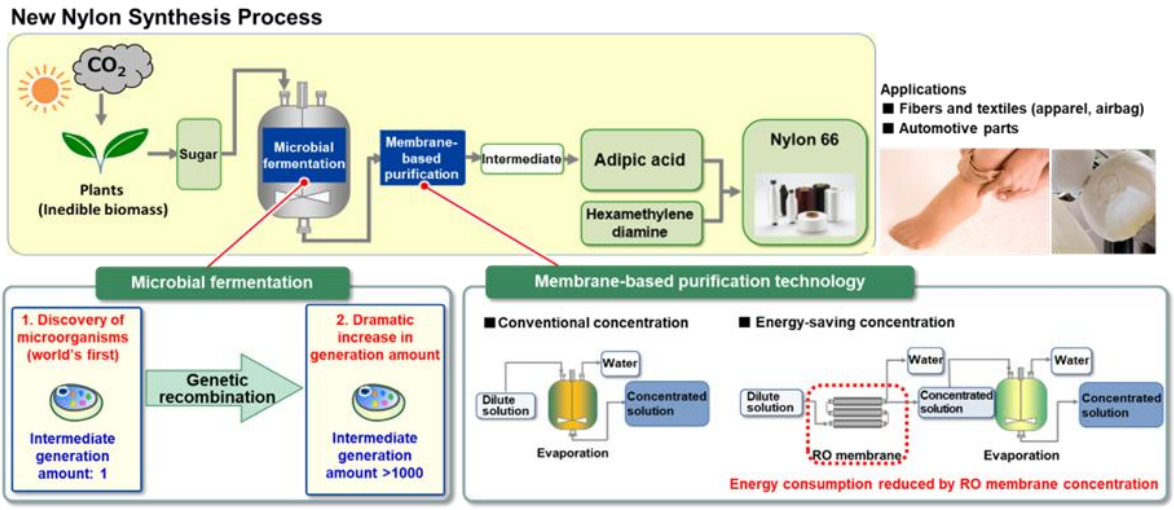
Under the Medium-Term Management Program, Project AP-G 2025, Toray Group aims to generate 1 trillion yen in revenue from all new businesses in the 2020s. The Group will achieve this goal by advancing the Future Toray Project and focusing its resources on the major themes that will drive the next stage of growth. This, in turn, will accelerate development and push forward the creation of new business models. The themes of the Future Toray Project include hydrogen and fuel cell-related materials, biomass utilization products and processing technologies, and eco-friendly printing solutions. Toray Group is also developing applications for porous carbon fiber that can be used in the structural support layer of gas separation membranes that are used for CO_2, biogas, and hydrogen separation.

CO_2 Emission Reductions Made Possible by a Circular Society OPP (7) RISK (5)

Biomaterials Business

Toray Group will contribute to moving away from fossil fuels and reducing GHG emissions by switching to biomass-derived materials for plastic products.

For example, Toray Group is developing a membrane bioprocess to enable plant-based raw materials to be manufactured with greater efficiency. This membrane bioprocess combines separation membrane technology and bio-organic synthesis technology to create new applications for water treatment separation membranes in processes such as saccharification, fermentation, and refinement. The technology significantly improves the manufacturing of raw sugar from non-edible biomass and increases fermentation efficiency, thereby fostering a non-fossil raw material. Toray Group is currently operating a technology demonstration project for a saccharification process that produces sugars from non-edible biomass. Toray Group will work to commercialize the technology, in order to build a supply chain that produces materials and chemicals from non-edible biomass.



Businesses Contributing to Waste Reduction

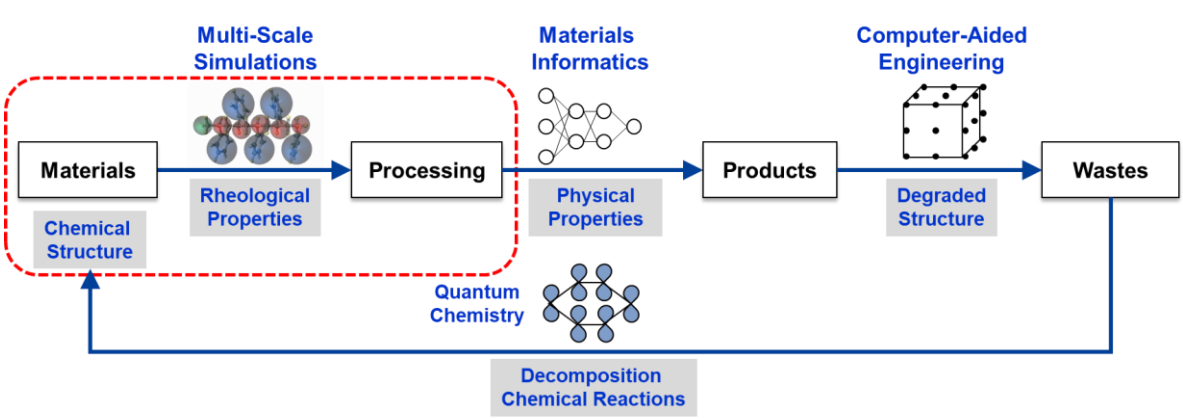
Toray Group is working with a partner to develop a VOC-free waterless offset printing system for flexible packaging. The system fully eliminates problematic VOCs emitted during gravure printing, a process is widely used in Asia for printing on flexible packaging. The system also utilizes an ink drying process that uses power-saving LED-UV technology to eliminate solvent drying and exhaust treatment that are required for gravure printing. As a result, the waterless offset printing system uses less than one-sixth of the amount of electricity compared to the conventional system, which significantly reduces CO_2 emissions from electricity use. By around 2030, Toray Group aims to see enough of the systems adopted and in operation to avoid approximately 4.4 million tons of CO_2 emissions per year (approximately 270,000 tons in Japan and 4.13 million tons avoided outside of Japan). (Data based on estimates and trial calculations performed by Toray Industries, Inc.)

Recycling Business for Circular Use of Resources

Toray Group and a research group that Professor Juan de Pablo leads at the University of Chicago have jointly developed a multiscale simulation technique that can accurately predict viscoelasticity from the chemical structures of polymers. Viscoelasticity is an important physical property in polymer molding and processing processes.

The new computational technique makes it possible to predict from the research stage the viscoelasticity of polymers, which fluctuates greatly with the use of waste material, and should speed up the development of products designed for recycling.

Going forward, Toray Group will integrate this technique with its strengths in quantum chemical calculations, materials informatics, and computer-aided engineering (CAE), deploying it with stock polymers, and thus establish an all-in-one digital product design framework linking all data, from raw materials to products and product waste to raw materials. The Group thereby seeks to respond swiftly to fast-changing market and customer needs.



Toray's all-in-one digital product design framework for promoting polymer recycling

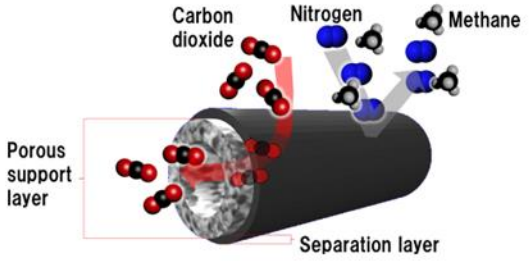
Gas Separation Membranes (CO_2, Biogas, and Hydrogen Separation) OPP (6)

In 2021, Toray Group created the world's first all-carbon carbon dioxide (CO_2) separation membrane composed of porous carbon fiber with a nano-sized continuous pore structure. By combining this with Toray's precision structure control technologies and optimizing carbonization conditions, the Group created a separation membrane that retains its micropore shape and delivers excellent CO_2 separation even in harsh natural gas refining processes and has verified its effectiveness through testing.

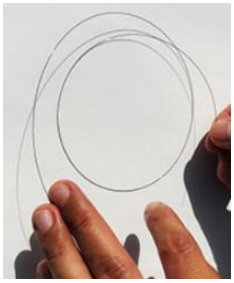
In fiscal 2024, the Group will install test facilities and conduct gas demonstrations with a membrane module using this separation membrane. It will also accelerate measures and demonstration tests for commercialization in collaboration with diverse partners, including natural gas refining-related engineering manufacturers.

The new material can be used in the support layer for the structure of gas separation membranes used for CO_2, biogas, and hydrogen separation. Conventional gas separation facilities that use absorption and adsorption processes are bulky and use a great deal of energy leading to increased CO_2 emissions. The membranes made of this new material can help make the module smaller and lighter in weight while enhancing separation performance. The material is also chemically stable, which makes it usable for a wider range of separation membrane applications.

Toray Group will develop applications for the new material to promote carbon recycling and help build a hydrogen-powered, energy-efficient society.



Structure of CO_2 separation membrane



CO_2 separation membrane under development

(3) Measures to Combat Climate Change in Production Activities

A. Initiatives to Reduce Scope 1 and Scope 2 Emissions

RISK (1) RISK (2) RISK (4) RISK (6)

Toray Group implemented the Challenge 50+ Project as a group-wide effort with the aim of achieving a 50% reduction of GHG emissions (Scope 1 and 2) per unit of sales revenue as well as water consumption compared with fiscal 2013 levels by 2030 as milestones toward realizing the Toray Group Sustainability Vision. As a result of working to reduce GHG emissions by expanding renewable energy facilities and introducing carbon-free electricity at plants in and outside Japan and discontinuing coal-fired power generation at overseas plants, in addition to initiatives to conserve energy driven by process improvements, Toray Group achieved a 36% reduction in GHG emissions per unit of sales revenue in fiscal 2023 compared with fiscal 2013 levels and a 26% reduction in GHG emissions in Japan.

Figure 14: Main Initiatives of the Challenge 50+ Project (Related to Reducing GHG Emissions

◆ Expand synergies by ensuring routine energy-saving activities in Japan and overseas, adopting successful case studies across the Group, and strengthening regional collaboration

◆ Reduce use of coal through fuel conversion, etc.

Example: Discontinuation of coal-fired power generation in Indonesia
(shift to purchase of electricity, conversion of fuel)

P.T. Indonesia Toray Synthetics (ITS):
Discontinued in 2021 (reduction of 250,000 tons-CO_2/year)

P.T. Easterntex (ETX): Discontinued in April 2024 (reduction of 150,000 tCO2/year)

◆ Introduce renewable energy

Example 1: Installation of renewable energy facilities

The Group has expanded installation globally at Toray Industries and affiliated companies. In fiscal 2023, facilities were increased at Toray's Shiga Plant, and new facilities were added at nine sites in China and one site in India that have commenced operation.

ITS power receiving and transforming facility

ETX gas boiler

Example 2: Introduction of carbon-free power sources

Tokyo Head Office introduced 100% renewable power in April 2022 (reduction of 1,500 tons-CO_2/year)

Figure 15: Upstream Scope 1,2 (Fiscal 2023) (10,000 tons-CO_2)

	Toray Industries, Inc.	Group companies in Japan	Group companies outside Japan	Toray Group Total
Scope1	136.7	3.2	109.3	249.1
Scope2	25.9	16.9	203.2	246.0
Scope1+Scope2	162.6	20.1	312.4	495.1

Moreover, Toray Group uses internal carbon pricing not only as an incentive for energy-saving investments and GHG emission reduction, but also as a reference value for determining the profitability of investment and analyzing potential risks relating to new and expanded production facilities to improve energy efficiency and accelerate investment for achievement of decarbonization. In fiscal 2024, the Group's internal carbon price was set at 10,000 yen/ton-CO_2, the same level as in fiscal 2023, with reference to the EU-ETS allowance prices in Europe. The internal carbon price will be reviewed every year by the GHG Reduction Subcommittee with reference to market trends.

B. Initiatives to Reduce Scope 3 Emissions

RISK (1) RISK (2) RISK (4) RISK (6)

Toray Group's total Scope 3 emissions as a total of the emissions for upstream Categories 1 through 8 and downstream Categories 9, 11, 12, and 13 in fiscal 2023 were approximately 17.56 million tons-CO_2. By category, Category 1 emissions (purchased goods and services) accounted for the highest percentage at 49% of this figure followed by Category 12 emissions (end-of-life treatment of sold products), which accounted for 25%. It was found that these two categories accounted for 74% of total Scope 3 emissions.

As Toray Group has no franchises, Category 14 emissions are considered to be zero.

Figure 16: Upstream Scope 3 Emissions by Category (Fiscal 2023) (10,000 tons-CO_2)

Category		GHG Emissions	Percentage of emissions
1	Purchased goods and services	860	49%
2	Capital goods	52	3%
3	Fuel-and energy-related activities not included in scope 1 or scope 2	96	5%
4	Upstream transportation and distribution	18	1%
5	Waste generated in operations	1	0%
6	Business travel	1	0%
7	Employee commuting	2	0%
8	Upstream leased assets	0	0%
9	Downstream transportation and distribution	3	0%
10	Processing of sold products	—	—
11	Use of sold products	275	16%
12	End-of-life treatment of sold products	447	25%
13	Downstream leased assets	1	0%
14	Franchises	0	0%
15	Investments	—	—
Total		1,756	100%

Toray Group is in the process of considering and formulating medium- and long-term reduction targets and roadmaps, focusing on the main categories. Toray Group is in the process of considering and formulating long-term reduction targets with a road map for each category, focusing on the main categories. To address Category 1 emissions, Toray Group will actively promote engaging with the Group's main raw material suppliers to build systems for cooperation on reducing the CFP of the raw

materials supplied to Toray, as well as promoting a switch to biomaterials and recycled raw materials.

To address Category 12 emissions, Toray Group will work to reduce GHG emissions across the supply chain by promoting recycling and improving the durability of Toray products.

C. Initiatives Regarding Physical Risks Arising from Climate Change

RISK (7) RISK (8)

Climate change will lead to higher temperatures, more severe disasters, and increase the frequency and severity of water shortages, torrential rains, and flooding, which will impact raw materials procurement and plant operations. Toray Group assesses the water risks at production sites using hazard maps and other methods. For production sites that are at risk of water-related disasters such as flooding (approximately 30% of all Toray Group sites), the Group has formulated business continuity plans and is promoting measures accordingly. These include equipment-related measures such as moving evacuation sites to higher locations and raising the height capacity of emergency generators, and conducting regular tsunami evacuation drills to ensure the safety of human life.

To address risks such as water shortages and drought, Toray Group also implemented the Challenge 50+ Project, which set a target for a 50% reduction in water consumption per unit of sales revenue compared with fiscal 2013 levels by 2030, and achieved a 35% reduction by fiscal 2023 through wastewater reuse in plants and other water conservation activities.

(For more information, refer to the Water Management section in **Comparative Table with SASB Standards** and **Initiatives for Managing Water Resources** on the Company's website.)

Figure 17: Initiatives to Address Water Risks

Elevated installation of an emergency generator

Reuse of plant wastewater using water treatment membranes

For information on the targets for fiscal 2023 to fiscal 2025, refer to **CSR Roadmap 2025** on the Company's website.

(4) Engagement with External Partners

Toray Group engages with external partners in order to realize the Paris Agreement and goal of carbon neutrality in 2050. In order to achieve carbon neutrality in 2050, Toray Group recognizes the need to transform and take a leap in technological innovation based on non-conventional ideas. This requires concerted efforts that are not limited to single corporations, but involve industry, government, and broader society working together. Toray Group engages in discussion and dialogue with the economic organizations and industry associations in which it participates as well as national government and works in collaboration with these entities.

Through this dialogue, Toray Group collects information released by the government, and conducts interviews with the relevant ministries. The Group shares its opinions and make recommendations as part of efforts to understand, confirm, and apply the relevant information to its internal policies.

Toray Group also participates in relevant industry organizations, which make recommendations to the government based on the consensus regarding initiatives needed to promote carbon neutrality.

Toray also participates in the GX League, a collaborative industry-government initiative to promote carbon neutrality. Accordingly, the Group discloses information related to its carbon neutrality activities, which includes the setting of GHG emission reduction targets and follow-up on the results achieved.

Details of Initiatives

A. Engagement with Relevant Government Ministries

Cabinet Secretariat and Cabinet Office

- Toray Group obtains information released by the Cabinet Secretariat and the Cabinet Office, which play the key role in Japan's carbon neutrality measures, checks on relevant Cabinet discussions and the direction of discussions by the **GX Implementation Council** to verify the consistency of its own efforts with national policy and take action on new initiatives.
- Toray Group submits issues in the promotion of carbon neutrality in the Group and the materials industry via public comment on government draft policies to reflect such issues in policy.

Ministry of Economy, Trade and Industry (METI)

- Toray Group checks on discussions at the Industrial Structure Council related to carbon neutrality and proactively obtains information on carbon neutrality policies in related METI departments to examine the Group's response to such discussions and policies. (Including submitting public comments and responses to

New Energy Development Organization (NEDO) projects such as NEDO Green Innovation Fund)

- During communication with METI departments related to Toray Group's business, the Group introduces its technologies and initiatives related to carbon neutrality, seeks understanding for the significance of these technologies and initiatives, and requests cooperation and support.

Other ministries (e.g. Ministry of the Environment, Ministry of Agriculture, Forestry and Fisheries, Ministry of Land, Infrastructure, Transport and Tourism)

- Toray Group checks on the direction of regulations related to carbon neutrality and examines the Group's response.

B. Engagement with Relevant Industry Groups

Nippon Keidanren (Japan Business Federation)

- Under the **Keidanren Carbon Neutrality Action Plan** announced in 2023, the realization of carbon neutrality in 2050 was positioned as the most important goal to aim for in the future. Toray Group has endorsed this objective and participates in various Keidanren committees related to overall management, including carbon neutrality initiatives, expressing views and making recommendations on promoting carbon neutrality from the perspective of Toray Group and manufacturing industry.

Japan Chemical Fibers Association (JCFA)

- The JCFA established and made public the **Action Policy of the Chemical Fibers Industry for Realizing a Sustainable Society** in 2021. Toray Group supports this objective and participates in various committees as a member company that sells chemical fiber products, expressing views and making recommendations on issues for the fibers industry in promoting carbon neutrality and the direction to be taken in the future. In particular, Toray Group provides recommendations on ideal goals for **promoting carbon neutrality** and recycling of fiber products and examines the required technology with a panoramic perspective on the supply chain, as well as making suggestions on specific promotion systems.

Japan Chemical Industry Association (JCIA)

- The JCIA has announced **The Chemical Industry's Stance on Carbon Neutrality**. Toray Group endorses its objectives and participates in various committees as a member company that sells chemical products, expressing views and making recommendations on promoting carbon neutrality from the perspective of Toray Group and the chemical manufacturing industry. In addition, JCIA has issued guidelines on the method of calculating CFP in the chemical industry, and Toray Group worked with the JCIA on the compilation of the guidelines.

- Moreover, in April 2024, the JCIA reorganized its Long-Term Strategy Study Working Group into the GX Promotion Subcommittee and is working with the Japanese government to consider a roadmap toward carbon neutrality that is in alignment with various policies and to address global warming. Toray Group continues to participate in the GX Promotion Subcommittee and actively make proposals.

Japan Association for Chemical Innovation (JACI)

- Toray Group takes part in various committees as a member company engaged in the development of products using chemical technologies, expressing views and making recommendations on promoting carbon neutrality from the perspective of Toray Group and the chemical industry. Toray Group also promotes mutual cooperation between JACI members and actively participates in working group activities related to carbon neutrality.

C. Engagement with GX League

In addition to participating in **GX League** (phase 1) and discussions on creating mechanisms for properly evaluating CO_2 emissions avoided, Toray Group will work to reduce its own emissions and emissions in the supply chain and help reduce emissions in society through products and services. Toray Group also discloses emission reduction targets and progress on targets on the League's GX **Dashboard**.

3. Risk Management

Toray Group has established the Risk Management Committee as body for reviewing, discussing, and sharing awareness to promote risk management. In the committee's regular identification and assessment of risks, those related to climate change have been assessed as risks with a relatively high degree of importance. (For more information, refer to **Risk Management** on the Company's website.)

Toray Group has been responding to climate change-related risks for some time, including helping to solve climate change issues through the value chain by expanding SI Business and strengthening disaster response capabilities. However, the Group has reassessed the risks in light of the results of detailed analysis and assessment in accordance with the TCFD framework and is promoting measures to address Group-wide climate change-related risks in an agile manner.

4. Metrics and Targets

As previously mentioned, the Toray Group Sustainability Vision sets forth quantitative targets for fiscal 2030, which are shown in Figure 18 together with the actual results for fiscal 2023, which serves as a milestone, and the interim targets for fiscal 2025 in the Medium-Term Management Program, Project AP-G 2025.

Figure18: Targets and Actual Results for Achieving the Sustainability Vision

		FY 2013 Actual	FY 2023 Actual	FY 2025 Target	FY 2030 Target
		(Baseline) (J-GAAP)	(Compared to FY 2013) (IFRS)		
Supply of Sustainability Innovation products[1]		562.4 billion yen	1,311.5 billion yen (2.3-fold)	1,600.0 billion yen (2.8-fold)	4.5-fold
CO_2 emissions avoided in value chain[2]		38.45 million tons	395.29 million tons (10.3-fold)	15.0-fold	25-fold
Water filtration throughput contribution by Toray's water treatment membranes[3]		27.23 million tons	73.00 million tons (2.7-fold)	2.9-fold	3.5-fold
Greenhouse gas emissions in production activities[4]	Per unit of revenue across the Toray Group	337 tons/ 100 million yen	228 tons/ 100 million yen (36% reduction)[6]	40% reduction	50% or more reduction
	Greenhouse gas emissions of Toray Group in Japan[5]	2.45 million tons	1.83 million tons (26% reduction)[6]	20% reduction	40% or more reduction
Water usage in production activities	Per unit of revenue across the Toray Group	15,200 tons/ 100 million yen	9,502 tons/ 100 million yen (35% reduction)[6]	40% reduction	50% or more reduction

1 (1) Products that accelerate measures to counter climate change; (2) products that facilitate sustainable, recycling-based use of resources and production; (3) products that help provide clean water and air and reduce environmental impact; and (4) products that help deliver better medical care and hygiene for people worldwide

2 Toray calculates the CO_2 emissions reduced throughout the value chain of products in accordance with the chemical sector guidelines of the Japan Chemical Industry Association and the International Council of Chemical Associations (ICCA).

3 Water treated annually with Toray water treatment membranes. It is calculated by multiplying the amount of fresh water that the Toray membranes can produce per day, including reverse osmosis (RO), ultrafiltration (UF) and membrane separation bioreactors (MBR), by the number of membrane elements sold.

4 With the use of renewable energies and other zero emission power sources rising worldwide, the Toray Group aims to employ zero-emission power sources at a rate equivalent to or better than the targets in each country by fiscal 2030.

5 In Japan, Toray works to surpass the reduction target set for the industrial sector by the Japanese government (absolute emissions reduced by 38%) in its comprehensive plan (Cabinet decision on October 22, 2021) based on Japan's Act on Promotion of Global Warming Countermeasures.

6 The calculation of the figure for the baseline of FY 2013 includes data for companies that joined the Toray Group in FY 2014 or later.

Third-party assurance has been obtained from LRQA Limited for Toray Industries, Inc. and overseas affiliates (manufacturing industry), which account for a high percentage of Toray Group's GHG emissions. For more information on Toray Group's GHG emissions, refer to **ESG Data** on the Company's website.

IV. Conclusion

In order to limit the temperature increase due to global warming to 1.5°C or lower, it is important to realize carbon neutrality, where GHG emissions are offset by absorption, by 2050.

Guided by the Corporate Philosophy of “contributing to society through the creation of new value with innovative ideas, technologies and products,” Toray Group will continue to leverage its materials and technologies associated with energy conservation and new and renewable forms of energy, to help reduce CO_2 emissions and achieve avoided emissions throughout the entire product lifecycle — as well as reducing emissions from manufacturing of its own products — through such means as improving fuel economy through weight reductions. The Group will also utilize these materials and technologies to help build a renewable energy economy by leveraging renewable energies such as wind power, which does not produce carbon dioxide, utilizing hydrogen and assisting in the electrification of mobility.

The Group will continue to pursue its mission to deliver innovative technologies and advanced materials that contribute real solutions to climate change and the other global-scale issues humanity faces on the road to balancing development and sustainability.

Index of TCFD Recommended Disclosure Items

Recommended Disclosure Items	Recommended Disclosures	References
Governance (Disclose the organization's governance around climate-related risks and opportunities.)	a) Describe the board's oversight of climate related risks and opportunities.	・**II. Toray Group Efforts to Date** (page 2-5) ・**III.1. Governance System Related to Climate Change** (page 6-8)
	b) Describe management's role in assessing and managing climate-related risks and opportunities.	
Strategy (Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.)	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	・**III.2. Strategy** (page 10-38)
	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2 °C or lower scenario.	
Risk Management: (Disclose how the organization identifies, assesses, and manages climate-related risks.)	a) Describe the organization's processes for identifying and assessing climate-related risks.	・**III.1. Governance System Related to Climate Change** (page 6-8) ・**III.3. Risk Management** (page 38)
	b) Describe the organization's processes for managing climate-related risks.	
	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	
Metrics and Targets (Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities, where such information is material.)	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	・**I. Achieving a World of Net Zero GHG Emissions in 2050** (page 1-2) ・**II. Toray Group Efforts to Date** (page 2-5) ・**III.1.(2) Activities of the Sustainability Committee** (page 9) ・**III.2.(2) Contribution to Solving Climate Change Issues through the Value Chain** (page 18-32) ・**III.2.(3) Measures to Combat Climate Change in Production Activities** (page 32-36) ・**III.4. Metrics and Targets** (page 38-39)
	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	
	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	

Footnotes

1 Scope 1: Direct GHG emissions from the company's operations
Scope 2: Indirect GHG emissions associated with the use of electricity and heat supplied by other companies
Scope 3: Indirect GHG emissions other than Scope 2

2 CO_2 emissions avoided is the estimated reduction of GHG emissions achieved by replacing conventional products and services with new products and services developed by Toray Group. For CO_2 emissions avoided in the value chain, Toray calculates the CO_2 emissions reduced throughout the value chain of products in accordance with the chemical sector guidelines of the Japan Chemical Industry Association and the International Council of Chemical Associations (ICCA).

3 Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. To achieve this temperature goal, aim to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.

4 State of the World's Drinking Water

5 Water, Sanitation and Hygiene Fact Sheet, United Nations Information Centre

6 Contributing to Avoided Emissions through the Global Value Chain (Fifth Edition), Japan Business Federation (Keidanren), page 30–31

Descriptions of predicted business results, projections and business plans contained in this material are based on assumptions and forecasts regarding the future business environment, made at the time of publication. Information provided in this material does not constitute any guarantee concerning the Toray Group's future performance.

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Innovation by Chemistry

Toray Industries, Inc.
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