Environmental Report 2022

Joy brings us together

KIRIN

2022.10

Contents

About this Environmental Report

Editorial Policy

The Kirin Group's main business areas are Japan, Oceania, and Asia, and it operates in the "Japan Beer and Spirits Businesses," "Japan Non-alcoholic Beverages Businesses," "Oceania Integrated Beverages Business," "Pharmaceuticals Business," and "Other Businesses."
Approximately 62% of revenue comes from "Japan Beer and Spirits Businesses," "Japan Non-alcoholic Beverages Businesses," and "Oceania Beer and Spiritss Business.
Initiatives to address the environmental issues are positioned as one of the purposes of CSV (the creation of value that can be shared with society), which is the core of our management strategy for the realization of sustainable growth.
The editing of this report has taken into account the characteristics of the Kirin Group's business and the positioning of its environmental approaches.

Structure of Corporate Information Disclosure

Information on the corporate activities of the Kirin Group, including this Report, discloses a diverse range of information in the interests of shareholders and investors, as well as the interests of a wide range of stakeholders in our local communities, including our customers.

Kirin Holdings Investor Relations Information
https://www.kirinholdings.com/en/investors/

Kirin Holdings Impact The Environment Websaite
https://www.kirinholdings.com/en/impact/

KIRIN CSV REPORT (Integrated Report)
https://www.kirinholdings.com/en/investors/library/integrated/

Kirin Holdings The Environment Websaite
https://www.kirinholdings.com/en/impact/env/

Lion Sustainability Website
https://lionco.com/force-for-good/

Kirin Group Environmental Report
https://www.kirinholdings.com/en/investors/library/env_report/

KYOWA KIRIN Sustainability Website
https://www.kyowakirin.com/sustainability/

Reporting Period

FY2021 (January–December 2021)
Where necessary, this report also contains historical data showing trends for the past 3 to 5 years.

Organizations Covered by this Report (FY2021)

Business	Company
Japan Beer and Spirits Businesses	Kirin Brewery, Kirin Distillery, SPRING VALLEY BREWERY, Eishogen, Kirin Brewery (Zhuhai), Brooklyn Brewery Japan
Japan Non-alcoholic Beverages Businesses	Kirin Beverage, Shinshu Beverage, Hokkaido Kirin Beverage, Kirin Maintenance Service, each site of Kirin Beverage Service (Hokkaido, Sendai, Tokyo, Chubu, Kansai) KIRINVIVAX, Tokai Beverage Service
Oceania Integrated Beverages Business	Lion, New Belgium Brewing
Pharmaceuticals Businesses	Kyowa Kirin, Kyowa Kirin Frontier, Kyowa Medical Promotion, Kyowa Kirin plus, Kyowa Hakko Kirin China Pharmaceutical, Kyowa Kirin,Inc.
Other Businesses (all companies included)	Mercian, NIPPON LIQUOR, Daiichi Alcohol, Wine Curation, Myanmar Brewery, Mandalay Brewery, Interfood, Vietnam Kirin Beverage, Four Roses Distillery, Kyowa Hakko Bio, KYOWA PHARMA CHEMICAL, KYOWA Engineering, Biokyowa, Shanghai Kyowa Amino Acid, Thai Kyowa Biotechnologies, Kirin Holdings, Kirin Business Expert, KIRIN BUSINESS SYSTEM, KOIWAI DAIRY PRODUCTS, Kirin Echo, Kirin Echo, Kirin and Communications, Kirin Engineering, Kirin City, Kirin Techno-System, KIRIN GROUP LOGISTICS

*Lion excludes the non-alcoholic beverages business unit from the reporting scope due to the transfer of shares in January 2021 (including data from prior years).

Calculation Method of Environmental Data

About Calculation Method of Environmental Data →P.121

Reference Guidelines

- GRI Standards
- Ministry of the Environment, Government of Japan's Environmental Reporting Guidelines (FY2018 version)
- Recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD Recommendations) (June 2017)
- Implementing the recommendations of the Task Force on Climate-related Financial Disclosures (the 2021 TCFD Annex) (October 2021)
- TCFD Guidance on Metrics, Targets, and Transition Plans (October 2021)
- Task Force on Nature-related Financial Disclosures (TNFD) Risk and Opportunity Management and Disclosure Framework v0.1 Beta (March 2022)
- SASB Standards (October 2018 version) Food & Beverage Sector/Alcoholic Beverages Industry and Non-Alcoholic Beverages Industry

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Forward-looking statements in this report, including forecasts, targets, and plans, are based on the current assessments by management at the time of preparation of the report. They contain inherent uncertainty that the outcomes will differ from the statements in this report due to changes in a variety of factors. Statements about risks and opportunities are also included in the report from the perspective of proactive information disclosure, even if they do not necessarily constitute risk factors that would have a material impact on investor decisions. The Kirin Group will, upon identification and acknowledgment of various risks associated with its business, strive to strengthen its risk management structure and to prevent and mitigate those risks, and will make its best efforts to respond to risks that become apparent.

Message from Top Management

Environmental issues are closely related to health issues. In TCFD scenario analysis, which we began disclosing in 2018, we found that climate change will have a significant impact on agricultural raw materials and water that are important for us, and that global warming will lead to an increase in infectious diseases, heat stroke, etc. The spread of dengue fever is particularly concerning. The northernmost habitat of the Aedes albopictus, a mosquito that carries the disease, was Tochigi Prefecture around 1948, but now it has moved north and lives in Aomori Prefecture as a result of global warming. The Kirin Group has conducted Foundation Research in Southeast Asia for many years, and in September 2021, a joint clinical study with the University of Malaya in Malaysia confirmed the efficacy of Lactococcus lactis (LC) Plasma in treating dengue fever symptoms. We work with universities and other research institutions in Japan and overseas on joint research concerning the effects of various tropical infectious diseases, intending to contribute as a measure of climate change adaptation. In customer surveys that the company conducted, customers' health awareness was most heightened in relation to their "interest in immunity," amid the spread of COVID-19. We believe that responding to these social demands in the Kirin Group's Health Science business will lead to the advancement of CSV that balances social and economic value. ESG agendas are now expanding from climate change to natural capital that provides ecosystem services to people and businesses. The various effects of Lactococcus lactis (LC) Plasma are a perfect example of ecosystem services. In 2013, we formulated our "Action Plan for the Sustainable Use of Biological Resources." Since then, we have supported the acquisition of sustainable farming certification by tea farms in Sri Lanka and promoted the use of FSC®-certified paper for paper containers. We intend to further meet the expectations of society and gain people's recognition of our ESG management in this area.

One of the Kirin Group's measures to mitigate climate change is to set ambitious GHG emissions reduction targets, which are approved as science-based by the Science Based Targets initiative (SBTi). We also participated in the Corporate Engagement Program held by the Science Based Targets Network and the Forum of the Taskforce on Nature-related Financial Disclosures (TNFD) and commenced actions, so that we will be able to set science-based targets related to natural capital and disclose them appropriately in the near future.

In 2019, the Kirin Group declared that we would "become a global leader in CSV." By solving a variety of social issues, including health issues such as infectious diseases, community issues, and environmental issues such as climate change and natural capital or ecosystem service depletion, which have a significant impact on these health and community issues, and thereby turning risks into growth opportunities, we will create new markets and value, and link these efforts to sustainable growth. We aim to make our corporate slogan, "Joy brings us together," a reality by creating a "new joy in food and well-being," to ensure that people around the world can enjoy mental and physical health and live surrounded by plentiful nature.

Kirin Holdings Company, Limited
President & CEO
Yoshinori Isozaki

Corporate Data

Corporate Philosophy

KIRIN brings joy to society by crafting food and healthcare products inspired by the blessings of nature and the insights of our customers.

2027 Vision

A global leader in CSV, creating value across our world of Food & Beverages to Pharmaceuticals.

"One KIRIN" Values

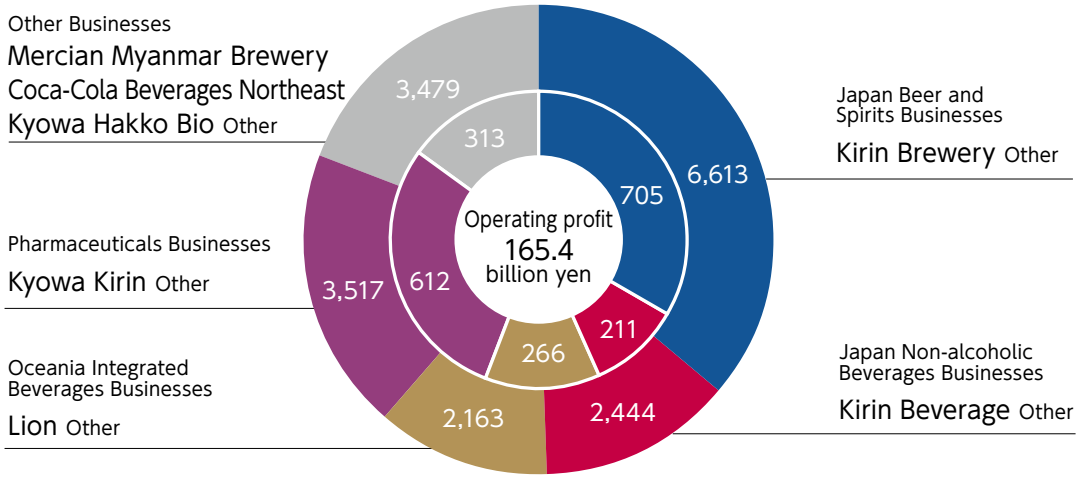
Passion
Our determination to continuously provide our customers and society with new value propositions based on innovative ideas, and our enthusiasm to meet goals with pride in the companies we work for and the brands we offer.

Integrity
Our gratitude to our stakeholders for always helping us move forward, and our promise to remain honest and humble in every business activity to serve them better.

Diversity
Our respect for different perspectives and values that enable constructive discussions, and our belief that the "differences" have the power to change the world and create better solutions.

*Inside: Normalized Operating Profit, Outside: Revenue (Actual results for the year ended December 31, 2021)

Sales revenue 1,821.6billion yen



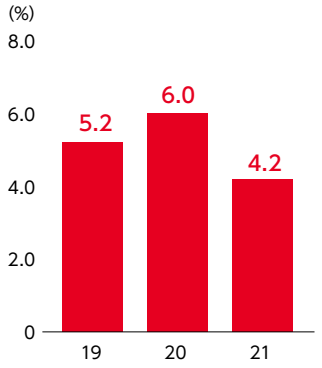
Segment	Food & Beverages	Pharmaceuticals	Health science	Company
Japan Beer and Spirits Businesses	●			Kirin Brewery
Japan Non-alcoholic Beverages Businesses	●			Kirin Beverage
Oceania Integrated Beverages Businesses	●			Lion
Pharmaceuticals Businesses		●		Kyowa Kirin
Other Businesses	●		●	Mercian Myanmar Brewery, Coca-Cola Beverages Northeast, Kyowa Hakko Bio, Other

Company overview

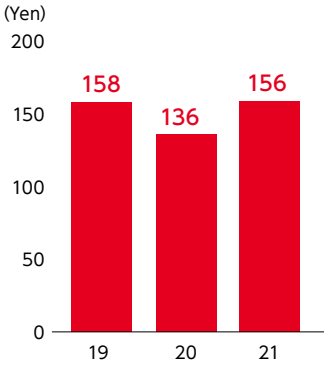
Trade Name	Kirin Holdings Company, Limited
Date of Incorporation	February 23, 1907 *Kirin Brewery Co., Ltd. changes its name to Kirin Holdings Co., Ltd. and becomes a holding company of the Kirin Group on July 1, 2007.
Head Office	NAKANO CENTRAL PARK SOUTH 10-2, Nakano 4-chome, Nakano-ku, Tokyo 164-0001, Japan
Paid-in Capital	102,045,793,357 yen
Number of Employees	29,515 employees on a consolidated basis (as of December 31, 2020)

Financial Key Performance Indicators

Capital efficiency indicator—Return on invested capital(ROIC)



Profitability and growth performance—Normalized EPS



Message from the Officer in Charge of CSV Strategy

Kirin's brewing philosophy of "Reverence for Life" lies behind the most important message of the "Kirin Group's Environmental Vision 2050," which we announced in 2020, "creating a plentiful world through positive impacts." Malt, hops, and water are all blessings from nature, and yeast, which breaks down the sugar in wort into alcohol and carbonic acid and determines the flavor of beer, is also a microorganism. The idea is that in order to produce great-tasting beer, we need to continue to work directly with "life" and study the life sciences. The idea of "Reverence for Life" is based on the teachings of respect for the diversity of humanity and the natural environment of Dr. Albert Schweitzer, who won the Nobel Peace Prize in 1952, namely his idea that, "I am life that wills to live, in the midst of life that wills to live."

"Life" depends on nature, which in turn on "place." The idea of terroir is important for wine. The specific characteristics of the land that produces grapes is an important factor in determining the taste of wine. People use the idea of terroir not only for wine, but also for tea and coffee.

In *Kirin Gogo-no-Kocha*, we make the most of the specific characteristics of Sri Lankan tea leaves, and hops also have different characteristics depending on where they are produced. If we damage the natural capital of a particular place that imparts unique characteristics to agricultural products, substituting ingredients will not work.

The issue of climate change has a major impact on biological and water resources, which depend on location. GHGs are a global issue that results in global warming no matter where they are emitted, and it is agricultural products and water resources, which depend on the local environment, that suffer damage from this issue. In our initiatives, we keep in mind the fact that climate change and natural capital are strongly related to each other, and through TCFD scenario analysis, we have gained a deeper understanding of this relationship.

At tea farms in Sri Lanka, we teach farmers to plant grasses that crawl the ground to protect the ecosystem and prevent the loss of fertile soil. This also prevents landslides caused by frequent heavy rain as a result of climate change. In Australia, where water stress is high, we have introduced advanced water treatment equipment, while in Japan, where water stress is relatively low, we are responding to these issues with ingenious methods, such as cascading water in place of equipment that consumes energy. We are promoting the use of FSC-certified paper to ensure that our paper containers do not destroy the precious forests that absorb GHGs, and we are also focusing on creating a "society that continuously recycles plastics," in order to stop problems related to plastic from impacting global warming and ecosystems.

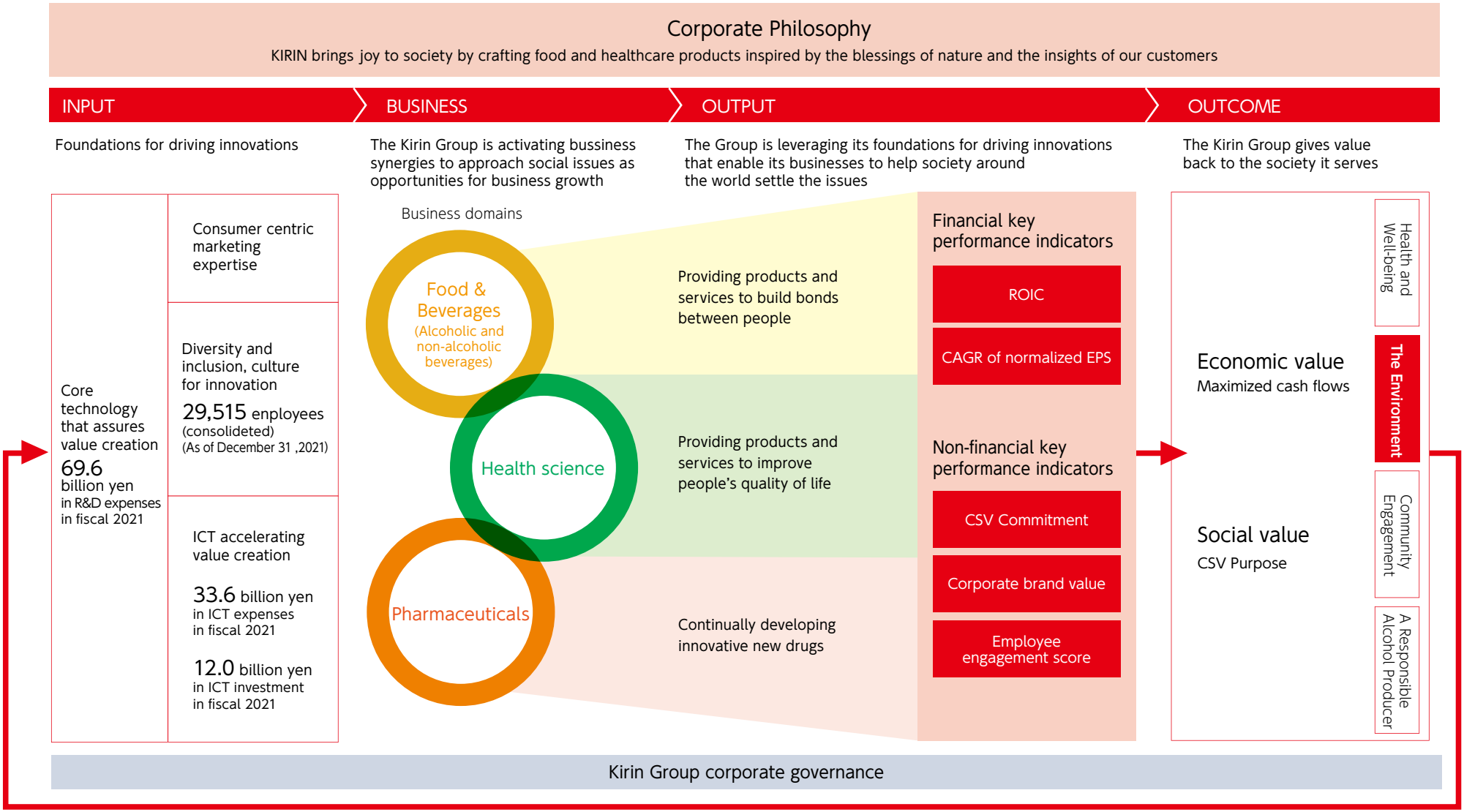
In this way, the four issues set forth in the "Kirin Group's Environmental Vision 2050" — biological resources, water resources, containers and packaging, and climate change — are not independent issues but are interrelated. Kirin's approach is to solve these related problems in a holistic way. Consortiums with NGOs and other companies, collaboration with local communities, and participation in global initiatives are all aspects of our holistic approach.

Going forward, we will continue looking at issues related to climate change, natural capital, and the circular economy in a holistic way. As such, in terms of "biological resources" and "water resources," we will contribute to resource conservation in areas that produce raw materials and areas where we operate our businesses, and with regard to "containers and packaging," we will prioritize in-house development, and for "climate change," we will pursue the additionality of renewable energy, thereby creating a positive impact in society that goes beyond the boundaries of our own company.

Senior Executive Officer, Kirin Holdings Company, Limited
(Officer in Charge of CSV Strategy, Group Environmental Manager)
Ryosuke Mizouchi

Value Creation Model

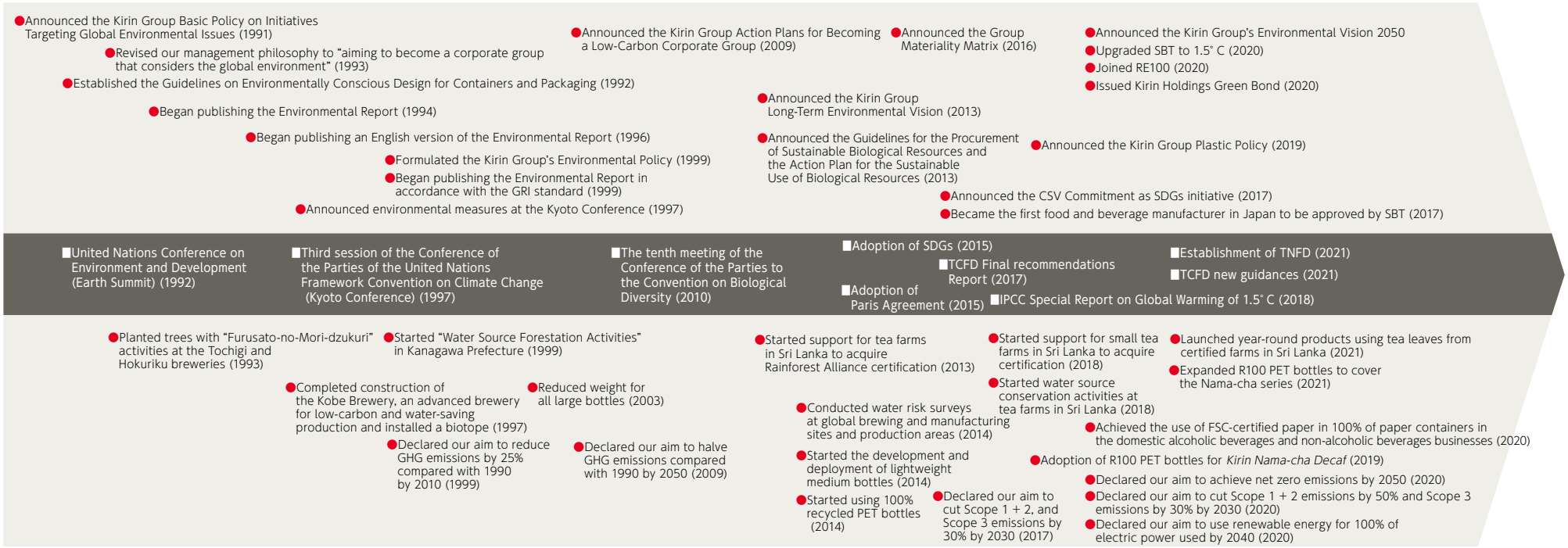
The Kirin Group creates value by processing agricultural products and water, putting them in containers, and offering them to consumers as products. If the GHGs produced during these processes cause climate change to become more serious, the biggest impact will be on biological and water resources, which are our ingredients. In this way, the four material environmental issues that we set forth in our 2013 Kirin Group Long-Term Environmental Vision — biological resources, water resources, containers and packaging, and climate change — are not independent issues but are interrelated. In the Kirin Group, we will utilize our technical capabilities, one of our strengths, to solve these four environmental issues in a holistic way, and support the sustainability of our value creation model.



Global Trends and Kirin's Actions

The Earth Summit in Rio de Janeiro in 1992 provided an opportunity for a major shift in the Kirin Group focus, from existing activities centered on anti-pollution measures to activities with a global perspective. In 1991, the year before the summit, we formulated the Kirin Group Basic Policy on Initiatives Targeting Global Environmental Issues, and in 1993, the year after the summit, we revised our management philosophy to "aiming to become a corporate group that considers the global environment." At the third session of the Conference of the Parties of the United Nations Framework Convention on Climate Change in Kyoto in 1997, the company participated as one of two companies representing Japan and we presented our environmental measures to the world. In 2013, we announced the Kirin Group Long-Term Environmental Vision, a long-term strategy targeting the year 2050, which was not common at the time. We revised this strategy into the Kirin Group's Environmental Vision 2050, our new long-term strategy, in 2020.
In 1997, when the Kyoto Protocol was adopted, we completed the construction of Kirin Brewery's Kobe Plant as a state-of-the-art advanced model brewery for low-carbon and water-saving production, and we also installed a biotope on the premises.

In 2010, the year of the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity in Nagoya, we published the Kirin Group Declaration of Support for Biodiversity Conservation. In 2013, we formulated the Kirin Group Action Plan for the Sustainable Use of Biological Resources, and began supporting the acquisition of more sustainable farming certification in Sri Lanka, a major producing area of tea leaves as an ingredient in *Kirin Gogo-no-Kocha*. In 2018, the Kirin Group also began water source conservation within tea farms. In order to protect precious forests which absorb GHGs and inhabited by diverse organisms, we have converted all paper containers in the domestic alcoholic beverages and non-alcoholic beverages businesses to FSC-certified paper.
In 1999, Kirin Brewery's Yokohama Plant became the first brewery in the industry to start Water Source Forestation Activities, which we have since expanded to all breweries. Kirin Brewery is taking steps to conserve water at an early stage, reducing its unit water consumption by nearly half compared with 1990.
In 1992, we established the Guidelines on Environmentally Conscious Design for Containers and Packaging. Taking advantage of our strength in having a research laboratory (currently the Institute for Packaging Innovation) that develops and designs containers and packaging in-house, which is unmatched in the alcoholic beverages and non-alcoholic beverages industry anywhere in the world, we began developing and rolling out lightest returnable large beer bottles in 1993, the lightest returnable medium bottles made in Japan in 2014, and now we use the lightest bottles made in Japan for all returnable beer bottles. We have also made advanced efforts to reduce the weight of cans, paper containers, and PET bottles, and we are now focusing on chemical recycling and the collection of used bottles as part of our aim to create a "society that continuously recycles plastics," in order to contribute to the circular economy and reduce the impact on ecosystems and water systems.
In 2009, we announced the Kirin Group Action Plans for Becoming a Low-Carbon Corporate Group. As one of the first corporate groups to set a long-term target for the reduction of emissions by 2050, we have set an ambitious target of halving GHG emissions across the value chain compared with 1990. In 2020, we obtained approval for our science-based targets for 1.5° C, joined RE100, and declared our aim to achieve net zero emissions by 2050.



Identification of Materiality

In February 2022, the Kirin Group announced the Kirin Group 2022-2024 Medium-Term Business Plan, the second stage of our Long-Term Management Vision, the Kirin Group Vision 2027. When formulating the new medium-term plan, we updated our social and environmental analysis, and after dialogue with internal and external stakeholders, as well as discussions among management including the Group CSV Committee on multiple occasions, and deliberation at meetings of the Board, we revised the Management Issues for Sustainable Growth (Group Materiality Matrix) in anticipation of the situation in ten years' time.
As a result, we reconfirmed that the following four important issues related to the environment that we set in the Kirin Group's Environmental Vision 2050 are highly material issues for Kirin Group management: "sustainable use of biological resources," "sustainable use of water resources," "sustainable recycling of containers and packaging," and "overcoming climate change."
Beta v0.1 of the Taskforce on Nature-related Financial Disclosures (TNFD) framework, published in March 2022, recommends an integrated approach to climate change and nature-related risks. The holistic approach is a fundamental concept of the 2013 Kirin Group Long-Term Environmental Vision, in which we clearly state that the four environmental issues of "biological resources," "water resources," "containers and packaging," and "climate change" are not independent but "interrelated environmental issues." The Kirin Group has continuously pursued this concept since we turned our focus to environmental activities with a global perspective in early 1990.
As a pioneer of the holistic approach, we intend to contribute to increased global awareness of this concept and the resolution of environmental issues.

Flow for the identification of materiality

Step1

Social environment analysis
We identify issues that we need to address by referring to trends in discussions and policies surrounding the Kirin Group in Japan and overseas, the results of scenario analyses, and other factors

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Step2

Stakeholder engagement
We reflect a diverse range of dialogue with external experts, NGOs, and other stakeholders in discussions within the Kirin Group

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Step3

Discussion at the senior management level
Based on the input information, senior management fully discusses and assesses risks and opportunities for our businesses and society

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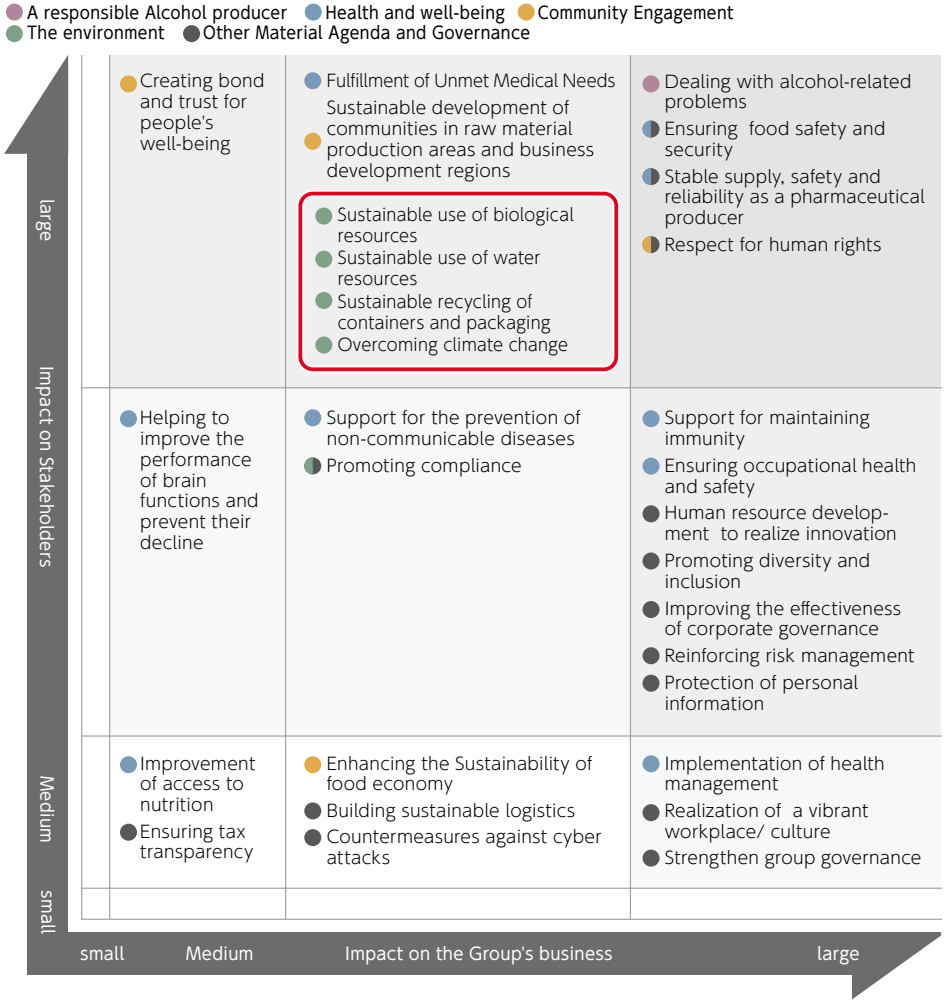
Step4

Deliberations by the Board
After discussions among senior management, the Board selects and makes resolutions concerning important themes for our sustainable survival and growth together with society in the future

Group Materiality Matrix (GMM) Revision of Management Issues for Sustainable Growth



Kirin Group's Environmental Vision 2050

Since the adoption of the Paris Agreement in 2015, many international initiatives such as SBTi and TCFD have started, and global trends related to the environment have changed significantly, including the discussion of marine pollution caused by plastics as a global issue. In scenario analysis based on the TCFD Recommendations, which we have been conducting since 2017, we have seen the enormous scale of the impact of climate change on agricultural products and water resources. We expect that the corporate environmental initiatives will evolve from being self-contained to having a positive impact on wider society.
In order to meet these demands from society, the Kirin Group has determined that we must establish a new environmental vision. Food companies are "canaries in the coal mine" who are quick to realize that the effects of climate change on agricultural raw materials have already become apparent. To reduce negative impacts on natural capital and pass on a sustainable planet to the next generation, it will not be enough just to minimize negative impacts and make our impact neutral. The "positive impact" approach that we have newly introduced in the Kirin Group's Environmental Vision 2050 represents a further development of our existing holistic approach to the environment. With regard to renewable energy sources, we are committed to "additionality," i.e., contributing to the decarbonization of society by adding and increasing renewable energy in the world, and we aim to build a "society that continuously recycles plastics" by developing our own commercialization techniques for chemical recycling. With regard to natural capital, we aim to be "nature positive," whereby the expansion of our businesses will contribute to the restoration of ecosystems and increase of their services. Under this new vision, we will broaden our horizons and expand the scope of our efforts from the value chain to wider society. Together with society, especially with the young generation who will lead the future, we will create a prosperous world for the next generation.

Kirin Group's Environmental Vision 2050

Enrich the Earth with Positive Impact

Biological Resources
A society that values sustainable biological resources.

Containers and Packaging
A society that circulates containers and packaging in a sustainable way.

Water Resources
A society that values sustainable water resources.

Climate Change
A society that has overcome climate change.

Input to and Output from Kirin Products
Environmental Interactions

Kirin and its broad stakeholders enrich society and the Earth for future generations through positive impact on people and the environment.

Efforts for Realization

Biological Resources
A society that values sustainable biological resources.

Cultivate, expand and procure sustainable agricultural raw materials
- Procure agricultural raw materials that comply with certification schemes, such as FSC, RSPO and the Rainforest Alliance.
- Cultivate agricultural raw materials that are suited to global warming and expand them to raw material production areas.
- Promote recycling and reduction of product waste, thereby bringing food waste generated by production activities to zero.

Stand by the side of farmers to make raw material production areas sustainable
- Expand support in acquiring sustainable certifications, such as the Rainforest Alliance, and solve environmental issues, etc., in production areas.
- Examine and research contributions to affluent biodiversity by sustainable agriculture and expand the outcomes to raw material production areas.

Water Resources
A society that values sustainable water resources.

Bring water, used as a raw material, to a sustainable state
- Continue to reduce the volume of water use in group operational bases.
- Further promote water source forestation activities in Japan.

Solve problems with water in a way that suits the characteristics of basin regions where our business bases are located
- Minimize risk during water-related disasters by reinforcing resilience and efficiency for supply chains.
- Implement water source preservation activities and education programs to preserve water in raw material production areas, thereby solving water issues in the value chain.

Containers and Packaging
A society that circulates containers and packaging in a sustainable way.

Develop and disseminate sustainable containers and packaging
- Use sustainable containers and packaging that employ recycled materials and biomass.
- Aim to develop new containers and services.

Build a resource-recycling system to make containers and packaging sustainable
- Take the lead in improving the recycling system in Japan.
- Contribute to collection of resources and establishment of recycling infrastructure in areas where operations are maintained.

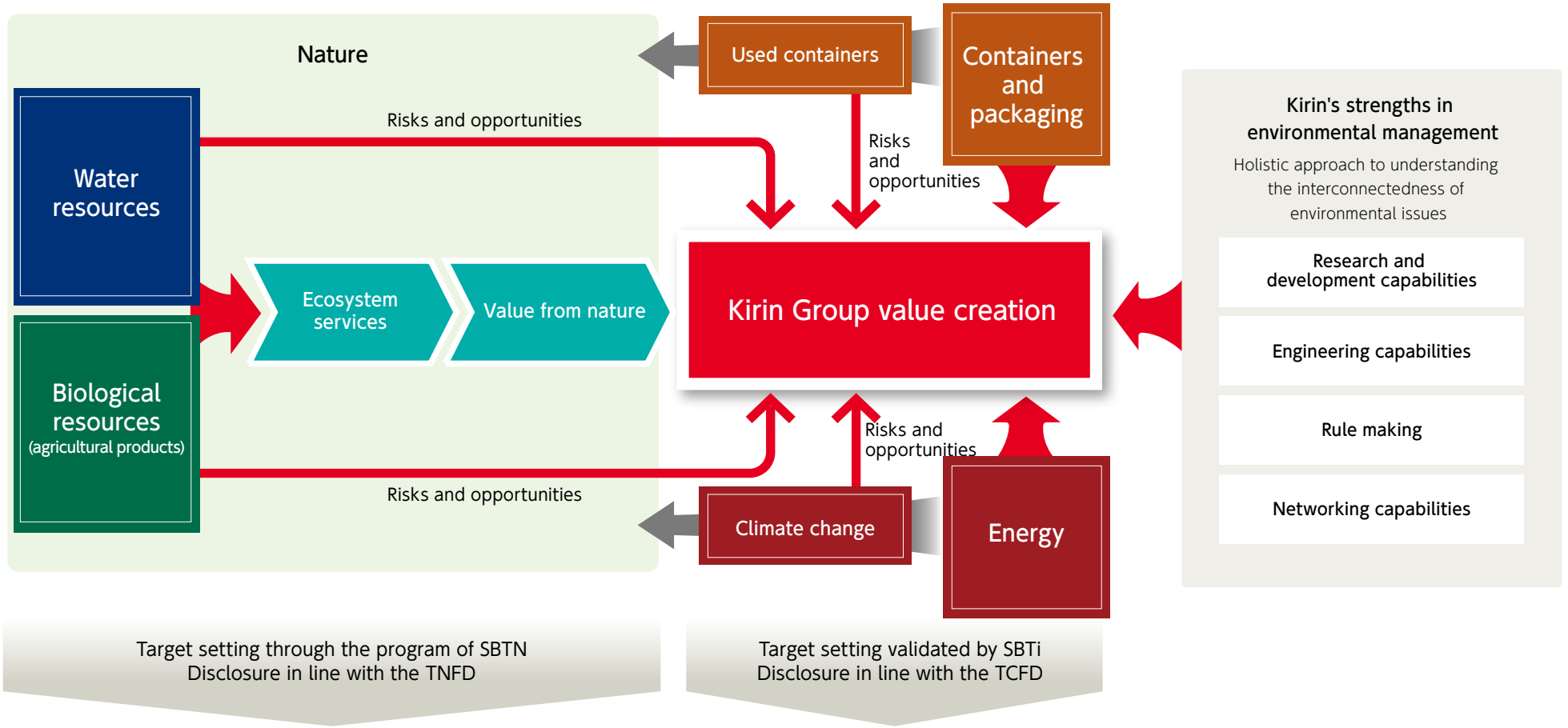
Climate Change
A society that has overcome climate change.

Realize Net-Zero GHG emission from the entire value chain
- Achieve RE100 at an early stage and source the company's energy from 100% renewable energy.
- Realize Net-Zero GHG emissions from in the entire value chain.

Lead to build a decarbonized society
- Build a business model that contributes to a decarbonized society with customers and other stakeholders.
- Support research to mitigate climate change and expand responsible renewable energy to society.

Our Holistic Approach to Solving Interrelated Environmental Issues

The Kirin brewing philosophy of “Reverence for Life” is behind the Kirin Group’s holistic approach. Malt, hops, and water are all blessings from nature, and yeast, which breaks down the sugar in wort into alcohol and carbonic acid and determines the flavor of beer, is also a microorganism. The idea is that in order to produce great-tasting beer, we need to continue to work directly with “life” and study the life sciences. The idea of “Reverence for Life” is based on the teachings of respect for the diversity of humanity and the natural environment of Dr. Albert Schweitzer, who won the Nobel Peace Prize in 1952, namely his idea that, “I am life that wills to live, in the midst of life that wills to live.” This idea also serves as the backbone of our CSV management, in which we contribute to those around us (social value), as well as our own company (economic value).
Our corporate culture, which is fostered through developing the life sciences, has led to R&D capabilities and engineering technologies that go beyond areas outside of the life sciences, such as packaging. Both the pursuit of getting our GHG emissions reduction targets validated against science-based criteria by the SBTi and our intention to contribute to the setting of scientific targets related to natural capital through participation in the corporate engagement program of the Science Based Targets Network stem from an organizational culture that values science. Consortiums with NGOs and other companies, collaboration with local communities, and participation in global initiatives are all aspects of our holistic approach.



Kirin's strengths in environmental management

The foundation of our inputs for the Kirin Group's value creation model are our unique "technological capability that assures value creation" that is unprecedented for a company with origins in the alcoholic beverages business. It is a source of strength that enables us to solve environmental issues through holistic solutions.

INPUT → OUTCOME

Foundation for innovation

Technological capability that assures value creation

Research and development capabilities

Kirin Central Research Institute

The Kirin Central Research Institute conducts research centered on health science. By combining our diverse strengths and technologies with those in other fields, we promote open innovation and create opportunities for new businesses and services.
Our strengths include: "raw material cultivation and production" technology, of which "mass plant propagation technology" is a representative research achievement; technology for "identifying and evaluating substances with health functions," which has discovered a constituent of matured hops that reduces body fat and a constituent of camembert cheese that improves memory function; technology for the "production of functional substances," which uses microorganisms such as E. coli and mold to ferment and produce raw materials for pharmaceuticals and bioactive substances; and "advanced constituent analysis" technology, which uses a combination of structural analysis called the crystalline sponge method, instrumental analysis, and information analysis to identify target constituents in samples and identify their structures in detail.
The Kirin Central Research Institute also successfully discovered the function of Lactococcus lactis (LC) Plasma. In September 2021, we announced that in a joint study with the Tropical Infectious Diseases Research & Education Centre at the University of Malaya (Vice Chancellor: Dr. Mohd Hamdi Abd Shukor) in Malaysia, the Kirin Central Research Institute confirmed that taking Lactococcus lactis (LC) Plasma for two months significantly reduced the cumulative number of days of fever, muscle pain, joint pain, pain behind the eyes, and other symptoms known to be the main symptoms of dengue fever. Kirin Holdings and the University of Malaya are accelerating joint research aimed at verifying the antiviral effect of this lactic vacteria on tropical diseases other than the dengue virus.

Institute for Packaging Innovation

The Institute for Packaging Innovation develops and evaluates technologies related to packaging lines and packaging and containers used in the Kirin Group's alcoholic and non-alcoholic beverages businesses. The Institute for Packaging Innovation engages in activities such as the in-house development of containers and packaging, as one of the few research laboratories of its scale owned by a global alcoholic beverage company. Based on the technologies it has accumulated over many years in areas such as glass bottles, cans, PET bottles, cardboard cartons, and other paper packaging, the Institute for Packaging Innovation provides the necessary technical assistance to bring products to market by utilizing AI technology, kansei (affective) engineering, and other technologies, and creates technical "seeds" that enrich the lives of our customers and society through new containers and packaging. The Institute is as well-equipped as a small plant, with machinery to fill glass bottles and aluminum cans with beer, as well as equipment to attach labels to bottles.
At Kirin, we are working to develop technologies for high-purity recycling and "chemical recycling" based on the chemical decomposition, purification, and repolymerization of PET bottles, as part of our aim to create a "society that continuously recycles plastics."

Engineering capabilities

Kirin Group engineering

As a manufacturer, production equipment is an essential part of our business, and it is vital that we possess the engineering capabilities to quickly develop facilities that are capable of efficiently producing quality products while being eco-friendly and comfortable for workers. The Kirin Group has set up engineering organizations within each operating company to ensure that our production facilities are supported by engineers with a thorough understanding of manufacturing processes, production technology, and maintenance techniques. The Kirin Group owns Kirin Engineering, a general engineering company specializing in the construction of plants producing beer, non-alcoholic beverages, pharmaceuticals, and other products. This company is engaged in the large-scale construction, expansion, and remodeling of production facilities for both for Kirin Group companies in Japan and overseas and companies outside the Group. The capabilities of these engineering organizations are strengths of the Kirin Group, and support environmental measures in our business domains, ranging from food and beverages to pharmaceuticals.

Rule making

The Science Based Targets Network

An organization that sets science-based targets related to natural capital and aims to create sustainable systems for the Earth. The Kirin Group's medium-term GHG emissions reduction target is approved by the Science Based Targets Initiative (SBTi) as 1.5° C-aligned, and we are the first company in the Japanese pharmaceutical and food and beverage industries to participate in the SBT for Nature Corporate Engagement Program (CEP), an initiative for setting targets related to natural capital.

The TNFD Forum

We are the first Japanese food and beverage and pharmaceutical company to participate in and support the TNFD Forum, which shares the mission and vision of the Taskforce on Nature-related Financial Disclosures (TNFD) for companies to report and act on risks related to natural capital.

Taskforce on Climate-related Financial Disclosures

The TCFD (Task Force on Climate-related Financial Disclosure) was established to consider how to disclose climate-related information and how financial institutions should respond, and published its final report in June 2017. The Kirin Group began disclosing information in accordance with the TCFD Recommendations in 2018.

Alliance To End Plastic Waste

In March 2021, the Kirin Group became the first Japanese food company to join the Alliance To End Plastic Waste (AEPW), an international non-profit organization dedicated to solving problems related to waste plastic in the environment. By solving the world's plastic waste problem from a global perspective, we aim to create a "society that continuously recycles plastics," together with other participating companies.

Networking capabilities

NGO

The Kirin Group works with international NGOs such as the Rainforest Alliance, WWF Japan, FSC Japan, and Earthwatch Japan to address various environmental issues.

Consortiums

We collaborate with other companies and NGOs, including the Consortium for Sustainable Paper Use and the Rainforest Alliance Consortium.

Local communities

We engage with people in producing areas to identify issues and consider and implement solutions, including local communities in Sri Lanka, which is a major tea producing area, and areas around the fields that Mercian manages.

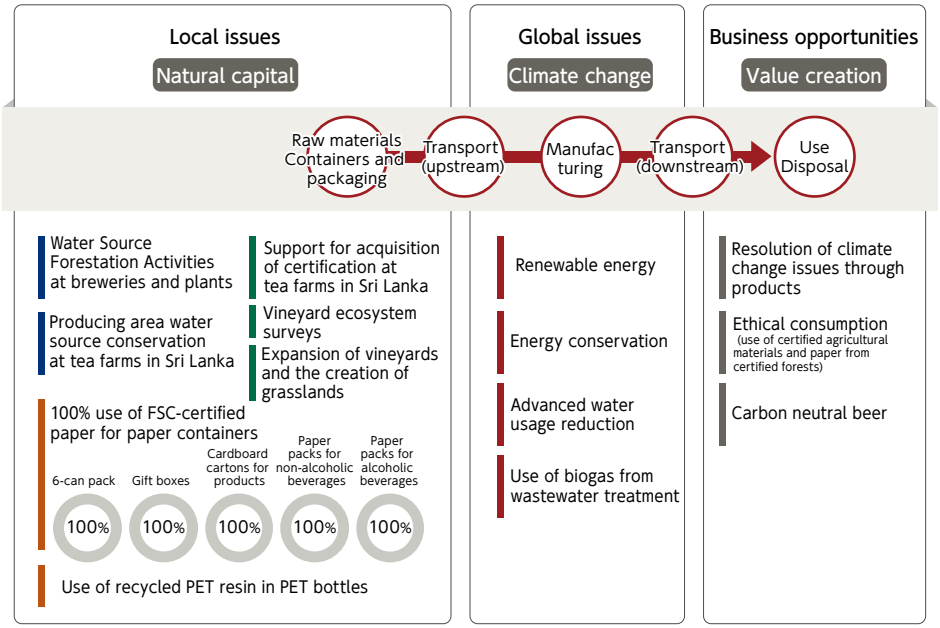
Next generationa

We promote engagement with the next generation through collaboration with the Kirin School Challenge, Japan Environmental Youth Network, etc.

Holistic solutions to environmental issues

Implementation of Our Vision and Approach ~Message from Group Employees~

The distinctive feature of the Kirin Group's holistic approach is that we are not merely working to achieve individual goals, but instead our activities are based on Group employees' awareness of the interconnectedness of environmental issues in their efforts and a better understanding of the world that we are aiming for in the environmental vision. By recognizing that solutions for these issues can also lead to solutions for other environmental issues and have a positive impact on people involved in the value chain and local communities, we are able to add breadth and depth to our activities and enable Group employees to work with a sense of mission.



Large-scale solar power generation facilities at breweries and plants

Strengthening measures to reduce GHG emissions in order to mitigate the impact on agricultural raw materials and water

In order to mitigate the impact of climate change on biological resources and water, the Kirin Group has established a strategy and roadmap through 2030 to achieve our GHG emissions reduction targets, which we have significantly raised compared with previous targets. In order to achieve net zero emissions throughout the value chain as a whole by 2050, we have upgraded our medium-term target for reducing GHG emissions to the new SBTi standard of a "1.5 ° C target." We have also joined RE100, and will take steps to use renewable energy for all electric power that we use by 2040.

The Kirin Group focuses on the "additionality" of renewable energy in our efforts. Our approach is to contribute to the decarbonization of society by adding and increasing the amount of renewable energy. The first step was the installation of large-scale solar power generation facilities at Kirin Brewery's plants in Japan. We also take "ethicality" into consideration. Renewable energy that people create by destroying nature, such as palm plantations that people create by cutting down tropical rainforests and biomass-power generation from precious forests, is unacceptable. We believe that we must avoid installing facilities that adversely affect the surrounding environment and generating power from renewable energy that is vulnerable to disasters.

Kirin Brewery
Manager of Technology Development Department, Production Division
Emiko Sekikawa

Leading the creation of a decarbonized society by introducing renewable energy with a focus on additionality

Following the installation of large-scale solar power generation facilities at the Yokohama Brewery in 2016, we continued introducing these facilities and completed the introduction of such facilities at all nine Kirin Brewery plants by our investment at the Fukuoka Brewery in March 2022. As a result, we expect to reduce GHG emissions by approximately 5,800 tons of CO_2e per year, while also increasing the proportion of renewable energy in electric power used by Kirin Brewery as a whole from approximately 18% as of 2020 to approximately 34%.
We achieved a 100% rate of renewable energy for all procured power at the Kirin Brewery Sendai Plant in April 2022, after doing the same at the Nagoya Plant in 2021. The brewery will emit zero GHG emissions from purchased electricity, and we intend for it to reduce GHG emissions by approximately 4,500 tCO_2e per year.
We aim to reduce GHG emissions in a profit and loss neutral way over the medium- to long-term, by implementing energy conservation measures with significant cost-cutting effects at an early stage and using funds saved from the reduction of energy costs to introduce renewable energy.

Use of sustainable biological resources through support for the acquisition of certification at tea farms in Sri Lanka

In response to a survey on risk related to biodiversity in 2011, the Kirin Group formulated the Action Plan for the Sustainable Use of Biological Resources. As a key pillar of this initiative, since 2013, we have been supporting the acquisition of Rainforest Alliance certification by tea farms in Sri Lanka, which we are highly dependent on as a major producer of tea leaves, an ingredient in *Kirin Gogo-no-Kocha*.

We initially considered the option of buying tea leaves from certified farms. In our surveys, however, we found that a long civil war had only recently ended in Sri Lanka and few farms was able to afford the training costs required to obtain certification. Rather than leaving behind these farms, we chose to focus on improving the sustainability of Sri Lanka's tea industry as a whole. We believe that if, through our support for the acquisition of certification, tea farms take the natural environment into consideration, and the working and living environments of farm laborers improve, many tea farms will become sustainable, and we will be able to use tea leaves with peace of mind in the future. By the end of 2021, Kirin had supported the acquisition of certification at 94 tea farms, equivalent to approximately 30% of all certified large tea estates in Sri Lanka. In 2018, we also began supporting small farms, and since then 120 tea farms have obtained certification.

Kirin Beverage
Senior Brand Manager, Marketing Department
Mariko Kato

Strengthening the resilience of tea plantations to climate change and water problems

Our activities to support the acquisition of certification, which began with the conservation of biodiversity, are expanding to a response to water risk and stress. Specifically, we guide farms on how to prevent the outflow of fertile soil in heavy rain by planting grasses with deep roots that crawl the ground. In 2018, we started water source conservation activities at tea farms, where we fence off water sources, to prevent local residents from using them for other purposes, and we also provide educational opportunities for them to learn about the importance of water sources, etc. These measures have also contributed to improving the resilience of tea farms against climate change.
In our surveys, we found that support for the acquisition of certification has a positive economic and social impact on tea farms and the people who work there. We will continue to build better partnerships with producing areas and support them in the future. Furthermore, we are also endeavoring to make our customers aware of the tea farms' efforts through our products that use tea leaves from certified farms.

250ml LL slim *Kirin Gogo-no-Kocha* Straight Tea with a mark of certification

Rainforest Alliance certification is a certification for farms that the Rainforest Alliance has recognized for their commitment to more sustainable farming practices while protecting nature and farmers.

Revitalizing Japan's Satoyama landscapes by expanding vineyards at Japan Wine Industry

Mercian's vision is to "make Japan recognized as one of the world's foremost wine regions." As such, in order to produce wine of world-class quality in a stable manner, Mercian decided on a policy of expanding vineyards that it manages itself and thereby secure high-quality grapes on an ongoing basis. Accordingly, in 2003, the company opened Mariko Vineyard in Ueda City, Nagano Prefecture. In 2014, in order to confirm the environmental impact of converting derelict farm land into vineyards, we started an ecological survey at Mariko Vineyard in joint research with the National Agriculture and Food Research Organization (NARO).

In this survey, we were surprised to find many insects and plants, including endangered species, in Mariko Vineyard, where we grow important grapes. According to a lecturer from NARO, the vineyard cultivated in hedgerow style, with grass growing under the vines, along with proper undergrowth cutting, have enriched the ecosystems that this vast good-quality grassland has created. In this way, increasing Japan Wine vineyards will also contribute to the regeneration of Satoyama landscapes. Château Mercian Mariko Winery is the only winery in Japan to have been included in the Top 50 of the "World's Best Vineyards," authoritative global awards, for two consecutive years, since 2020. Château Mercian has established coexistence with nature, the local community, and the future as an important keyword. In order to put this theme into practice, employees engage in activities such as replanting rare and native species of plant life, and working with NGOs, volunteers, and local elementary schools to increase shrubby sophora (Sophora flavescens).* Since January 2022, 100% of electricity purchased at three wineries (Katsunuma, Mariko, and Kikyogahara) has been generated from renewable energy, and we have also reduced GHG emissions from purchased electricity to zero.

Mercian
Group Manager, Brands Group, Marketing Department
Aya Jindo

* Shrubby sophora (Sophora flavescens): The only edible grass for feeding Shijimiaeoides divinus, a butterfly that the Red List of the Ministry of the Environment lists as critically endangered IA (designated as endangered IB by Nagano Prefecture).

Working with wineries around the world to make more sustainable wines

In 2022, we teamed up with wineries taking on the challenge of making sustainable wine around the world to launch "Mercian Wines," a new brand of imported wine.
Mercian's long-time partner, Concha y Toro (Chile), the producer of Sunrise, which Mercian has sold for 25 years, is a leader in the global wine industry in areas such as the introduction of green power, the reduction of water consumption, and activities to protect ecosystems. Mercian, which engages in ecological surveys, plant life regeneration, the introduction of green power, and other activities, is also aiming in the same direction. We hope to make Japan Wine even more sustainable by working together with sustainable and advanced wineries.

Ecosystem Survey in Mariko Vineyard, a hedgerow style vineyard

Argyronome laodice japonica (a vulnerable species on the Ministry of the Environment's Red List. Near threatened species on the Nagano Red List)

Hemerocallis citrina var. vespertina (near threatened species on the Nagano Red List)

Management summary: climate change

Transition plans related to climate change

The Kirin Group has been continuously performing scenario analysis since 2017, and we have found that climate change will cause significant declines in agricultural products that are important raw materials for the Kirin Group, water stress and water risk, and an increase in energy costs. Wherever we emit GHG, they result in global warming. Accordingly, this is a global environmental issue, and we must all take responsibility. In order to respond to this crisis, the Kirin Group has formulated a roadmap for mitigating climate change, which we began implementing in January 2022, following deliberations and a resolution by the Group Executive Committee. When executing this roadmap, we will aim to balance economic and environmental considerations, as we aim to achieve our Science-based 1.5℃ target with profit and loss neutrality by 2030, across the Group as a whole. We have incorporated climate change adaptation measures such as sustainable agricultural production and measures to address water stress into our management plans as non-financial targets.
The transition plan we present here is a summary of this roadmap. For more information on disclosure based on the TCFD recommendations, please refer to (→P.72), and for a report on our activities, please refer to (→P.25).

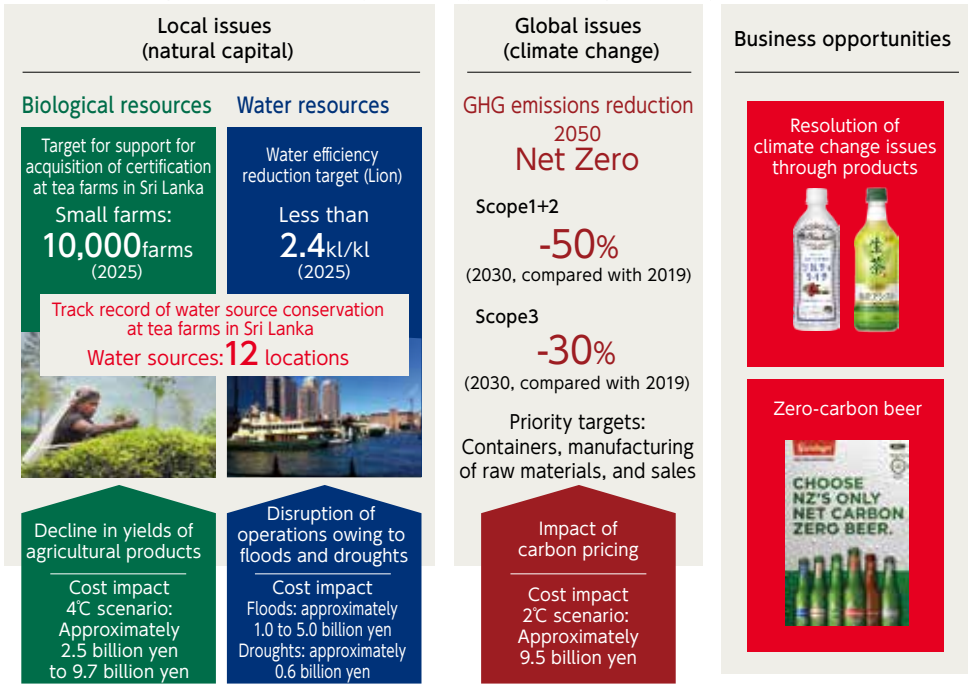
Target

The Kirin Group's long-term climate target is to "achieve net zero GHG emissions across the entire value chain by 2050," which we set in the "Kirin Group's Environmental Vision 2050," as deliberated and resolved by the Board. As medium-term targets to achieve this long-term target, we commit to reduce the total of Scope 1 and 2 GHG emissions 50% and Scope 3 GHG emissions 30% compared with 2019 by 2030. The SBTi, an international initiative, has approved these targets as science-based net-zero and 1.5℃ targets respectively. By 2040, we have committed to use renewable energy for 100% of our electric power usage upon joining RE100. We have set detailed targets related to agricultural products and water resources for each group company.
We have also incorporated these indicators for target setting into executive officers' performance evaluations. In addition to financial indicators, we have a system in place where we consider matters related to climate change when determining the level of achievement for performance-linked remuneration.

Management

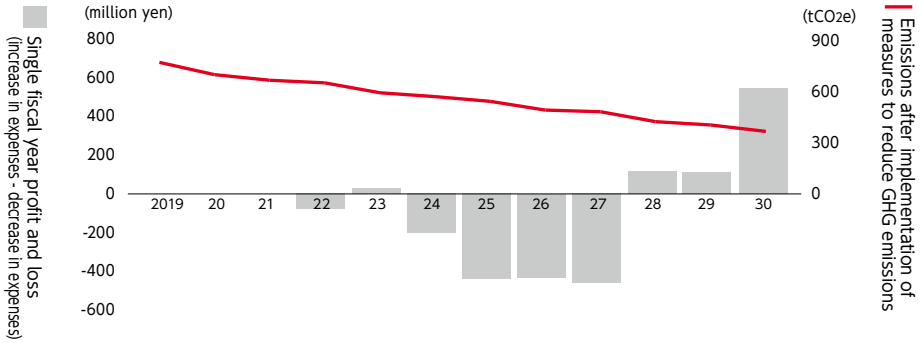
Kirin Holdings has delegated corporate functions related to activities aimed at reducing GHG emissions across the Group as whole to the Technology Development Department of Kirin Brewery, which provides technical support to each company to help them achieve their targets and coordinates efforts within the Group to achieve targets for the Group. We have broken down targets for the Group into targets for each company, and we will aim to achieve group-wide targets through each company working autonomously to achieve their targets. We have set these targets as performance indicators in each company's CSV Commitment, a non-financial KPI, thus reflecting them in the management plans of each company. We added up data for each group company to create our plans through 2024, and we think the possibility of achieving these plans is high.
We will achieve our SBT for 1.5℃ on a profit and loss neutral basis by using cost savings from energy conservation to offset renewable energy procurement costs and depreciation. We have formulated our roadmap such that it will allow us to achieve on a profit and loss neutral basis without taking into consideration ICP (Internal Carbon Pricing: a method where a company sets its own carbon prices and utilizes them for strategies and decision-making as an organization). As of February 2022, we use

Main financial impact of climate change and mitigation and adaptation targets



* We estimated the "decline in yields of agricultural products" and "carbon pricing" in 2050

Plans for profit and loss neutral reduction of GHG emissions



63 US dollars/tCO2e, or 7,000 yen/tCO2e). If, however, we take ICP into consideration, we expect to accelerate our progress. Under our current roadmap, approximately 70% of the reduction of overall GHG emissions will come from the procurement of renewable energy. Accordingly, in the future, we will increase our energy-conservation measures and thereby enhance economic efficiency as we look to achieve our target. We reflect investment and expenses required to achieve our targets in the management plans of each company, and the Finance Department and Technology Development Department work together to to assess economic efficiency whether these plans will be profit and loss neutral over the long term. We will monitor the implementation of measures at group companies and rates of decline in GHG emissions after implementation, etc., and update our roadmap as appropriate.

Reduction of Scope 1 and Scope 2 emissions

The Kirin Group takes three approaches to reducing direct GHG emissions: (1) promotion of energy conservation, (2) expansion of renewable energy, and (3) energy transition.

We will focus mainly on the promotion of energy conservation and the expansion of renewable energy until 2030. From 2030 onward, in order to achieve our net zero emissions target in 2050, we must also promote energy transition, i.e., converting combustion fuels used in steam brewing and manufacturing processes from fossil fuels to hydrogen and other fuels that do not emit GHG. We expect that converting to energy that is free from GHG will require some time for technical development, infrastructure development, etc. Accordingly, we are preparing to take various measures at our facilities and solve technical issues. When selecting renewable energy, we will priotize "additionality," i.e., the contribution to the decarbonization of society through the addition and increase of new renewable energy power sources, and "ethicality," i.e., the responsible expansion of the use of energy, from the perspective of the environmental impact and human rights.

Reduction of Scope 3 emissions

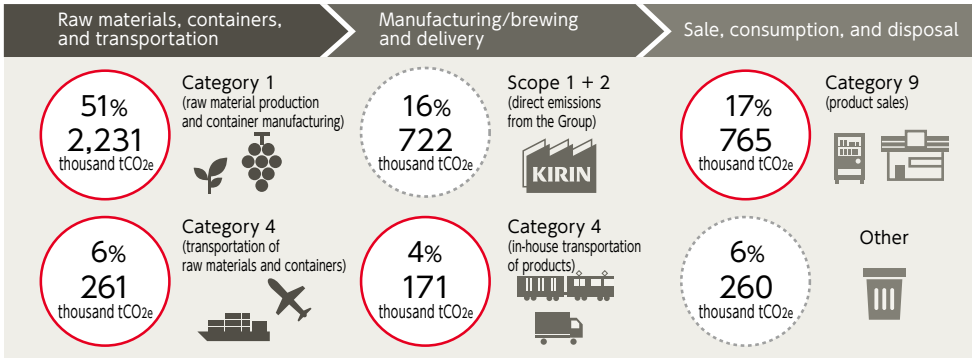
Approximately 80% of GHG emissions from the Kirin Group's value chain are Scope 3 emissions, and we must work with many stakeholders outside the Kirin Group to reduce such emissions. We think this is an opportunity for both the Kirin Group and our stakeholders to create economic and social value, and we thus intend to lead the creation of a decarbonized society. Of the 15 categories defined in the "GHG Protocol," the largest proportion of Kirin Group Scope 3 emissions, at approximately 60%, are category 1, i.e., associated with the production of ingredients and materials. Category 4 (emissions associated with transportation) and category 9 (emissions associated with sales) also each account for a significant proportion of the total. Accordingly, we will define these three categories as priority categories when implementing related initiatives. We will achieve our target for the reduction of Scope 3 emissions by implementing two approaches in parallel: "reduction of our own independent emissions" and "encouragement of reduction at business partners."

Even when "encouraging reduction at business partners," we will emphasize positive impact and additionality, and will prioritize engagement with suppliers over the suspension of transactions. We have already held briefings to share information on the Kirin Group's policies, and we are currently working to confirm emissions reduction plans at each company and the status of progress in both quantitative and qualitative terms through questionnaires for major suppliers. Going forward, we will consider initiatives aimed at the procurement of low-carbon ingredients and materials based on data that we have identified. We will also engage in regular communication on the theme of climate change.

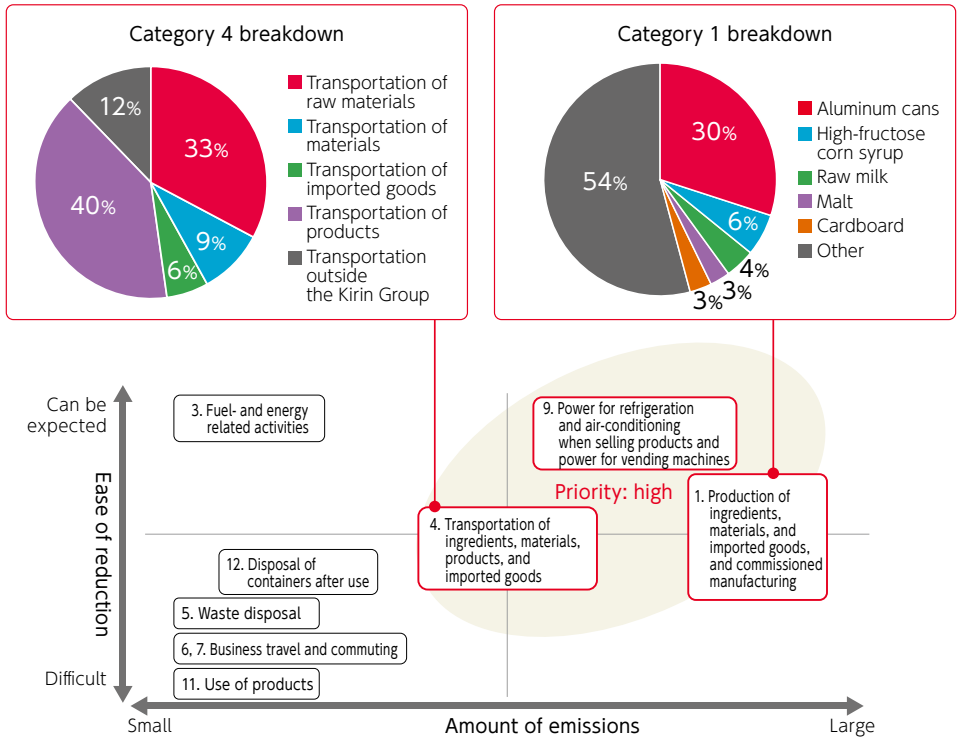
The reduction of Scope 3 emissions is an issue not just for the Kirin Group, but across society as a whole. Accordingly, we intend to share issues with industry peers, various industry organizations, and other bodies, and clarify the domains where we can cooperate. In order to accurately reflect our initiatives to reduce emissions in the calculation of Scope 3 emissions, we will change the database we use for these calculations to IDEA.* We will also consider utilizing external platforms in order to gather accurate data. Containers and packaging will be a key theme in the "reduction of our own independent emissions." We will work to make containers and packaging lighter utilizing our strength – the fact that we have a globally unmatched research institute where we conduct in-house container and packaging development – while also expanding the use of "sustainable containers and packaging," which we will create by recycling used containers. In this way, we reduce GHG emissions associated with the manufacture of ingredients and materials. With regard to transportation, we will operate both production and logistics in an integrated manner that takes into consideration the risk that we will be "unable to transport" products owing to truck driver shortages and other factors. At the same time, we will also continue joint deliveries and our modal shift. In sales, we will take on new challenges, such as zero-carbon products.

* Calculated retrospectively from 2019, the SBT base year, using IDEA (Inventory Database for Environmental Analysis). IDEA is an LCA database offered by the National Institute of Advanced Industrial Science and Technology (AIST). There are plans for regular renewal and the creation of overseas coefficients, and it is in the process of becoming used as standard in Japan.

GHG emissions in the value chain (2021)



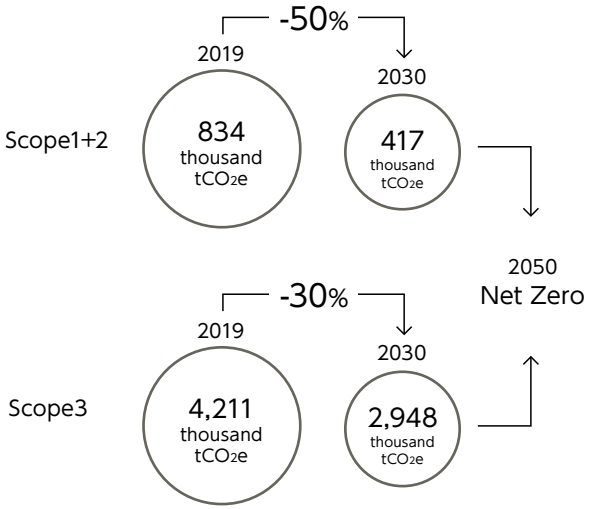
Scope 3 priority targets and emissions ratios



The future

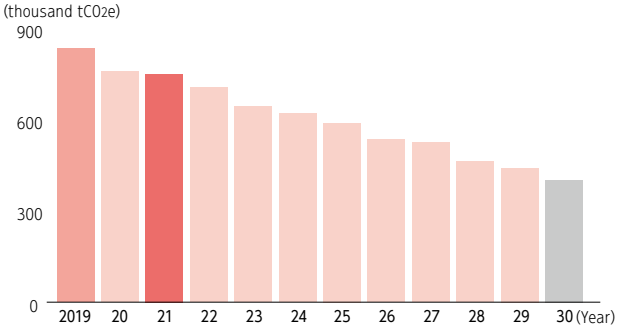
In our roadmap, which forms the core of our transition plan, we intend to update our plans every year to reflect the latest changes in the environment within and outside the Kirin Group, and thereby increase the accuracy of our plans. We intend to continuously implement initiatives to lead the creation of a decarbonized society and create value in both financial and non-financial terms, while also having a positive impact on society.

1.5℃ targets

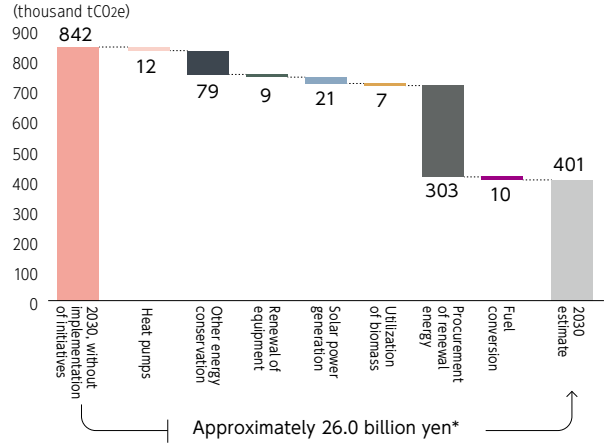


Plans through 2030 (Scope 1 + Scope 2)

Scope 1 + 2 emissions after implementation of measures to reduce GHG emissions

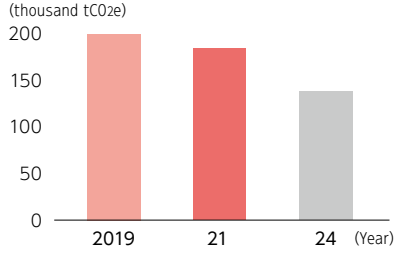


Breakdown of plans to reduce Scope 1 + 2 GHG emissions

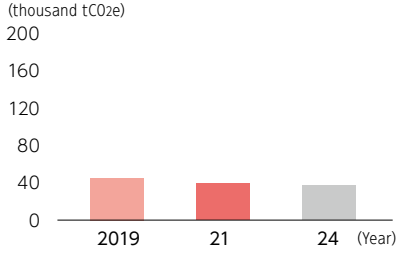


Plans through 2024 (Scope 1 + Scope 2)

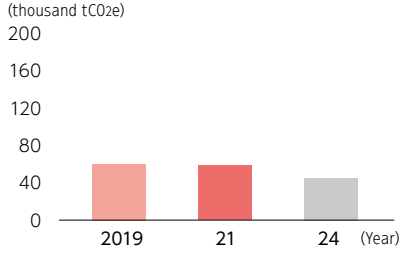
Kirin Brewery



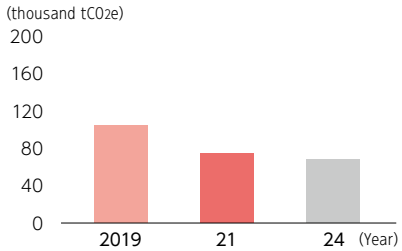
Kirin Beverage



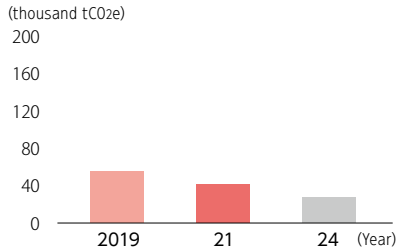
Mercian



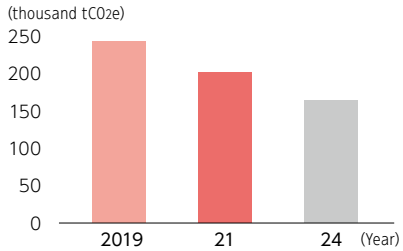
Lion



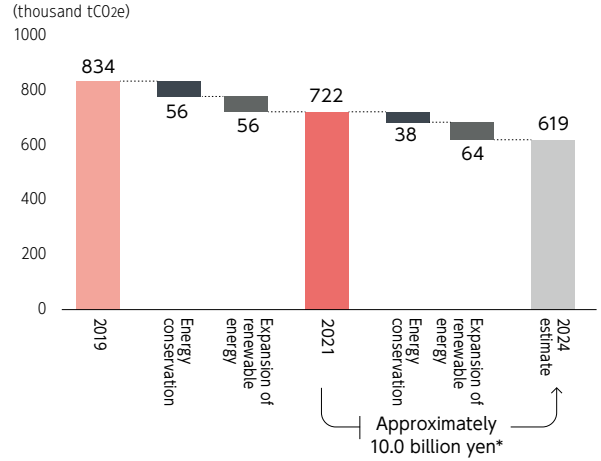
Kyowa Kirin (global)



Kyowa Hakko Bio (global)



Breakdown of GHG emissions reduction (2019 to 2024)



* "Environmental investment" is the total of capital investment and the increase in costs to procure renewable energy. Data from 2025 onward are expected amounts based on our current roadmap, and are subject to revisions as necessary.

More information on environmental investment to achieve our Science-based 1.5℃ target →P.76

Management Summary: Natural Capital (Biological and Water Resources)

Awareness of Natural Capital and "Location"

Holistic understanding and disclosure of climate change and natural capital

In May 2021, the Finance for Biodiversity (F4B) initiative released "The Climate-Nature Nexus: Implications for the Financial Sector," which emphasizes the concept of "The Climate-Nature Nexus." This concept considers climate change and natural capital not separately, but in a holistic manner. The Kirin Group's businesses depend on natural capital and it has understood that climate change has a major impact on agricultural raw materials and water, which is also concluded from the scenario analysis based on TCFD recommendations. Our approach is to solve environmental issues holistically based on the premise that they are interrelated rather than independent. As such, the assertion of "The Climate-Nature Nexus" is exactly what we have been trying to achieve. In the future, we intend to use the TCFD and TNFD frameworks to advance integrated disclosure.

Global and local perspectives

The Kirin Group took the opportunity of Tenth Meeting of the Conference of the Parties to the Convention on Biological Diversity held in Nagoya in 2010 to conduct a risk assessment of biological resources and understand the dependence of its operations on the natural capital of specific regions. It is to address this issue that we have begun supporting the acquisition of The Rainforest Alliance certifications in Sri Lanka, the main producing area of tea for *Kirin Gogo-no-Kocha*. In the area of water resources, we are acting on our early recognition that water stress and risk vary widely by country and region given our experience conducting business in Japan and Australia which have highly contrasting water resources and water stress.

Our scenario analysis also confirmed that climate change will have extreme physical impacts on natural capital in certain areas. Based on this experience, the Kirin Group understands both that global warming is a global issue and that GHG emissions must be reduced at all companies and that natural capital, such as biological and water resources, needs a local perspective because its characteristics differ by region and location. This is why the Kirin Group is making holistic efforts as proposed the LEAP (Locate-Evaluate-Assess-Prepare) approach in the beta version of the TNFD Disclosure Framework.

LEAP approach focusing on "Location"

The LEAP approach involves analytical activities in the following order: Discovering the nature interface (Locate), diagnosing dependencies and impacts (Evaluate), assessing risks and opportunities (Assess), and preparing to address nature-related risks and opportunities and reporting back to investors (Prepare). This is a new approach to assessing and prioritizing natural capital dependence and impacts, with a focus on "Location".
The Kirin Group intends to use the LEAP framework to organize and deepen the initiatives it has been pursuing as a company dependent on natural capital, and to make appropriate disclosures.

"Locations" that have a significant impact on our businesses and are important in terms of the natural and social environment.

Sri Lankan tea farms

Locate	The delicious taste of *Kirin Gogo-no-Kocha* is supported by tea farms in Sri Lanka. Water sources of large coastal cities exist on the farms.
Evaluate	Approximately 25% of the Sri Lankan tea leaves imported by Japan are used by *Kirin Gogo-no-Kocha*. Tea production areas face increased water risk and stress due to climate change, while heavy rains run off fertile soils.
Assess	If Sri Lankan tea leave on which Kirin is highly dependent, cannot be used sustainably, the product concept will fail.
Prepare	Supporting Sri Lankan tea farms in obtaining The Rainforest Alliance certifications since 2013. Widely publish the number of farms obtained the certificate and the number of farms trained in environmental reports, and on the Web.

The Japanese wine where "Location" determines the characteristics of the product.

Mariko Vineyard

Locate	An important factor that determines the taste of wine is "terroir" or the character of the land. The vineyard is an area that remains natural and inhabited by rare species of plant and wildlife.
Evaluate	Expansion of vineyards is necessary for the expansion of the Japanese wine, and the target is derelict land.
Assess	Joint research with the National Agriculture and Food Research Organization (NARO) revealed that converting derelict land into vineyards creates high-quality grasslands and contributes to a rich ecosystem.
Prepare	Contributing to Nature Positive and 30 by 30.

"Locations" where water risks are high and water resource management is particularly important.

Production plants in Australia

Locate	All Kirin Group Australian brewery locations are in water-stressed watersheds.
Evaluate	Water stress in Australia is very high both empirically and when measured with such tools as Aqueduct. Once every few decades, when flooding occurs due to torrential rains, the damage is significant.
Assess	Water-saving technology is the best in the Group, but there remains a possibility that production could be disrupted in the event of a severe drought.
Prepare	Contribute to the development of the SBTs for Nature methodology and set new goals in line with this. Widely publish joint research results in environmental reports, and on the Web, environmental reports, and on the Web.

Scientific approach to natural capital, including biodiversity

Understanding that the Kirin Group is a business dependent on agricultural products (biological resources) and natural capital such as water, we conducted a risk assessment of biological resources in 2011 and a water risk survey of our global production site watersheds and major agricultural raw meterial production areas in 2014. We have been working to set data-based targets and initiatives. However, there have been issues that have remained empirical because the methodology for setting targets has not been established. We would also like to contribute to rule-making by participating in a corporate engagement program sponsored by the Science Based Targets Network (SBTN) to assess impacts and set targets based on scientific evidence, such as greenhouse gas emission targets. The AR3T Framework, as set forth in the SBTN Action Framework, is being evaluated on a trial basis as it is consistent with the approach taken by the Kirin Group. The Group considers agricultural raw materials and water resources to be the most vulnerable to climate change and has also identified impacts on natural capital through various studies on physical risks and transitional risks.

Value chain assessment and prioritization

STEP 1
ASSESS

Due to the nature of the Kirin Group's businesses, we assess that the Group has a significant impact and dependence on freshwater and terrestrial areas in its upstream agricultural raw materials and manufacturing sites.

SBTN's AR3T framework

STEP 2
INTERPRET & PRIORITIZE

In the freshwater areas, we studied and prioritized the risks and impacts on water quantity in the watersheds of our production sites according to the proposed methodology presented by the SBTN. In the future, we plan to collect data on high-priority production sites with reference to biodiversity indicators based on the IUCN Red List. In terrestrial areas, the AR3T framework was used to examine raw material production areas and organize the procurement of raw materials that do not damage nature, support the sustainability of production areas, and positive impact initiatives.

Trial Prioritization

Country	Manufacturing site	Water stress	Water Use	Biodiversity risk
US	Biokyowa	★★★★☆	★★★★★	★★☆
Thailand	Thai Kyowa Biotechnologies	★★★★☆	★★★☆☆	★☆☆
Japan	KYOWA PHARMA CHEMICAL	★★★☆☆	★★★★☆	★★☆
Japan	Kirin Brewery Toride Plant	★★★☆☆	★★★☆☆	★☆☆
Japan	Kirin Brewery Yokohama Plant	★★★☆☆	★★★☆☆	★☆☆
Japan	Kirin Gotemba Distillery	★★★☆☆	★★★☆☆	★☆☆
Japan	Kyowa Kirin Fuji Plant	★★★☆☆	★★★☆☆	★☆☆
Australia	Lion Tooheys Brewery	★★★★☆	★★☆☆☆	★★☆
Japan	Kirin Brewery Nagoya Plant	★★★☆☆	★★★☆☆	★★☆
China	Shanghai Kyowa Amino Acid	★★★★☆	★★☆☆☆	★☆☆
Japan	Kirin Beverage Shonan Plant	★★★☆☆	★★☆☆☆	★★☆
Australia	Lion Castlemaine Perkins Brewery	★★★★☆	★★☆☆☆	★★☆
China	Kirin Brewery (Zhuhai)	★★★☆☆	★★☆☆☆	★★☆
US	New Belgium Brewing Fort Collins Brewery	★★★★★	★☆☆☆☆	★☆☆

*Water stress is evaluated using three indicators (Aqueduct's Baseline Water Stress, Water Risk Filter's Baseline Water Depletion and Blue Water Scarcity) that assess the amount of available water resources.
*Water use as a percentage of total use at 14 sites with high water stress
*Biodiversity is assessed by the scores in Species Threat Abatement and Restoration (STAR), namely START for threat abatement and STARR for restoration. These are calculated based on the IUCN Red List for the watershed of the manufacturing site. We also consider whether biodiversity elements triggering Key Biodiversity Area (KBA) criteria such as fish, amphibians, turtles, crustaceans, dragonflies, etc. are present within a 50km radius of the site's watershed.

Avoid

The Kirin Group depends on agricultural products and forests for its raw materials. We aim to avoid problematic use of biological resources and to use them sustainably in accordance with the Kirin Group Action Plan for the Sustainable Use of Biological Resources established in 2013.

Initiatives and Commitments

- 100% use of FSC-certified paper or recycled paper for office paper by 2030 in major global operations to avoid the use of valuable forest resources. (Achieved in Japan Beer and Spirits and Non-alcoholic Beverages businesses.)
- To avoid deforestation of tropical rainforests, the Group will ensure that 100% of transactions for palm oil used as a primary or secondary raw materials in domestic operations have RSPO certification using RSPO Credits*. (Achieved at present)

*Excluding palm kernel oil

Reduce

If we cannot completely eliminate the burden on the natural environment, we will try to reduce it. Once a scientific goal-setting framework is constructed, goals are re-set accordingly.

Initiatives and Commitments

- Support 10,000 small-scale Sri Lankan tea farms supported in obtaining Rainforest Alliance certification by 2025. (About 30% of the large estates certified in the country received Kirin's support.)
- 2.4kl/kl unit water consumption by 2025 at Lion where water stress is high. (Targets have also been set for Japan Beer and Spirits, Non-alcoholic Beverages, Pharmaceutical, and Biotechnology businesses in line with water stress.)
- Reduce food waste in the Japan Beer and Spirits, and Non-alcoholic Beverage businesses by 75% by 2025 compared to 2015.

Restore &Regenerate

We are working to restore ecosystems and water resources in the raw material production areas. We are also involved in water source conservation activities at our domestic plants and in vegetation restoration activities in our domestic vineyards in cooperation with NGOs and local communities.

Initiatives and Commitments

- Harvest 160 tons of grapes from directly managed vineyards in 2024 (In vineyards where grass growth is encouraged, the expansion of the vineyard leads to the growth of the grasslands and enriches the ecosystem.)
- In Sri Lanka, on a cumulative basis from 2022 through 2024, we aim to have 15 sites for on-farm water source conservation, 20,000 people to be educated on water conservation, and 200 people to be educated on wildlife conservation.

Transform

Natural capital initiatives need to be undertaken not only by companies, but also by society and local communities. We will promote collaboration with many stakeholders and contribute to a new disclosure framework.

Initiatives and Commitments

- As a member of the TNFD Forum, we contribute to the development of a framework for financial disclosure of nature-related information through participation in a pilot program.
- The Kirin Group contributes to the development of a scientific goal-setting framework for natural capital as a Corporate Engagement Program participant in SBTs for Nature.
- We apply our experience in establishing a consortium for sustainable paper and tea leaves to collaborate with NGOs and other companies on these and other topics.

Management summary: containers and packaging

Disclosure and dialogue related to the circular economy

As there has been no appropriate disclosure framework that we could use globally for the circular economy including containers and packaging, we have reported on this issue only in the "Activity" sections of our Environmental Reports and other documents. This time, to further promote ESG disclosure and dialogue, we use on a trial basis the framework set forth in "Disclosure and Engagement Guidance to Accelerate Sustainable Finance for a Circular Economy" that the Ministry of Economy, Trade and Industry disclosed in January 2021.

https://www.meti.go.jp/press/2020/01/20210119001/20210119001.html

Values	●Kirin and its broad stakeholders enrich society and the Earth for future generations through positive impact on people and the nature (Kirin Group's Environmental Vision 2050)
Business model	●We will develop and disseminate sustainable containers and packaging and build a sustainable resource recycling system for containers and packaging
Risk	●**Policy:** Stricter laws and regulations related to packaging and its circulation may increase the cost of response and complicate our operations ●**Technology:** It is possible that innovation will not move forward and there will be no progress in recycling containers and packaging ●**Market:** If our measures lack consideration for the environment, it may discourage customers from buying ●**Reputation:** It is possible that we will lose the trust of long-term investors if we are unable to respond appropriately
Opportunities	●**Policy:** An advanced response can contribute more flexibly and effectively to the circular economy while reducing regulatory complexity and the cost of response ●**Technology:** Advances in innovation in our container and packaging technology give us a competitive advantage ●**Market:** Consumers recognize our new environmentally-conscious initiatives, meaning we can pass through costs to prices ●**Reputation:** Stable investment from long-term investors will continue for us as a sustainable company
Strategy	●Develop new container and packaging technologies at the Institute for Packaging Innovation ●In addition to mechanical recycling, the development of chemical recycling technology for PET bottles will create a society that recycles PET resin from a wide range of other applications, not just used PET bottles ●As for paper, a forest resource, we will expand our efforts to use sustainable paper, which we have already achieved in the domestic alcoholic beverages and non-alcoholic beverages businesses, to all of our businesses, including overseas businesses
Metrics and Targets Governance	**Metrics and Targets** ●Achieve 100% sustainable containers and packaging by 2050 (Kirin Group's Environmental Vision 2050) ●Raise the percentage of recycled resin in PET bottles in Japan to 50% by 2027 (Kirin Group Plastic Policy) **Governance** ●The Board discusses and resolves basic policies and important matters, while the Executive Committee discusses and resolves KPIs

Identification of risks and opportunities

In addition to issues related to climate change, the risks and opportunities related to material environmental issues that are believed to affect the Kirin Group's business and the strategies for addressing them are as follows.

Theme	Scenario	Scenario driver	Time frame			Types of risks and business opportunities	Potential impact			Strategy	Related pages
			S	M	L		L	M	H		
Biological Resources	As a result of global warming, yields of major agricultural raw materials (barley, hops, and coffee beans) decline significantly, affecting procurement costs. Quality degradation is also expected.	Increase in procurement costs due to decline in yields of agricultural products		●	●	Physical risk (acute and chronic) / transitional risk (market and reputation)	■	■		・Brewing technology that does not rely on barley ・Mass plant propagation technologies ・Support for farms to acquire certification for sustainable agriculture	P80 P33、P80 P28、P29、P32、P80
	Increases in the cost of petroleum-based fertilizers and chemical pesticides due to carbon pricing, as well as competition with biofuel cultivation, affect procurement costs.	Increase in procurement costs of agricultural products due to carbon pricing		●	●	Physical risk (acute and chronic) / transitional risk (market and reputation)		■	■	・Brewing technology that does not rely on barley ・Mass plant propagation technologies ・Support for farms to acquire certification for sustainable agriculture	P80 P33、P80 P28、P29、P32、P80
	Domestic farm land becomes derelict and distinctive agricultural products and traditional Satochi-Satoyama landscapes are lost as a result of the decline in domestic farmers.	Biodiversity / ecosystem services	●	●		Physical risk (acute and chronic) / transitional risk (reputation)			■	・Support for farms to acquire certification for sustainable agriculture ・Efforts to enrich ecosystems	P28、P29、P32、P80 P30、P31
	It is discovered that the environment and the human rights of workers in areas producing agricultural products are not being protected, resulting in a loss of trust from society as a buyer and a decline in brand value.	Biodiversity / ecosystem services Violations of human rights Brand value	●	●		Reputation	■	■		・Support for farms to acquire certification for sustainable agriculture ・Efforts to enrich ecosystems	P28、P29、P32、P80 P34、P48、P108、P109
	Supply shortages occur as a result of limits on commercial forestry out of consideration for nature and human rights, as well as a rapid increase in demand for certified agricultural products.	Increase in procurement costs of wood, paper, and agricultural products	●	●		Reputation	■	■		・Support for acquisition of sustainable forestry and farm certification systems ・Mass plant propagation technologies	P28、P29、P32、P80 P33、P80
Water Resources	Manufacturing becomes impossible owing to droughts caused by climate change. Society criticizes the company for operating during droughts.	Disruptions to operations due to droughts	●	●	●	Physical risk (acute and chronic)/ transitional risk (reputation)	■	■		・Advanced water usage reduction technologies ・Water stress response for Ingredient Agricultural Production Areas	P41、P84 P38、P39、P84、P85
	Floods due to extreme rainfall accompanying climate change cause the suspension of production and obstacles to transportation in Japan and overseas.	Disruptions to operations due to floods	●	●	●	Physical risk (acute and chronic)	■			・Flood response manual and facility response ・Water risk response for Ingredient Agricultural Production Areas	P81、P82、P83 P39、P84、P85
	Floods due to extreme rainfall and droughts accompanying climate change affect areas producing agricultural products, causing significant declines in yields and affecting our procurement costs.	Decline in yields of agricultural raw materials due to droughts and floods	●	●	●	Physical risk (chronic)	■	■		・Measures to address torrential rain and conserve water resources in areas where agricultural raw materials are produced	P39、P40、P83、P84
	Operation is suspended and brand value declines owing to the pollution of rivers and seas caused by pollutants flowing into wastewater from business sites.	Violations of laws and regulations Scale of damage to surrounding businesses and residents due to pollution	●			Reputation	■			・Improvements to environmental management systems	P106、P107
Containers and Packaging	Climate change results in rapid increases in the price of crude oil, meaning raw material-based resins for PET bottles rapidly increase in price or become difficult to obtain.	Usage rate of recycled resins or plant-based resins	●	●		Physical risk (acute and chronic) / transitional risk (market and reputation)	■	■		・Expansion of mechanical recycling ・Establishment of chemical recycling manufacturing technology ・Creation of social systems for collecting used PET bottles	P45、P46 P47 P45
	A failure to address marine plastic pollution problems results in a loss of trust from society and a decline in brand value.	Usage rate of recycled resins or plant-based resins	●	●		Reputation	■	■		・Expansion of mechanical recycling ・Establishment of chemical recycling manufacturing technology ・Creation of social systems for collecting used PET bottles	P46 P47 P47、P53
	With the shift from plastic to paper containers, the use of wood and paper from forests that are not eco-friendly results in a loss of trust from society and a decline in brand value.	FSC and other certification networks and the usage rate of recycled paper	●	●		Physical risk (acute and chronic) / transitional risk (market and reputation) Reputation	■	■		・Expansion of the use of FSC and other products with sustainable forest certification	P48
Climate Change	Carbon taxes are introduced and stringent policy and law are enacted around the world.	Increase in energy costs due to carbon pricing		●	●	Transitional risk (policy and law, technologies, and markets)	■	■	■	・Reduction of GHG emissions on a medium- to long-term profit and loss neutral basis	P15、P16、P60、P87
	The number of persons requiring emergency services as a result of heatstroke doubles owing to rising global temperatures.	Population requiring emergency services for heatstroke	●	●	●	Physical risk (chronic) / transitional risk (market) / products, services, and markets	■	■		・Contribution to products that support consumers' immune systems	P92
	The population exposed to the risk of infectious diseases increases as a result of higher global temperatures.	Population exposed to infectious diseases	●	●	●	Physical risk (chronic) / transitional risk (market) / products, services, and markets	■	■	■	・Contribute to products to counter heatstroke	P94
	Research on responding to climate change cannot be put into practice at the right time. We cannot introduce facilities at an appropriate time.	Research and development capabilities Strengthen engineering functions	●	●		Transitional risk (policy and law, and technologies)		■	■	・Research and development capabilities ・Strengthen engineering functions	P89 P89
	Brand value declines as it is pointed out that the renewable energy used by the company affects nature and the scenery, creates noise, is not resilient to disasters, etc.	Violations of policy and law, and human rights, media reporting, and brand value	●	●		Transitional risk (policy and law, and reputation)		■	■	・Introduction of renewable energy with additionality ・Introduction of renewable energy with consideration for ethics	P96 P92、P97

Non-financial targets and CSV Commitments (Environmental)

Item	Theme	Non-financial indicators NEW	Connection to economic value
Environmental	Climate Change	**GHG** Reduction rate of GHG emissions (Scope1+2 vs. 2019)	Reduction of cost increase when carbon tax is introduced due to energy saving effect
	Containers and Packaging	**PET bottles** Percentage of recycled resins used for PET bottles	Profit generation through value creation, stable procurement of PET raw materials
	Water Resources	**Water** Water use intensity at manufacturing sites with high water stress	Reduction of manufacturing costs, reduction of manufacturing risks due to drought

Group Materiality Matrix					
	Medium items	Theme	Company/Department	Our Achievements	(Target Year) Target Value
01	Sustainable use of biological resources	Tea leaves	Kirin Beverage	Number of farms supported to obtain Sri Lanka RA certification	(Cumulative total 2022-2024) Farms : 17 Small farms: 5,350
02		Paper	Kirin Brewery	Usage ratio of FSC-certified paper or recycled paper for paper containers and packaging *	(2024)100%
03			Mercian		(2024)100%
04			Koiwai Dairy Products		(2030)100%
05			Kyowa Hakko Bio		(2030)100%
06			Kyowa Kirin		(2030)100%
07			Kirin Holdings Health Science Business Dept.		(Cumulative total 2022-2024) Adoption of FSC-certified paper: 8 products Switch to FSC-certified paper: 4 products Switch to non-metallic packaging materials: 2 products
08		Food waste	Kirin Brewery	Amount of product waste reduction rate (compared to 2015)	(2024)50%
09			Kirin Beverage	Amount of product waste reduction	(2024)Continue to expand food bank transactions
10	Sustainable use of water resources		Kirin Brewery	Water intensity	(2024)5.6m^3/kl or less
12			Mercian (Fujisawa plant)	Water intensity	(2024)3.41m^3/kl or less
13			Lion(Tooheys, Castlemaine Perkins, James Boag, Pride)	Water intensity	(2025)2.4kl/kl
			Kirin Beverage (Shonan Plant, Shinshu Beverage)	Water use volumes/Water intensity	(2024)Less than 2023
14			Kyowa Hakko Bio	Reduction rate of water use volumes(compared to 2015)	(2030)32%
15			Kyowa Kirin	Reduction rate of water use volumes(compared to 2019)	(2030)40%

Group Materiality Matrix					
	Medium items	Theme	Company/Department	Our Achievements	(Target Year) Target Value
16	Sustainable recycling of containers and packaging	Recycled resin	Kirin Brewery	PET bottle recycled resin	(2027)≥50%
17			Kirin Beverage	PET bottle recycled resin	(2027)≥50%
18			Mercian	PET bottle recycled resin	(2027)≥50%
19				Reduction of one-way plastic volume Reduction of PET volume(Compared to 2020)	(2024) PET bottles 93t Other plastic bottles 34.5t
20		Other	Lion	Percentage of containers and packaging materials that can be reused, recycled, or composted	(2025)100%
21				Percentage of container materials that can be recycled	(2025)50%
22	Overcoming climate change		Kirin Brewery	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)30% (2030)55%
23			Kirin Beverage	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)17% (2030)55%
24			Mercian	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)25% (2030)55%
25			Lion	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)35% (2030)55%
26			Kyowa Hakko Bio	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)32% (2030)55%
27			Kyowa Kirin	GHG emission reduction rate (Scope 1+2)(compared to 2019)	(2024)51% (2030)55%
28			Whole Group	Ratio of renewable energy to electricity used by the entire Group	(2040)100%
29			Whole Group	GHG emission reduction rate (Scope 3) (compared to 2019)	(2030)30%

●Non-financial targets and CSV commitments are shown only in relation to the environment.

*Paper containers and packaging handled by each operating company, with targets determined by each operating company.Kirin Beverage will continue to use 100% FSC-certified paper for paper containers and packaging.Overseas target companies will check the status of sustainable paper resource procurement and set targets for the future.

Progress (The end of 2021)

Theme	We will create together	Major item	Minor item	Targets	Achievements
Biological Resources	A society that values sustainable biological resources	Supporting Sri Lankan tea farms to obtain Rainforest Alliance certification	Number of largel farms assisted to obtain Rainforest Alliance certification (Number of farms trained) KBC	17 farms (2022~2024)	Total **7 farms** (Total number of certified large farms: 94)
			Number of small farms assisted to obtain Rainforest Alliance certification (Number of farms trained) KBC	10000 farms (2025)	Total **2,120 farms**
		Others	Use of FSC-certified paper or recycled paper for office paper KB KBC ME	100% (2020)	**100%**
			Response to sustainable palm oilt KB KBC ME KIW *Except palm kernel oil	100% (2020)	**100%**
			Reduction of food waste (Compared with 2015 levels) KB KBC ME	-75% (2025)	**-80% (2020)**
Water Resources	A society that values sustainable water resources	Water reduction	Reduction of water consumption rate LN	2.4kl/kl (2025)	**3.8kl/kl**
			Rate of reduction of water use volumes (Compared with 2019 levels) KKC	-40% (2030)	**-25%**
			Rate of reduction of water use volumes (Compared with 2015 levels) KHB	-32% (2030)	**-52%**
		Water Source Forestation Activities	Number of water source conservation sites KBC	5 sites (2020)	**12 sites**
Containers and Packaging	A society that circulates containers and packaging in a sustainable way	PET bottles	Ratio of usage of recycled resin for PET bottles KB KBC ME	50% (2027)	**4.9%**
		Paper container	Use of FSC-certified paper for 6-can packs KH KB KBC ME	100% (2020)	**100%**
			Use of FSC-certified paper for gift boxes KH KB KBC ME	100% (2020)	**100%**
			Use of FSC-certified paper for drink boxes KH KB KBC ME	100% (2020)	**100%**
			Use of FSC-certified paper for cardboard cartons for products KH KB KBC ME	100% (2020)	**100%**
Climate Change	A society that has overcome climate change	GHG emissions	GHG emissions from the entire value chain KG	Net-Zero (2050)	**4,411 thousand tCO_{2e}**
			GHG emission reduction rate – Scopes 1 +Scopes 2 (Compared with 2019 levels) KG	-50% (2030)	**-13%**
			GHG emission reduction rate – Scope 3 (Compared with 2019 levels) KG	-30% (2030)	**-12%**
		Renewable energy	Ratio of renewable energy in plant purchased electric power KG	100% (2040)	**17%**

KG Kirin Group KH Kirin Holdings KB Kirin Brewery KBC Kirin Beverage ME Mercian KKC Kyowa Kirin KHB Kyowa Hakko Bio LN Lion KIW KOIWAI DAIRY PRODUCTS

External Evaluation

The Kirin Group conducts transparent information disclosure to its investors and other stakeholders.
As such, we have been selected for and rated by the following global indices.

CDP "climate change" category "A-List" (three consecutive years)

CDP "water security" category "A-List" (six consecutive yearss)

"Gold Award" in the "Environmentally Sustainable Company Category" (two consecutive years)
*Declined in FY2021 due to receiving the award for two consecutive years.

CDP Supplier Engagement Rating "Leader Board" (four consecutive years)

"Environmental Value Award" and highest ranked at the Second Nikkei SDGs Management Grand Prix (three consecutive years)

The "Kirin Group Environmental Report 2020" won the "Climate Change Reporting Grand Prize (Minister of the Environment Award)" in the 24th Environmental Communication Award

Development of Lightweight PET Bottle "the 46th Kinoshita Prize for packaging technology"

New Thin Film Deposition Technology for PET bottles WorldStar Award and Kinoshita Prize

The middle-sized bottle also received WorldStar Packaging Awards

Kirin School Challenge won the Encouragement Award in the Career Education Awards

Judge's Special Award in the 6th Ikimono Nigiwai Corporate Initiatives Contest

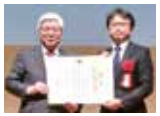
Minister of Land, Infrastructure, Transport and Tourism Award under the Excellent Green Logistics Commendation Program

Ranked No. 1 in WWF Japan's "Ranking for Corporate Measures Against Global Warming in the Food Sector"

Kirin Namacha Decaffeinated Tea Drink won WorldStar Packaging Awards

Fuji-Sankei Group Award in the 26th Global Environment Awards

Kirin School Challenge won the Judges Committee Encourage Award at the FY2017 Corporate Awards for Youth Experience Activities



Yokohama Plant won the Green Cities Awards and Green Social Contribution Award

Logistics Environmental Grand Prize at the 18th Logistics Environmental Award

King of Beasts Award in WWF Japan's "Business & Diversity Katte-ni Award"

Selected for the following indices

MSCI ESG RATINGS AA

2021 CONSTITUENT MSCIジャパン ESGセレクト・リーダーズ指数

FTSE Blossom Japan

FTSE4Good

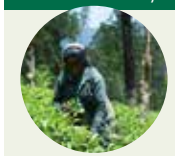
FTSE Blossom Japan Sector Relative Index

2022 Sompo Sustainability Index

Performance highlight

Biological Resources
→P.26～P.35

A society that values sustainable biological resources



Sri Lankan tea farms

Supporting Sri Lankan tea farms to obtain Rainforest Alliance certification

Number of large farms assisted to obtain certification KBC **94farms**

Percentage of certified large farms that have been certified with Kirin's support KBC **Approx.30%**

Number of small farms assisted to obtain Rainforest Alliance certification KBC **Total2,120farms**

Coffee plantations in Vietnam

Supporting coffee plantations in Vietnam to obtain Rainforest Alliance certification

Number of small farms assisted to obtain Rainforest Alliance certification KBC **309farms**

Others

Use of FSC-certified paper or recycled paper for office paper KB KBC ME ····· 100%

Response to sustainable palm oilt (Except palm kernel oil) KB KBC ME KIW ····100%

Reduction of food waste (compared with 2015 levels) KB KBC ME ···· -80% (2020)

Containers and Packaging
→P.44～P.57

A society that circulates containers and packaging in a sustainable way

PET bottles

Ratio of usage of recycled resin for PET bottles KB KBC ME **4.9%**

R100 PET bottles made of 100% recycled PET material

Paper containers made of FSC-certified paper

Paper container

Use of FSC-certified paper for 6-can packs KH KB KBC ME **100%**

Use of FSC-certified paper for gift boxes KH KB KBC ME **100%**

Use of FSC-certified paper for drink boxes KH KB KBC ME **100%**

Use of FSC-certified paper for cardboard cartons for products KH KB KBC ME **100%**

Kirin Group's Environmental Vision 2050

Enrich the Earth with Positive Impact

Kirin and its broad stakeholders enrich society and the Earth for future generations through positive impact on people and the environment.

Water Resources
→P.36～P.43

A society that values sustainable water resources

Water reduction

Rate of reduction of water consumption rate

(Compared with 1990 levels) KB **-49%**

(Compared with 2015 levels) LN **4%** (Oceania region*)

Amount of water use

(Compared with 2019 levels) KKC **-25%**

(Compared with 2015 levels) KHB **-52%**

Water Source Forestation Activities

Water Source Forestation Activities

Number of participants total **Approx.32,000people**

Water source conservation sites in Sri Lanka tea farms

Number of water source conservation sites in Sri Lanka tea farms

Number of water source conservation sites KBC **12locations**

* This region covers the Oceania region where Lion conducts business activities, excluding New Belgium Brewing.

Climate Change
→P.58～P.71

A society that has overcome climate change

GHG emissions reduction

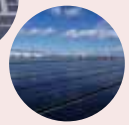
GHG emissions from the entire value chain KG **4,411 thousand tCO_2**

GHG emission reduction rate – Scopes 1 +Scopes 2 (Compared with 2019 levels) KG **-13%**

GHG emission reduction rate – Scopes 1 +Scopes 2 (Compared with 2019 levels) KG **-12%**

RE100 CLIMATE GROUP | CDP

RE100 membership, SBT1.5 approved



Renewable energy

Ratio of renewable energy to electricity used KG **17%**

Installation of large-scale solar power generation facilities

Waste

Recycling at the plants

Recycling rate KB KBC KD **100%**

Next generation

Kirin School Challenge

The number of students total **1,097people**

KG Kirin Group KH Kirin Holdings KB Kirin Brewery KBC Kirin Beverage ME Mercian KKC Kyowa Kirin KHB Kyowa Hakko Bio
KD Kirin Distillery KIW KOIWAI DAIRY PRODUCTS LN Lion

Biological resources

Background to initiatives

The Kirin Group has taken concrete measures toward biological resources from an early stage, including announcing the Kirin Group Declaration of Support for Biodiversity Conservation in 2010, conducting risk surveys and assessments of biological resources in 2011, and announcing the Kirin Group Action Plan for the Sustainable Use of Biological Resources in 2013. Agricultural raw materials often reflect the unique characteristics of the areas that produce them. We must maintain both a local perspective centered on our "dependence" on agricultural products produced in specific "places," as well as a global perspective centered on the fact that climate change has a significant impact on the yield and quality of agricultural raw materials. With our understanding of this background, in addition to scenario analysis based on the TCFD recommendations, we will develop a holistic approach by referring to the LEAP (Locate, Evaluate, Assess,Prepare) approach presented in the beta version of the TNFD Disclosure Framework.

We will create together

A society that values sustainable biological resources

- Cultivate, expand and procure sustainable agricultural raw materials
- Stand by the side of farmers to make raw material production areas sustainable

Production regions	P.28	Tea farms
	P.30	Vineyard
	P.32	Coffee farms
	P.32	Hop fields
	P.33	Mass plant propagation technology
	P.35	Educational program for wildlife conservation in Sri Lanka
Manu facturing	P.34	Palm oil
	P.34	Paper and Printed Materials
	P.35	Biotopes at manufacturing plants
Products	P.34	Reducing of food waste

Points

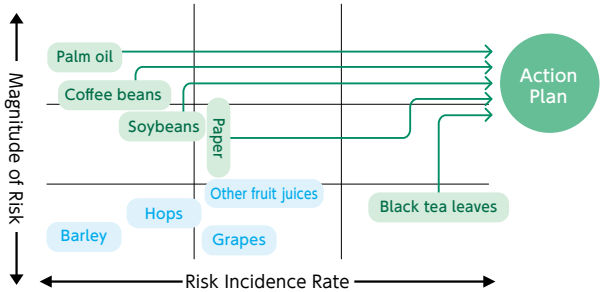
- We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important materials
- The Kirin Group supports 94 tea farms, equivalent to approximately 30% of all large estates in Sri Lanka that have received Rainforest Alliance certification. We began sales of year-round products that use tea leaves from certified farms
- We expanded our support for the acquisition of Rainforest Alliance certification to coffee farms in Vietnam. 309 small farms trained to transition to new certification standards
- We maintained the use of FSC-certified paper or recycled paper for 100% of office paper used in the Japan Alcohol and Non-alcoholic Beverages Businesses
- We participated in the Corporate Engagement Program of the Science Based Targets Network and "The TNFD Forum" of the Taskforce on Nature-related Financial Disclosures, thereby participating in setting targets and creating rules for disclosure related to the use of natural capital

Overview of initiatives

Initiative	Issue	Progress
Initiatives to achieve our vision	Risk assessment	We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important themes (September 2021).
	Rule making	We participated in the Corporate Engagement Program of the Science Based Targets Network. We participated in "The TNFD Forum" of the "Taskforce on Nature-related Financial Disclosures" (TNFD)
Cultivate, expand and procure sustainable agricultural raw materials	Office paper	In the Japan Alcohol and Non-alcoholic Beverages Businesses, as of the end of December 2021, we maintained the use of FSC-certified paper or recycled paper for all office paper (copy paper, envelopes, business cards, etc.)
	Palm oil	The Group continues to ensure 100% use of RSPO Book & Claim-certified palm oil for primary and secondary raw materials.
	Mass plant propagation technologies	Through joint research with Bridgestone, the Kirin Central Research Institute succeeded in developing a technology that utilizes "bag-type culture production technology," one of a "mass plant propagation systems," to improve the productivity of natural rubber derived from the "guayule" plant, and began infield assessments.
	Food waste	As we look to achieve our food waste reduction target in the Japan alcohol and non-alcoholic beverages businesses (down 75% by 2025, compared with 2015), we will continue measures such as promoting the use of "year-month labeling" for best-before periods.
Stand by the side of farmers to make raw material production areas sustainable	Tea farms	We have been continuously supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms since 2013, and as of the end of 2021, 94 tea farms had obtained certification, approximately 30% of the total number of large estates that have obtained certification in Sri Lanka. Conducted training on the acquisition of certification at 2,120 small tea farms. Launched a year-round product that uses certified tea leaves (August 2021).
	Coffee farms	In 2020, we began supporting the acquisition of certification by small coffee farms in Vietnam, and from 2020 to 2021, we conducted training on transitioning to the new certification standard at 309 farms.
	Vineyards	Continued ecological surveys to show that converting derelict farming land into vineyards for Japan Wine will enrich the ecosystem. From 2018, we added birds, spiders, and earthworms to the existing list of plants and insects subject to surveys, and researched the impact of maintaining rich ecosystems on grape production. Joined the 30 by 30 Alliance for Biodiversity.
	Hop fields	The Kirin Group discovered a rare species near a new hop field for BEER EXPERIENCE, in which we invest. (We did not conduct a survey in 2021 owing to the spread of COVID-19)

For policies on biological resources→P.118~P.119

Materiality Analysis of Biological Resources



Prepared in 2012 and scheduled for revision in 2021

Progress

Support for obtaining certification by tea farms in Sri Lanka

Percentage of large certified farms that have received support from the Kirin Group

Number of certified farms: 94

Support for certification of large farm

Number of large farms trained: 7

Target: 17 farms
(cumulative total from 2022 to 2024)

Ratio of sustainable raw materials

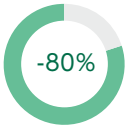
Ratio of Book & Claim RSPO certification

Primary raw materials
(excluding palm kernel oil)

Office paper

FSC-certified paper or recycled paper

Food waste



Rate of reduction

2020 (compared with 2015)

Reduction target : -75% (by 2025, compared with 2015)

2010
Developed the Kirin Group Declaration of Support for Biodiversity Conservation.

2012
Conducted risk surveys on biological resources and selected "tea leaves," "paper and printed materials," and "palm oil" as important themes.

2013
Developed the Kirin Group Guidelines for the Use of Sustainable Biological Resources and the Kirin Group Guidelines for the Procurement of Sustainable Biological Resources, and selected "tea leaves," "paper and printed materials," and "palm oil" as important themes. Started supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms.

2014

2017
Revised the Kirin Group Guidelines for the Procurement of Sustainable Biological Resources, and declared our intention to achieve 100% usage of FSC-certified paper or recycled paper in the Japan alcohol and non-alcoholic beverages businesses by the end of 2020.

2018
Started supporting the acquisition of certification by small-scale tea farms in Sri Lanka.

2020
Began expanding support for the acquisition of Rainforest Alliance Certification to coffee farms in Vietnam.

2021
We participated in the Corporate Engagement Program of the Science Based Targets Network. We revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources to add coffee beans and soybeans as important materials. We participated in the TNFD Forum.

Tea farms

Support for acquisition of Rainforest Alliance Certification

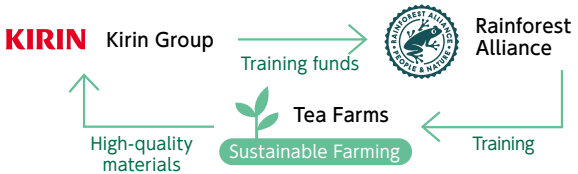
Since 2013, the Kirin Group has supported the acquisition of Rainforest Alliance certification by tea farms in Sri Lanka. As of end of 2021, we had supported the acquisition of certification at a total of 94 tea farms in Sri Lanka, equivalent to approximately 30% of all certified large estates, and in August 2021, we also began sales of year-round products that use tea leaves from certified tea farms.

Kirin's high level of dependence on Sri Lanka for tea leaves

Since its launch, we have used tea leaves from Sri Lanka as the main ingredient for Kirin Gogo-no-Kocha, Japan's leading brand of black tea brand with a share of approximately 50%*1 of the domestic packaged black tea market. When we conducted a biodiversity risk assessment in 2011, we learned that approximately 25%*2 of the Sri Lankan tea leaves imported by Japan were used for Kirin Gogo-no-Kocha. We also considered purchasing tea leaves from certified farms to reduce risk from our high level of dependency. But at the time, Sri Lanka was in the immediate aftermath of a civil war and we found the number of farms that were able to access training themselves was limited. Therefore, rather than leaving behind such farms, we decided to create a positive impact on the sustainability of the production area as a whole by supporting the acquisition of certification by tea farms in Sri Lanka in order to build better partnerships with production areas and the people who work there and to continue producing tasty and reliable tea drinks.

Share of tea leaves imported by Japan by area of production

Supportiing Growers Obtain Rainforest Alliance Certification*3



*1 Actual data for 2021 based on research conducted by Food Marketing Research Institute Co., Ltd.
*2 Source: 2011 Tea Statistics, Japan Tea Association
*3 Certification is awarded to farms that meet comprehensive standards for sustainable agriculture to create a better future for people and nature.
https://www.rainforest-alliance.org/lang/ja

Training content

Rainforest Alliance certification program is made up of three principal pillars of sustainability: "environment," "society," and "economy."
In terms of "environment," we provide guidance to tea farms on matters such as forest conservation, surveys and protection of wildlife, trash sorting, and recycling.
In terms of "society," items related to human rights are subject to examination, such as the improvement of working conditions and living environments for tea pickers. Certified farms make efforts to improve the lives of farm workers, including by creating clinics on farms and providing homes for tea pickers.
In terms of "economy," we provide training related to agricultural technology itself. Farmers in developing countries generally face problems such as poor agricultural knowledge and skills, and excessive use of pesticides and fertilizers.
We not only protect forests, but also reduce spending, improve farm profits, and enhance tea leaf safety by teaching scientific methods of increasing yields while reducing agricultural chemical and fertilizer use in our training.
Droughts and heavy rains are frequent in Sri Lanka due to the impact of climate change. Urbanization, industrialization, soil erosion and outflow as a result of inappropriate agriculture are also major problems. Tea farms are often located on steep, sunny slopes, so heavy rainfall not only causes the loss of fertile soil, but there have also been examples of it causing landslides that kill people living on the farms. In training, we teach people how to identify grasses that have a negative effect on tea cultivation and show them how to ensure the ground in tea farms is covered with harmless grasses with deep roots.
This prevents landslides by stopping rain from directly hitting the ground during heavy rain, while also serving to retain water during droughts, making it an effective measure for adapting to climate change.

More information on the impact of climate change on tea leaves →P.79, P.85

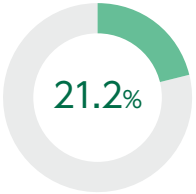
Kirin Gogo-no-Kocha Straight Tea using tea leaves from certified farms 250ml LL Slim

Wildlife panel

Left: before soil runoff prevention measures, right: after measures

Percentage of large certified farms that have received support from the Kirin Group

Number of certified farms: 94



Small farms for which to support acquisition of certification

Target 10,000 farms (2025)

Number of training farms: 2,120 farms (Number of certified farms: 120)*4

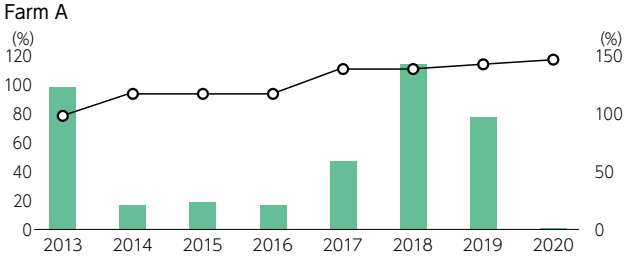
*4 The target for small farms was a cumulative total of 5,350 farms between 2022 and 2024, but in 2021, it was difficult for trainers to visit farms owing to strict curfews, etc., as a result of the spread of COVID-19, and we were not able to provide training at small farms.

Social and economic impact of certification

The figure below shows an evidence social impact at a farm in Sri Lanka that has acquired Rainforest Alliance Certification. This data is from a specific farm, and from it, we may say that our support for certification has a positive impact, both financially and socially, on farms and farm workers, and makes areas where raw materials are produced more sustainable.
In an effort to achieve greater sustainability, some farms are utilizing some of the training expenses that Kirin provides to conduct research to significantly increase yields and attempt pesticide-free cultivation, as part of measures that go beyond the standards for certification.

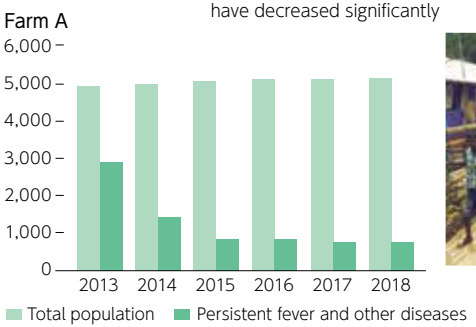
Social impact of supporting the acquisition of Rainforest Alliance Certification

Profitability As profit per kilogram increases, workers' salaries also increase



* Both charts are indexed with 2013 as 100.

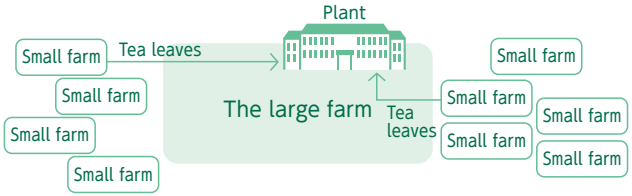
Sanitary conditions While the total population of the farm is increasing slightly, the number of cases of disease have decreased significantly



* Farm A obtained certification in 2014 respectively.

Support for the acquisition of certification by small farms

In 2018, we began supporting the acquisition of certification by small farms, and by 2025, we plan to support the acquisition of certification by 10,000 small farms.
In Sri Lanka there are many small family-operated farms, with the total number said to be in the hundreds of thousands. Nationally qualified collectors collect the tea leaves that small farms produce, and sell them to large nearby farms for processing before shipping. Tea leaves from small farms can sometimes account for as much as half or more of the tea leaves processed in the large farms' plants. We thus determined the acquisition of certification at small tea farms is also necessary for the sustainability of black tea leaves.



In order to obtain certification for small farms, multiple small farms are organized to form a team and appoint a leader. Local trainers first train the leaders, who then train the team's small farms, thus ensuring that they learn about the requirements of the certification standard.
In many cases, we are able to obtain the full cooperation of large farms, including the dispatch of instructors and the opening of training rooms. Since it is necessary, however, to begin by organizing the small farms into a team, it often takes time to start actual training, and the process to obtain certification is perhaps more difficult than the process for large farms.

More information on the conservation of water sources at tea farms→P.39

Book donations to elementary schools in Sri Lanka

In 2007, the year following the 20-year anniversary of *Kirin Gogo-no-Kocha*, we launched the Kirin Sri Lanka Friendship Project to further strengthen ties with Sri Lankan tea farms and continue to ensure stable production of tea leaves.
In Sri Lanka, unlike in urban areas, schools in rural areas such as those well known as tea-producing areas usually do not have class libraries or substantial libraries, which are taken for granted in Japan. The Kirin Group donates quality books to elementary schools for the children of tea farm workers, and continues to help children improve their academic abilities and envision their dreams for the future. We have already made donations to over 200 schools and plan to continue to increase the number of schools to which donations are made.

Mr. Giri Kadurugamuwa, a trainer (top left), a farm manager (top right), a small farm owner (bottom left), checking the site (bottom right)

Vineyard

Nature Positive at Japan Wine vineyards

We have invited researchers from the National Agriculture and Food Research Organization (NARO), and have been conducting ecological surveys at Château Mercian Mariko Vineyard, on the Jinba Plateau in the Maruko district of Ueda City, Nagano Prefecture, since 2014. In these surveys, we confirmed the existence of 168 species of insects and 288 species of plants, including endangered species listed in the Red Data Book of the Ministry of the Environment, Japan. Many rare species, including endangered species, have also been found in Jyonohira Vineyard in Katsunuma-cho, Koshu City, Yamanashi Prefecture.

In addition to contributing to the expansion of our business, the conversion of derelict farm land into hedgerow-style vineyards for Japan Wine also creates valuable grasslands and contributes to the expansion and protection of Japan's traditional rural Satochi-Satoyama landscapes.

Mariko Vineyard as vast, good-quality grasslands that develops ecosystems

Within nature, there is a kind of nature called "secondary nature" that is protected only by human intervention. Attention has been focused on trends such as the proposal of "Other effective area-based conservation measures" (OECMs) at the Fourteenth Conference of the Parties to the Convention on Biological Diversity in 2018. A typical example is grasslands. Grasslands are said to have covered 30% of Japan's national land area 130 years ago, but they have dwindled to just 1% today. However, the ratio of endangered plants per unit area is extremely high (see figure on the top right), and grasslands play an important role in conserving biodiversity.

In Japan Wine vineyards, we regularly cut the undergrowth for vertical shoot cultivation, and this has created an environment that functions as high-quality, vast, grasslands, enabling the development of native and rare species, without being dominated by highly fertile plants. Mercian envisions to "make Japan recognized as one of the world's foremost wine regions." As such, in order to produce wine of world-class quality in a stable manner, the expansion of vineyards that Mercian manages itself to secure high-quality grapes on an ongoing basis contributes to creating grasslands and enriching ecosystems.

In 2019, in order to also investigate the effects of grass growing on grapes themselves, we began conducting a study of spiders, soil organisms, and birds in the vineyards. For spiders, we start by investigating what they eat.

Surveys of arachnids in Japan Wine vineyards are rare, and we have already discovered Phaeocedus braccatus, the fourth specimen of this extremely rare species of spider found in Japan. We have also confirmed the existence of 55 birds from 7 species in vineyards, and 87 birds from 21 species in adjacent forests. We observed many larks, buntings, pheasants, and tits, suggesting that vineyards are functioning as an alternative to grasslands, which are in sharp decline in Japan. We are also investigating earthworms, a kind of soil organism, on an ongoing basis.


Mariko Vineyard


Château Mercian Mariko Winery

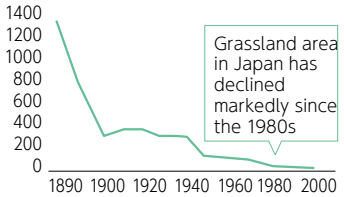

Careful mowing at Jyonohira Vineyard

Surveys at Jyonohira Vineyard

Jyonohira Vineyard in Katsunuma district of Yamanashi Prefecture is a vineyard operated by Mercian that started vertical shoot positioning cultivation in 1984 in an attempt to produce the finest Cabernet Sauvignon in Japan.

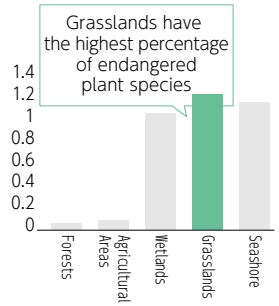
In surveys conducted between 2018 and 2019, we found many rare species, including Japanese bellflower (Platycodon grandiflorus) and silver orchids (Cephalanthera erecta), which the Red Data Book of the Ministry of the Environment designates as endangered. More than 30 years have passed since we began cultivation, and we are very careful when cutting the grass, partly because it is a relatively small vineyard, which we speculate is the reason.

Trends in grassland area in Japan



Aggregated from Successive-Year Forest Area Statistics and MAFF Statistical Tables

Number of endangered species by unit area



Endangered plant species per hectare
Source: Western Japan Grasslands Research Group (2007)

Rare species found in ecological surveys

Mariko Vineyard

Zygaena niphona niphona

Near threatened species on the Ministry of the Environment and Nagano Prefecture Red List

Sophora flavescens

The only edible grass for feeding *Shijimiaeoides divinus*, a butterfly that the Red List of the Ministry of the Environment lists as critically endangered IA (designated as endangered IB by Nagano Prefecture)

Argyronome laodice japonica

Vulnerable species on the Ministry of the Environment's Red List. Near threatened species on the Nagano Red List

Hemerocallis citrina var. vespertina

Near threatened species on the Nagano Red List

Leonurus japonicus

Near threatened species on the Nagano Red List

Vincetoxicum pycnostelma

Near threatened species on the Ministry of the Environment and Nagano Prefecture Red List

Jyonohira Vineyard

Platycodon grandiflorus

Vulnerable species on the Ministry of the Environment's Red List and near threatened on the Yamanashi Red List (NT)

Cephalanthera erecta

Vulnerable species both the Ministry of the Environment's Red List and the Yamanashi Red List (VU)

Tengusawa Vineyard

Argyronome laodice japonica

Near threatened species on the Nagano Red List

Studies into the process of converting derelict farm land into vineyards

At Tengusawa Vineyard in Koshu City, Yamanashi Prefecture, we are collaborating with NARO to conduct a research project that is rare even on a global basis, relating to changes in ecosystems as a piece of derelict farm land is converted into a hedgerow-style vineyard that can be harvested.

At Mariko Vineyard and Jyonohira Vineyard, we can only conduct surveys in well-maintained vineyards, but at Tengusawa Vineyard, we can make observations based on the condition of derelict farm land before developlment. Through these surveys, we believe that we have successfully confirmed that the development of derelict farm land into vineyards enriches ecosystems.

When we investigated derelict farm land prior to its cultivation in 2016, we found only insect and plant species extremely lacking in diversity, as a result of damage from deer eating the vegetation. Since we fenced and reclaimed the area in 2017, however, the landscape has changed to one like a vineyard, and we are seeing how the ecosystem has become richer during this process. In vegetation surveys, we found that after development, the plant life gradually changed from a plant colony of annual grass to one of perennial plants. At present, there are signs of nekohagi (Lespedeza pilosa), lawn marshpennywort (Hydrocotyle sibthorpioides), and reedgrass, all indicator species for the quality of grassland, as well as Chinese spiranthes (Spiranthes sinensis) and spooted bellflower (Campanula punctata), and in 2021, we confirmed the existence of 103 species, an increase from the previous year, when it was 88. It is fair to say that, through such signs, we have confirmed that the area is becoming a high-quality grassland.

In insect surveys, we also found Argyronome laodice japonica, a vulnerable species listed in the Ministry of the Environment and Yamanashi Prefecture's Red Data Book in 2021, and we were also able to confirm the existence of Ascalaphus ramburi and Nephargynnis anadyomene, which are vulnerable species in the Kanto area. As such, it is fair to say that Tengusawa Vineyard has become a vineyard with a rich ecosystem, where rare species can thrive. We use butterflies as an indicator, and before the site was developed the only notable species were the pale grass blue and dryads (Minois dryas), but around 2019, thanks to the diversification of vegetation on the slopes that we created, the number of observable species increased, leaping to 28 in 2021, from 16 the previous year.

Revegetation activities

In 2016, under the guidance of specialists, we began activities aimed at regenerating rare and native species with the participation of employees, and we have achieved concrete results. Château Mercian has established coexistence with nature, the local community, and the future as an important keywords, and is putting this theme into practice at Mariko Vineyard. In fall, we collect dry grass from areas where there are rare and native species and sow it on the reclaimed land in fields in order to regenerate the vegetation. In the area where we regenerated vegetation, the average number of species present in 2016 was 8.2, but by 2021 this number had increased to 17.9. These areas are steadily becoming high-quality grassland, with tufted vetch (Vicia cracca), bromes (Bromus), lady's bedstraw (Galium verum), queen coralbead (Cocculus orbiculatus), Thunberg's geranium (Geranium thunbergii), toothed ixeridium (Ixeridium dentatum), reedgrass, violets, and nekohagi (Lespedeza pilosa) also becoming established. Native species with flowers have also become established, and in fall, these areas are like flower gardens.

Evolution of the Tengusawa Vineyard ecosystem

Year of study	number of species	
	Butterflies	Plants
2016	14	36
2018	13	43
2019	18	78
2020	19	88
2021	28	103

Revegetation activities at Mariko Vineyard

Year of study	Average number of species per square meter
2016	8.2
2017	12.0
2018	14.2
2019	16.8
2020	17.5
2021	17.9

The process of converting idle and devastated land into vineyards in Tengusawa Vineyard

2016 2017 2018 2019 2020 2021

Activities to increase shrubby sophora

(Above) Elementary school students from the foot of Mariko Vineyard planting shrubby sophora
(Bottom) Volunteers planting shrubby sophora

Activities to increase shrubby sophora

Along with an NGO and local elementary school students, we have begun activities to increase shrubby sophora (Sophora flavescens) in Mariko Vineyard. Shrubby sophora is not a rare species at the national level, but it is the sole grass used for feeding Shijimiaeoides divinus, a critically endangered IA (CR) butterfly. In 2019, international NGO Earthwatch Japan and its volunteers collected, with the permission of the rice field owners, cuttings of shrubby sophora from the sides of rice fields near vineyards, and took them home to grow them. Two years later, at the end of May 2021, we planted the seedlings at Mariko Vineyard.

Since 2021, Ueda City Shiogawa Elementary School at the foot of the Jinba Plateau where Mariko Vineyard is located has also participated in activities to increase shrubby sophora. The school grew cuttings taken in 2021 in a flower bed in the schoolyard, and planted them in Mariko Vineyard at the end of May 2022. We also invite a lecturer from NARO and hold environmental classes for students at the school.

More information on our engagement with areas that produce grapes→P.110

Coffee farms

Support for the acquisition of Rainforest Alliance Certification at coffee farms

Since 2020, the Kirin Group has supported the acquisition of Rainforest Alliance Certification by coffee farms in Vietnam. By the end of 2021, we had provided training for transition to new certification to 309 farmers of arabica coffee. We are utilizing the knowledge we have accumulated by supporting the acquisition of certification by tea farms in Sri Lanka since 2013 to expand our activities to coffee farms in Vietnam.
In 2019, approximately 30% of the coffee beans the Kirin Group imported came from Vietnam, for use in Kirin FIRE and other products. On the other hand, most coffee farms in Vietnam are small farms. As such, the level of agricultural technology is low, and there are farmers who use chemical fertilizers inappropriately owing to a lack of adequate educational opportunities. In 2019, we conducted scenario analysis of the impacts of climate change in 2050 and 2100 and found that coffee bean yields will likely be significantly affected in many countries and regions. We expect that our support for the acquisition of certification, which we began in 2020, will enhance the sustainability of small farms in production areas and contribute to the stable use of high-quality raw materials in the future.

Training based on data analysis

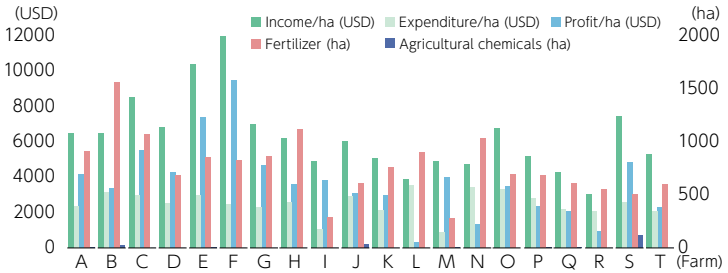
In this activity, we provide training based on data. Specifically, we gained an understanding of data such as the ratio of chemical fertilizers and agricultural chemicals to the income and expenditure of each small farm, the number of shade trees (mainly fruit trees, etc.) that prevent soil drying in direct sunlight and the depletion of coffee trees, and earnings from fruits harvested from those trees. Based on our analysis of the data we collected, we are providing training based on a program we created to contribute to improving farmers' earnings and sustainable production.

More information on the impact of climate change on coffee beans→P.79, P.85

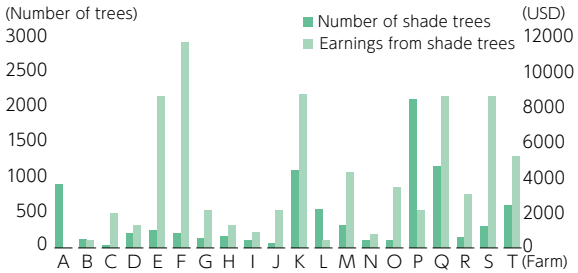

Coffee farm with shade trees


Coffee farm without shade trees

Profit structure of small coffee farms in Vietnam



Data on shade trees in coffee farms in Vietnam




Group training


Practical training at a farm

Hop fields

Hop fields living species survey

We have been conducting an ongoing living species survey in the hop fields of contracted farmers in Tono City since 2014. In 2015, the survey confirmed the presence of 104 insect species and 19 bird species. This rich diversity of living species in the hops fields is attributable to the existence of windbreak forests that protect the hops plants, which grow to a height of five meters, from the effects of the wind.
In the fall of 2020, we conducted a survey of the vegetation in the new hop fields of BEER EXPERIENCE, an agricultural corporation funded by Kirin Brewery, in Tono City. As a result, we found there were *Corydalis raddeana*, which are designated as "Near threatened" in the Ministry of the Environment's Red Data Book, as well as *Cynoglossum asperrimum*, which is designated as "Near threatened" by Iwate Prefecture. In a survey we conducted in spring 2021, we found Adonis ramosa, designated as a "Vulnerable" species by Iwate Prefecture, as well as Anemone debilis and moschatel *(Adoxa moschatellina)*, which are both designated as "Near threatened" by Iwate Prefecture. Next to the hop fields, there are creeks flowing into nearby rice and farm irrigation canals, and the area is also surrounded by forests, ensuring that the soil contains sufficient moisture. We farm the hop fields every year, so the fields themselves do not have the function of enriching vegetation. However, it is fair to say that the creation and maintenance of windbreak forests to aid in the cultivation of hops and the continued functioning of hop fields as rich ecosystems in Japan's traditional rural Satochi-Satoyama landscapes both contribute to the richness of vegetation.

Diverse forms of life inhabit the wind-breaking forests planted to protect the hops and the underbrush planted to prevent drying of the ground.

Insects 104

Birds 19


Corydalis raddeana
Near threatened species on the Ministry of the Environment Red List (NT)


Cynoglossum asperrimum
Near threatened species on the Iwate Red List


Adonis ramosa
Vulnerable species on the Iwate Red List


Moschatel (Adoxa moschatellina)
Near threatened species on the Iwate Red List

Mass plant propagation technology

Kirin's proprietary mass plant propagation technology

Our research of plants began with beer ingredients such as hops and barley, developed into proprietary mass plant propagation technology in the 1980s. Recently, various sectors are increasingly focusing on this technology for its potential to solve social issues. Kirin's mass plant propagation technology is original and globally unprecedented in that it consists of four elemental technologies: stem propagation technique (organ culture method), sprout propagation technique (PPR method), embryo propagation technique (somatic embryo method), and potato propagation technique (micro tuber method).

Plant propagation is normally performed using seeds, cuttings, etc., but the cultivation period is limited and the growth rate can be quite low depending on the plant. However, Kirin's mass propagation technology that we developed through our own research makes it possible to significantly increase the number of quality plants with the same characteristics as the parent plant, regardless of the season.

Kirin's scenario analyses based on the TCFD recommendations that we have conducted since 2018 show that climate change has a significant impact on yields of many agricultural products used as raw materials. Mass plant propagation technology is also useful for the mass propagation aimed at promoting the spread of new varieties that have been developed in response to environmental changes as well as for mass propagation of new varieties, endangered species, and useful plants, and we thus expect it to positively impact the sustainability of agriculture.

Bag-type culture vessel technology

The resin film bag-type culture vessel system that Kirin has developed for mass plant propagation technology offers the advantages of high production and operational efficiency, light weight, low cost, high operational safety, and flexibility in adjusting production size. We aerate a solution containing nutrients necessary for plant growth inside a small bag to allow plants to grow, making it easier to use water more effectively than in soil cultivation and to create a virus/pathogen-free environment. We developed the bag-type culture vessel system from research on the micro tuber method for potato propagation and have enhanced it for use in other propagation technologies.

Bag-type culture vessel system

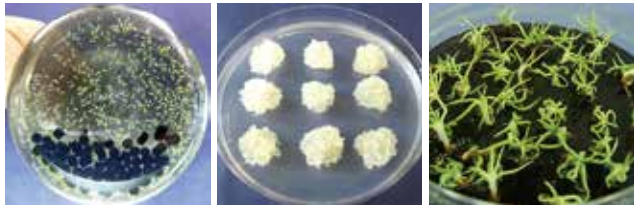
Social impact of mass plant propagation technology

Through joint research with Bridgestone, the Kirin Central Research Institute succeeded in developing a technology that utilizes "bag-type culture vessel technology," a production technology underpinning the commercialization of "mass plant propagation technology," to improve the productivity of natural rubber derived from the "guayule" plant, and began infield assessments. "Rubber trees," which are the main source of natural rubber today, are concentrated in the tropical zones of Southeast Asia, so there is a risk of decreased yields owing to climate change. "Guayule," however, can be grown in arid areas such as deserts, and is thus expected to result in greater capacity to respond to this risk.

Regeneration of coastal forests in the Tohoku Region

For two years from 2014, the Kirin Central Research Institute participated in the Ministry of Agriculture, Forestry and Fisheries project, "Dramatic Improvement of Production of Seeds and Seedlings of *Bursaphelenchus Xylophilus* - Resistant Black Pine for Regeneration of Coastal Forests in the Tohoku Region." We worked to regenerate the coastal protection forests that suffered devastating damage from the tsunami in 2011.

* Agriculture, Forestry and Fisheries Industry/Food Industry Science and Technology Research Promotion Project (lead institution: Forest Tree Breeding Center, Forestry and Forest Products Research Institute, Forest Research and Management Organization)



Cultivation of asexual embryos

Contribution to the lunar farm

The Kirin Central Research Institute took part in the lunar surface base project led by the Ministry of Education, Culture, Sports, Science and Technology launched in 2017, which included industry-academia collaboration research on a pest free farm system and emergency backup system using bag-type culture vessel technology to reproduce growth patterns similar to those under the same atmospheric pressure as on the earth.

World's first cultivation experiment performed onboard the ISS's Japanese Experiment Module "Kibo"

The Japan Aerospace Exploration Agency (JAXA), Takenaka Corporation, Kirin, Chiba University, and Tokyo University of Science, aiming at food production during long-term stays in space for future lunar and other exploration missions, carried out a demonstration experiment of bag-type culture vessel technology onboard the Japanese Experiment Module "Kibo" on the International Space Station (ISS). This was a first of its kind in the world.

JAXA is promoting research aimed at setting up farms on the moon and producing food to enable long-term stays without relying on supplies from Earth. Under a framework calling for joint research proposals, in 2017, JAXA began joint research related to bag-type culture vessel technology with a view to its application in space activities.

Based on the results of previous joint research, the team performed the experiment onboard Kibo, using lettuce cultivation in a bag-type culture vessel technology to assess the effectiveness of this cultivation method in a micro-gravity, closed environment in space, as well as its advantages over hydroponics and soil cultivation.

The team conducted the experiment over a period of 48 days from Friday, August 27 to Wednesday, October 13, 2021. During the experiment, the team promoted cultivation by ensuring the supply of a culture solution and exchange of air. The team confirmed the existence of true leaves of lettuce on September 10, and subsequently continued to steadily grow the vegetable before harvesting it.

Bag-type culture tank with lettuce

We expect future applications of bag-type culture vessel technology to include not just the mass production of leafy vegetables, but also the virus-free growth of seedlings, which will support long-duration manned planetary exploration missions and large-scale cultivation in spacecraft in orbit and/or accommodation on the moon.

Demonstration experiment for bag-type culture vessel technology onboard Kibo

Palm oil

Use of sustainable palm oil

Ratio of Book & Claim RSPO certification

Primary raw materials
Secondary raw materials

The Kirin Group uses palm oil as an ingredient in some of its products, but because the quantity we use is very small and it is difficult to procure physically certified oil, we adopt the Book & Claim method approved by the Roundtable on Sustainable Palm Oil (RSPO) for the procurement of certified sustainable oil.
In accordance with our Action Plan for the Sustainable Use of Biological Resources, we have been adopting this method for the total volume of palm oil (excluding palm kernel oil) used as a primary raw material every year since 2013 and the estimated total volume used as a secondary raw material from 2014.
In March 2018, we became an associate member of the RSPO, and in FY2022, we became a full member. Since 2021, we have been a member of the "Japan Sustainable Palm Oil Network (JaSPON)," in order to accelerate the procurement and consumption of sustainable palm oil in the Japanese market as a secondary raw material.

Paper and Printed Materials

Use of sustainable paper and printed materials

FSC-certified paper or recycled paper

Paper and Printed Materials

In the Action Plan that we revised in February 2017, we declared our aim of using 100% FSC-certified paper or recycled paper in the Japan Alcoholic and Non-alcoholic Beverages Business for all office paper such as copy paper, envelopes, business cards, company brochures, and other printed materials, as well as paper containers, by the end of 2020.
We successfully completed the switch to 100% FSC-certified paper or recycled paper in November 2020.
Currently, we are also promoting the use of FSC-certified paper for paper bags with the KIRIN logo, application postcards for prizes, and some paper cups for tasting.
We plan to expand these activities to other domestic and overseas businesses in the future.

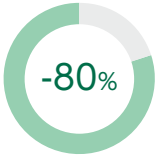
More information on paper containers and packaging→P.48

Food Waste Reduction and Recycling

Reducing losses from disposing of products

In order to reduce losses from disposing dated and damaged products on an ongoing basis, we optimize production by improving demand forecasts through means such as the close sharing of information on factors affecting demand, such as retail sales, with plants and logistics centers. In addition, we are moving forward with efforts to prevent valuable biological resources and containers and packaging from going to waste by strictly managing sales volume targets.

More information on the change to "year-month" labelling for production dates→P.68



Kirin Brewery
Kirin Beverage
Mercian

* Actual data for fiscal 2020

Reduction target -75%
(by 2025, compared with 2015)

Continuous donation of surplus inventory* to local governments and food banks

We are making various efforts to reduce food waste, but there are still cases when we cannot avoid generating surplus inventory* as a result of trends in product sales and other factors. Since 2022, Kirin Beverage has donated excess inventory to local governments, food banks, etc., for effective use by those in need.

* Products that have no quality problems and are within their expiration date, but that we cannot ship because they will take a long time to reach customers

Recycling spent grains from beer mashing as livestock feed

Production processes for beer, low-malt beer, and other products generate spent grains after the mashing process. Because such spent grains contain residues of nutritious substances, we utilize them efficiently as livestock feed for cattle, for growing mushrooms, and other applications.

Developing food products from brewer's yeast

Lion continues to supply brewer's yeast for use as an ingredient in the Australian fermented food, Vegemite.

Reuse of grape press lees

The grape lees from wine-making are turned over in a compost heap on the company vineyard for a year to make compost, which is used as organic fertilizer.

Effective use of shochu lees

Since 2015, we have been supplying some of the distillation residue (shochu lees) generated in the shochu production process at Mercian's Yatsushiro Plant to hog farmers in Kumamoto Prefecture. Farmers used approximately 80% of the shochu lees produced in 2019 as livestock feed.
In 2019, Kirin Holdings, Mercian and the University of Tokyo jointly confirmed for the first time in the world that shochu lees can reduce stress among hogs and improve pork palatability, demonstrating the potential for the effective use and creation of value from shochu lees.

Support for the restoration of nature

Educational program for wildlife conservation in Sri Lanka

Kirin Beverage is funding an educational program for wildlife conservation for young people in tea farms in Sri Lanka.
Leopards are at the top of the food chain in Sri Lanka's ecosystem, but local residents often trap and kill them in traps, raising the need for farmers and local residents to understand the importance of ecosystem conservation.
In 2020, a black panther, said to be a mutation of a leopard that was thought to have gone extinct decades ago, was found in a trap. The black panther was sheltered at the Elephant Transit Home in Udawalawe National Park, but unfortunately died later.
In the wake of this incident, Sri Lankan NGOs, the Department of Wildlife Conservation, academic experts, and farm managers passionate about environmental conservation came together to plan a pilot project to educate young tea farmers about the local ecosystem, which Kirin Beverage helped implement through funding support. The spread of COVID-19 delayed the implementation of this project, but in 2021, two seminars for farm employees and students (69 participants in total) were held in March, and a residential workshop for a total of 43 young people was held in Horton Plains National Park in April and October.

Wildlife conservation workshop

Protection of endemic species in biotopes at manufacturing plants

At the Kirin Brewery's Yokohama Plant, in an endorsement of the "Yokohama b Plan," the city's biodiversity action plan, we built a biotope in the grounds of the plant in the summer of 2012. The Yokohama Brewery, which is part of a widespread network of ecosystems, is pursuing initiatives to enrich the local ecosystem as a whole. Since 2012, the brewery has conducted "Tours to Experience the Blessings of Nature" every week from spring through fall, in collaboration with the Tsurumi River Catchment Network, an NPO with a deep base of knowledge related to the region's natural environment. (We are currently suspending these tours due to the spread of the COVID-19).

The Okayama Brewery biotope

The Kirin Brewery's Kobe Plant has been cultivating local endangered species, including the fish species, Hemigrammocypris rasborella (golden venus chub), and Pogonia japonica, a species of orchid, in the biotope that we set up in 1997. This biotope functions as a "refuge biotope" for the protection and cultivation of local endangered species.
Since 2005, Kirin Brewery's Okayama Pant has been involved in activities with local communities to conserve the ayumodoki (Parabotia curtus), a nationally designated natural monument. Every year, farmed ayumodoki raised by a local elementary school are released into the biotope on the site, and in cooperation with the Organization for the Protection of Ayumodoki in Seto and other specialists, etc., we work to improve the environment to make it easy for ayumodoki to grow, and conduct regular biological surveys. So far, we have not been able to confirm the spawning of ayumodoki, but in a growth survey that we conducted in 2021, we successfully confirmed the spawning of the Cobitis minamorii, an endangered species whose spawning environment is close to that of the ayumodoki. We also display our aquariums during brewery tours to raise awareness of the conservation of the ayumodoki.

Vending machines for the support of the Borneo Green Corridor

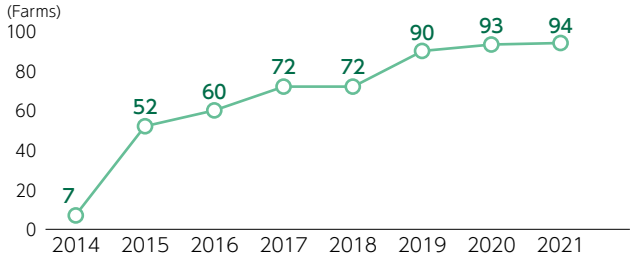
Kirin Beverage endorses the Ongaeshi "Rewarding" Project sponsored by the Borneo Conservation Trust Japan, a specified NPO that conserves Borneo's biodiversity, and operates vending machines that support Borneo and enable users to make donations to the project. We have installed these vending machines in approximately 200 locations throughout Japan, including offices, schools, general buildings, zoos, and construction sites.

The United Nations Food Systems Summit 2021

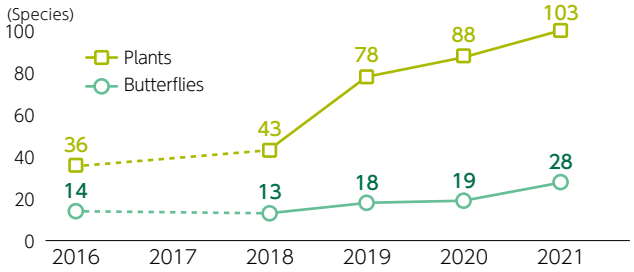
The Kirin Group has made a commitment expressing our support for the United Nations Food Systems Summit 2021 (FSS) to be held in New York in September 2021. In future, we will promote initiatives that contribute to the transformation of sustainable food systems.

Key data related to biological resources

Number of tea farms obtaining certification in Sri Lanka

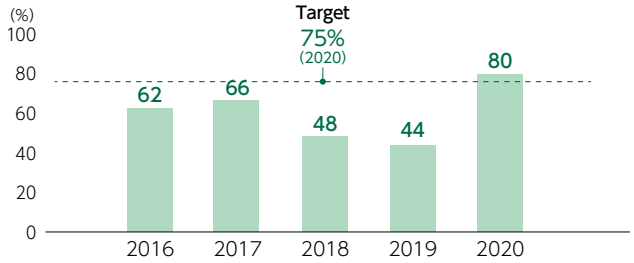


Recovery of Tengusawa Vineyard ecosystem



* There was no ecological survey in 2017, and we began plant surveys in 2018.

Food waste reduction rate (compared with 2015)



Water Resources

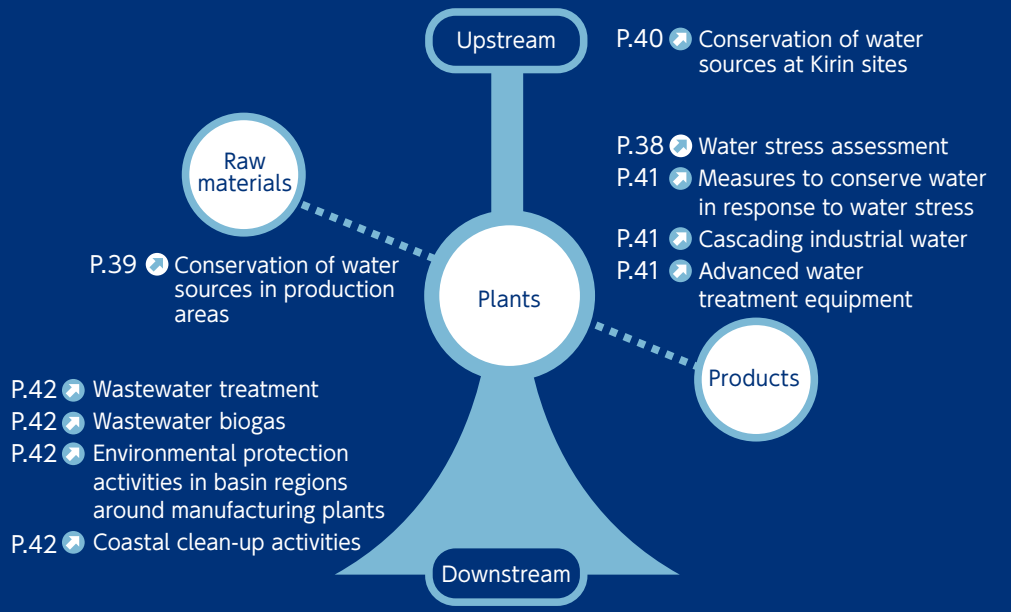
Background to initiatives

Water is not only an essential raw material for the Kirin Group, but is also an indispensable resource for cleaning our production facilities, etc. The Kirin Group has large businesses in both Japan, where water stress is low, and Australia, which has experienced severe water shortages many times in the past. We have been empirically aware from early on that water risks and water stress vary greatly between countries and regions. Since 2014, we have been quantitatively assessing water risk and stress using surveys, and have taken measures to conserve water tailored to water stress at each business site. We are also conducting a scenario analysis based on the TCFD recommendations to study and identify water risks in areas producing agricultural raw materials, and testing countermeasures in areas where we can implement such measures. Looking ahead, we plan not simply to conserve water, but also to identify our impact on the natural capital of basins as a whole and set targets to enable us to reduce our impact.

We will create together

A society that values sustainable water resources

- Bring water, used as a raw material, to a sustainable state
- Solve issues with water in a way that suits the characteristics of basin regions where our business bases are located



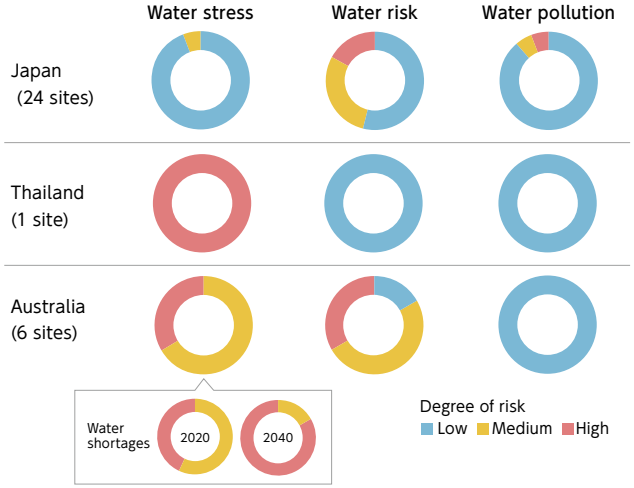
Points

- We had completed the conservation of water sources at 12 locations in tea farms in Sri Lanka as of the end of 2021, and we are currently implementing conservation activities at 2 more locations.
- We are participating in the Corporate Engagement Program held by the Science Based Targets Network to develop scientific approaches and rules for setting targets related to water resources.
- In our third group-wide water risk survey, we reaffirmed that water stress is high in Australia and Thailand, and that water risk is high in China, Australia, and Japan.

Overview of initiatives

Initiative	Issue	Progress
Initiatives to achieve our vision	Risk assessment	We conducted new water risk surveys for two brewing sites at New Belgium Brewing from 2021 to 2022. We also identified our water footprint in relation to key agricultural raw materials.
	Rule making	We are participating in the Corporate Engagement Program of the Science Based Targets Network.
Bring water, used as a raw material, to a sustainable state	Kirin Brewery	In 2021, Kirin Brewery reduced unit water consumption by 49% (compared with 1990), and reduced water usage by 65%.
	Lion	In 2021, Lion increased unit water consumption by 4% (compared with 2015), and reduced water usage by 15% (Oceania region*).
	Kyowa Kirin (global)	In 2021, Kyowa Kirin reduced unit water consumption by 35% (compared with 2019), and reduced water usage by 25%.
	Kyowa Hakko Bio (global)	In 2021, Kyowa Hakko Bio reduced unit water consumption by 22% (compared with 2015), and reduced water usage by 52%.
	Domestic water source forestation	In 2021, we only conducted conservation activities in two locations as a result of the spread of COVID-19. In 2019, 1,192 people participated at 12 locations nationwide.
Solve issues with water in a way that suits the characteristics of basin regions where our business bases are located	Value chain upstream	We had engaged in water source conservation activities at Sri Lankan tea farms in 12 locations through the end of 2021, since commencing these activities in 2018, and activities are ongoing at two locations. We will continue these activities after 2022.
	Response to torrential rain	In response to disruptions to logistics networks caused by the 2018 West Japan Torrential Rain Disaster, we prepared a manual for responding to similar disasters. In 2019, we successfully minimized the impact of Typhoon Faxai and Typhoon Hagibis.

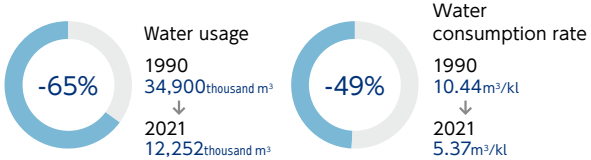
Risk assessment of water resources



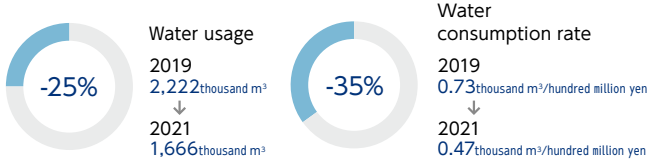
More information on water risk assessments of business sites→P.81

Progress

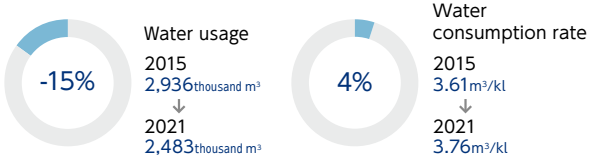
Kirin Brewery



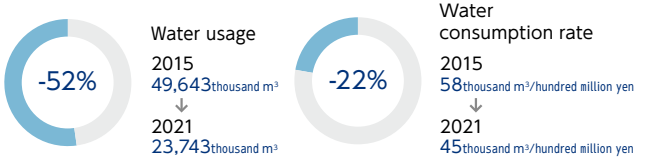
Kyowa Kirin (global)



Lion(Oceania region*)



Kyowa Hakko Bio (global)



1966
Began full-scale introduction of wastewater treatment equipment using the activated sludge process at Kirin Brewery plants.

1997
Kirin Brewery's Kobe Plant, which has achieved the industry's highest level of water conservation, began operations.

1999
Kirin Brewery's Yokohama Plant led the industry in starting Water Source Forestation Activities.

2009
Installed a water recycling plant at Lion's Castlemaine Perkins Brewery.

2014
Identified water risks to natural capital (GHGs, water and land use) in the upstream portion of the Kirin Group's value chain and at major global business sites (disclosed in 2015).

2017
Assessed water risks at 44 sites in 9 countries and in major areas producing agricultural raw materials.

2018
Started water source conservation activities at tea farms in Sri Lanka.

2019
As part of our scenario analysis, we conducted a more detailed water risk assessment of major areas producing agricultural raw materials.

2020
As part of our scenario analysis, we conducted a more detailed water risk assessment of business sites. Lion measured the water footprints of its business sites in Australia and New Zealand, as well as key agricultural raw materials.

2021
We are participating in the Corporate Engagement Program of the Science Based Targets Network. We have conducted trials based on the draft version of the methodology.

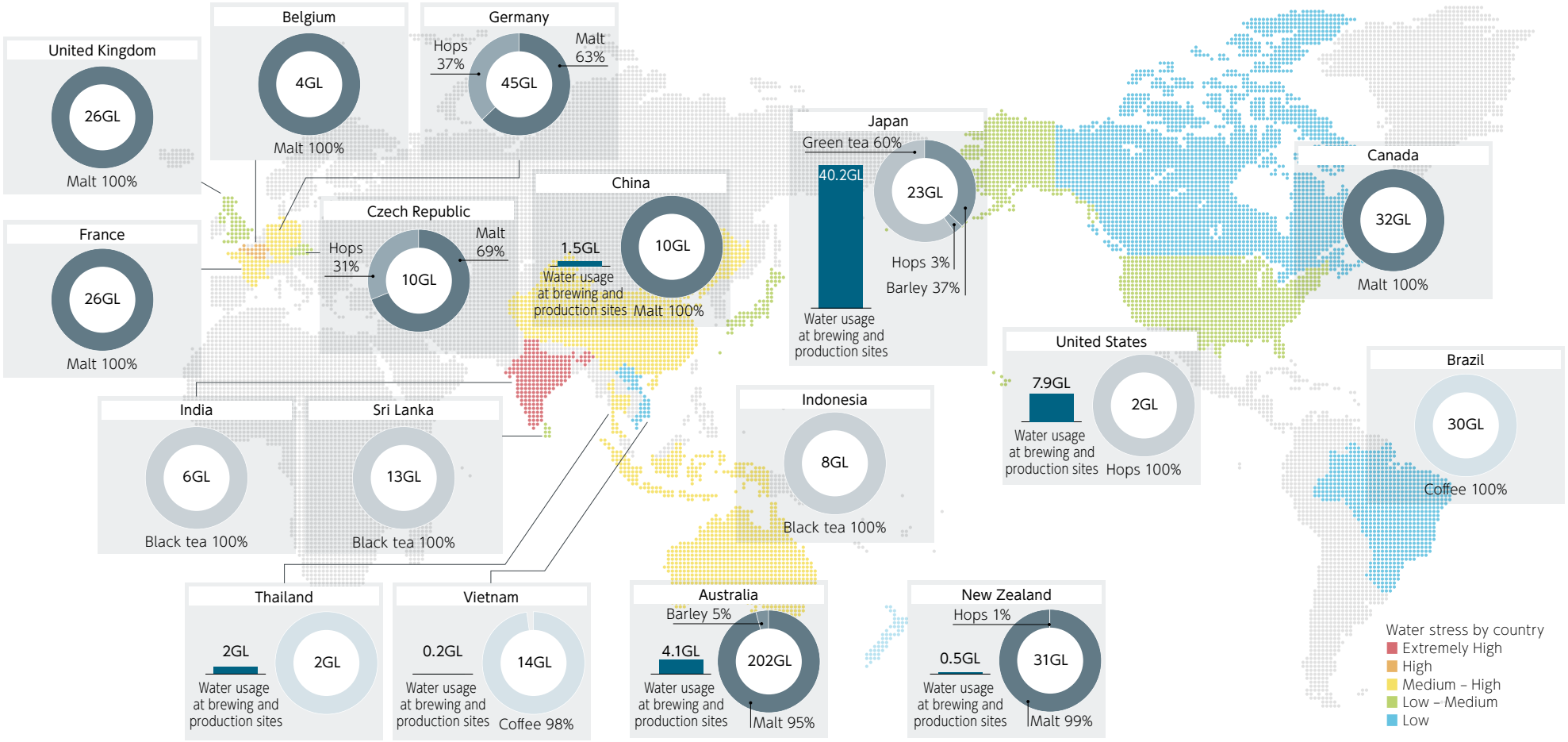
* This region covers the Oceania region where Lion conducts business activities, excluding New Belgium Brewing.

Water stress (drought) assessment

The Kirin Group uses a large amount of water for applications such as cleaning pipes in brewing and production processes. Water is also essential for agriculture to produce agricultural raw materials, which uses more water than the brewing and production bases of Group companies. It is not easy to respond to water resource issues in the upstream of the value chain, but we start by identifying water risk and water stress and understanding the issues.

Below, we have shown water stress by country with the colors on the map, water usage at brewing and production sites in each country with bar graphs, and water usage in areas producing agricultural raw materials with pie charts.

More information on water stress at basins for brewing and production sites→P.81



The survey of agricultural raw materials covered barley, malt, and hops that Kirin Brewery and Lion sourced, and green tea, black tea, and coffee that Kirin Beverage sourced (data for Kirin Brewery and Kirin Beverage are as of 2021; Lion data is as of 2018).
Water stress due to drought is based on the country score for Baseline Water Stress used in WRI Aqueduct.

Conservation of water sources in production areas

Water resource issues in the upstream of the value chain

As a first step in solving water issues in areas where we source our agricultural raw materials in the upstream of our value chain, the Kirin Group began water source conservation activities at Sri Lankan tea farms in 2018. The COVID-19 pandemic resulted in difficulties for our activities, but as of the end of 2021, we had completed conservation activities at 12 sites, and we are currently implementing conservation activities at two more sites. We have provided group training to 1,750 people living near water sources in order to support understanding of the necessity of conserving water sources. In addition, we have distributed pamphlets on water conservation and basin protection to 15,000 residents as part of measures to raise awareness.

Conservation activities for water sources on tea farms

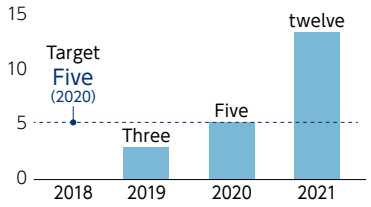
In a 2017 assessment of water risks and water stress in the value chain and scenario analysis in 2019, it was evident that climate change will cause water stress and flood risks to increase in areas producing agricultural raw materials in the future. It is not easy to respond to water resource issues in the upstream of the value chain. Therefore, the Kirin Group decided to start addressing this issue with Sri Lanka, where we have been providing assistance for obtaining sustainable tea farm certification, and where we have developed strong partnerships with local tea farms and NGOs. As such, we are working to accumulate knowledge in this area.

At the tea farms in the Sri Lankan highlands, there are many areas with tea trees on steep slopes. In such places, it is said that the level of water recharge is not high because even if it rains, the rainwater flows down the slope. In places with good conditions such as strata, however, rainwater penetrates into the ground and gushes out as springs in certain places in tea farms. These places are known as micro watersheds. Micro watersheds on tea farms can be found in the highlands of central Sri Lanka, and, in almost all cases, they are headstreams of rivers flowing through coastal cities. For this reason, while they occupy only a tiny area, they are very precious water sources.

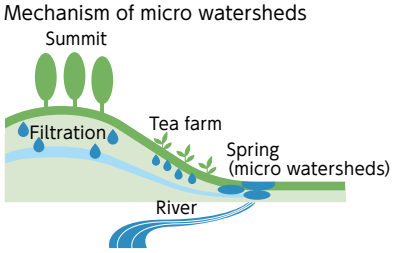
In our yearly efforts to engage with local farms managers, we learned that although the Sri Lankan government went as far as mapping micro watersheds in order to support understanding of their importance and make them easier to conserve and manage, these efforts were held up owing to a lack of funds. Therefore, in order to further enhance the sustainability of tea farms whose acquisition of certification we supported and the surrounding areas, we began activities to conserve water sources at farms in 2018.

These activities involve fencing off micro watersheds of the farms so that they are not used for other purposes, and planting unique regional native species around them. This provides a diversity of vegetation at tea farms, which have a single crop, and prevents soil from flowing down the mountain slope into water sources as a result of torrential rain, etc.

Number of areas where water sources were conserved among Sri Lankan tea farms



Mechanism of micro watersheds




Tea bushes planted on steep slopes


A fenced off micro watershed


A stream in a tea farm

Education programs to teach the value of water

Number of residents to educate about the importance of water

15,000

Target 15,000 (2020)

Owing to the history of large Sri Lankan tea farms, going back to when the plantations were first established under British colonial rule, many people still live on the vast tea farms who make a living by doing work that has nothing do with the tea farms themselves. These residents have been generally allowed to use empty plots that are not being used to grow tea for their living. For this reason, there have been cases in which these residents, not recognizing the micro watersheds as water sources, have converted those areas to vegetable patches or grazing pasture, or have cut down the trees around the watersheds for firewood. In order to protect the water sources, instead of merely fencing off the micro watersheds to keep the tea farms' residents away, there is a need to educate them that those areas are water sources that we should protect.

The Kirin Group is conducting an education program to teach residents living near target water sources about such matters as the importance of water and the functions of micro watersheds. At some farms, we are also working to incorporate our educational programs as part of the curriculums of day care centers and elementary schools attended by the children of tea pickers, etc.


Flyer for water education

Contribution to water-efficient agriculture

The bag-type culture technology that Kirin has developed for the practical application of mass plant propagation technology is expected to be used in water-efficient agriculture.

With the resin film-based bag-type culture vessel system, we allow plants to grow by aerating a solution containing nutrients necessary for plant growth inside a small bag, making it easier to use water more effectively than in soil cultivation. This system may have applications in cultivation in dry areas, for example.

More information on mass plant propagation technology→P.33

Conservation of Kirin water sources

Water source forest conservation activities

Our Water Source Forestation Activities, which are an activity to protect the water sources of our breweries and plants, began in the forest of the Tanzawa district of Kanagawa Prefecture, which is the water source for Kirin Brewery's Yokohama Plant in 1999. We have since adopted this initiative, which was a pioneering initiative in the industry, in 11 locations across Japan. Under medium and long-term agreements with the local governments and other relevant parties that manage the water source forests, the program includes tree planting, undergrowth cutting, pruning, and thinning. Today, many of the forests are bright, luxuriant forests. In some locations, some of our customers have volunteered to take part in the activities.
In 2019, 1,192 people participated in a total of 15 activities, but starting in 2020, we ceased our activities in most locations in response to the COVID-19 pandemic. At the end of 2020, scoria terrain particular to Mt. Fuji crumbled and fallen trees, etc., were found in the Kirin Mt. Fuji water source forest, a water source for Kirin Distillery. Accordingly, in 2021, Tsuchi ni Kaeru Ki Forestation Society (NPO), Shizuoka Prefecture, Gotemba City, and Kirin Distillery concluded the "Shizuoka Future Forest Supporter Agreement," and began forestation activities covering a total of approximately 2.7 ha, including not only the water source forest but also the Takane Regeneration Forest nearby. In 2021, 70 employees planted trees, and 11 junior high school students from the Gotemba Special Needs School Junior High School planted trees and learned about the forest environment.
At the Kyowa Hakko Bio Yamaguchi Production Center, we engaged in activities that were possible even amid the COVID-19 pandemic, such as the participation by eight employees in forest conservation activities organized by the Water Utilization Council at water intake sites.

Water source forest activities at Kirin Mt. Fuji water source forest

Grassland conservation activities to recharge groundwater

In the "Aso Area Grassland Regeneration Project Aimed at 'World Cultural Heritage' Status," we are providing "support for the resumption of open burning" to preserve the grassland landscape of Aso. These activities are part of the support that we provide based on the comprehensive tri-party support agreement related to the Kirin KIZUNA Relief-Support Project concluded between Kumamoto Prefecture, the Nippon Foundation, and the Kirin Group in 2018, with the aim of achieving a creative recovery from the 2016 Kumamoto Earthquake. Preserving the vast grasslands of Aso, which recharge large amounts of groundwater, will help protect the water that we use as a raw material at the Mercian Yatsushiro Plant. In 2021, six people from the Yatsushiro Plant participated in this activity. In 2021, we cut paths in the grass around areas for controlled burning, then burned the cut grass a few days later to create firebreaks to control fires. The maintenance of grasslands is also important for the survival of rare plants adapted to grasslands.

Cutting paths around areas for controlled burning

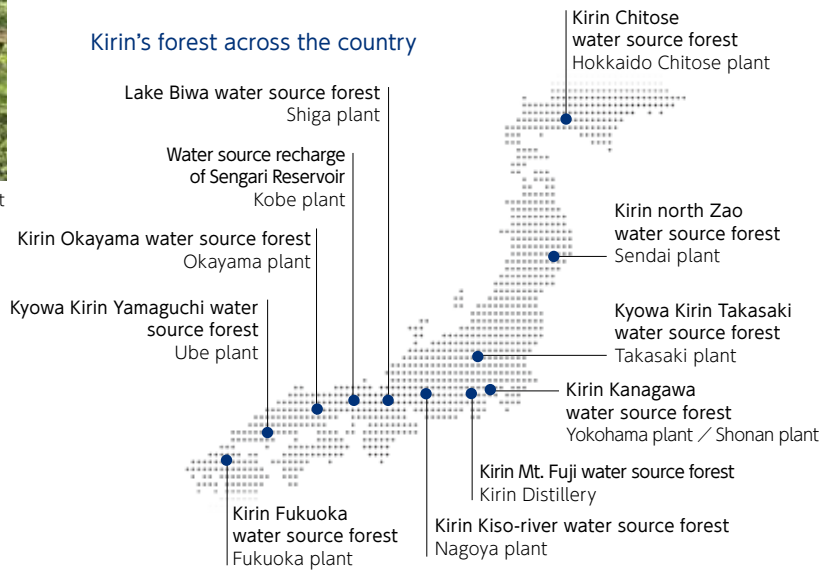
Controlled burning

Voice of Stakeholder

"Forestation" helps store water, prevent soil runoff, absorb carbon dioxide, and contribute to mitigating climate change through the promotion of forest maintenance activities such as planting seedlings, clearing undergrowth, cutting, thinning, and regeneration cutting. At the Kirin Mt. Fuji water source forest, in 2021, Kirin Distillery, Tsuchi ni Kaeru Ki Forestation Society (NPO), Gotemba City, and Shizuoka Prefecture concluded the "Shizuoka Future Forest Supporter Agreement." With the support of the local government, we are working to create forests for passing on people's wishes and the rich natural environment to future generations.

Tsuchi ni Kaeru Ki Forestation Society (NPO)

Kirin's forest across the country



Production

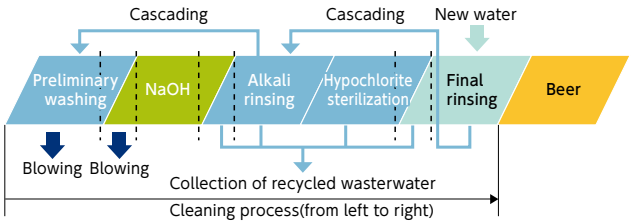
Measures to conserve water in response to water stress

Reducing the amount of water we use in our breweries and plants is a major issue. The Kirin Group has pursued water conservation through recycling and other means, in addition to initiatives based on using water only when and as much as needed.
Focusing on water stress in the basin regions around our breweries and plants, we are installing and operating water-saving equipment according to the level of water stress.

Cascading industrial water

In plants, much of our water usage is for washing and sterilizing processes for equipment and pipes. In addition to establishing frameworks and mechanisms to confirm and assure the washing, from a quality perspective, we also strictly control water flow rate and velocity to ensure that we do not waste water. We also actively pursue the re-use of water, depending on the purpose.
For example, the rinsing water that we use in the final step of the pipe and equipment washing process is still relatively clear, so we can use it again for the initial process of pipe washing. In this way, we have implemented a cascading system of water use in which we repeatedly use water that we have previously used in washing, according to the quality of the water. In actuality, considerable knowledge on how to use equipments is necessary to guarantee that we are properly washing the equipment and pipes, such as achieving the right balance of the amount of water we can recover and the amount of water we can use, as well as the timing of recovery and use.
The Kirin Group is achieving a high level of water conservation by sharing and accumulating various different types of expertise.

Cascading rinse water for washing tanks



Reuse of cooling water

Thai Kyowa Biotechnologies, which was subject to restrictions on water intake in 2020, has been promoting the reuse of cooling water for amino acid production.
In order to produce amino acids, a large amount of water is required, including cooling water for cultivation, water for making preparations for the production process, and water for washing purification resin column. The system is such that cooling water produced from piped water is drained after a certain number of uses, and new piped water is supplied. Thai Kyowa Biotechnologies has been increasing the number of times cooling water is reused to save piped water required for cooling.

Air rinse facility

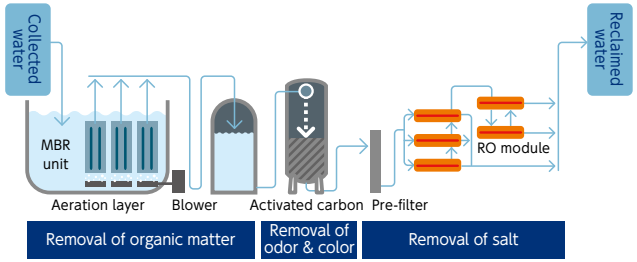
In January 2022, Kirin Beverage's Shonan Plant introduced and used a new sterile filling system for PET bottles. This system replaces water with air in the rinsing process on the non-alcoholic beverages production line. We expect the annual amount of water conserved during production to be around 130,000m^3. We plan to introduce the same system in other non-alcoholic beverage lines to further reduce water consumption.

Air rinse facility introduced at the Shonan Plant

Advanced water treatment equipment

In 2009, Lion partnered with the government of Queensland, Australia, to install a reverse osmosis (RO) plant at the Castlemaine Perkins Brewery, to recover wastewater and minimize our reliance on mains-fed town water from the area where the brewery is located. Lion has introduced a water recycling plant with the aim of reducing the amount of water used for brewing by half. We use water treated with reverse osmosis membranes in non-product related processes, such as cleaning, cooling, and pasteurizing. In 2021, Castlemaine Perkins Brewery achieved a unit water consumption rate of 2.8kl/kl, which approaches world class levels.
Lion is sharing this technology within the Kirin Group, and we are now using it at Kirin Brewery's Kobe Plant.
Lion, which faces a high level of water stress, set a target during 2021 of increasing water efficiency to 2.4kl/kl by 2025 at breweries producing large quantities of beer. At Tooheys Brewery, which uses the most water, we are considering various options for water recycling and reuse, and plan to develop an effective approach during 2022.

Flow of sophisticated water processing facility at the Kobe Plant



Wastewater treatment

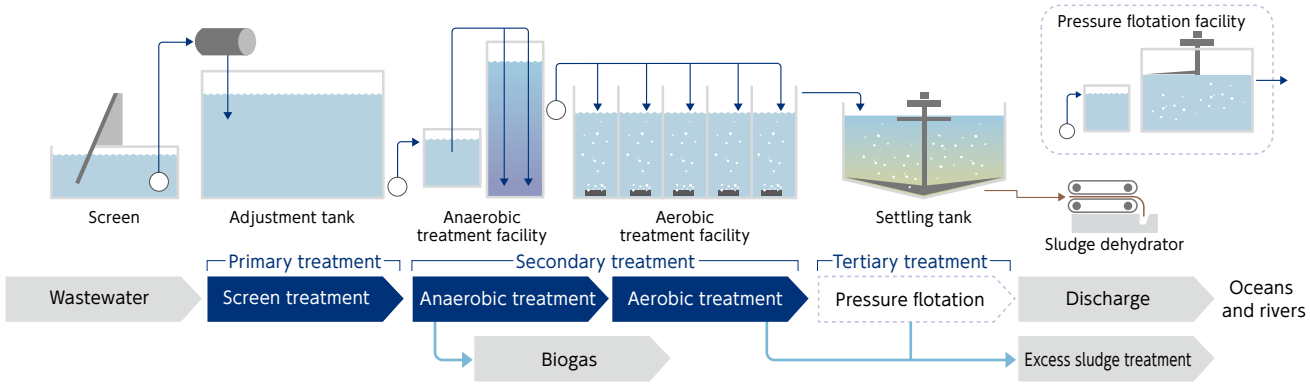
Wastewater treatment

In the Kirin Group, we purify the water that we have finished using to voluntary standards that are stricter than those required by law, before we release it into rivers and sewers.
Breweries and plants in basin areas with strict wastewater standards remove phosphorus and solids by anaerobic and aerobic treatment followed by pressure flotation. We reuse excess sludge discharged from aerobic and pressure flotation treatment as fertilizer and soil conditioner. The Kirin Group discharges clean water into the ocean, rivers, and sewers in consideration of the aquatic ecosystem.

Wastewater biogas

In our breweries, we have introduced anaerobic treatment facilities to purify the wastewater generated by the production process. Unlike conventional aerobic treatment, anaerobic treatment does not require electricity for aeration. Also, the anaerobic microorganisms generate biogas as a by-product of the treatment process. This biogas, the main component of which is methane, can be utilized in biogas boilers and cogeneration systems. Derived from plant-based raw materials such as malt, biogas is a renewable energy and a CO_2-free fuel.

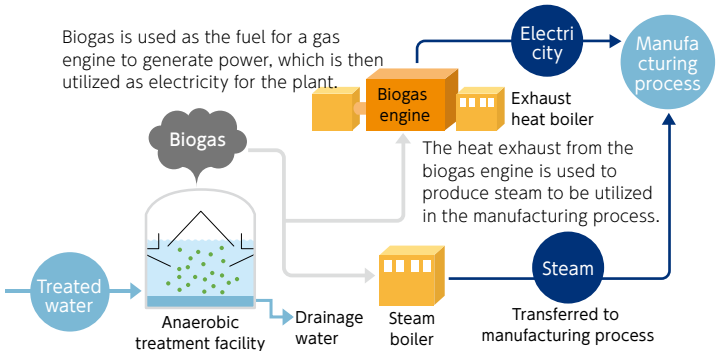
Wastewater treatment system



Anaerobic treatment mechanism

Drainage water is used to generate electricity and steam.

The main component of biogas is methane.Biogas is produced by putting the drainage water from the plant into a tank filled with granules of an anaerobic microorganism, and circulating the water in the tank.



Environmental protection activities in basin regions around production plants

At the various production plants of the Kirin Group, we are conducting a range of environmental protection activities, particularly riverside clean-up activities in cooperation with local governments and NGOs.
The Kirin Brewery's Yokohama Plant, in cooperation with an NPO, Tsurumi River Basin Networking, continues to conduct beautification campaigns at nearby Tsurumi River, Living Species Observation Events, and other events.
At our breweries and plants, including those of Kirin Brewery, Kirin Beverage, Mercian, Kyowa Kirin, and KOIWAI DAIRY PRODUCTS, we are also engaged in local environmental beautification and environmental protection activities, focusing on the rivers they draw water from and other nearby rivers.
In response to the COVID-19 pandemic, a considerable number of our plants canceled river and beach clean-up activities in 2021. In April and November, however, the Kirin Brewery's Chitose Plant took part in coastal clean-up activities along the Chitose River, while the Mercian Yatsushiro Plant did the same along the Harima River in November.

Coastal clean-up activities

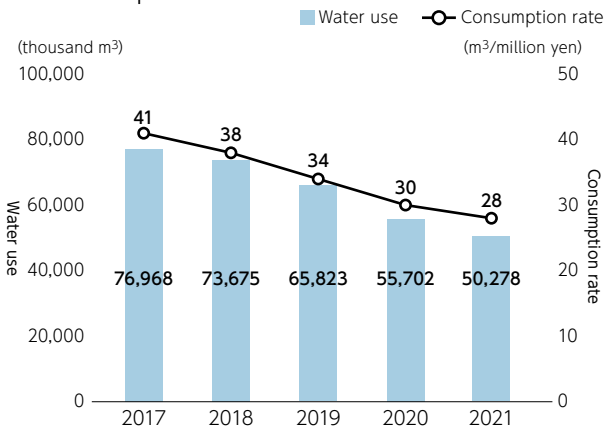
In 2021, we canceled coastal clean-up activities as a result of the COVID-19 pandemic, but employees of Mercian's Fujisawa Plant and their families participated in clean-up activities on the Katase Coast in Fujisawa.
At the Kyowa Hakko Bio Yamaguchi Production Center, employees performed clean-up activities in the waters off Hyakken, a port facility where chemicals and glucose solutions are unloaded.

Clean-up activities off Hyakken

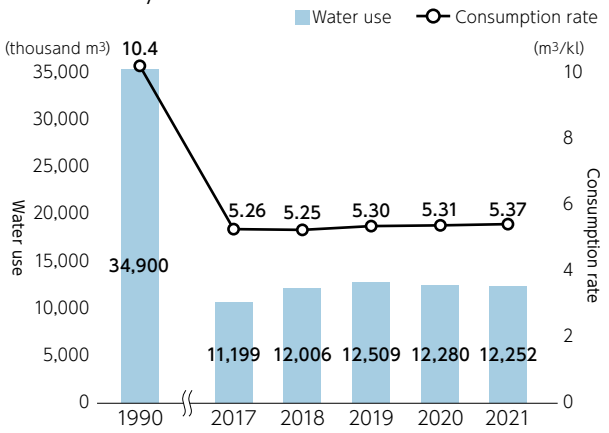
Key data related to water resources

Related Information→P.125～P.126

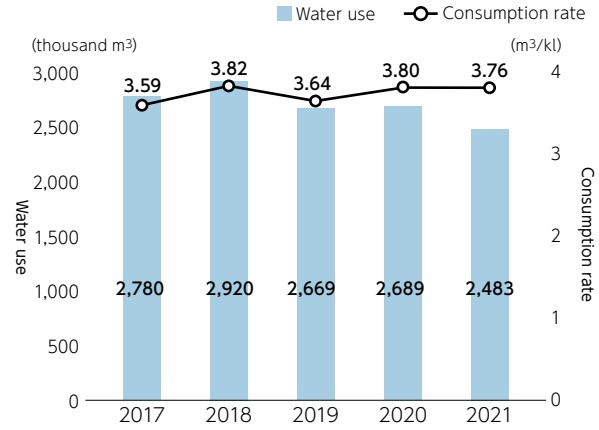
Water use and consumption rate (water use / sales revenue) of entire Group



Water use and consumption rate (water use / production volume) of Kirin Brewery

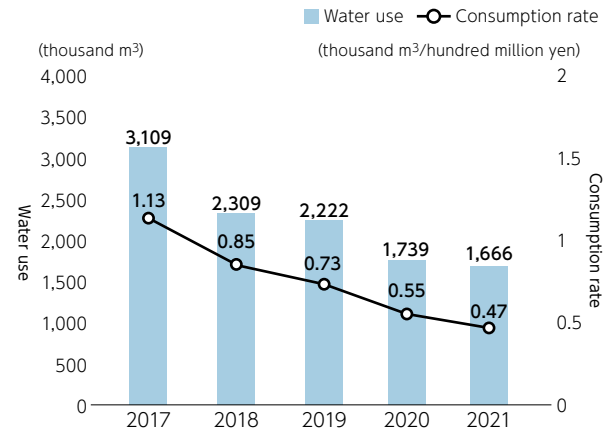


Water use and consumption rate (water use / production volume) of Lion(Oceania region*)

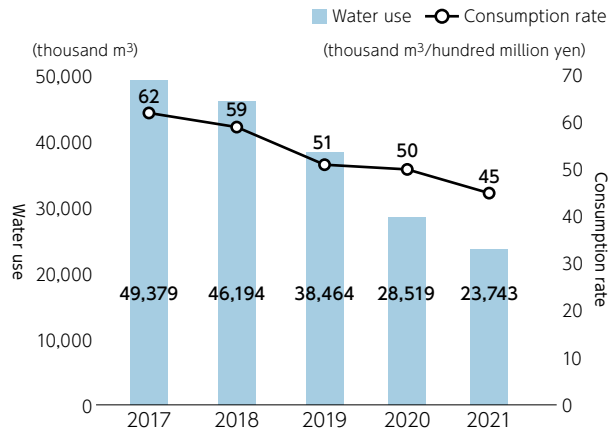


* This region covers the Oceania region where Lion conducts business activities, excluding New Belgium Brewing.

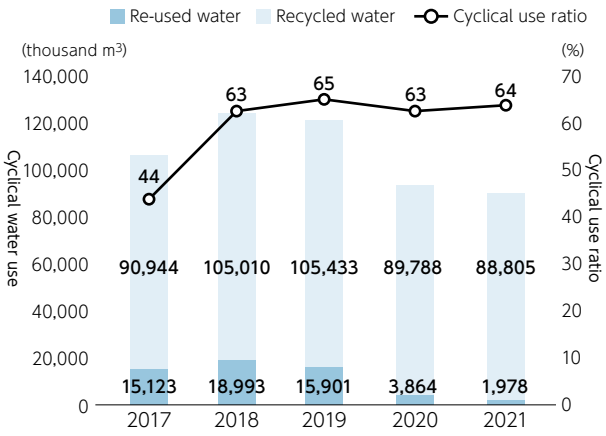
Kyowa Kirin (Global) water use and basic unit (water use / sales revenue)



Kyowa Hakko Bio(Global) water use and basic unit (water use / sales revenue)



Cyclical water use and cyclical use ratio (cyclical use / (tap water use + cyclical use)) of entire Group



Containers and Packaging

Background to initiatives

Containers and packaging are essential to protect the quality of products for delivery to our customers. To address the issues caused by containers and packaging, the entire industry has promoted 3R (reduce, reuse, recycle) and achieved a high recycling rate. With regard to paper containers, in order to solve problems related to human rights and the destruction of forests that provide raw materials, we soon began promoting sustainable paper use. By the end of 2020, we had achieved 100% use of FSC-certified paper for all paper containers in the Japan Alcohol and Non-alcoholic Beverages Businesses. In response to issues related to plastics, we also aim to solve issues specific to countries where we operate our businesses and create a "society that continuously circulates plastics" from a global perspective.

We will create together

A society that circulates containers and packaging in a sustainable way

- Develop and disseminate sustainable containers and packaging
- Build a resource circulation system to make containers and packaging sustainable

Raw materials

Reduce
- P.46 Sustainable PET bottles and R100 PET bottles
- P.48 Sustainable paper containers and FSC-certified paper
- P.49 Cardboard cartons for products
- P.49 6-can pack
- P.49 Aluminum cans
- P.50 Returnable glass bottles
- P.50 No label products
- P.50 PET bottles

Reuse
- P.52 Returnable glass bottles

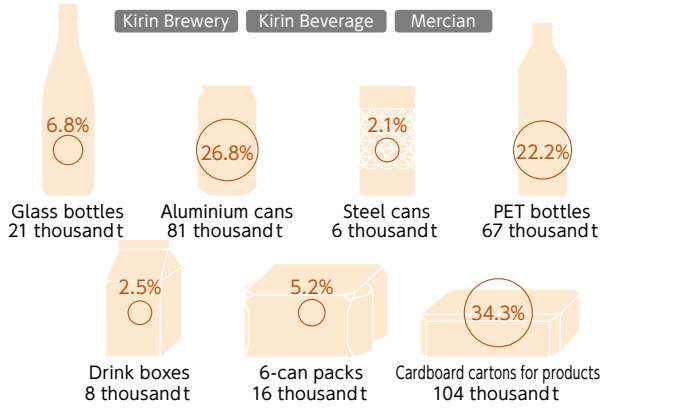
Recycle
- P.53 PET bottles
- P.53 Glass bottles
- P.53 Cans
- P.54 Promotion of recycling in Australia and New Zealand

Society
- P.55 With the Society

Points

- Expanded use of "R100 PET bottles" made from 100% recycled PET resin to cover *Kirin Nama-cha, Kirin Nama-cha Hoji Sencha, Kirin Nama-cha Life Plus Immune System Assist, and Kirin Nama-cha Caffeine Zero.*
- With the aim of creating a "society that continuously circulates PET bottles," we have begun technical studies on PET recycling using chemical recycling in a joint project with Mitsubishi Chemical Corporation. As part of our aim to create a resource circulation system, we expanded our trial of the collection of used PET bottles to drugstores in addition to convenience stores.
- Maintained our achievement of the 100% use of FSC-certified paper for all paper containers in the Japan Alcohol and Non-alcoholic Beverages Businesses.
- Joined the "Alliance to End Plastic Waste (AEPW)," an industry-led NGO.

Material mix of containers and packaging in 2021, by weight

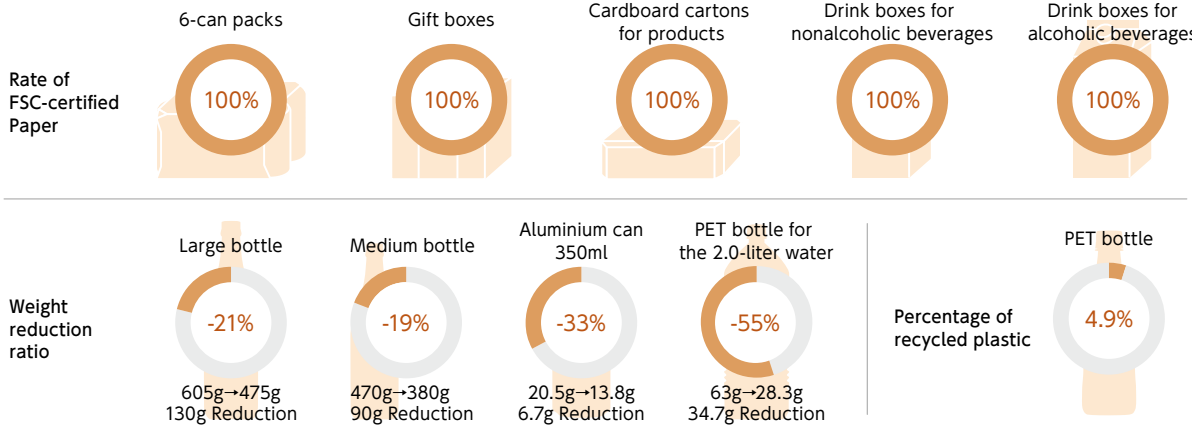


Global resource use of containers and packaging: 480 thousand tons For details→P.126

Overview of initiatives

Initiative	Issue	Progress
Initiatives to achieve our vision	Joint research	In a joint project with Mitsubishi Chemical Corporation, we began studying technologies for using chemical recycling to recycle PET.
	Consortium	We were the first Japanese food company to participate in AEPW, as part of our aim to create a "society that continuously recycles plastics."
Develop and disseminate sustainable containers and packaging	Paper containers	Achieved 100% use of FSC-certified paper for all paper containers in the Japan Alcohol and Non-alcoholic Beverages Businesses in November 2020.
	Expanded use of recycled PET resin	Since 2021, we have expanded the use of "R100 PET bottles" made from 100% recycled PET resin to cover *Kirin Nama-cha, Kirin Nama-cha Hoji Sencha, Kirin Nama-cha Life Plus Immune System Assist, and Kirin Nama-cha Caffeine Zero.*
	Weight reduction of PET bottles	In 2020, we achieved a 16% weight reduction in some 2L and 1.5L large PET bottle products in lines such as *Kirin Gogo-no-Kocha* and *Kirin Nama-cha*. In addition, we adopted "roll labels," which are much thinner and smaller than shrink labels, for vending machine products. We have developed a 720ml PET bottle for wine that is the lightest in Mercian's history (29g, making it 5g lighter than the previous 34g).
	Weight reduction of other containers	We have been continuously using the lightest returnable beer bottles produced in Japan, some of the lightest aluminum cans produced in Japan, smart-cut cartons, etc.
Build a resource circulation system to make containers and packaging sustainable	Recycling of PET bottles	As part of our aim to achieve the Kirin Group Plastic Policy (established in 2019), we have begun trialing the collection of used PET bottles at convenience stores using a bottle collection machine developed by our Institute for Packaging Innovation, as a system for recycling PET bottles.
	No label products	In 2021, we launched *Kirin Nama-cha No Label, Kirin Nama-cha Hoji Sencha No Label,* and *Kirin Gogo-no-Kocha Oishii Muto (sugar-free) No Label*, and in 2022, we expanded our range of no label products with the launch of *Kirin FIRE ONE DAY Black No Label.*
	Reuse of beer bottles	Firmly maintain a reuse system.
	Recycling of cans	Continuing to provide voluntary support for the recovery of aluminum cans.

Progress



1993 Developed the lightest returnable large bottles produced in Japan and introduced them into the market on a limited trial basis.

1994 Began using 204-diameter beer cans.

2003 Completed the switch to 100% use of the lightest returnable large bottle produced in Japan.

2004 Began using corner-cut cartons.

2014 Began developing and deploying the lightest returnable medium bottle produced in Japan. Began using some PET bottles made from 100% recycled PET resin.

2017 Revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources, and declared our aim to achieve 100% use of FSC-certified paper for all paper containers at domestic beverage manufacturers by the end of 2020.

2019 Developed the Kirin Group Plastic Policy. Began using "R100 PET bottles" made from 100% recycled PET resin for Kirin Nama-cha Decaf.

2020 In the Kirin Group's Environmental Vision 2050, we declared our aim to achieve 100% sustainable containers and packaging using recycled materials and biomass by 2050. Achieved 100% use of FSC-certified paper in all containers at domestic beverage producers. In a joint project with Mitsubishi Chemical Corporation, we began studying technologies for chemical recycling of PET bottles.

2021 Expanded use of "R100 PET bottles" to cover Kirin Nama-cha and Kirin Nama-cha Hoji Sencha. Began sales of no label products. Joined the "Alliance to End Plastic Waste (AEPW)," an industry-led NGO. Began trialing the collection of used PET bottles at convenience stores.

2022 Revised the "Action Plan for the Sustainable Use of Biological Resources," and expanded the number of Group companies that aim to use paper containers that have been confirmed to take sustainability into consideration. Launched a demonstration trial on the collection of used PET bottles at drugstores.

* The product pictures used on page 44 are as of the end of June 2022.

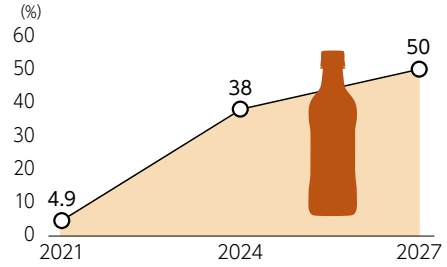
Sustainable PET bottles

Plastic Policy

Kirin Holdings developed the Kirin Group Plastic Policy in February 2019 with the intention of finding solutions to issues related to plastic.
The convenience of plastic has made it a popular material for many different products, including containers and packaging. With such a vast range of types and applications of plastics, collection and recycling rates vary depending on the type of plastic used, and it cannot be said that all plastic resources are being efficiently circulated. Mismanaged plastic waste discarded into the environment is finding its way into the oceans, causing marine pollution and global concern about the potential adverse effects on ecosystems. To solve these problems, we must promote resource recycling for PET bottles.
In the Kirin Group Plastic Policy, to further promote the resource circulation of PET bottles, we pledged a target of increasing the percentage of recycled resin in PET bottles for the Japan market to 50% by 2027. We also declared that we would consider the introduction of PET resin made derived from inedible plant material, with the aim of moving away from petroleum resources.
In the Kirin Group's Environmental Vision 2050 that we announced in February 2020, we declared our goal of creating a "society that sustainably recycles containers and packaging" by 2050. To that end, we are working to move to 100% sustainable containers and packaging that use recycled materials, biomass, etc.

More information on our Plastic Policy→P.117

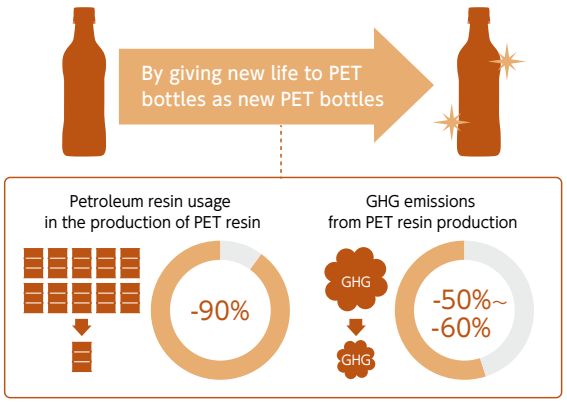
Recycled resin usage ratio target



Expansion of the use of "R100 PET bottles" made from 100% recycled PET resin

In accordance with the Plastic Policy that we established in 2019, the Kirin Group is gradually expanding the use of "R100 PET bottles" made from 100% recycled PET resin.
"R100 PET bottles" use "mechanical recycling" technology to enable the use of recycled PET resin as a raw material for PET bottles. With the technology, we sort, crush, and clean used PET bottles, and then treat them at high temperatures in a state close to a vacuum. This means we can volatilize and remove impurities in the resin, and recover the molecular weight reduced during the recycling process to a level suitable for bottle molding.
Recycled PET resin use 90% less resin derived from petroleum and achieves a reduction in GHG emissions of 50-60% compared with regular petroleum-derived PET materials.
We began using recycled resin for some of the packaging of *Kirin Gogo-no-Kocha Oishii Muto (sugar-free)* product in February 2014. Subsequently, in 2019, we began using "R100 PET bottles," which use 100% recycled PET resin, for *Kirin Nama-cha Decaf*, followed by *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* (600ml size for each), which are only available in convenience stores throughout Japan, from 2021. We also began using "R100 PET bottles" for Kirin Nama-cha Life Plus Immune System Assist from October 2021, and *Kirin Nama-cha Caffeine Zero* in April 2022, and we have since continued its use in these products. Of the *Kirin Nama-cha* products that we launched nationwide in April 2022, we plan to also gradually introduce the "R100 PET bottles" for vending machine products (555ml) by the end of the year.
The "R100 PET bottle" used for *Kirin Nama-cha Decaf* won the President of Japan Packaging Institute Award at the Japan Packaging Contest 2019, and the WorldStar Award in the beverages category at the 2020 WorldStar Packaging Awards Competition.

More information→P.140



Products using R100 PET bottles as of June 2022. From the left: *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* (600ml size for each), *Kirin Nama-cha Life Plus Immune System Assist*, and *Kirin Nama-cha Caffeine Zero*

* The information above is as of the end of June 2022. Product pictures may not necessarily be the pictures of the latest product because they include pictures of products at the time of the events described.

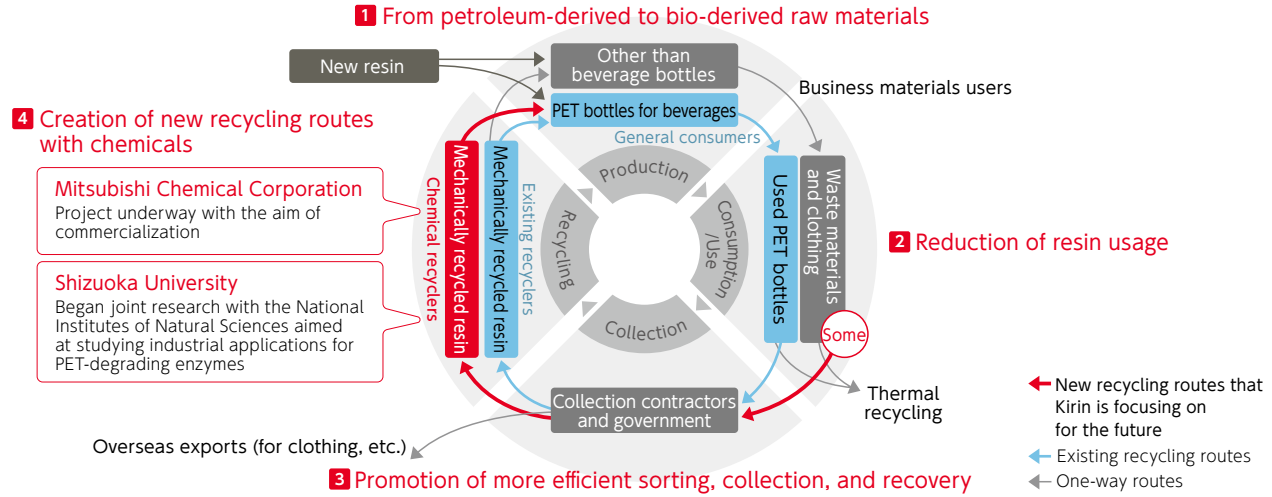
Creation of new recycling routes with chemical recycling

In December 2020, Kirin began technical studies and a joint project aimed at commercialization with Mitsubishi Chemical Corporation Corporation, focusing on recycling PET bottles using chemical recycling.
In the current mechanical recycling system, there are impurities that are difficult to remove from recycled resins, and it is said that the quality of resins deteriorates with repeated recycling. In chemical recycling, we sort, crush, and wash used PET bottles to remove dirt and contaminants, then we depolymerize them (chemical decomposition treatment), and break down and purify the PET into intermediate raw materials, which we then polymerize (synthesize) again into PET It is possible to recycle PET bottles to a state similar to new materials as many times as we want through decomposition down to the molecular level, and we can also recycle PET products other than used PET bottles into PET bottles. In addition to aiming to establish a circular economy for PET products, we will also build a system for collecting PET products other than PET bottles. Since 2022, we have been working with FANCL to promote the reuse of PET materials. In January 2022, Kirin Central Research Institute began joint research with Shizuoka University and the National Institutes of Natural Sciences (NINS) to establish enzymatic PET recycling technology. The Kirin Central Research Institute has been conducting research and development on PET2 - a thermostable PET-degrading enzyme - since 2019, aiming to use it as a base to establish a kind of PET recycling using the enzymatic degradation method. This came in the course of searching for chemical recycling technologies that utilize the fermentation technologies Kirin has cultivated to date.
In July 2021, Shizuoka University and NINS announced the results of a study in which modifications to a PET2 enzyme significantly improved its thermal stability and PET degradation ability. By combining their respective knowledge, Kirin, Shizuoka University, and NINS aim to accelerate research and development for the practical use of PET-degrading enzymes, thereby using their technical capabilities to create a positive impact in society.

Promotion of more efficient sorting, collection, and recovery

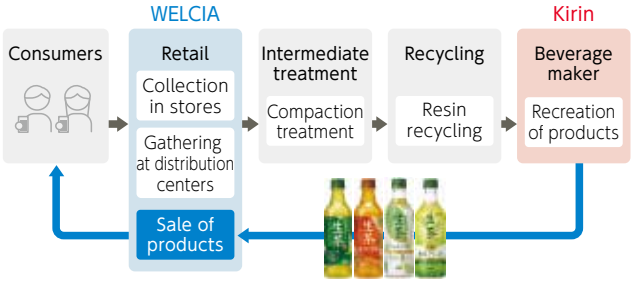
Aiming to create “a society that continuously recycles plastics,”

Society that continuously recycles plastics



in July 2021, we launched a demonstration trial to collect used PET bottle containers, in collaboration with Lawson, Inc. In June 2022, we also expanded the demonstration to Welcia Yakkyoku Co., Ltd.
In the Lawson demonstration trial, we installed “PET bottle compaction and collection machines,” developed within the Kirin Group, at several Lawson stores in Yokohama, to encourage consumers visiting the stores to collect PET bottles discarded at home. By using the vending machine operation routes of Kirin Beverage affiliates for collection, we are enhancing transportation efficiency before shipping the materials to recycling plants.
In the demonstration trial at WELCIA, we collect and sort used PET bottles in collection boxes installed at WELCIA stores,

Flow of recovery, recycling, and product creation



and after gathering these materials at a WELCIA distribution center, we transport them to Far Eastern Ishizuka Green PET Corporation, a recycler.
Subsequently, we recycle the PET bottles into the raw materials for PET bottles through processes such as grinding and washing at a plant that manufactures recycled PET raw materials. After verifying the results of the demonstration at approximately 190 WELCIA stores in Saitama Prefecture, we will expand the scope of our activities to include other drugstore chains in the same area, and in the future, we plan to expand the size of our activities outside of this industry, including other retail industries.

Efforts to solve the global plastic problem

In March 2021, the Kirin Group joined the Alliance To End Plastic Waste (AEPW), an international non-profit organization, in order to solve problems related to waste plastic in the world from a global perspective, together with other participating companies. In cooperation with global companies, organizations, and other entities involved in the plastic value chain that participate in AEPW, we are promoting projects in four strategic areas: “infrastructure creation and development,” “innovation,” “education and awareness-raising activities,” and “clean-up activities.”

Sustainable paper containers

Achieving 100% use of FSC-certified paper in all paper containers and packaging

At the end of November 2020, the Kirin Group achieved the 100% use of FSC-certified paper in all paper containers and packaging at Kirin Brewery, Kirin Beverage, and Mercian. The targeted paper containers are "6-can packs," "gift boxes," "drink boxes," and "cardboard cartons." This is the first declaration and achievement of that declaration by a Japanese manufacturer to cover all paper containers.
In 2022, we revised the "Action Plan for the Sustainable Use of Biological Resources," and expanded the scope of Group companies to include Kyowa Kirin, Kyowa Hakko Bio, Lion, and Koiwai Dairy Products. We also declared our intention to switch to sustainable paper, such as FSC-certified paper and wastepaper, by 2030, and began related initiatives.

* The Forest Stewardship Council (FSC) Forest Certification System is a system for the appropriate management of forests and the sustainable use and conservation of forest resources. The FSC label is a mark that protects forests.

FSC-certified paper targets and status of achievement

The status of achievement of targets as of the end of December 2021 is as follows.

Type	Target	Target Year	Rate of FSC-certified paper	Rate of FSC labeling
6-can packs for beer	100%	End of 2017	100%	about 93%
6-can packs for non-alcoholic beverages	100%	End of 2017	100%	about 78%
Gift boxes	100%	End of 2020	100%	100%
Drink boxes for non-alcoholic beverages	100%	End of 2020	100%	about 75%
Drink boxes for alcoholic beverages	100%	End of 2020	100%	about 9%
Cardboard cartons for non-alcoholic beverages	100%	End of 2020	100%	about 85%
Cardboard cartons for beer and RTD products*	100%	End of 2020	100%	100%
Cardboard cartons for wine and Shochu products	100%	End of 2020	100%	0%

* Excluding commercial use

For policies on biological resources→P.118~P.119

Initiatives for sustainable paper containers

In 2013, the Kirin Group developed the "Action Plan for the Sustainable Use of Biological Resources," and we have since been endeavoring toward the sustainable use of paper. In the same year, with the aim of creating a society where sustainable paper is available for use in day-to-day settings, five companies engaged in advanced initiatives related to the use of paper formed the "Consortium for Sustainable Paper Use" together with WWF Japan, and engaged in initiatives such as holding dialogues with suppliers with the aim of promoting the supply of certified paper. In 2017, we revised our Action Plan for the Sustainable Use of Biological Resources, and pledged a target of 100% FSC-certified paper for all paper containers. As of May 2016, before this declaration, we had adopted FSC-certified paper for all 250ml drink boxes for the Tropicana 100% series. By the end of March 2019, all Kirin Brewery paper containers were using 100% FSC-certified paper, and by the end of November 2019, all Kirin Beverage paper containers were using 100% FSC-certified paper. In November 2020, we achieved 100% use of FSC-certified paper for all Mercian paper containers.

FSC logo displayed on top of 6-can beer packs and cardboard cartons for products

The Kirin Group is pursuing the display of the FSC-certified label to give consumers a real sense of the importance of protecting the forests. In May 2017, we became the first brewery in Japan to sell 6-can packs of beer showing the FSC-certified label. Since October the same year, we have been progressively displaying the certified label on the underside of other 6-can packs and it now appears on the underside of almost all of our 6-can packs.
We have also started displaying the label on the spout and sides of drink boxes for non-alcoholic beverages, with the label already visible on most of these products. Starting with January 2019 shipments, we have begun showing the FSC logo on the top of 6-can packs and cardboard cartons for alcoholic beverages. Now consumers can see the logo on most of our products on store shelves.

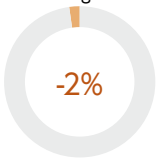
* The information above is as of the end of June 2022. Product pictures may not necessarily be the pictures of the latest product because they include pictures of products at the time of the events described.

Reduce

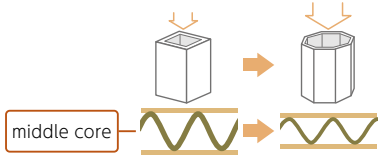
Corner-cut cartons

The Institute for Packaging Innovation developed "corner-cut cartons" and we introduced them to the market in 2004. The beveled corners have reduced the weight of the carton and, because the carton has eight sides, making it stronger, the cardboard thickness has been reduced, resulting in a 10.9% reduction in the weight of the carton compared to conventional cartons.

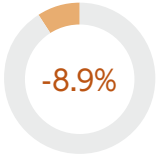
Quantity of paper saved by eliminating corners



Of the same thickness, more corners make the object more load-bearing.



Quantity of paper saved by making cardboard core thinner



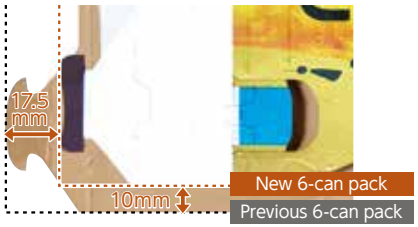
Smart-cut cartons

The smart-cut carton, which we introduced in 2015, is based on the corner-cut carton technology. In addition to the reduction in weight, the corners of the long edges at the top of the carton have been cut to fit the space created by the lids of the 204-diameter can, which are smaller than the rest of the can. This has resulted in a 16% weight reduction compared to the corner-cut carton.
The Institute for Packaging Innovation developed the smart-cut carton in conjunction with a container and packaging manufacturer, and obtained a joint design registration.

6-can pack

We have incorporated innovations into various parts of the 6-can pack to make it more lightweight, as well as achieving ease of carrying and removing from the shelf. For example, we have included a new cut-out section at the sides of the pack to match the can edge (Kirin patent), and use a "can bottom lock structure" to stabilize the bottoms of the can with paper. These innovations have resulted in a reduction in packaging material of 4 grams, or 8%, per 500 ml 6-can pack, while also improving the pack's can-holding power.

Layered for comparison



Reducing the weight of paper containers for wine

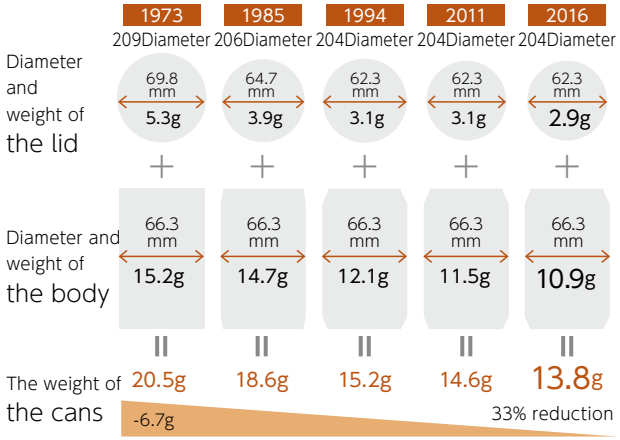
Since March 2022, Mercian has also reduced the weight of containers for wine that it sells. Mercian uses bag-in-box packaging with an inner bag inside an outer box for a total of five types of wine, namely *FRANZIA* (red, white, dark red) bag-in-box and *FRONTERA* (Cabernet Sauvignon and Chardonnay) wine-fresh servers. By reducing the weight of the outer box by approximately 25%, from 190g to 143g, we are able to reduce our use of paper resources by around 31t per year.

Lightweight bag-in-box packaging

Reducing the weight of aluminum cans

At Kirin Brewery, by reducing the diameter of the can ends and narrowing the top and bottom edges of the can body to reduce the weight of the can, as well as thinning out the walls of the can body, for our 350-ml aluminum cans, we have achieved a weight reduction of approximately 29% for our 204-diameter can end compared with the 209-diameter can end in 2011.
Working with can manufacturers, we developed Japan's lightest aluminum can with thinner can ends and bodies in 2016. We have reduced the overall weight of the can by approximately 5% (0.8 grams) from 14.6 grams to 13.8 grams. This represents a weight reduction of 33% (6.7 grams) from the 209-diameter can end.
Weight reduction is necessary for both steel and aluminum cans, but aluminum in particular may require a large amount of electricity for smelting, so weight reduction contributes significantly to the reduction of Scope 3 GHG emissions.

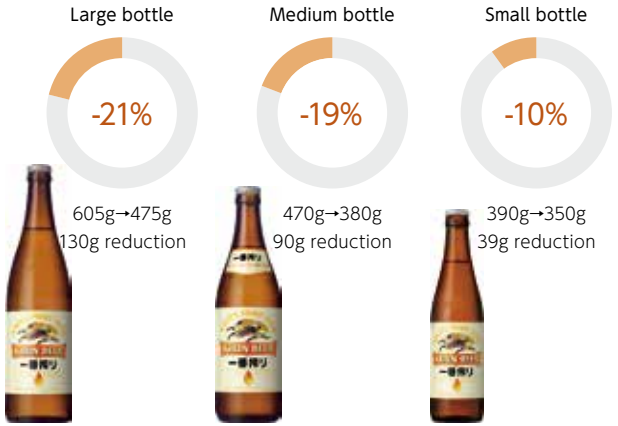
Transitioning weight of the 350ml aluminum cans



* The information above is as of the end of June 2022. Product pictures may not necessarily be the pictures of the latest product because they include pictures of products at the time of the events described.

Lighter returnable glass bottles

The lightest weight returnable bottle produced in Japan in all sizes (large, medium, and small). As well as being light in weight, returnable glass bottles need to be durable enough to maintain their returnable functionality and strong enough to ensure consumer safety and peace of mind.
To meet this challenge, the Institute for Packaging Innovation made excellent use of innovations such as a ceramic coating that forms a thin film on the bottle's outside surface, an impact-resistant shape design, and a bottle mouth design that meets the conflicting requirements of being easy to open and able to be sealed tightly and that is also strong enough not to chip.

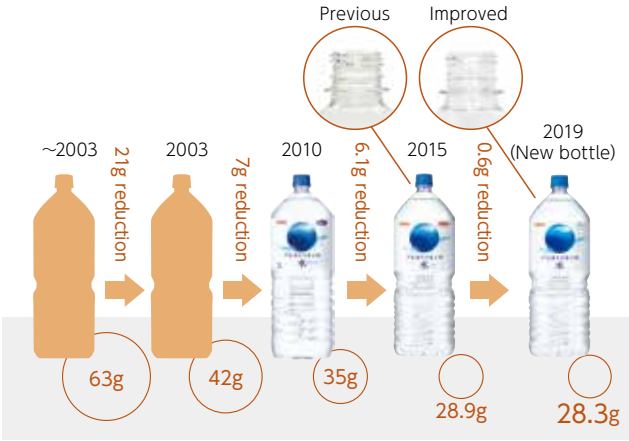


No label

Since March 2021, we have been selling *Kirin Nama-cha No Label 6-Pack* and *Kirin Nama-cha Hoji Sencha No Label 6-Pack* at general merchandise stores nationwide, as well as Kirin Nama-cha No Label and *Kirin Nama-cha Hoji Sencha No Label* exclusively online. In May 2022, we expanded our range of no label products with the launch of *Kirin Gogo-no-Kocha Oishii Muto (sugar-free) No Label* and *Kirin FIRE ONE DAY Black No Label* exclusively online. Eliminating labels makes sorting waste easier for customers and thereby promotes recycling. It also reduces the use of resin derived from petroleum and thus reduces GHG emissions during production.
In June 2022, we will begin test sales of *Kirin Nama-cha No Label* with Paper Sticker at some general merchandise stores in the Tokyo metropolitan area. By attaching small paper stickers that provide the required information, we are able to sell individual products at the store without conventional labels.

Lightest PET bottles for water produced in Japan

The Institute for Packaging Innovation has developed and put into practical use the lightest 2L PET bottle for water produced in Japan, at 28.3g.
We reduced the weight of the 2L PET bottle for Kirin Alkali Ion Water from 63g prior to June 2003 to 28.9g in 2015, and further reduced the weight in April 2019 by improving the bottle's screw top, including making the screw threads narrower and the screw portion shorter, thereby making achieving the lightest such PET bottle produced in Japan and putting it into practical use. These efforts will result in annual reductions of PET resin use of approximately 107 tonnes and GHG emissions of approximately 375 tonnes.
For some 2L and 1.5L large PET bottle products, such as *Kirin Gogo-no-Kocha* and *Kirin Nama-cha*, we reduced the weight by approximately 16%, from 38.2g to 32.2g, by improving the molds of preforms used to make the PET bottles. We have been gradually introducing these bottles starting from products manufactured in December 2020. These efforts will result in annual reductions of PET resin use of approximately 439 tonnes and GHG emissions of approximately 1,515 tonnes.



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PET bottles for wine

In 2022, the Institute for Packaging Innovation developed a 720ml PET bottle for wine that is the lightest in Mercian's history. We reduced the weight by 5g, from 34g to 29g. We expect the use of this bottle for all 720ml PET bottle products produced and sold by Mercian to reduce PET resin use by approximately 83 tonnes per year and GHG emissions by approximately 286 tonnes.
The lightweight PET bottle received the "46th Kinoshita Award for Packaging Technology." This bottle won the award partly because we reduced resin use by approximately 15% while maintaining the "Bordeaux shoulder shape" and a "clean body shape," as well as the fact that the Kirin Group's gas barrier coating technology, which uses DLC* film, can keep wine fresh for a long period of time.

* An abbreviation for Diamond-Like Carbon (* Patent No. 4050648, etc.). A technology in which a thin film of carbon is formed inside a PET bottle, which suppresses the permeation of oxygen, water vapor, carbon dioxide, etc.

Use of roll labels for vending machine products

Since September 2020, Kirin Beverage has used "roll labels" on some PET bottle products for sale in vending machines.
There are two main types of label for PET bottled soft drinks: shrink labels and roll labels. We place shrink labels over bottles with a labeler in the filling plant, then apply heat to shrink the label. This means a certain thickness is required to prevent the label from bending. We do not use heat to shrink roll labels, instead attaching them by wrapping them around the PET bottle, which enables us to make the label thinner. Customers can easily remove the label by simply pulling the edge of the label, making it easier to sort trash, and thereby promoting recycling.
We are introducing roll labels for certain products exclusive to vending machines, such as *Kirin Nama-cha* and *Kirin Gogo-no-Kocha Oishii Muto (sugar-free)*.

Shortening of labels and packaging materials

We have shortened the label on packaging for the 600ml *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* that we released in 2022. In addition to reducing the size of the label and making it thinner by switching to roll labels, this will result in annual reductions of resin use by approximately 180 tonnes and GHG emissions of approximately 400 tonnes.
We have made the paper packaging materials for the 525ml and 600ml products in the six-bottle packs of no label products shorter than those of the products we launched in 2021, thereby reducing paper consumption. We also use FSC-certified paper for packaging materials, and display a label of our certification.

Shortening of labels

Product released in 2021　　Product released in 2022

Shortening of paper packaging materials for six-bottle packs

Product released in 2021　　Product released in 2022

Reduction of glass bottles with prefilled syringe preparations

Kyowa Kirin sells plastic prefilled syringe preparations, which eliminate the need for the glass bottles containing the injection solution that are normally required, thus reducing glass usage.
With prefilled syringe preparations, the solution is already in the syringe, meaning there is no need to draw the solution from the glass bottle into the syringe. Therefore, in addition to excellent qualities such as convenience, safety, and sterility, we are able to reduce the use of glass resources and the amount of medical waste.

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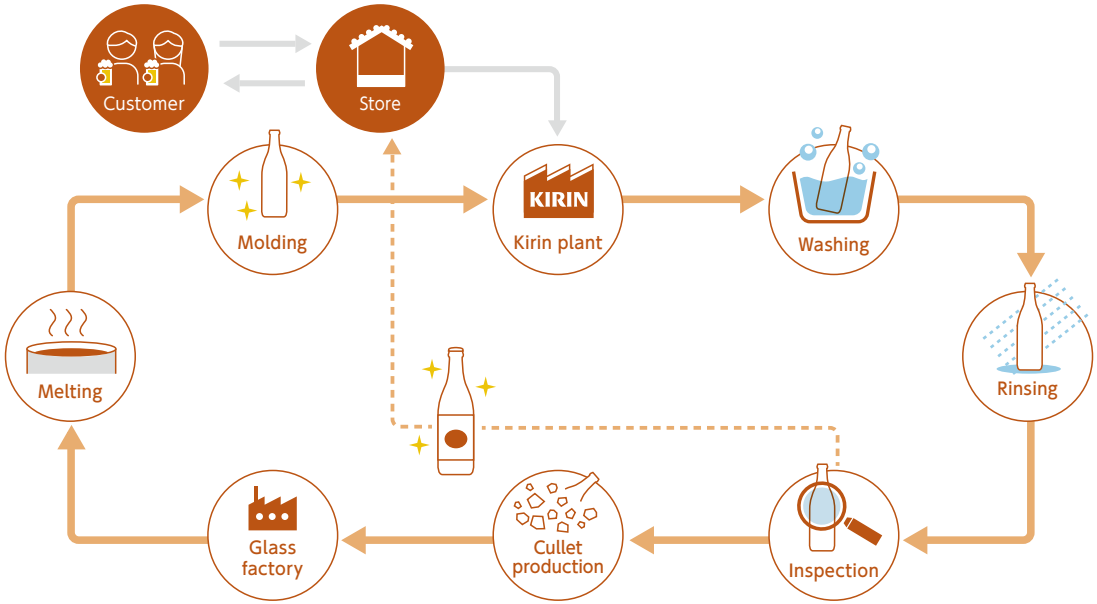
Reuse

Re-use of glass bottles

In Japan, people have collected and re-used glass bottles over and over since the Meiji Era (1868-1912), long before the word “3R” was coined.
We wash returnable glass bottles that come back to the plant thoroughly inside and out to make them as clean as a new bottle. After stringently checking the bottles for scratches and cracks with an empty bottle inspection machine, we put them back into product service and fill them with beer. When handled carefully, returnable glass bottles last for an average of about eight years. This means they are used around 24 times.
When bottles have small scratches or fine cracks or are too old to be of service any longer, we crush them and turn them into a material called cullet, which we use as the raw material to make new bottles.



Recycle

Recycling of PET bottles

The Kirin Group promotes the recycling of PET bottles as a member of the Council for PET Bottle Recycling. Under the Council's Fourth Voluntary Action Plan (FY2021-FY2025), we are working toward a target recycling rate of at least 85% (base year: FY2004).
The recycling rate in 2020 was 88.5% (up 2.6 percentage points from the previous year), achieving the target.
In July 2021, we began testing the collection of used PET bottles at convenience stores, and in June 2022, at drugstores.

More information on collection at stores→P.47

Recycling of glass bottles

We turn old returnable glass beer bottles that can no longer be re-used and one-way bottles which are used only once into cullet, for use primarily as the raw material for making new glass bottles.
We are pursuing uses for cullet made from colored glass, which cannot easily be re-used for glass bottles. We are expanding potential ways to recycle this material for other applications, including in building materials such as tiles and blocks and road paving materials.

Recycling of cans

The Kirin Group is pursuing the adoption of aluminum cans that use a high rate of recycled metal. We have also joined the Japan Aluminum Can Recycling Association, and we are providing assistance for the collection of used aluminum cans as a way to promote their recycling. Can manufacturers recycle aluminum cans discarded at breweries and use them as 100% aluminum cans for beer.

Collection of used containers at vending machines

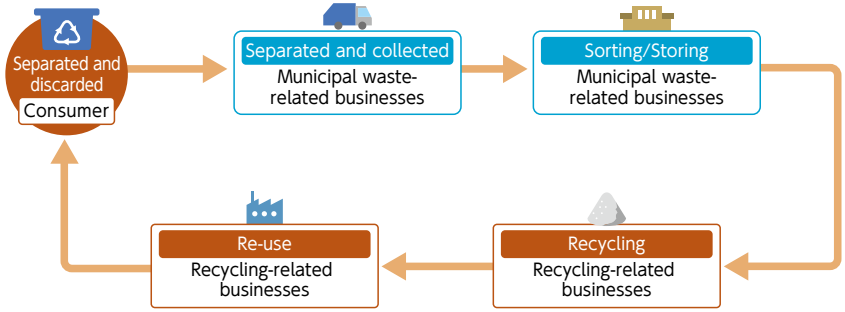
For vending machines installed by Kirin Beverage, the company conducts a comprehensive operation, from proposal and refilling of merchandise to service and repair of the vending machines.
In addition, as an environmental initiative, we collect the empty containers and even clean the area around the vending machines.

Voluntary collection of aluminum cans

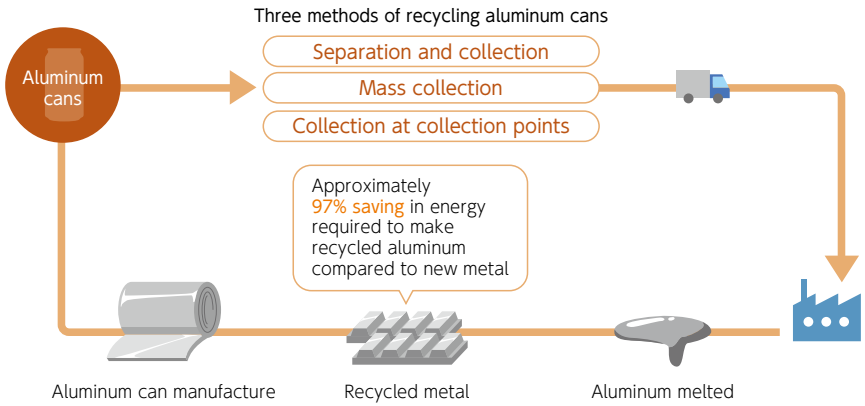
The Kirin Group supports the collection of used aluminum cans by can manufacturers. Can manufacturers collect more than 40,000 tonnes of aluminum cans via these activities, all of which are recycled back into new cans, which Kirin uses for its products.

Bags for recycling
provided by Kirin Brewery

Flow of recycling of PET bottles



CAN-to-CAN flow



Promotion of recycling in Australia and New Zealand

Lion has established the “Sustainable Packaging Strategy” to promote recycling. “Lion's Sustainable Packaging Project Steering Group,” which Lion established to promote this strategy, has set the following targets.

- Increasing recycled content to at least 50% by 2025.
- 100% of Lions packaging material to be reusable, recyclable, or compostable by 2025.
- A commitment to zero avoidable waste to landfill by 2025.

As glass accounts for the highest proportion of Lion's material inputs, Lion is working closely with its supplier to increase the recycled content of bottles.
Lion will promote activities to achieve these targets, which are aligned with those of the Australian Packaging Covenant Organisation (APCO).

Lion’s role in Container Deposit Schemes

Australia has Container Deposit Schemes in six of its eight states, and both remaining states have announced that they will implement this system in the future. Victoria and Tasmania are expected to commence schemes in 2023.
Lion plays an important role in Australia's Container Deposit Schemes. For example, in South Australia and the Northern Territory, Lion holds a majority of the shares of Marine Stores, a collection coordinator that aggregates collected materials for reuse and recycling. Lion also participates in Exchange for Change (EfC), a joint venture that coordinates the New South Wales and the Australian Capital Territory Container Deposit Schemes.
In Queensland and Western Australia, Lion participates in the administration and operation of Container Deposit Schemes as a member of the Container Exchange (QLD) Limited (CoEx) and WA Return Recycle Renew Limited (WARRRL), which were established and appointed as Producer Responsibility Organizations. Lion is a member of the nonprofit entities VicRecycle and TasRecycle, which intend to submit proposals to act as the coordinators of the Container Deposit Schemes in Victoria and Tasmania.
In New South Wales almost nine billion bottles and cans have been returned in less than four years of the scheme being in place, and there are currently 621 return points operating. The Queensland Container Deposit Scheme has been operating less than three years with nearly 5.4 billion containers returned and 341 return points in operation. The Western Australian Container Deposit Scheme commenced on October 1, 2020, and almost one billion containers have been returned. The South Australian scheme has been operating for over 40 years and recent reports stated the return rate of beverage containers sold is approximately 76.9%. In 2022, the South Australian government is considering improvements to modernize the scheme and further increase the rate of return. Lion is working with the state government to support the development and implementation of improvements. In the Australian Capital Territory, more than 270 million containers have been returned and recycled since the scheme began operating in December 2017. The Northern Territory scheme had a total return rate of 72% of containers sold.
New Zealand is also currently holding public consultations in relation to the implementation of a Container Deposit Scheme, which is expected to commence in 2025.

Together with society

Plastic resource circulation efforts in the soft drink industry

The Japan Soft Drink Association, of which Kirin Beverages is a member, issued a Plastic Resource Reclamation Declaration in November 2018.
As one of the initiatives under this declaration, from May 2019, the Association rolled out a campaign to attach 500,000 stickers to the empty container recycling boxes placed next to vending machine, to make consumers aware that these boxes are solely for the collection of empty containers for recycling purposes. The soft drinks industry aims to reduce any contaminants from the PET bottle recycling chain to ensure that 100% of the bottles can be used effectively.
In April 2021, the Japan Soft Drink Association made a "declaration of 50% bottle-to-bottle ratio by 2030" for PET bottles. This declaration is based on current technology and economic efficiency. In future, we will aim for a higher "bottle-to-bottle recycling ratio" through "advances in material recycling technology" and the "establishment of chemical recycling." With advances in the development of "PET materials derived from plants and organisms," we are also promoting reductions in the use of new fossil-derived resources.

Easily separated containers and packaging

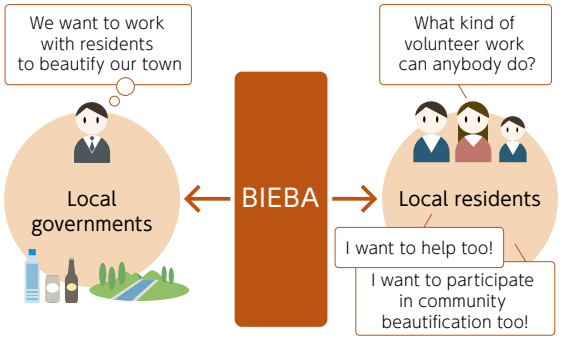
In consideration of ease of trash separation, we endeavor as far as possible to use single materials in our containers and packaging or make it easier to separate them into single materials. To raise awareness about the recycling of containers and packaging, we provide containers and packaging that are easy to separate.
Since September 2020, Kirin Beverage has gradually begun selling products with "roll labels," which can be easily peeled off by simply pulling the edge of the label.

Consumer awareness activities

We are engaged in awareness-raising activities on the internet, such as the KIRIN KIDS website to raise awareness of the 3Rs among children. We also deal with the theme of 3R for containers and packaging at our Kirin School Challenge workshops for junior and senior high school students.
We also use Eco Panda, an environmental-awareness mascot character that made its first appearance to coincide with the launch of the "pecology bottle," an environmentally-friendly, resource-conserving, easily crushable container, to conduct awareness-raising activities aimed at junior and senior high school students.
We have also conducted awareness-raising activities at a variety of events, including exhibiting our R100 PET Bottle for the *Kirin Namacha Decaf*, which uses 100% recycled PET resin, and Japan's lightest 2L PET bottle used for Kirin Alkali Ion Water, at the G20 Innovation Exhibition and PR for the International Media Center (IMC) during the G20 Osaka Summit in 2019.

Adopt Program (community beautification)

The Adopt Program is a method of community beautification in which residents "adopt" a section of a neighborhood and participate in cleanup activities. The Beverage Industry Environment Beautification Association (BIEBA) brings together six beverage producer bodies to conduct promotions and activities aimed at the beautification of communities. Kirin Brewery and Kirin Beverage participate in BIEBA as members of their respective industry bodies, the Brewers Association of Japan and the Japan Soft Drink Association, providing support for activities in this Program.



Main activities of the Beverage Industry Environment Beautification Association

Support for education
BIEBA grants awards to schools that are actively engaged in the education and practice of community beautification. It also produces and supplies community beautification education guides for teachers.

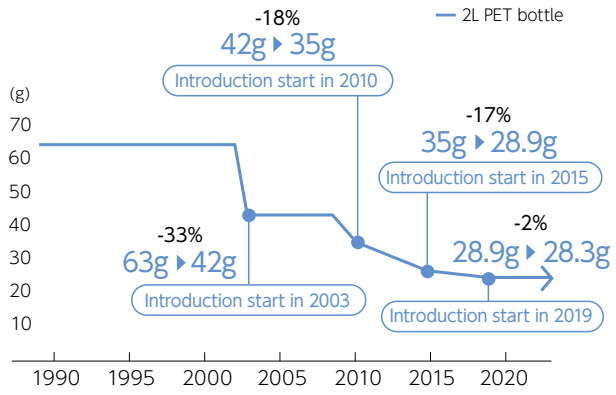
Littering prevention campaign
BIEBA places "No Littering" stickers on roadside signs and vending machines to call for the prevention of littering.

* The information above is as of the end of June 2022. Product pictures may not necessarily be the pictures of the latest product because they include pictures of products at the time of the events described.

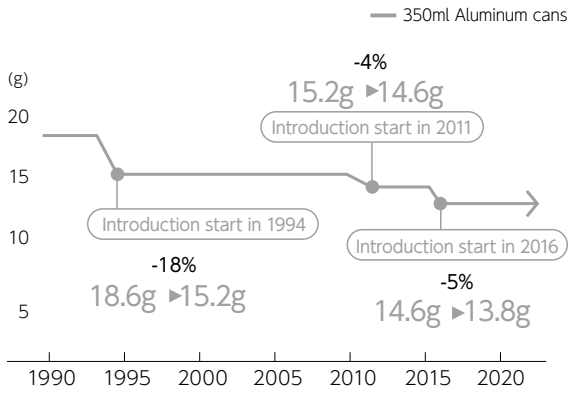
Key data related to Containers and Packaging

Related Information→P.126～P.127

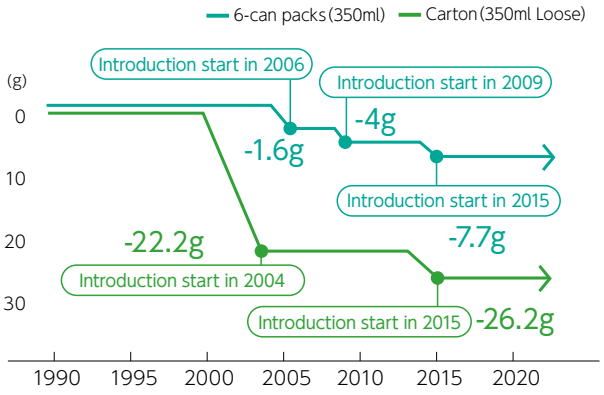
Change in weight of PET bottles (*Kirin Alkali Ion Water* 2L PET bottle)



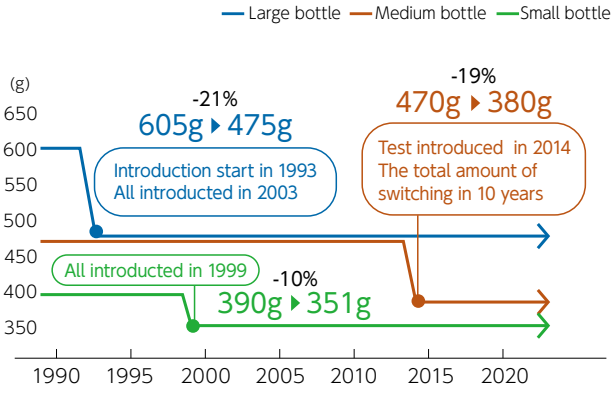
Can lighter transition



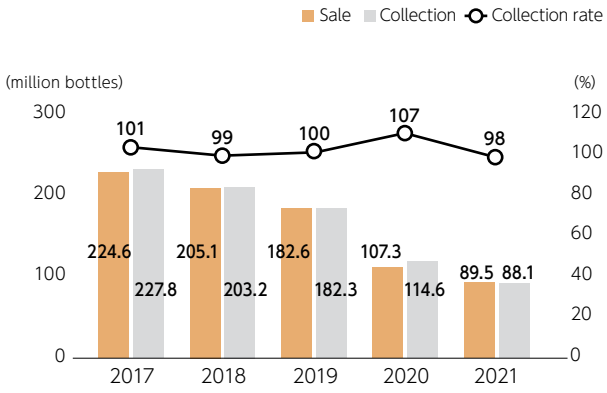
Trends in weight reduction of cartons and 6-can packs



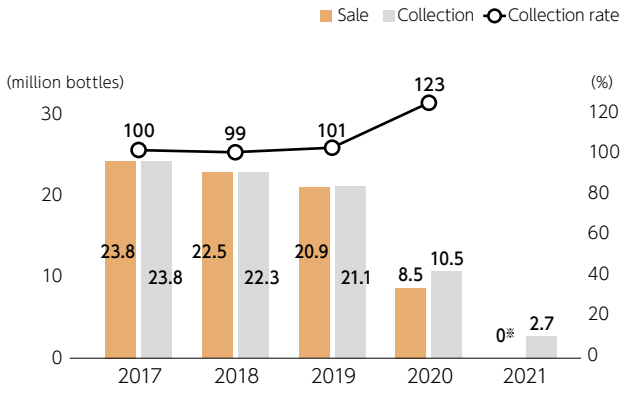
Returnable beer bottles lighter transition



Kirin Brewery trends in sale and collection of returnable glass bottles

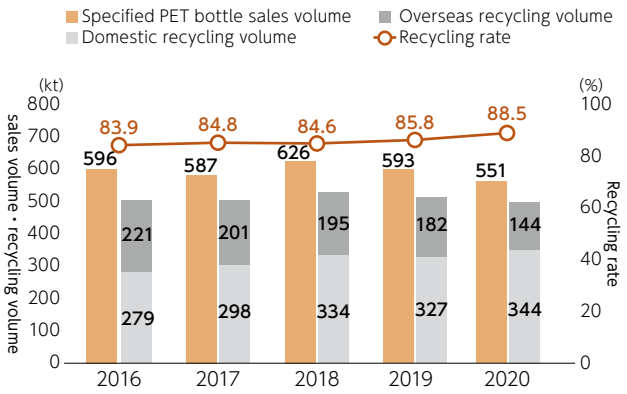


Kirin Beverage trends in sale and collection of returnable glass bottles



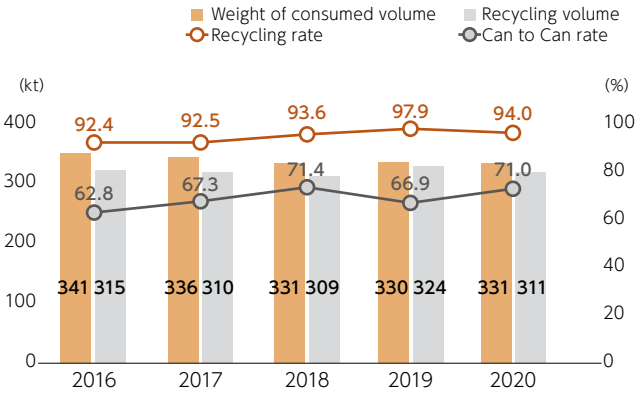
*Kirin Beverage bottle product sales ended at the end of 2020

Rate of PET bottle recycling in Japan



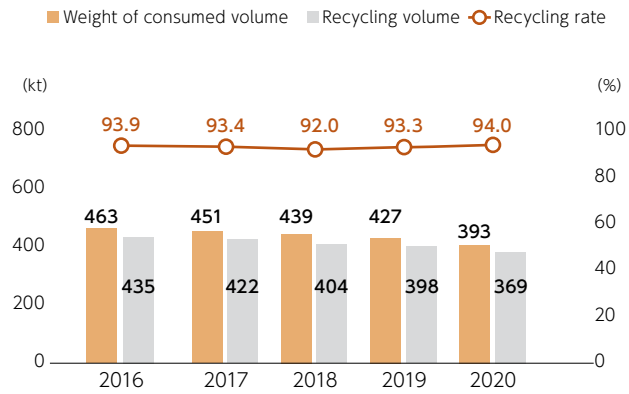
Source: The Council for PET Bottle Recycling

Rate of aluminum can recycling in Japan



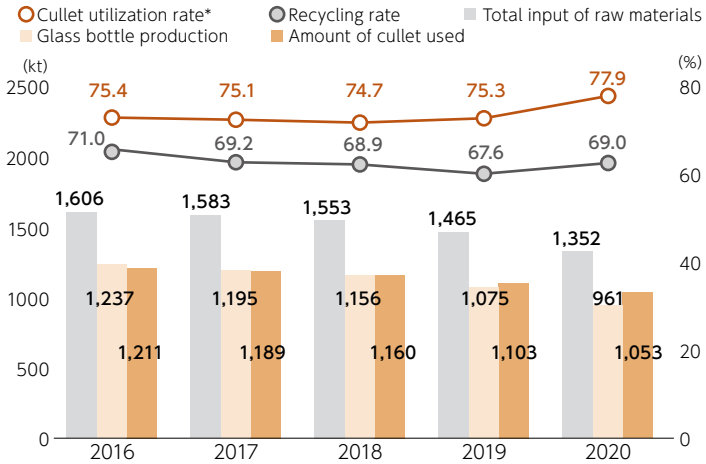
Source: Japan Aluminum Can Recycling Association

Rate of steel can recycling in Japan



Source: Japan Steel Can Recycling Association

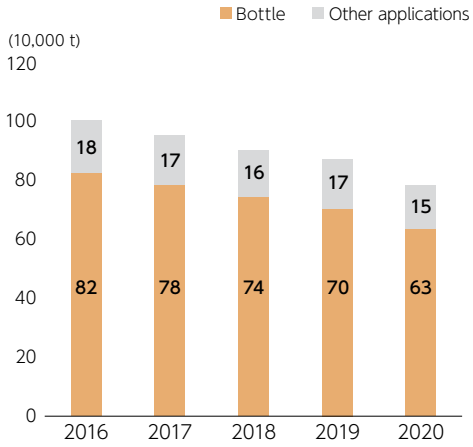
Glass bottle production and cullet utilization rate



* Cullet utilization rate = amount of cullet used / total input of raw materials

Source: Glass Bottle 3R Promotion Association

Cullet applications



Source: Glass Bottle 3R Promotion Association

Climate Change

Background to initiatives

The Kirin Group was one of two companies that represented Japan when we announced our environmental measures to the world at the third session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Kyoto in 1997. The Kirin Group has long been working to reduce GHG emissions. We have achieved significant reductions, having set an ambitious target of "reducing GHG emissions across the entire value chain by half from the 1990 level by 2050" in 2009. Since the adoption of the Paris Agreement in 2015, we have been leading the way in creating a decarbonized society, having gained a renewed understanding of our impact on natural capital such as agricultural raw materials and water through scenario analysis based on the TCFD recommendations, set science-based targets for the reduction of greenhouse gas emissions, and pledged our aim to switch to 100% renewable energy for electric power used by 2040 and achieve net zero GHG emissions by 2050.

We will create together

A society that has overcome climate change

Realize net zero GHG emissions across the entire value chain

Lead to build a decarbonized society

Raw materials Containers

- P.64 Tea farms
- P.64 In-house container manufacturing and weight reduction
- P.64 Ocean transportation in large bags

Production

- P.60 Heat pumps
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Distribution

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Sale

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A decarbonized society

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Points

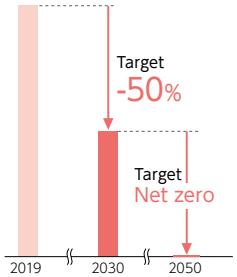
- Having obtained approval for the science-based 1.5℃ target, raised our target for reducing GHG emissions to 50% across Scope 1 + 2, and 30% for Scope 3 (both by 2030, compared with 2019).
- Our long-term target to achieve net zero GHG emissions across the entire value chain by 2050 received certification as a science-based net zero target (the first in the global food and beverage industry).
- Joined RE100 and set a target for the proportion of renewable energy in electric power used (100% by 2040).
- Expanded the introduction of heat pump systems from wastewater treatment plants to production processes to further promote energy conservation.
- Moved to renewable energy for 100% of electric power purchased at two Kirin Brewery plants. Installed large-scale solar power generation facilities at all nine breweries and plants in Japan (of these, eight breweries and plants introduced the PPA model).

Overview of initiatives

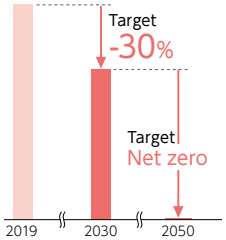
Initiative	Issue	Progress
Initiatives to achieve our vision	Reduction of GHG emissions	Acquired approval for science-based 1.5℃ target. We raised our targets for reducing GHG emissions to 50% across Scope 1 + 2, and 30% for Scope 3 (by 2030, compared with 2019). Also acquired approval as a science-based net zero target.
	Renewable energy	Joined RE100 and declared our aim of using renewable energy for 100% of electric power by 2040.
Realize net zero GHG emissions across the entire value chain	Energy conservation	Began introducing heat pump systems at wastewater treatment facilities in 2019, and expanded their introduction to production processes.
	Hydro-electric power	Began using hydro-electric power at the Kyowa Kirin Takasaki Plant in 2020, as the first pharmaceuticals production business in Japan. Completed installation at the Kirin Brewery's Toride Plant and the Kirin Beverage Shonan Plant in 2017.
	Solar power generation	Utilized large-scale solar power generation at nine breweries and plants in Japan.
	Renewable energy certificates	After previously doing the same at Kirin Brewery's Nagoya Plant, we utilized electric power with environmental value (non-fossil fuel energy certificates with tracking information) and moved 100% of electric power purchased to renewable energy at Kirin Brewery's Sendai Plant. From 2022, all "Château Mercian" wineries have achieved 100% renewable energy by combining green power certificates with purchased electricity. Introduced renewable energy certificates (I-REC) at Kyowa Hakko Bio's Thai site, with the aim of reducing GHG emissions from electricity. We plan to reduce annual emissions by 10,200 tonnes.
Lead to build a decarbonized society	Reinforcing resilience in the upstream portion of the value chain	Prevented soil outflows from torrential rain by supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms.
	Green recovery declaration	Signed the "Business Ambition for 1.5° C" and "Uniting Business and Governments to Recover Better." Consented to "Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action."
	Engagement with the next generation	Supported the Decarbonization Challenge Cup. Rolled out an environmental mark program.

Target

Total emissions targets for Scope 1 and Scope 2*



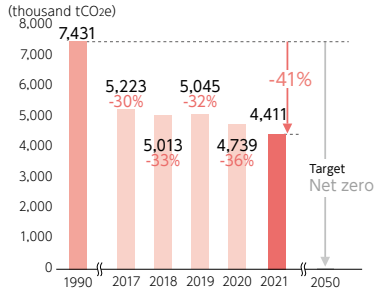
Scope 3 emissions target*



* In December 2020, we upgraded our previous "SBT for 2℃" target, and received approval for our "SBT for 1.5℃" target.

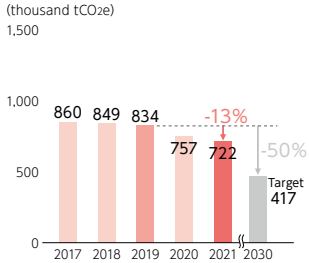
Progress

GHG emissions across the whole value chain

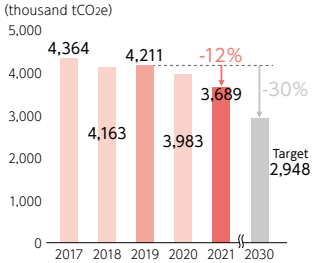


Progress towards medium-term GHG emissions reduction targets

Total emissions for Scope 1 and Scope 2



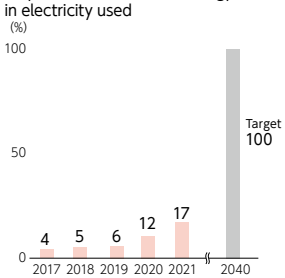
Scope 3 emissions



* Since 2019, we have excluded Lion's non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

Progress toward the target for increased use of renewable energy

Proportion of renewable energy in electricity used



1996
Began installing biogas boilers at breweries.

2002
Began introducing biogas cogeneration facilities at breweries.

2004
Began converting fuel used at breweries from heavy oil to city gas.

2006
Kirin Beverage was selected as an "Eco-Rail" mark-certified company. Kirin Brewery sponsored a "wind power generation project" in Yokohama City. Began introducing heat pumps for Kirin Beverage vending machines.

2007
Completed fuel conversion at Kirin Brewery.

2009
Announced Action Plans for Becoming a Low-Carbon Corporate Group, and declared aim to halve GHG emissions by 2050 compared with 1990.

2010
Kirin Brewery was selected as an "Eco-Rail" mark-certified company.

2017
Obtained approval for "SBT for 2° C" target.

2019
Introduced a heat pump at Kirin Brewery's Okayama Plant.

2020
Declared our aim to achieve net zero emissions by 2050 in the "Kirin Group's Environmental Vision 2050." Joined RE100 and declared our aim of using renewable energy for 100% of electric power by 2040. Acquired approval for science-based 1.5℃ target.

2021
Moved to renewable energy for 100% of electric power purchased at Kirin Brewery's Nagoya Plant. Began utilizing electric power from large-scale solar power generation thanks to the introduction of a PPA model at four domestic plants. Began using heat pumps on the production lines of Shinshu Beverage. Moved to renewable energy for 100% of electric power purchased at the Kirin Brewery Sendai Plant.

2022
Completed the installation of large-scale solar power generation facilities at all nine breweries and plants in Japan. Moved to renewable energy for 100% of electric power purchased at all Château Mercian wineries. Obtained science-based net zero target certification (the first in the global food and beverage industry).

Achieving our science-based 1.5℃ target: Aiming for the world's most advanced energy system

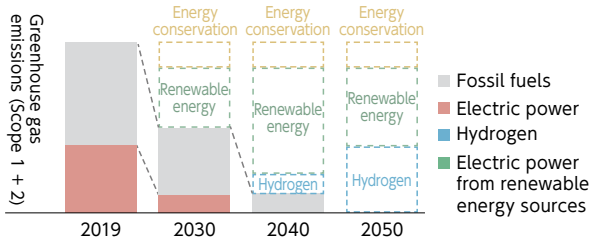
Development of roadmap to achieve our science-based 1.5℃ target and certification of our science-based net zero target

As a mid-term target for the reduction of GHG emissions, the Kirin Group obtained approval from the international SBT initiative (SBTi) for our science-based 2℃ target in 2017, and subsequently obtained approval for a target under the new standards for an science-based 1.5℃ target in November 2020. In 2021, we formulated a roadmap to 2030 aimed at achieving our science-based 1.5℃ target, and began implementing related initiatives. In July 2022, we obtained science-based net zero target certification, making us the first company in the global food and beverage industry to do so. We intend to take three approaches to reducing Scope 1 and Scope 2 emissions: "promotion of energy conservation," "expansion of renewable energy," and "conversion of energy." We will work to reduce GHG emissions focusing mainly on the promotion of energy conservation and the expansion of renewable energy until 2030. We believe that, from 2030 onward, in order to achieve our net zero emissions target in 2050, we must also promote energy conversion for combustion fuels used in steam production processes from fossil fuels to hydrogen and other fuels that do not emit GHG.

Although large-scale investment will be required to achieve this goal, through 2030, the fiscal year of our SBT, the Kirin Group aims to implement measures to combat climate change that will be profit and loss neutral by introducing renewable energy, using the energy cost reduction benefits of energy conservation investments throughout the Group as funds. We have formulated this roadmap to enable us to achieve profit and loss neutrality even without taking ICP (Internal Carbon Pricing) into consideration, but we plan to accelerate the reduction of GHG emissions by taking ICP into consideration.

In terms of the reduction of Scope 3 emissions, of the 15 categories defined in the "GHG Protocol," Category 1 emissions, i.e., those from the manufacture of ingredients and materials, make up the largest proportion of the total, at approximately 60%. As a key category for the reduction, we will pursue two parallel approaches as we work to achieve our target: "reducing emissions through our own initiatives" and "encouragement of reduction at business partners."

Method of reducing GHG emissions



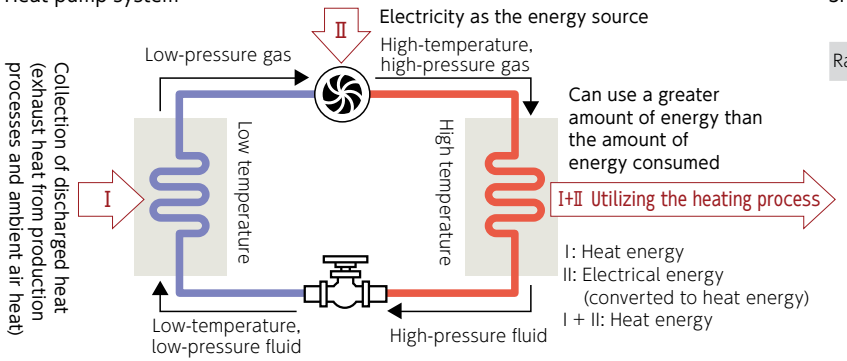
Use of heat pumps in production processes

The Kirin Group is aiming to shift our energy sources from fossil fuels to electric power. We currently use both electric power and fossil fuels as energy sources at our breweries and plants. Of these, fossil fuels, which we use to generate heat, are the largest source of GHG emissions. Therefore, in order to reduce GHG emissions, we need to improve energy efficiency and reduce the amount of energy consumption. At the same time, we believe that shifting the energy mix from fossil fuels to electric power, and, furthermore, using electricity generated by renewable energy sources are the most effective ways of reducing GHG emissions.

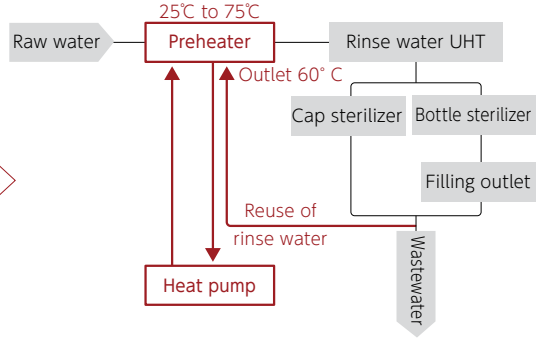
Kirin Brewery has successfully reduced its GHG emissions by approximately 70% over the 25 years from 1990 to 2015. We are now taking on the challenge of applying even more technological innovations to achieve our target of reducing Scope 1 and Scope 2 emissions by 50% by 2030 (compared with 2019). Heat pump systems are a key technology in this regard. In 2019, we introduced heat pump systems at the wastewater treatment facilities of five Kirin Brewery plants, thereby reducing GHG emissions by 2% (approximately 3,400 tonnes) from the previous year across Kirin Brewery as a whole. Advanced engineering techniques are essential to both save energy and shift to electric power, including analyzing the entire heat flow of the production process and optimizing it through advanced designs before installation. We will deploy the knowledge that we have accumulated across Kirin Group companies as soon as possible to maximize the benefits. In 2020, we expanded the use of heat pumps to the production lines of Shinshu Beverage, followed by production processes at the Kirin Brewery Okayama Plant in March 2022. At Shinshu Beverage, we reuse waste heat, which is difficult to use directly in rinsing processes for bottles and caps, through a heat pump unit, enabling us to reduce GHG emissions by approximately 970 tonnes per year. The Kirin Brewery Okayama Plant has reduced annual GHG emissions by approximately 180 tonnes by reusing waste heat in hot water sterilization equipment for cans and heat in the air. The Kirin Group will continue leveraging its technological strengths to take on the challenge of creating the world's best energy system.


Heat pump at Shinshu Beverage

Heat pump system



Shinshu Beverage production line



RE100: Aiming for 100% of electric power used to come from renewable energy

Joining RE100 and 100% of electric power used to come from renewable energy that prioritizes "additionality"

In November 2020, Kirin Holdings joined "RE100," an international environmental initiative consisting of companies aiming to use renewable energy for 100% of their electric power. At the same time, we announced that we would aim to increase the proportion of renewable energy in electric power used to 100% by 2040. We are actively promoting specific initiatives such as moving to 100% renewable energy for all purchased electric power at two Kirin Brewery plants, our utmost prioritization of "additionality," and the use of power generated from large-scale solar power at all breweries in Japan.

100% renewable energy for all electric power purchased at Kirin Brewery's Sendai and Nagoya plants, and all Château Mercian wineries

Since April 2022, 100% of the electric power purchased at Kirin Brewery Sendai Plant has been generated from renewable energy. In August 2021, Kirin Brewery's Nagoya Plant became our first brewery in Japan to use 100% renewable energy. By changing all electric power used at two plants in Japan to renewable energy, we expect to reduce GHG emissions by 11,900 tonnes per year.
Since January 2022, all "Château Mercian" wineries producing Japan Wine (Château Mercian Katsunuma Winery, Château Mercian Mariko Winery, and Château Mercian Kikyogahara Winery) have achieved 100% renewable energy by combining green power certificates with purchased electricity. With these efforts, we expect to be able to reduce annual GHG emissions by approximately 300 tonnes.


Katsunuma Winery


Mariko Winery


Kikyogahara Winery


Hokkaido Chitose Brewery


Toride Brewery


Okayama Brewery


Fukuoka Brewery


Sendai Brewery


Kobe Brewery


Shiga Brewery


Nagoya Brewery

Use of large-scale solar power generation at all breweries in Japan

At the Kirin Group, we are prioritizing "additionality," which refers to creating new sources of renewable energy in the world. Following the introduction of large-scale solar power generation facilities at the Yokohama Brewery in 2016, Kirin Brewery introduced these facilities at the Sendai, Nagoya, Shiga, and Kobe Breweries in 2021, and at the Hokkaido Chitose, Toride, Okayama, and Fukuoka Breweries in March 2022. The introduction of these facilities at all nine breweries (eight breweries, excluding the Yokohama Brewery, use the PPA model*) will increase the proportion of renewable energy in electric power used by Kirin Brewery as a whole from approximately 18% to approximately 34%.

Use of solar power in Australia

In Australia, we installed solar power generation facilities at Castlemaine Perkins Brewery in 2019 and at Little Creatures Geelong in Victoria in 2020. In 2021, Lion focused on developing a brewery network that will support measures to respond to climate change. We continued to invest in energy efficient equipment and review options for expanding the PPA model for renewable energy to other areas outside of our PPA in New South Wales, Australia. In 2021, we focused on building a network of production sites to support our response to climate change, considering expanding the renewable energy PPA model we are implementing in New South Wales, Australia, to other regions, and investing in energy-efficient facilities.
Lion is also helping small-scale energy users procure renewable electricity at low prices. New South Wales' largest brewery, Tooheys Brewery, has signed a PPA agreement with a renewable energy distributor in partnership with the Australian Hotels Association (AHA), which consumes a low amount of energy. By jointly signing a large power contract, the AHA is able to introduce renewable energy at a lower cost, successfully reducing the cost of power for hotels from 11.5c/kWh to 6.9c/kWh. The agreement will reduce Lion's GHG emissions by approximately 20%.


Lion Little Creatures Geelong Brewery

* PPA stands for the "Power Purchase Agreement" model and refers to an agreement between a business that sells electricity to users (PPA provider) and the users of electric power. At Kirin Brewery, MCKB Energy Service Co., Ltd., a subsidiary of Mitsubishi Corporation Energy Solutions Ltd., acts as a PPA provider, installing megawatt-class solar power generation facilities on the roofs of breweries, while Kirin Brewery purchases and uses the power generated.

Other solar power generation

Production breweries and plants, including those of Kirin Brewery and Kirin Beverage, have installed solar-power generation equipment in their plant tour facilities and other locations. KIRIN GROUP LOGISTICS, Kyowa Hakko Bio, and Shinshu Beverage have leased parts of their premises and building roofs to companies that build large-scale solar power generation facilities, contributing both to effective use of company assets and to the dissemination of natural energy.

Yokohama Brewery

Kyowa Hakko Bio

Wastewater biogas

At breweries, we use CO_2-free biogas generated from anaerobic treatment facilities to purify wastewater at gas boilers, cogeneration systems, and other equipment.

More information on wastewater biogas in Japan→P.42

Breweries in Australia and New Zealand are also working toward the stable use of biogas from wastewater treatment. At Tooheys Brewery in Australia, the Utility Team focused on improving biomass population loss in anaerobic wastewater treatment plant bioreactors and discrepancies in the quality and quantity of biogas production. At the Castlemaine Perkins Brewery anaerobic treatment plant, we use healthy microorganism collected from the plant at Tooheys Brewery to replenish the bioreactor, optimized pH levels, and stabilized treatment volumes, resulting in an improvement of more than 30% in biogas generation per unit of effluent discharge volume in 2022 compared with the previous year. We have also added a cogeneration plant and are working to make effective use of biogas.

Hydro-electric power generation

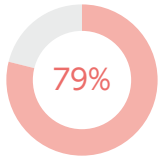
Since April 2017, Kirin Brewery's Toride Plant and Kirin Beverage's Shonan Plant started using GHG-free hydro-electric power in a portion of purchased power. The plants are taking advantage of Aqua Premium, the Japan-first option offered by TEPCO Energy Partner to supply only hydro-electric power. By using hydro-electric power, which does not emit GHG at the time of power generation, they will contribute to global warming countermeasures. This is the first example of the use of this option by any plant in Japan, not just in the food and beverages industry.

In January 2020, Kyowa Kirin's Takasaki Plant began using the same system, followed by the Fuji Research Park and CMC Research Center in January 2022. As a result, of the approximately 72.4 million kWh annual electric power consumption of the Kyowa Kirin Group, we expect that approximately 45.4 million kWh will be converted to hydro-electric power, reducing the Kyowa Kirin Group's GHG emissions by approximately 39%.

This is the first case of using electric power generated from hydro-electric power in the Japanese pharmaceutical manufacturing industry.

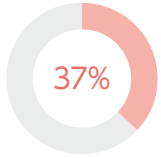
Kyowa Kirin Takasaki Plant

Percentage of purchased electric power generated from hydro-electric power (2021)



Kirin Beverage Shonan Plant

Percentage of purchased electric power generated from hydro-electric power (2021)



Wind power

Through a consortium represented by Mitsubishi Corporation Energy Solutions, Ltd., Venti Japan Inc., C-Tech Corporation, and Mitsubishi Corporation (the "Consortium"), we have been selected as a power generation business operator for projects off the coast of Noshiro City, Mitane Town, and Oga City in Akita Prefecture, off the coast of Yurihonjo City in Akita Prefecture, and off the coast of Choshi City in Chiba Prefecture. Kirin Holdings is a partner of the Consortium. These projects are Japan's first fixed-bottom offshore wind power generation projects in general sea areas. They will be among the largest sources of power in Japan, and will make a significant contribution to the Japanese government's commitment to achieve carbon neutrality by 2050. The maximum power output of the three projects will be approximately 1.69 million kW, which is sufficient to meet the electric power demand of approximately 1.21 million households.
In the future, through the activities of the Consortium, we will create a positive impact toward the decarbonization of society through the creation of new renewable energy, and achieve cooperation and symbiosis with local communities.
The Kirin Group has been sponsoring the Yokohama City Wind Power Generation Project, which Yokohama City promotes using the Green Power Certification System since 2007 as part of our support for the promotion of the use of natural energy as a Hama Wing Supporter. So far, the power generated by this project has been used by SPRING VALLEY BREWERY TOKYO, the Earth Hour hosted by WWF, etc.

Yokohama City Wind Power Plant (Hama Wing)

Renewable energy certificates

Since 2021, Kyowa Hakko Bio has introduced "Renewable Energy Certificates (I-REC)" at Thai Kyowa Biotechnologies in Thailand. This marks the first adoption of these certificates in the pharmaceutical and food industries in Thailand, and we expect it will enable us to reduce annual GHG emissions by 10,200 tonnes, thanks to the use of renewable energy sources for some of the electricity used in the plant. In anticipation of growing global demand for Human Milk Oligosaccharide (HMO) for powdered milk, we are building a new production facility at the Rayong Plant, which we plan to bring online in the summer of 2022. By introducing this renewable energy certificate, we are aiming to achieve business growth while reducing the environmental impact. In 2022, Shanghai Kyowa Amino Acid began introducing renewable energy certificates.
At Kyowa Kirin's Tokyo Research Park, as a "Designated Global Warming Prevention Facility" based on the Tokyo Metropolitan Ordinance on Environmental Preservation, we achieved significant additional reductions in emissions (equivalent to 3,736 tonnes of CO_2) by exceeding the mandatory reductions for the first and second plan periods, and provided these reductions as credits under the "Tokyo 2020 Carbon Offset Programme," as part of our support for the achievement of "Tokyo zero carbon four days in 2020."

Thai Kyowa Biotechnologies

Carbon neutrality in Australia and New Zealand

In May 2020, Lion became Australia's first large-scale carbon neutral certified brewer.
In order to obtain Climate Active*1 certification in Australia, Lion must disclose carbon credits used to offset total emissions for the year in its annual report, and Lion has been complying with this requirement. This certification standard is a new standard for carbon neutral certification in Australia.
In New Zealand, Lion also obtained Toitū*2 carbon zero certification in 2021.

*1 A third-party certification body established by the government of Australia
*2 A third-party certification body established by the government of New Zealand

Climate Active Carbon Neutral ORGANISATION

TOITŪ NET CARBON ZERO ISO 14064-1 ORGANISATION

Raw materials

Measures for adapting to climate change at tea farms

The Kirin Group contributes to measures for adapting to climate change through training programs for Rainforest Alliance Certification at Sri Lankan tea farms. Specifically, we direct people to plant grasses whose roots sink deep into the soil and that crawl the ground on slopes, and thus prevent the runoff of soil from erosion by torrential rain and falls in tea leaf production volumes.
The results of scenario analysis show that the effects of climate change increase water risks and water stress in many countries and regions producing agricultural products. In Sri Lanka, in recent years, unusual heavy rainfall in the rainy season has become more frequently, likely owing to the effects of climate change, and in the key black tea production region of Uva Province, many human lives were lost as a result of landslides some years ago. This initiative also contributes to the prevention of landslides and other disasters caused by heavy rainfall.

Prevention of soil runoff from rain

Containers

In-house production of PET bottles

Kirin Beverage introduced Japan's first in-line PET blowing aseptic filling machine at Nagano Tomato (currently Shinshu Beverage) in 1997, and subsequently installed a high speed in-line PET blowing aseptic filling machine at the Shonan Plant in 2000. In the past, we purchased empty PET bottles from container manufacturers and shipped them to plants where we filled them with beverages, to make final products. With an in-line blow aseptic filling machine, we mold PET bottle containers from a material called preform in the production process of the plant and fill them under aseptic conditions. Installation consequently contributes greatly to reducing GHG emissions as using preforms allows us to process greater loads on trucks compared to transporting empty PET bottles.
In 2003, we installed preform molding equipment on the beverage production line at Kirin Distillery ahead of other players in the industry, thereby saving the transportation of preforms.

Reducing the weight of containers

Between 1990 and 2021, Kirin Brewery and Kirin Beverage reduced GHG emissions from container manufacturing by a total of 4.8 million tonnes* by reducing the weight of containers and packaging. Making containers lighter leads to reducing GHG emissions in the manufacturing process of containers and packaging and improving loading efficiency, which leads to the reduction of GHG emissions.

* Calculated based on the Carbon Footprint Product Category Rule (Certified CFP-PCR Number: PA-BV-02) applied to the actual container usage of Kirin Brewery and Kirin Beverage from 1990 to 2021.

Ocean transportation in large bags and bottling in Japan

Mercian ships some of the wine it imports via ocean transportation in specially designed, large 24kl bags (equivalent to about 32,000 of 750ml bottles) with low oxygen permeability, and bottles the wine in plants in Japan. Compared to importing bottled wine, this method lets Mercian reduce GHG emissions during ocean transport by roughly 60% because it eliminates the need to transport heavy bottles by sea, although it increases the amount of GHG emissions from the company's plants owing to bottling in Japan. We are able to use Ecology Bottles (made with at least 90% recycled glass), lightweight bottles, and PET bottles as containers, which contributes to making effective use of resources and reducing GHG emissions significantly across the entire value chain.


Specially designed large bags


Annual GHG emissions when producing labels

Approximately 400t reduction

Annual GHG emissions from recycled PET bottles and no label products

Approximately 1,300t reduction

* The information and product images above are as of the end of June 2022.

Production

Fuel shift and cogeneration

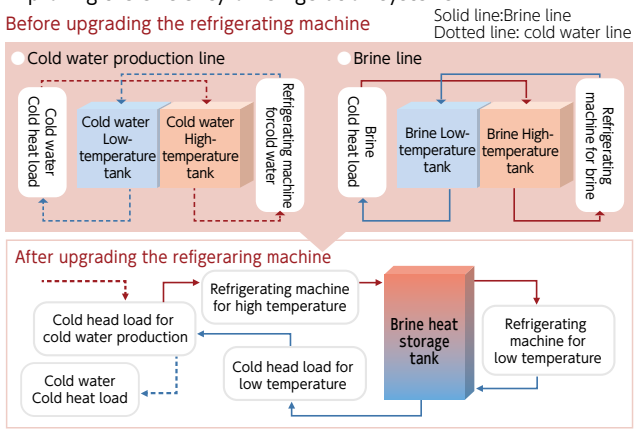
The majority of the fuel we use at breweries is consumed in the boilers that generate steam. At all Kirin Brewery and Kirin Beverage plants, we have completed the shift to natural gas, which generates less GHG emissions than heavy oil.
We have achieved more efficient boiler operations through the installation of highly efficient small boilers in line with the fuel shift.
We have introduced cogeneration systems to provide some of the plants' heat and electricity.

Cogeneration

Refrigeration systems

At Kirin Brewery, we reduce energy consumption through improving the efficiency of refrigerating systems. We are introducing a cascade refrigeration system, which cools in phases, for processes that involve a considerable temperature difference, and we are also making operational improvements to refrigeration systems.

Improving the efficiency of refrigeration systems



Upgrades to high-pressure compressors for PET bottle molding

At the Kirin Beverage Shonan Plant, as part of our production processes, we mold PET bottles from a material called preform and fill them under aseptic conditions. In 2021, we switched our high-pressure compressors for PET bottle molding from V-type reciprocating compressors to inverter-controlled pneumatic machinery in the form of screw compressors and horizontally opposed reciprocating compressors, thereby reducing annual power usage by around 8%. This machinery can also recover and reuse waste heat from compressors.

Inverter-controlled pneumatic machinery

Introduction of high-efficiency boilers

Biokyowa, which produces amino acids in the United States, uses natural gas as a heat source during production. In order to reduce the use of natural gas, in 2020, we replaced all boilers with high-efficiency package boilers that control the number of operating units. This has made it possible to reduce annual natural gas consumption by approximately 8%.

High-efficiency package boilers

Plant staff involved in the boiler project

Distribution

Modal shift

The Kirin Group is actively pursuing a modal shift of switching from truck transport to rail and ocean transport, which has lower GHG emissions, for long-distance shipments (400 to 500 km or more). Although truck transport is efficient when transporting various types of beverages over a relatively short distance to the warehouses of our business partners, rail transport enables further reduction of GHG emissions over long-distance shipments. We have developed special cartons (registered as a utility model) that are less likely to rub together during long-distance rail transport. These are just some of the initiatives we are continuing to take in pursuing a modal shift as we work to reduce GHG emissions and maintain and improve quality during shipping at the same time.

Joint delivery

The Kirin Group has positioned the logistics area as a non-competitive sector and is actively engaging in initiatives together with other companies in the same industry.
In 2017, together with other companies in the industry, we established a joint delivery center in Kanazawa City, Ishikawa Prefecture, and launched joint transport by rail container from plants in the Kansai area. Neither of the companies has plants on the Japan Sea side, so products previously had to be transported by truck over long distances—of 200 km—from their plants on the Pacific Ocean side. This was inefficient and placed a great burden on the truck drivers. Joint transportation using rail containers has not only significantly reduced GHG emissions but shortened distances between the plants and the terminals and between the terminals and the destinations with a significant alleviation of the burden on drivers, which is helping to solve the social issue of a shortage in truck drivers. Through these efforts, we have successfully completed a modal shift from long-distance truck transportation, equivalent to 10,000 vehicles a year, to railway containers, and we estimate that we can thus annually reduce GHG emissions by approximately 2,700 tons.
In September 2017, we began joint delivery in the eastern Hokkaido area. As a result of these efforts, we are effectively utilizing railway containers and have enhanced truck loading efficiency, leading to more efficient logistics. We estimate that this results in a reduction in annual GHG emissions of approximately 330 tons.*
The Kyowa Kirin Group also conducts joint transportation of products between distribution centers. Since 2020, the Ube Plant has been transporting raw materials in railway containers.

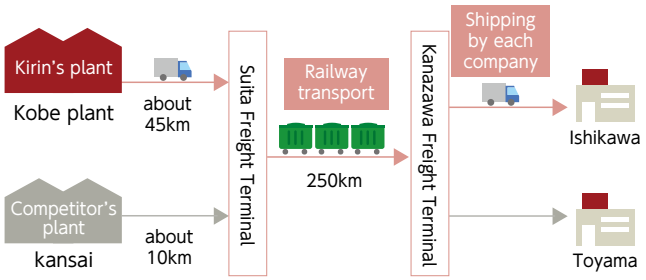
* Contribution to Avoided Emissions through the Global Value Chain, Third Edition, Keidanren (Japan Business Foundation)

Joint collection of beer pallets

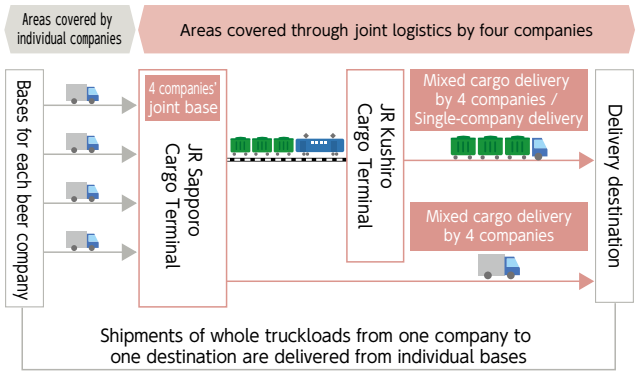
In a joint initiative by the Japan's four major breweries, we are expanding the joint collection of beer pallets.
We began the joint collection of beer pallets in the Tohoku area in November 2018. From July 2019, we expanded the initiative to the Tokyo metropolitan, Tokai, and Kyushu areas, before deploying it nationwide from November 2019.
Thanks to these efforts, it is estimated that in total, the four brewers have reduced annual GHG emissions by 5,158 tons (a reduction of approximately 37% compared with former methods),* by improving the loading ratio of collection vehicles and shortening distances to collection.

* Contribution to Avoided Emissions through the Global Value Chain, Third Edition, Keidanren (Japan Business Foundation)

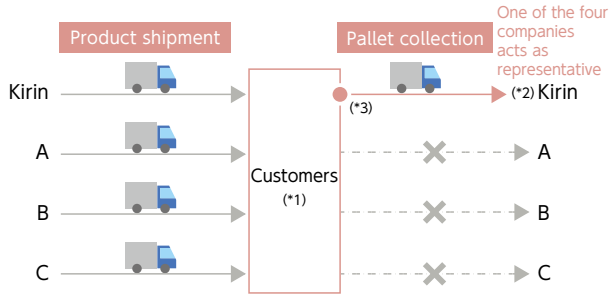
Joint delivery from Pacific Ocean side to Japan Sea side



Joint delivery in Hokkaido



Joint collection scheme for beer pallets



*1 Restricted to customers that have dealings with multiple companies and a transaction scale of at least a certain level (total of around 10,000 beer pallets a year from members of the Association for Joint Use of Beer Pallets)
*2 One company will represent the four beer companies and collect the pallets. None of the other companies will collect them.
*3 The representative will tally up the pallets of the four beer companies and manage the collection with the customer.

Improving loading efficiency

Using a truck allocation system that has master data for the precise loading capacities of each truck, the Kirin Group is working to transport our products with the most efficient combinations of trucks and cargo. Kirin Beverage has adopted a bottle shape that enhances loading efficiency, enabling us to increase the number of bottles per pallet. Kirin Beverage compensated for reduction in capacity for large carbonated drink containers (1.5L) by changing the shape of the "shoulders" of bottles and changing the diameter of PET bottles bodies from 92.5mm to 89.5mm. This means that the number of cases loaded on one pallet has been increased from 40 (10 cases x 4 stacks) to 60 (15 cases x 4 stacks), improving the loading efficiency by a factor of 1.5.
Since April 2022, we have been using square PET bottles for *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* (525ml and 600ml), as part of the expansion of our activities to medium-sized PET bottles. By adopting a square shape, we have increased the number of boxes loaded per pallet for 525ml bottles from 48 cases (8 cases x 6 stacks) to 60 cases (10 cases x 6 stacks), improving loading efficiency by a factor of 1.25, and for 600ml bottles, from 48 cases (8 cases x 6 stacks) to 50 cases (10 cases x 5 stacks), improving loading efficiency by a factor of 1.04.

* Calculated based on the results of shipments of large carbonated drink containers in 2016.

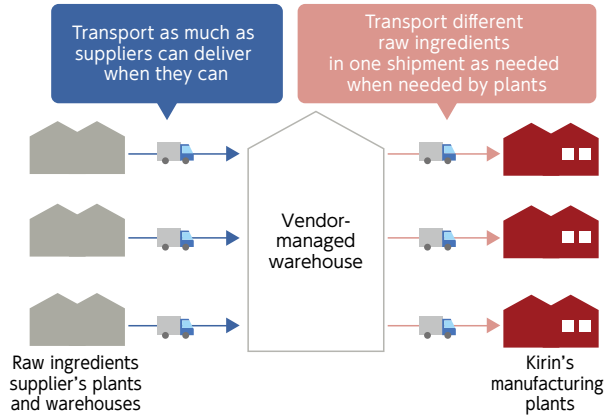
Adjustments to brewing and production sites

KIRIN GROUP LOGISTICS and Kirin Brewery are making adjustments to brewing and production sites as a key measure to reduce GHG emissions from transportation. Kirin Brewery's Sendai Plant began producing RTD products in 2022, and we expect to be able to reduce GHG emissions by approximately 3,000 tonnes per year by reducing transport distances. We will promote the optimization of our network across production and distribution as a whole at other brewing and production sites.

Vendor-managed warehouse

The soft drinks sold by Kirin Beverage are produced at plants throughout Japan, and they cover a wide range of beverages, including tea, coffee, carbonated drinks, and sports drinks. Because raw ingredient production plants and warehouses are extremely limited in number in contrast to product manufacturing plants, long distance shipments are increasing. Since we transport raw ingredients when necessary, and in the amounts necessary, in accordance with the production plans of product manufacturing plants, even small amounts of raw ingredients are transported over a long distance, which was becoming an inefficient practice.
With the aim of mitigating the risk of not being able to transport due to an unavailability of trucks and optimizing transportation efficiency, we started a trial operation of a raw materials procurement and distribution system using a raw materials warehouse (vendor-managed warehouse) adjacent to Kirin Beverage's in-house plants, the Shonan Plant and Shiga Plant, from October 2019. By establishing this facility as a vendor-managed warehouse, raw ingredient suppliers can transport the desired amount of raw ingredients when they need to, thereby maximizing efficiency. This has made it easier to cope with sudden changes in production plans, and contributed greatly to improving the responsiveness of plants.
Based on the results of this trial, in April 2020, we increased the number of applicable raw ingredients to more than 200 types at 20 plants nationwide, including subcontracted plants, and the system is in full operation. Given full-scale operation, we have estimated that we are able to reduce GHG emissions by at least 1,000 tonnes per year (reduction rate of approximately 80%) and cut the number of long-distance*1 transport trucks by at least 4,000 vehicles (reduction rate of approximately 63%).*2

*1 Defined as 100 km or more
*2 Estimated based on the raw ingredient transportation results in 2017, only for raw ingredients that are assumed to make use of vendor-managed warehouses.



* The information and product images above are as of the end of June 2022.

Sale

Carbon zero certified beer

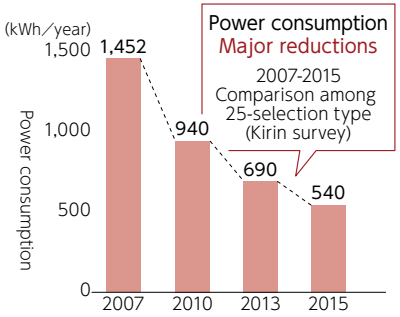
Steinlager, which Lion sells in New Zealand, has obtained certification as a carbon zero beer under the Toitu program by a body of the New Zealand government. In 2021, we featured the Toitu carbon zero mark in our marketing campaigns to highlight to consumers the commitment Lion has made to reducing GHG emissions through Steinlager and other products.
In Australia, Lion is preparing to acquire carbon neutral certification through Climate Active for many key products. In order to obtain certification, Lion is working to comply with the requirement that it must offset all GHG emissions from the complete life cycle of the product, including emissions from raw materials and packaging, distribution and product waste.

TOITŪ
NET CARBON ZERO
ISO 14064-1 ORGANISATION

Vending machines

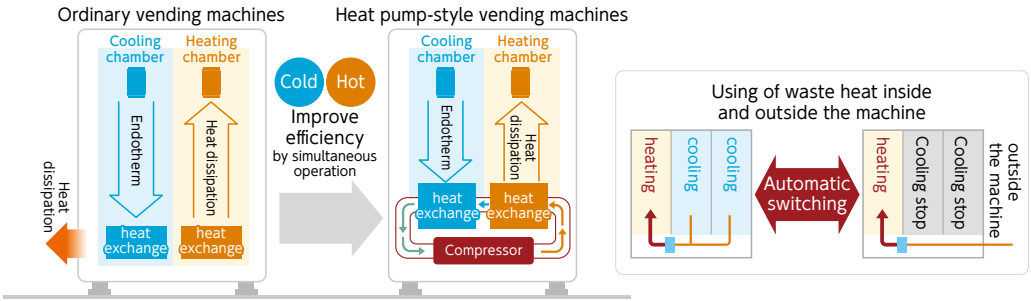
Kirin Beverage was the first in the industry to introduce heat pump-style vending machines in 2006, and from 2012, almost all newly installed vending machines for cans and PET bottles are of this type. As of April 2021, we have switched more than 85% of installed vending machines to this type.
Heat pump-style vending machines pump up the waste heat generated when cooling products and use it for heating to warm up the products. This allows reduction in power consumption compared to conventional vending machines by cutting down the power used by the heaters.

Trend in power consumption



The latest heat pump-style vending machines are equipped with a compressor that uses an inverter to delicately control the operation (variable speed of rotation) according to the atmospheric temperature and the temperature of the products in the machine. Some types offer higher energy-saving performance, such as with heating functions not only by using the waste heat released by the cooling chamber as previous models did, but by capturing the heat from outside the machine, and by improving hot and cold insulation performance with the heavy use of vacuum insulation materials. These vending machines have evolved to the point where power consumption can be reduced by about 40% compared to 2013. Installation of the new models began in 2015, and we are aiming for 80% of the new machines we install in 2022 to be new models.
With regard to lighting, we are replacing conventional fluorescent lighting with LED lighting, which conserves more energy.

About heat pump



Change to the best-before labeling

Since 2013, Kirin Beverage has been working to shift to labeling the "year and month" as the best before date on soft drinks.
Kirin Brewery has changed its labeling of production dates on cans and bottles of beer, low-malt beer, no-malt beer products, and non-alcoholic beer-taste beverage from the former "year, month and early/middle/late month" to "year and month" for products from October 1, 2020 onwards.
We expect that this change in labeling will contribute to alleviating the need for managing products based on periods of "one-third of a month," streamlining store display operations at distributors, and reducing operational loads associated with in-house inventory management and shipping operations, thereby increasing efficiency across the supply chain and significantly reducing product waste losses.

More information on measures to reduce food waste→P.34

SPRING VALLEY BREWERY TOKYO

PRING VALLEY BREWERY TOKYO is an all-day dining establishment with a brewery that we opened in Log Road Daikanyama in April 2015, where patrons can enjoy craft beer made on premises. 100% of the restaurant's electricity needs are met by green power using Green Power Certificates issued by the Yokohama City Wind Power Generation Project.

SPRING VALLEY BREWERY TOKYO, where patrons can enjoy craft beer

Policy recommendations

Kirin Holdings signs the “Business Ambition for 1.5℃” and “Uniting Business and Governments to Recover Better”

On June 24, 2020, the Kirin Group signed the “Business Ambition for 1.5° C” commitment letter jointly issued by three parties - United Nations Global Compact (UNGC), Science Based Targets initiative (SBTi) and We Mean Business—requesting companies to set targets that will limit the rise in global temperature to 1.5° C.
On the same day, we signed the “Uniting Business and Governments to Recover Better” statement, which makes requests of companies that have set SBT or declared their intention to set SBT.

Kirin Holdings consents to “Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action”

On July 30, 2020, Kirin Holdings became a supporter of “Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action,” a recommendation by the RE-Users (Renewable Energy Users Network), which promotes the use of renewable energy mainly by companies. This recommendation was developed in January 2020 in cooperation with CDP Japan and WWF Japan based on the opinions of 20 large companies participating in the RE-Users. The RE-Users will communicate with the Japanese government and electric power companies to take measures to ensure that the country as a whole is able to promote the implementation and use of renewable energy, even in the face of the spread of COVID-19.

Participation in the “consortium for promoting the use of electric vehicles”

On May 1, 2020, the Kirin Group became a member company of “the consortium for promoting the use of electric vehicles” (hereinafter, the Consortium), which aims to promote the penetration of electric vehicles for business use.The Consortium aims to promote the introduction and use of electric vehicles, solve social issues, and realize a sustainable society by having companies and organizations share issues and work together to solve them. By participating in the Consortium, the Kirin Group will study highly practical electric vehicles suitable for our business operations, share insights across industries, and promote initiatives to realize a sustainable society.

Participation in the Climate Leaders Coalition

Lion continues to participate in the Australian Climate Leaders Coalition (CLC), which has the mission of having company CEOs jointly lead the response to climate change through transparent and meaningful action related to mitigation and adaptation. By participating in the CLC, we are calling for policies and investments that will enable New Zealand to transition to a zero-carbon economy, and as a participating company, we are committed to addressing climate change, including measuring and publicly reporting emissions, setting public emissions reduction targets, and working with suppliers to reduce emissions.

Interview in TCFD Guidance on Scenario Analysis

In the “Guidance on Scenario Analysis for Non-Financial Companies” published by the TCFD in October 2020, we expressed our opinions in an interview as one of 15 companies from around the world.

https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Guidance-Scenario-Analysis-Guidance.pdf

Participation in study group related to non-financial disclosure

Since 2021, in response to a request from the Ministry of Economy, Trade and Industry, the senior executive officer responsible for CSV strategy in the Kirin Group has participated in the Study Group on Disclosure Policies for Non-financial Information. This study group will consider approaches to disclosure and disclosure media that contribute to high-quality dialogue with users of non-financial information. The study group also aims to accurately communicate Japan's position on non-financial information disclosure and guidelines, and to enhance international recognition of this issue.
The senior executive officer responsible for CSV also participated in a panel discussion at the TCFD Summit held on October 9, 2020 (organized by the Ministry of Economy, Trade and Industry and cosponsored by the WBCSD and the TCFD Consortium).
In 2020, a representative of the Kirin Group served as a member of the Review Committee of Sector-Specific Disclosure Guidance (food sector), the results of which were made public in the “Guidance on Climate-related Financial Disclosures 2.0 (TCFD Guidance 2.0)” by TCFD consortium published on July 31, 2020.

Key data related to Climate Change

Independent Assurance Report→P.143

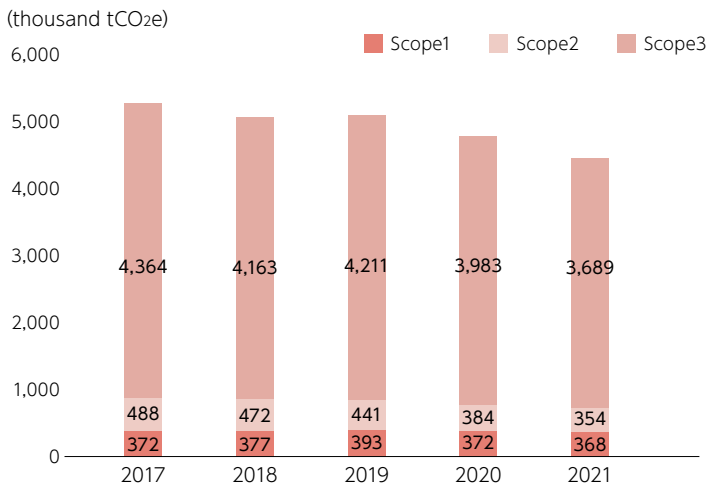
Value chain greenhouse gas emissions

(Unit : tCO_2e)

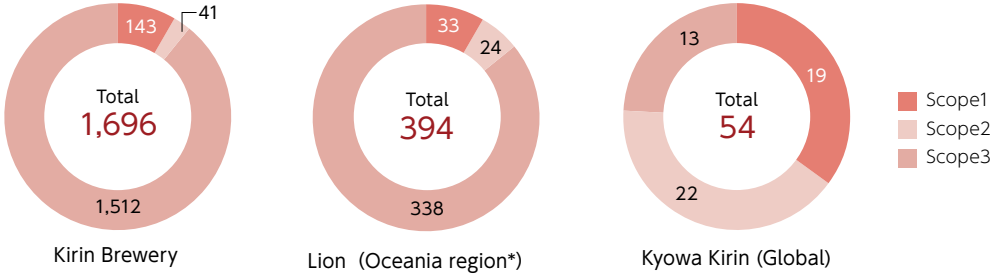
	2017	2018	2019	2020	2021
Direct emissions from corporate activities (Scope 1 + Scope 2)	859,751	849,247	833,691	756,596	721,553
Scope 1 (Emissions from use of fuel)	371,897	377,216	392,647	372,456	367,742
Scope 2 (Emissions related to purchase of power and steam)	487,853	472,032	441,044	384,140	353,811
Indirect emissions (Scope 3)	4,363,666	4,163,408	4,211,284	3,982,547	3,688,961
Raw materials (Category 1)	2,628,183	2,444,176	2,517,658	2,394,770	2,230,657
Transport - Upstream (Category 4)	376,266	379,998	521,214	492,272	433,015
Transport - Downstream (Category 9)	995,389	981,069	890,607	847,648	765,018
Product use/disposal (Category 11, 12)	158,309	150,569	47,573	45,242	43,103
Other (Category 2, 3, 5, 6, 7, 8, 10, 13, 14, 15)	205,519	207,595	234,232	202,614	217,169
Emissions from entire value chain (Scope 1 + Scope 2 + Scope 3)	5,223,417	5,012,655	5,044,975	4,739,143	4,410,514

Calculation boundaries→P.121

Trend in value chain greenhouse gas emissions

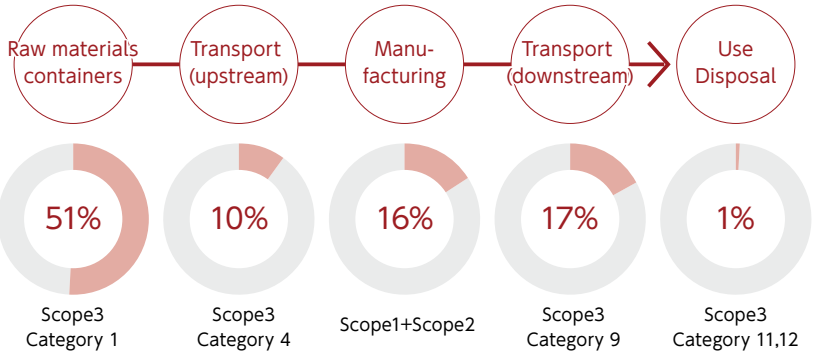


Greenhouse emissions by business (2021) (thousand tCO_2e)



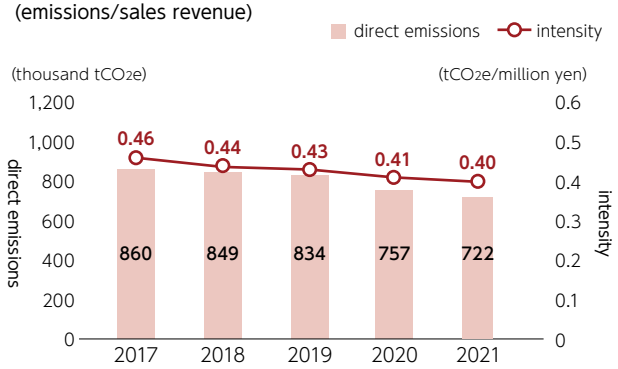
* This region covers the Oceania region where Lion conducts business activities, excluding New Belgium Brewing.

Ratios of greenhouse gas emissions in value chain (2021)

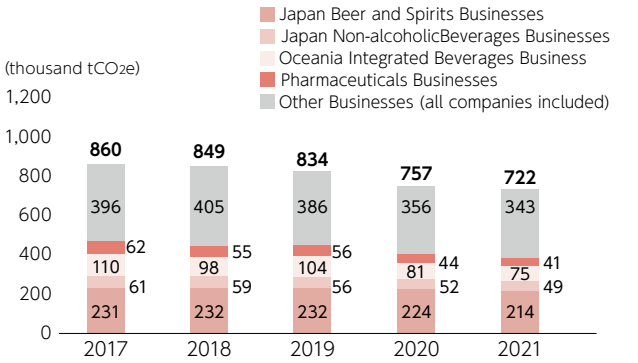


* Since 2019, we have excluded Lion' s non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

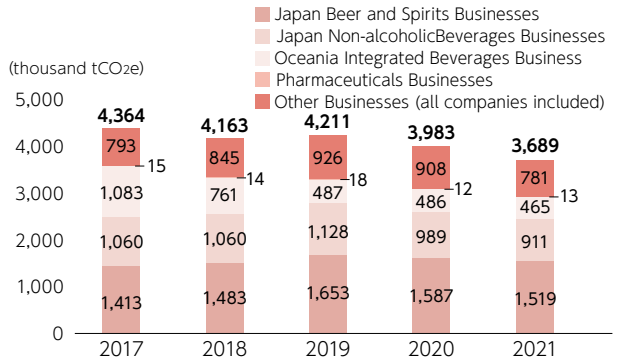
Total direct emissions (Scope 1+2) and intensity (emissions/sales revenue)



Kirin Group total direct emissions by business segment (Scope1 + 2)

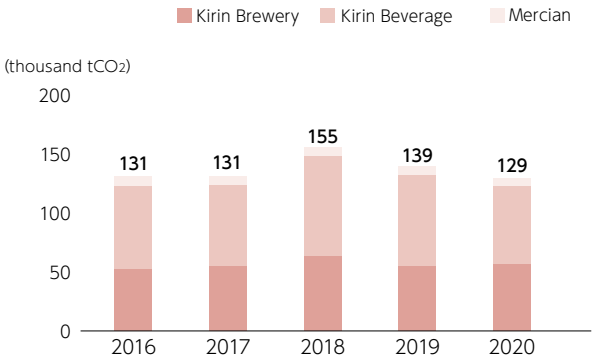


Kirin Group total Scope 3 emissions by business segment

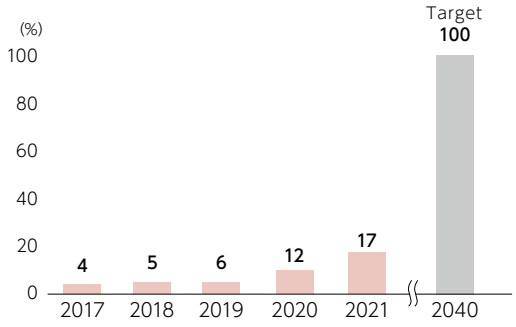


* Since 2019, we have excluded Lion' s non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

CO_2 emissions associated with domestic transportation



Ratio of renewable energy to total electric power used in the Kirin Group as a whole



Disclosure based on TCFD recommendations

Introduction

In almost all of the Kirin Group's businesses, we process agricultural products and water, put them in containers, and offer them to consumers as products. We recognize the greenhouse gases produced during these processes cause climate change to become more severe, and the biggest impact will be on biological and water resources, which are our ingredients. We are very dependent on natural capital. Based on this understanding, since around 2010, prior to the publication of the TCFD final recommendations, we have conducted various risk surveys related to natural capital.

We believe that this accumulation of many years' insight about risk assessment in the value chain was what enabled us to begin scenario analysis soon after the TCFD final recommendations were published in 2017, and to disclose information in line with the TCFD recommendations in the Kirin Group Environmental Report 2018 as early as the end of June 2018.

In 2019, under the 2℃ and 4℃ scenarios set in-house, we analyzed the impact of climate change on agricultural raw materials per major supplier country in 2050 and 2100. Furthermore, we conducted water risk and water stress surveys in areas producing agricultural products and production and logistics sites, and carbon pricing impact assessments.

In 2020 and 2021, we estimated the financial impact of declines in agricultural yields on procurement costs and the financial impact of water risk/stress on production sites. We also estimate and disclose information pertaining to business opportunities related to heatstroke and infectious diseases caused by climate change.

Effectiveness of scenario analysis

We believe that scenario analysis is a very effective management tool for identifying and mitigating risks that would have extremely serious consequences for our businesses if they occur, regardless of the likelihood of occurrence.

In July 2018, when we disclosed the results of scenario analysis for the first time in our 2018 Environmental Report, the 2018 West Japan Torrential Rain Disaster (the Heavy Rain Event of July 2018) occurred, causing extensive damage to a large area of western Japan and disrupting roads and railway networks.

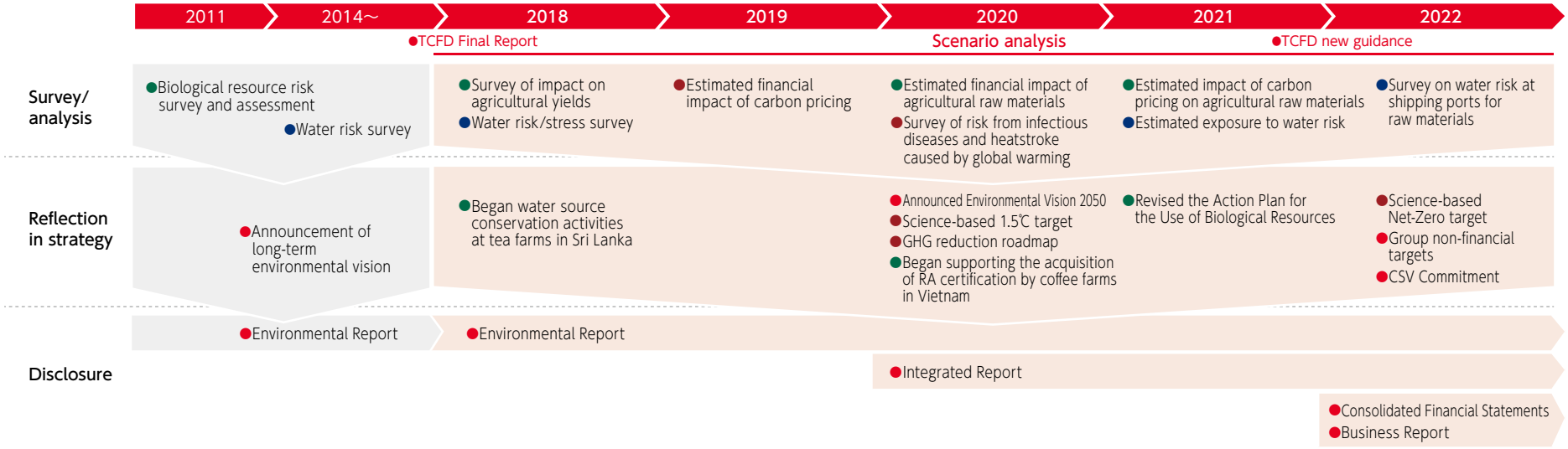
Kirin Beverage has actively promoted a modal shift, partly also to cope with the shortage of truck drivers, and has achieved a significant reduction in GHG emissions. This shift to railway transportation, however, happened to disrupt deliveries during peak sales periods due to the disaster, which caused a major impact. We had listed the impact of natural disasters on transportation as a major risk in conventional risk management, and we had made some efforts to mitigate this risk. However, since we regarded the probability of occurrence as low, we did not consider detailed countermeasures.

Learning from this experience, in the fall of 2018, we prepared and began implementing a manual for what to do in the event of similar disasters. Through this measure, we successfully avoided any major impact from Typhoon Faxai (2019 Boso Peninsula Typhoon) and Typhoon Hagibis (2019 East Japan Typhoon) in October 2019. Currently, we apply scenario analysis methods to risk management other than climate change as well.

Reflection in strategy

At a meeting of the Group CSV Committee in June 2019, the rapidly changing situation surrounding the environment following the adoption of the Paris Agreement and the results of scenario analysis were reported. Senior management discussed these matters, and as a result, directed the launch of a project to review the formulation of strategies and the setting of targets. In February 2020, following deliberations based on the results of the project, the Board passed a resolution to adapt the "Kirin Group's Environmental Vision 2050," a long-term strategy that significantly raised the targets in our existing environmental vision, as well as our aim to achieve "net zero GHG emissions" by 2050. In this way, the results of scenario analysis provide meaningful input information for our environmental strategy.

Following the declaration of our aim to achieve net zero emissions in February 2020, we joined RE100 in November 2020, and declared our aim to use renewable energy for 100% of electric power used by 2040. In December 2020, the Kirin Group raided our target to 1.5℃ from our previous 2℃ target, for which we were the first Japanese food company to obtain the approval from SBTi in 2017. In 2021, we formulated a roadmap to achieve our science-based 1.5℃ target by 2030 and net zero emissions target by 2050, and launched specific measures, such as introducing large-scale solar power generation facilities at our breweries and plants. On the other hand, since the impact of climate change on agricultural raw materials (biological resources) and water resources is significant, we think adaptation measures are also important for our alcoholic and non-alcoholic beverages businesses.



Disclosure framework

The "Disclosure based on TCFD recommendations" section of this report adopts the Task Force on Climate-related Financial Disclosures (TCFD) framework to explain how the Kirin Group assesses and analyzes the impact of climate change and whether we appropriately incorporate and promote measures to mitigate and adapt to climate change in our strategy, in order for us to appropriately transition our businesses, enhance our resilience, and lead the building of a decarbonized society, against the backdrop of the characteristic of our businesses that are highly dependent on natural capital. In this year's report, we have referred to the new guidance* that the TCFD published in October 2021. We have disclosed information related to natural capital (biological resources and water resources) that is important for our businesses referring to the prototype framework of the Taskforce on Nature-related Financial Disclosures (TNFD), together with climate-related information in accordance with the TCFD framework in the section of this report on "Disclosure based on TCFD recommendations", based on the fact that the TNFD framework itself is still being developed. We have disclosed information concerning our "LEAP (Locate, Evaluate, Assess, and Prepare)" approach to natural capital and our organization under the "AR3T" framework on pages (→18~19). In addition, on page (→97), we have provided information on "systemic risks," which is newly proposed by the TNFD. Since there is currently no available framework for the circular economy, we have disclosed related information on a trial basis on page (→20), based on "Disclosure and Engagement Guidance to Accelerate Sustainable Finance for a Circular Economy". We have used the TCFD framework only for the disclosure of information related to climate change and natural capital, and we have disclosed other information in the section of this report related to our activities.

In recent years, there have been rapid developments in research results related to climate change and natural capital, assessment methods, various tools for simulations, scenario analysis processes, and disclosure frameworks, and we can therefore anticipate major developments in approaches toward the value chain. In scenario analysis that we conduct every year, the Kirin Group constantly identifies these trends, and we will reflect them in better analysis and strategy and enhance our disclosure.

Scenarios

In scenario analysis, we use Group Scenarios that combine temperature scenarios (RCPs) and socioeconomic scenarios (SSPs) from the IPCC, etc. In Group Scenario 1 (2℃ or 1.5℃ scenario), we have mainly used SSP1 and RCP2.6, whereas in Group Scenario 3 (4℃ scenario), we have mainly used SSP3 and RCP8.5. All research results, information, data, and other sources of information for each scenario were valid at the time of consideration of the scenario, and by their nature, estimates of impact analyzed and calculated based on these scenarios contain uncertainties. We have not taken the impact of geopolitical factors into consideration in this scenario analysis.

Applicable businesses

The businesses to which this analysis applies account for approximately 90% of the Kirin Group's sales, consisting of Kirin Brewery, Kirin Beverage, Mercian, Lion, Kyowa Kirin, Kyowa Hakko Bio, and KOIWAI DAIRY PRODUCTS.

Risk and opportunities

For physical risk, we have mainly analyzed the impact on major agricultural raw materials and water in all areas, from food and beverages to pharmaceuticals, particularly the alcoholic and non-alcoholic beverages businesses, which we have found to be significantly affected in past scenario analysis, as well as the impact on brewing and manufacturing sites and logistics networks, where the risk is thought to be significant. For transitional risks, we have analyzed policies, technology, markets, and our reputation, particularly in relation to energy costs, which make up a significant proportion of procurement costs. In terms of business opportunities, we have analyzed areas such as health, which is a key area for the value creation across everything from food and beverages to pharmaceuticals, and an area where we think we can contribute to social issues caused by climate change.

Time horizon

For the periods when risks will materialize, we have generally defined the short term as from the present to 2024 (the period of the Medium-Term Business Plan), the medium term as from 2025 to 2030 (the period of KV2027 and the SDGs target period), and the long term as 2031 to 2050 (the target year for the Kirin Group's Environmental Vision 2050). However, these time horizons are not necessarily consistent with the sources of information used for risk assessment or senario analysis. In such cases, we have used the time horizons set for those specific references.

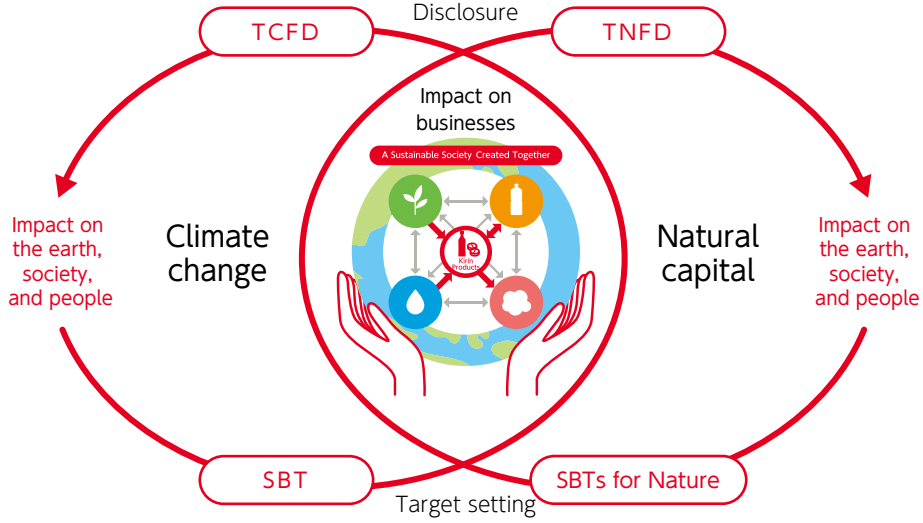
Reference information and calculation methods

We have summarized information on specific processes for analysis and calculation, as well as the data we used, on pages (→102~103). We have provided information related to processes for calculating GHG emissions (calculation of metrics, methods used for estimation, etc.), Boundaries, coefficients used in calculation, calculation methods, and other information in the sections of this report on Metrics and Targets, pages (→99~100), and Environmental Data, pages (→121~122), when we have not provided it for each part.

Independent assurance

The Kirin Group has been receiving independent assurances to ensure the reliability and transparency of information disclosed. For details, please refer to the Environmental Data section of this report.

Relationship between the environmental vision and disclosure framework



Summary

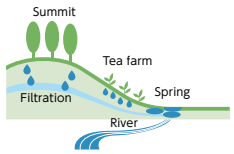
	Initiatives	Progress in 2021 and 2022
Governance	●Significant matters such as basic policies related to the environment as a whole, including climate change issues: the Board conducts deliberations and makes resolutions ●Setting of targets, such as upgrading our science-based targets to 1.5℃-alingedand joining RE100: the Group Executive Committee conducts deliberations and makes resolutions ●Incorporation into group companies' management plans: establishment in CSV Commitments as a non-financial KPI ●Responses to environmental issues across the Kirin Group: the "Group CSV Committee," which is chaired by the CEO of Kirin Holdings and whose members are the CEOs of key Group companies and the senior executive officers of Kirin Holdings, conducts deliberations (meets three times a year) and reports its decisions to the Board ●Reports and reviews at meetings of the Board: progress in environmental management and business risks and growth opportunities related to environmental issues (every year)	●Increased the number of meetings of the Group CSV Committee(from once a year to three times a year) ●Established the Group Environmental Meeting (meet twice a year) ●Disclosed climate-related information in accordance with the new TCFD guidance ●Set the reduction of GHG emissions as a non-financial target indicator linked to officer remuneration
Strategy	●Inputs for revisions to the long-term strategy, "Kirin Group's Environmental Vision": adoption of the Paris Agreement in 2015, the 2018 IPCC "Special Report on Global Warming of 1.5℃," and the results of scenario analysis ●Mitigation measures: upgrading our science-based targets to 1.5℃ aligned. Join RE100 and expand our use of renewable energy ●Adaptation measures: technologies for utilizing alternative sugars that do not depend on barley, mass plant propagation technologies, technologies that reduce water usage, and support for the acquisition of sustainable farming certification ●Business opportunities: providing products that act as solutions for social issues caused by climate change, such as the spread of heatstroke and infectious diseases	●Set targets for the reduction of GHG emissions for all operating companies in CSV Commitments, which are linked to the assessment of the performance of operating companies ●Established large-scale solar power generation facilities at all Kirin Brewery plants using the PPA method (excluding the Yokohama Brewery) ●Achieved a 100% rate of renewable energy for procured power at the Kirin Brewery Sendai plant after doing the same at the Nagoya plant ●Achieved a 100% rate of renewable energy for procured power at three Château Mercian wineries
Risk management	●Risk management, including climate-related risks: the Group Risk and Compliance Committee manages risk (meets each quarter) ●Response to risks that would significantly impact our businesses if they occurred, even if we do not know the probability that they will occur: introduction and operation of a new approach to identify and consider important risks by setting scenarios and conducting analysis and assessment	●Started BCPs for all types of hazards
Metrics and targets	●Long-term target: net zero GHG emissions across the value chain as a whole by 2050 (already approved as "SBT for net zero") ●Medium-term target: reduce Scope 1+2 emissions by 50% and Scope 3 emissions by 30% by 2030, compared with 2019 (already approved as "SBT for 1.5℃") ●Renewable energy: use renewable energy for 100% of electric power by 2040 (joined RE100) ●Others: set by each operating company as its own CSV Commitments	●Scope 1 + 2: reduced 13% (compared with 2019, result as of end-2021) ●Scope 3: reduced 12% (compared with 2019, result as of end-2021)

Risk	Business impact	Financial impact	Strategy
Physical risk	Decline in yields of agricultural products	Approximately 2.5 billion yen to 9.7 billion yen (4℃ scenario, 2050)	Brewing technology that does not rely on barley Mass plant propagation technologies Support for farms to acquire certification for sustainable agriculture
	Disruption of operations owing to floods	1.0 billion yen (200-year disasters, total of 20 locations in Japan)	Knowledge sharing Adjustment of facilities
	Disruption of operations owing to droughts	0.03 to 0.6 billion yen	Knowledge sharing Water usage reduction technologies
Transitional risk	Carbon pricing	Approximately 1.0 billion yen (4℃ scenario, 2030)	Achievement of science-based 1.5℃ target
	Financial impact of energy	Approximately 9.5 billion yen to 427.0 billion yen (1.5℃ scenario, 2030)	
	Financial impact of agricultural products	1.6 billion yen to 5.7 billion yen (RCP8.5 scenario, 2050)	Mass plant propagation technologies Support for farms to acquire certification for sustainable agriculture
Business opportunity	Spread of infectious diseases	28,961.4 million US dollars (global sales of immunity and health supplements in 2030)	Contribution in Health Science domain
	Carbon pricing Increase in the number of persons requiring emergency services as a result of heatstroke	94.0 billion yen to 188.0 billion yen (4℃ scenario)(size of Japanese market for non-alcoholic beverages that prevent heatstroke in 2100)	Products to address heatstroke

Physical risks

Decline in yields of agricultural products

Droughts and floods



Transition risks

Energy costs

Business opportunity

Water stress

Heatstroke

Health Science domain

Business characteristics and approach to environmental issues

All of the Kirin Group's businesses are directly formed from the benefits of natural capital. Reflecting this characteristic of our businesses, in the "Kirin Group's Environmental Vision 2050," we set four key issues: "biological resources," "water resources," "containers and packaging," and "climate change."

In the Kirin Group's businesses, the impact of the physical risks of climate change is significant, and the scope to which we can respond with "adaptation measures" is limited. Accordingly, "mitigation measures" will be important to lessen the effects of climate change.

Japan and Australia are areas that make up a large proportion of our businesses. From a global perspective, water is relatively abundant in Japan, whereas Australia is a country with significant water stress, and the country has in fact experienced continuous large-scale droughts. We have operated our businesses in these two widely differing countries, giving the Kirin Group an understanding rooted in experience of the fact that water risk and water stress differ significantly between countries and regions. We depend on Sri Lanka for tea leaves for most of our mainstay products, *Kirin Gogo-no-Kocha*. Accordingly, we are aware that our dependencies and impacts on natural capital, which is the source of corpotare value creation as well as a source of risk, differ between places.

In this way, we consider the four key issues in the "Kirin Group's Environmental Vision 2050" to depend on location, while also being mutually related and not independent issues at the same time, and Kirin's approach is to solve these issues in a holistic manner. Kirin Brewery have passed on a brewing philosophy of "Reverence for Life" through generations. This comes from the idea of Dr. Albert Schweitzer, who won the Nobel Peace Prize in 1952, namely his idea that, "I am life that wills to live, in the midst of life that wills to live." Besides the agricultural products used as ingredients, the yeast that powers the fermentation is also alive, and it would be impossible to make beer without life. "Reverence for Life"is also the foundation of CSV management, in which we will contribute to those around us (social value) in the same way we contribute to our own company (economic value), and it is linked to our environmental vision of going beyond the framework of our own company to have a positive impact in society as Kirin's environmental philosophy. Looking ahead, the Kirin Group will continue to work on environmental issues such as climate change, natural capital, and the circular economy, in order to enrich society and the Earth for future generations by collaborating with customers and a wide range of other stakeholders to have a positive impact on nature and people.

More information on our Corporate Data→P.5

Qualitative information to reflect long-term changes

The impact of climate change is already apparent. Various natural disasters have significantly affected our businesses, including major disasters caused by unprecedented heavy rainfall in Sri Lanka, where tea leaves are produced as a raw ingredient, and Europe, as well as long-term droughts and unprecedented large-scale and long-term forest fires in Australia and California, where grapes are produced.

In climate-related scenario analysis, it appears likely that yields of agricultural products will decline and quality will fall over the medium to long term, and that floods and droughts will occur frequently, etc. We also expect to face risks such as rising energy costs from carbon pricing and higher costs for agricultural products. In Japan, various issues are arising, including limited places to establish renewable energy power plants, and the increasing burden on citizens of additional charges under the feed-in tariff system (FIT) for renewable energy. On the other hand, prices of renewable energy are falling while prices of fossil fuels have spiked, meaning that it has become easier than before for companies to introduce renewable energy when looking at the situation from a global perspective.

In terms of mitigation measures, awareness of the sustainable farm certification system is rising rapidly, which means it is becoming easier to link to our brand value.

In response to the increase in infectious diseases and heatstroke as a result of global warming, and people's resulting interest in their health, opportunities are becoming visible to solve issues through our products and expand our businesses, including products that maintain the immune system and non-alcoholic beverages that prevent heatstroke.

Direction of initiatives

For our climate change strategy, we are promoting the reduction of GHG emissions and introducing renewable energy as "mitigation measures" (or measures to reduce the impact of carbon pricing), including commitment to science-based 1.5℃ targets by 2030 and net-zero emissions targets by 2050, and joining the RE100.

As "adaptation measures," we are also promoting the use of sustainable biological resources and water resources. When implementing specific initiatives, we intend to create a positive impact in society and lead the decarbonized society. I.e., in relation to "biological resources" and "water resources," we contribute not only to conserving our own raw materials and water, but also contributing to broader resource conservation in areas that produce raw materials and areas where we operate our businesses. In "climate change" and "containers and packaging", we prioritize the additionality of renewable energy and the in-house development of sustainable containers.

Approach to investment

Our basic principle for environmental investment to achieve our "SBT for 1.5℃"will be that it is profit and loss neutral. Specifically, the merit in terms of costs derived from saving energy will offset depreciation and amortization from the investment and the procurement costs of renewable energy.

For our "SBT for 1.5℃", the SBTi criteria stipulate that the rate of reduction must not be set based on a rate of reduction for the target year, but instead on a rate of reduction for each year leading up to the target year. Accordingly, we aim to reduce emissions for the Group as a whole each year in a linear manner.

Over the three years of our medium-term plan, from 2022 to 2024, we will execute environmental investment of approximately 10.0 billion yen, reflecting the results of our estimates based on a roadmap formulated from these assumptions.

We will use the Net Present Value (NPV) as an indicator for environmental investments aimed mainly at reducing GHG emissions, and we have also introduced Internal Carbon Pricing (ICP) into our framework for making investment decisions. When setting our ICP, we have referred to reference values from the IEA. ($63/tCO2e or 7,000 yen per tCO2e as of February 2022). We have formulated our current roadmap in a way that will enable us to achieve profit and loss neutrality even without taking ICP into consideration, and we plan to accelerate this by taking ICP into consideration.

We will actively implement and consider the issuance of green bonds as a way of reducing our cost of capital. Of the funds to be allocated from the 18th Series of Unsecured Corporate Bonds (Green Bonds), we plan to allocate the full amount by the maturity of the bonds in 2025, including a cumulative total of 3.2 billion yen for the "procurement of recycled PET resin" and a cumulative total of 0.2 billion yen for the "introduction of heat pump systems at plants."

More information on green bonds→P.132

GHG emissions reduction and investment plans

	2022-2024	2025-2027	2028-2030
(1) GHG (Scope1+2)			
Rate of reduction compared with 2019 in final fiscal year (%)	26% (2024, compared with 2019)	37% (2027, compared with 2019)	52% (2030, compared with 2019)
Emissions in the final year (thousand t)	619,000 t (2024)	524,000 t (2027)	401,000 t (2030)
Cumulative GHG reductions over the three years (thousand t)	168,000 t/3 years	73,000 t/3 years	157,000 t/3 years
(2) Environmental investment (Billions of yen)	Approximately 10.0 billion yen	Approximately 8.0 billion yen	Approximately 8.0 billion yen

* "Environmental investment" is the total of capital investment and the increase in costs to procure electric power from renewable energy. Data from 2025 onward are expected amounts based on our current roadmap, and are subject to revisions as necessary.

Governance

In the Kirin Group, the Board deliberates and make resolutions concerning our basic policy and important matters related to climate change issues and environmental issues as a whole, such as natural capital and the circular economy, and the Group Executive Committee deliberates and makes resolutions concerning the setting of important targets.
The Board supervises the execution of duties in relation to climate change issues and environmental issues. At least once per year, strategies related to environmental management, action plans, the status of progress, business risks related to environmental issues, growth opportunities, and important issues are reported to, deliberated and reviewed by the Board.

* Matters such as setting targets related to environmental issues, including climate change, business plans, medium-term plans and fiscal year budgets, and risk management policies are reported to, deliberated and reviewed by the Board at the same timing as the above, or together with other matters reported.

To ensure that directors of the board, audit and supervisory board members, and executive officers provide high-level supervision, including group decision-making and environmental management, the company appoints persons who possess the required experience, advanced insight, and a high level of expertise.*
In order to actively and independently promote CSV across the Kirin Group as a whole, we have established the "Group CSV Committee" (meets three times a year, in principle) to oversee sustainability as a whole. The committee is chaired by the CEO of Kirin Holdings, its members are the CEOs of key Group companies and senior executive officers of Kirin Holdings, and it deliberates environmental issues as an important management issue. We have positioned the Group CSV Committee as an advisory body to the CEO, and it submits agenda items and provides reports to the Group Executive Committee and the Board as necessary concerning its decisions, thus ensuring that they are reflected in the strategy of the Kirin Group as a whole.
In 2022, we established the "Group Environmental Meeting" (meets twice a year, in principle) under the Group CSV Committee. The Group Environmental Meeting is chaired by the senior executive officer responsible for CSV strategy, and its members consist of related senior executive officers and heads of departments. The main agenda items at its meetings are the monitoring of matters such as the status of progress toward the roadmap established for environmental issues, including climate change, biodiversity, water and plastics, as well as the exchange of opinions on related policies, strategies, and plans. At meetings of the Group CSV Committee and the Board, there are agenda items and reports concerning deliberations by the Group Environmental Meeting, as necessary. Through the establishment and operation of the Group Environmental Meeting, we will strengthen our initiatives targeting sustainability-related issues, as required by Japan's Corporate Governance Code following revisions in 2021. The Kirin Group engages in environmental management, including responding to climate change, as part of our CSV management system.
Starting from our medium-term plan in 2022, we have set indicators more directly linked to the execution of management plans as non-financial target indicators linked to indicators for assessing the performance of senior executive officers. We have set our "SBT for 1.5℃"in relation to climate change, and we have also established targets for the efficiency of water use at breweries and production sites with a high level of water stress as a related target.
We incorporate environmental targets, including climate change, into our CSV Commitment, one of our non-financial KPI targets, and reflect them in management plans by setting them as performance indicators for each operating company. The status of achievement of the CSV Commitment serves as a metric for assessing the performance of the CEOs of group companies.

More information on non-financial target indicators and our CSV Commitment → P.22
More information on performance assessment indicators → P.100

* See below for a skill map of senior management. https://www.kirinholdings.com/en/purpose/governance/provisions/

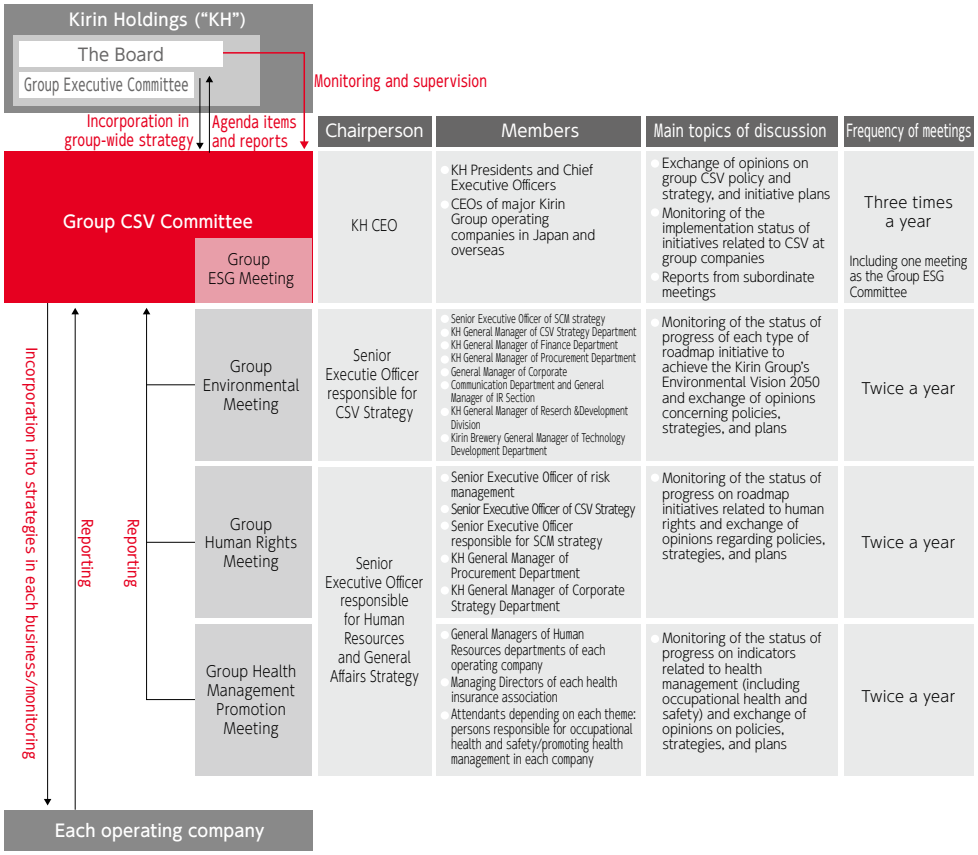
Details of reports at meetings of the Group CSV Committee

FY2019 (June 10)	●Main progress in FY2018 and future issues ●ESG assessment response in order to strengthen management resilience as we aim to be a "global leader in CSV" ●Exchange of opinions regarding Task Force on Climate-related Financial Disclosures (TCFD) scenario analysis and transition plans
FY2020 (June 3)	●Plans to renew the group materiality matrix ahead of the next Medium-Term Business Plan ●Exchange of opinions regarding our "response to human rights in the supply chain" ●Status of consideration of measures accompanying revisions to our environmental vision, etc.
FY2021 (June 10)	●Confirmed progress since the Group CSV Committee meeting for FY2020 ●Response to human rights in the supply chain ●Initiatives to achieve the "Kirin Group's Environmental Vision 2050"

Content of reports to the Board in FY2021

- ●Sharing of Kirin's ESG assessment. The fact that Kirin is continuing disclosure under the TCFD recommendations, which is at the core of the ESG assessment, in a pioneering manner
- ●The fact that, as part of the roadmap to achieve the "SBT for 1.5℃"under the profit and loss neutral principle, we will accelerate the reduction of GHG emissions within a scope where upfront expenses not exceeding tax savings
- ●Our aim to be recognized as a global leader in environmental management through the commercialization of PET chemical recycling and the creation of a circular economy, participation in the SBTs for Nature and TNFD rulemaking, etc.
- ●Details of our response to Japan's Corporate Governance Code after revisions

Management of environmental issues



Physical risks	Risk assessment	Strategy
Chronic risks (biological resources)	Declining yields of agricultural products and increasing procurement costs [medium to long term] ●Significant decline in yields of major agricultural products, including barley, hops, tea leaves, and coffee ●The financial impact from lower agricultural yields caused by climate change is approximately 0.9 billion yen to 2.5 billion yen in 2050 under the 2℃ scenario, and approximately 2.5 billion yen to 9.7 billion yen under the 4℃ scenario (25-75 percentile range in the price fluctuation) ●The risk is small for corn if the increase is 2℃ or less, but there is research with different results so close attention is required. The risk of decline in yields for agricultural raw materials related to high-fructose corn syrup is low.	●Brewing technology that does not rely on barley (adaptation measures/risk reduction) ●Mass plant propagation technologies (adaptation measures/risk reduction) ●Support for farms to acquire certification for sustainable agriculture (adaptation measures/risk reduction) ●GHG emissions reduction (mitigation measures/risk reduction)
Acute risks (water resources)	Disruption of operations owing to floods [short to long term] ●Breweries and plants with high water risk: one in China (the site in China (Zhuhai) has extremely high water risk according to Aqueduct), two in Australia, and four in Japan ●Historical examples of actual flood damage: Approximately 1.0 to 5.0 billion yen ●Exposure to 200-year disasters (total of 20 locations in Japan): Approximately 1.0 billion yen	●Sharing of knowledge concerning responses to floods (adaptation measures/risk reduction) ●Insurance for flooding (adaptation measures/risk transfer)) ●Capital investment for flooding at facilities (adaptation measures/risk reduction or acceptance)
	Impact on shipping & delibery owing to floods [short to long term] ●There is a risk of flooding at shipping ports but planned responses exist	●Sharing of knowledge on responses to floods (adaptation measures/risk reduction) ●Diversification of suppliers (adaptation measures/risk reduction)
	Disruption of operations owing to droughts [short to long term] ●Breweries and plants with high water stress: three Lion breweries in Australia and Thai Kyowa Biotechnologies (six Lion breweries in the future) ●Impact from decline in procduction owing to droughts: estimated to be between approximately 30 million yen and 600 million yen	●Advanced technologies for water use reduction (adaptation measures/risk reduction) ●Sharing of knowledge concerning responses to droughts (adaptation measures/risk reduction)
	Impact on agricultural products owing to floods and droughts [short to long term] ●We forecast that water stress will become higher in many producing areas ●Natural disasters are materializing in many countries and regions	●Responses to water stress in areas producing agricultural raw materials (adaptation measures/risk reduction oracceptance) ●Prevention of soil outflow in areas producing agricultural raw materials (adaptation measures/risk reduction) ●Utilization of bag-type culture vessel technology that enables the recirculation of water (adaptation measures/risk reduction) ●GHG emissions reduction (mitigation measures)

Chronic risks

Details of physical risks

Declining yields of agricultural products and increasing procurement costs [medium to long term]

Yields of agricultural raw materials may decline significantly owing to global warming and reductions in daily temperature ranges.

When we assessed the financial impact of lower agricultural yields using the 25-75 percentile range of the distribution of forecast data for change in prices, the impact was approximately 0.9 billion yen to 2.5 billion yen in 2050 under the 2℃ scenario, and approximately 2.5 billion yen to 9.7 billion yen under the 4℃ scenario (Graph 2). The range of the 25-75 percentile range was 4.5 times larger for the 4℃ scenario than the 2℃ scenario, from which we can infer that uncertainty is higher and the risk is more significant.

Since 2018, we have continued surveys and analysis of the impact of climate change on agricultural raw materials, with reference to numerous academic papers.* Although the impact differs between countries and regions, we have found that there are some agricultural raw materials for which yields will decline significantly. In 2022, we added surveys related to high-fructose corn syrup and protein sources, which are raw materials for low-malt beer products, etc. Every year, we refer to the latest academic papers and revise our information related to other agricultural products (Table 1).

In surveys related to water risk and water stress in areas producing agricultural raw materials, we also identified severe levels of drought risk and flood risk, which may impact agricultural products (Table 10).

In 2022, we estimated the financial impact of declines in agricultural yields for Kirin Brewery, Kirin Beverage, Mercian, Lion (excluding the non-alcoholic beverages business), Kyowa Kirin, and Kyowa Hakko Bio, referring to numerous academic papers. Our estimates covered the following agricultural products: barley, hops, tea leaves, grape juice, starch, lactose, corn, and cassava.

Reference documents→P.102

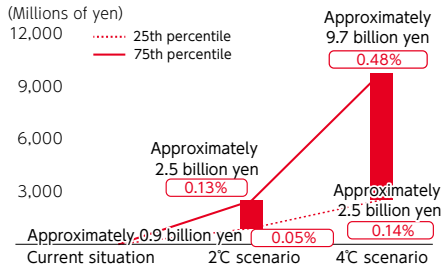
1 Impact of climate change on yields of key agricultural products (forecast for 2050 unless otherwise specified)

Kirin Group Scenario3: 4℃, unwanted world, 2050

Agricultural products	America (North and South)	Asia	Europe and Africa	Oceania
Barley	Canada -12% (2100) U.S. +9%(2100)	West Asia -5% to +10% Korea +0.5%	Finland -5.9% (spring barley) France -10% or more(Winter barley) -20% or more(Spring barley) Mediterranean coast (West)-0.3%(Portugal, Spain, France, Italy) (East)+4.4%	Western Australia -10 to -30%
Hops	U.S. (Washington) -16% (2100)		Czech Republic -8.5%	
Tea leaves		Sri Lanka Decline in yields in lowlands, low impact in highlands India (Assam region) 3.8% decline in yields per 1°C increase above average temperature of 28°C India (Darjeeling region) -40% to -80%	Kenya Change in suitable land from 1500 to 2100 meters above sea level to 2000 to 2300 meters above sea level. Drastic reduction in suitable land in the western part of Kenya, with land remaining suitable in the mountainous area of Kenya Malawi Chitipa 80% reduction in suitable land Nkhata Bay 60% reduction in suitable land Mulanje 70% increase in suitable land Thyolo 20% increase in suitable land	
Wine grapes	U.S. (California) 60% reduction in suitable land U.S. (Northwest) 231% increase in suitable land Chile 25% reduction in suitable land	Japan(Hokkaido) Increase in suitable land, Pinot Noir cultivation possible Japan (Central) Increase in suitable land while also anticipating obstacles from high temperatures	Northern Europe 99% increase in suitable land Mediterranean 68% reduction in suitable land Spain Change in overall wine production for each 1°C rise -2.1% (Spain as a whole) -4.6% (Andalusia) -4.8% (Duero River Valley) -34.6.% (northern Mediterranean)	New Zealand 168% increase in suitable land Australia (southern coast) 73% reduction in suitable land Australia (ex. southern coast) 22% reduction in suitable land
Coffee beans	Brazil 55% reduction in land suitable for arabica 60% reduction in land suitable for robusta	Southeast Asia 60% reduction in land suitable for arabica 52% reduction in land suitable for robusta	East Africa 13% reduction in land suitable for arabica 16% reduction in land suitable for robusta	
Corn	U.S. (Southwest) -27% U.S. (Midwestern Iowa) -5% to -12% U.S. -46/5% (2100) Brazil -19/4% (2100) Argentine -28.5% (2100)	China -27.4%	Ukraine -40.6% (2100)	
Soybeans	U.S. -10% (2080) Brazil -20% (2080) Argentine+40% or more	China +16% to +50% (2100) India -80%		

Reference documents→P.102

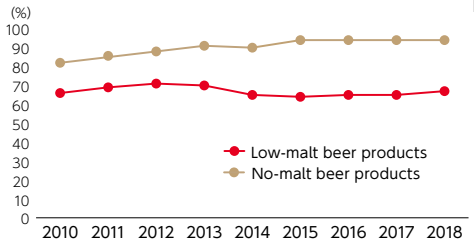
2 Impact of lower yields on procurement costs for agricultural products in 2050



Estimated for the main agricultural raw materials at Kirin Brewery, Kirin Beverage, Mercian, Lion (excluding the non-alcoholic beverages business), Kyowa Kirin, and Kyowa Hakko Bio. Figures in ▭ show the percentage of revenue

Reference documents→P.102

3 Change in Kirin Brewery domestic share of low-malt beer products and no-malt beer products market



Less than 25% malt beer products

Kirin share: approximately 70%

Zero malt

Kirin share: approximately 90%

●Brewing technology that does not rely on barley (adaptation measures)

In response to declining barley yields as a result of climate change, we will maintain earnings by securing the support of consumers with products that limit the amount of barley used.
Kirin Brewery has been a market leader (Graph 3), with an extremely high share of the market for low-malt and no-malt beer, which together account for more than 40% of the Japanese market. We have judged that we will be able to maintain our competitive advantage on an ongoing basis, thanks to our experience effect, which is proved to be proportional to the cumulative amount brewed of such products, our intellectual property, and our deep understanding of the market.
We have also conducted surveys and analyses related to high-fructose corn syrup and protein sources, which are required to brew low-malt and no-malt beer products, while referring to numerous academic papers, and as a result (Table 5), we have judged that there are no major issues at present.
As for corn, we studied the impact of climate change on four major exporting countries of corn (approximately 87% of global exports). Although there is a fairly significant probability (Table 4) that yields in each producing area will fall by 10% or 20%, we found that the probability that average yields will fall at the same time across the four major exporting countries was approximately 7% under the 2℃ scenario. Under the 4℃ scenario, this probability was approximately 86%, so we would be unable to avoid a significant impact. But provided the increase is within the 2℃ scenario, we think we may be able to reduce the impact by changing the countries we procure from.
In 2021, an international research team consisting of 20 research institutions from eight countries, including Japan's National Institute for Environmental Studies and the National Agriculture and Food Research Organization (NARO) reported average global corn yields will fall by approximately 24% by the end of this century compared with the present (1983 to 2013) if climate change progresses. We will continue to monitor the development in research and assess new studies.
We expect that yields of sugar cane, which can act as a raw material for high-fructose corn syrup besides corn, will fall in Brazil, the leading producer, but will rise in China and parts of India.
Yields of potatoes will either rise or fall in India and America, depending on the variety, but overall, we do not expect yields to fall, partly because we expect an increase in yields in China.
As for soybeans, which are a raw material for no-malt beer products, we forecast that yields will either rise or fall depending on the region, and we have judged that it is highly likely we will be able to avoid any impact.

Reference documents→P.102

●Support for farms to acquire certification for sustainable agriculture (adaptation measures)

In order to ensure that areas producing agricultural products are resilient to climate change, we will continue to support the acquisition of sustainable farming certification.
In our support for the acquisition of Rainforest Alliance certification at tea farms in Sri Lanka and coffee farms in Vietnam, we provide training to reduce the impact of heavy rainfall, droughts, and other disasters caused by climate change.
We provide direction to farms to enable the protection of wild animals and the environment, such as forests and rivers. At the same time, we also work to diffuse methods of reducing expenditure and raising earnings while also stably and safely producing tea leaves, by providing direction on scientific methods to raise yields while limiting the usage of agricultural chemicals and fertilizers.
We will accumulate knowledge by continuing to support the acquisition of such certifications, to ensure that we can address any future needs related to other agricultural products.

More information→P.28～P.29、P.32

●Mass plant propagation technologies (adaptation measures)

We will continue efforts to enhance the range of applications of "mass plant propagation technologies" developed by the Kirin Central Research Institute, to ensure that they can be used for heat-tolerant agricultural breeds developed in response to falling yields of agricultural products as a result of climate change.
While it is difficult to conceive of a business model for the Kirin Group that is completely independent of barely and hops, we anticipate that "mass plant propagation technologies" will have a positive impact on the stability of agriculture when agricultural breeds suited to global warming are developed.
We will be able to use plastic film "bag-type culture vessel technology," which the Kirin Group has developed proprietarily, to significantly increase growth rates of healthy seedlings with no diseases and seedlings that are genetically identical to their parents (clones) by multiples of tens or hundreds of thousands depending on the plant species. We aerate a solution containing nutrients necessary for plant growth inside a small bag, making it easier to use water more effectively than in soil cultivation and enabling cultivation in areas with high levels of water stress. In this way, we expect that we can reduce our dependence on water specific to certain countries and regions.

More information→P.33

●GHG emissions reduction (mitigation measures)

In order to minimize the risk of falling agricultural yields, we aim to achieve net zero emissions by 2050, our "SBT for 1.5℃" by 2030, and renewable energy targets under RE100 by 2040, in accordance with our roadmap.

4 Probability of simultaneous 10% or 20% decline in average yield compared to the current level due to climate change in the four largest corn exporters

	2℃ scenario		4℃ scenario	
Country	>10%	>20%	>10%	>20%
United States	68.6	29.5	100.0	96.9
China	46.2	16.8	98.8	89.2
Argentina	50.0	9.9	96.9	86.9
Ukraine	51.8	19.2	98.2	85.0

Reference documents→P.102

5 Impact of climate change on high-fructose corn syrup and soybeans(4° C scenario, 2050, unless otherwise noted)

Agricultural Products	Regional Harvest Forecasts		
	North America	South America	Asia
Sugarcane	–	Brazil ▲9.6%～+1.4%	Pakistan +1.6%～+4.1% China +22～+40%(2060)
Potatoes	United States No fertilizer effect Atlantic ▲20%～▲27% Russet Burbank +0～+5% Fertilizer effective Atlantic 0～▲5% Russet Burbank +18%	–	India +5.7%～+6.2% China Rainfed agriculture - Dabaihua +21.8% (2060) Irrigated agriculture, Kexin-1 +20.9% (2060)
Soybeans	United States (Central) No effect of fertilizer application ▲33.3% (2080) Fertilizer application +4.4% (2080)	Brazil ▲20%(2080)	China +50%(2080) India ▲8.24%

Reference documents→P.103

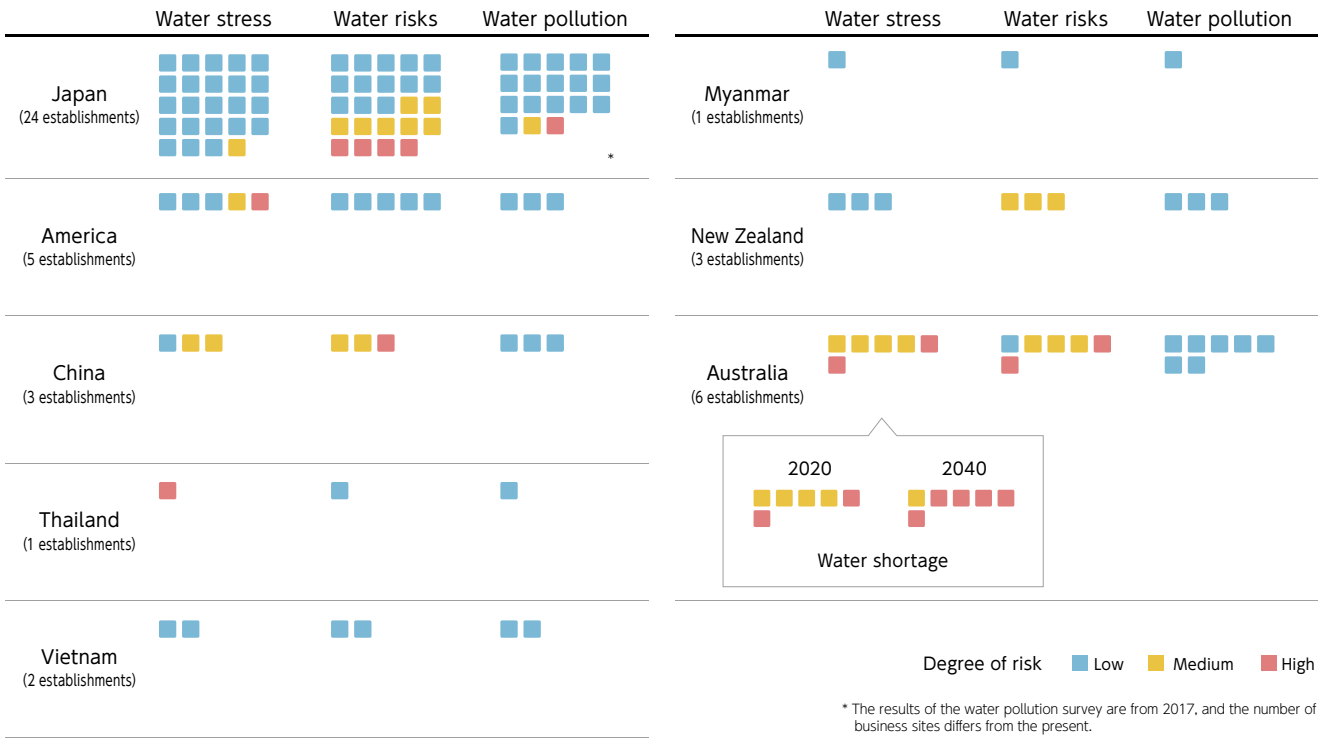
Acute risk

Details of physical risks

Disruption of operations owing to floods [short to long term]

Disruptions to brewing and manufacturing, or a significant impact, may occur as a result of damage from typhoons, heavy rainfall, and other disasters caused by climate change.
The Kirin Group has operated businesses in Japan and Australia, two countries where the level of water stress differs significantly. As such, we have developed an understanding rooted in experience of the fact that problems related to water differ between countries and regions, and that they largely depend on basins and specific locations. Since 2014, we have been conducting regular scientific surveys, and in 2021, we conducted additional surveys and assessments based on Aqueduct for two main brewing sites at New Belgium Brewing in the United States in accordance with the expansion of our businesses.
In 2020, we conducted surveys and analyses of water risk at brewing and production sites using Aqueduct 3.0, hazard maps created by local governments, and other resources. As a result (Figure 6), we identified breweries or plants with a high level of water risk from flooding, etc., as follows: one in China, two in Australia, and four in Japan. In particular, the one in China (Zhuhai) has extremely high water risk, according to Aqueduct. Flooding occurred at Lion's Castlemaine Perkins Brewery in Australia, which we assessed as having a high level of water risk, as a result of large-scale floods in Brisbane caused by very heavy rainfall over a wide area in the eastern part of Australia in March 2022. Flooding occurred as a result of heavy rainfall in 2011 as well. Going forward, we will continue using tools to assess risk, while also considering factors based on our experience.
Our management benchmark for the financial impact of flooding on breweries and plants is approximately 1.0 billion yen to 5.0 billion yen, in line with the actual amounts of flood damage in the past (Table 7).
We are also using wind and water damage simulation systems to forecast losses from the risk of flooding. Our exposure to general 200-year disasters (the total of 20 business sites in Japan) is approximately 1.0 billion yen. There is a possibility of flood damage at our business sites from a rise in sea levels caused by global warming, but although there are forecasts for a rise in sea levels of 0.46 to 0.97 meters with a 4℃ increase in temperature in Japan, we think it is still difficult to form a quantitative assessment. Going forward, we will continue paying close attention to the results of research.

6 Site water risk assessment (results of surveys from 2020 for water stress and water risks and 2017 for water pollution)



* The results of the water pollution survey are from 2017, and the number of business sites differs from the present.

7 Cost of damages in past factory flooding events

Country	Operating companies	Plant	Cost of damage*	Sales ratio
Australia	Lion	Castlemain Perkins Brewery	Approx. 1 billion yen	0.05%
Japan	Kirin Brewery	Sendai Plant	Approx. 5 billion yen	0.27%

*The amount for the Sendai Brewery is from tsunami and earthquake damage in the 2011 Great East Japan Earthquake

* Among Kirin Group business sites, the proportion with a high level of risk is approximately 16%, and the proportion with a medium level of risk is approximately 9%, whereas the proportion with a high level of water stress is approximately 36%, and the proportion with a medium level of water stress is approximately 18%. We have disclosed detailed information on P101.
* In Brisbane, there is a high level of water stress, and there have been continuous severe droughts, but at the same time, there has been repeated severe flooding occurring around once every few decades.
* Japan Meteorological Agency: *Sea Level, High Tide, and Storm Wave Records and Future Forecasts –From "Climate Change in Japan 2020"–*
https://www.mlit.go.jp/kowan/content/06.pdf

8 Results of wind and water damage simulation

Recurrence period (years)	Wind+Flood AEP*
500	42.00%
250	0
200	0
150	0
100	0

* Aggregate Exceedance Probability

Kirin Brewery Nagoya Plant

Castlemaine Perkins Brewery

Response strategy

●Sharing of knowledge on responses to floods (adaptation measures)

At breweries and plants in areas where, comparatively, there is leeway in terms of time until flooding occurs, we will minimize damage in ways such as shutting down power sources in advance.
When flooding occurred at Castlemaine Perkins Brewery in 2011, we shut down power sources in the brewery in advance, partly because there was some time between the flood alert and the actual flooding. As a result, we prevented harm from short-circuiting to electrical equipment in the brewery, and were able to reduce the amount of damage and quickly restart operations. Similar countermeasures were also effective against partial flooding at the Kirin Brewery Nagoya Brewery in 2000.

●Insurance for flooding (adaptation measures)

We will consider insurance at business sites as an effective measure against natural disasters, including floods.
In 2020, we used the natural disaster model AIR to simulate wind and water damage for our main 20 business sites in Japan, thereby estimating loss percentages and amounts of damage for each recurrence period. For 200-year disasters (a disaster occurring once every 200 years), the total exposure across the Kirin Group was approximately 1.0 billion yen. At KYOWA PHARMA CHEMICAL, however, we calculated that the annual amount of damage from a wind and water disaster of a scale occurring once every 500 years would be equivalent to 42% of the value of its property. Accordingly, we will consider covering an insurance, etc., after on-site surveys (Table 8).
Going forward, we will continue to steadily conduct on-site risk surveys and assess the possibility of insurance for business sites where we have judged that there is a high risk of future flood damage based on wind and water damage simulation systems.

●Addressing flooding at facilities (adaptation measures)

We assume that flooding would have a serious impact on the continuity of our businesses, and we will therefore promote physical countermeasures as necessary at business sites where we must fulfill our responsibility to supply customers without interruption.
At Kyowa Kirin, we have judged that the amount of damages from recovery, production disruption, and business opportunity losses would be considerable in the event that water damage, etc., caused long-term disruptions to operations at Kyowa Kirin's own pharmaceutical plants, commissioned manufacturers of drug substances, and packaging material suppliers.
At Kyowa Kirin's own sites, we have formulated policies on countermeasures against water damage, and have also taken measures to prevent flooding (geographically distributed storage of important assets related to production, waterproofing of buildings, moving important facilities to high floors and locations, the installation of flood walls, etc.). In the future, we intend to continue to address these issues through investment in our facilities. We will assess and address the impact across the supply chain as a whole, and take steps to avoid production disruptions and minimize damages. At the same time, there will also be a significant impact on companies commissioned to manufacture drug substances, packaging material suppliers, etc., so we will gather information about water damage countermeasures at each partner company, identify issues, and consider measures such the formulation of BCPs and disaster response drills.

* We have assessed risk related to flooding in a multifaceted manner, using multiple systems. Aqueduct can be used to assess risks, not just at the present but also including future forecasts. Aqueduct is the most widely used tool today, so one of its advantages is that it has a high potential for comparisons, but it is a black box, and in some aspects it does not fully reflect Japan's complex water systems. Hazard maps provide an assessment of the worst expected damage by local governments with a deep understanding of the area. We believe that when hazard maps and Aqueduct are used together, it enables more accurate risk assessments. With simulation systems, it is possible to estimate loss percentages and amounts of damage for each recurrence period, so we use them to identify our exposure and make judgments concerning insurance.

Details of physical risks

Impact on transportation from floods [short to long term]

There may be an impact on product distribution and the transportation of raw materials from typhoons, heavy rainfall, and other disasters caused by climate change. In 2018, the West Japan Torrential Rain Disaster resulted in long-term disruptions to railroads and roads in the Chugoku region, and there were major obstacles to the transportation of products from breweries and plants to customers.
In 2022, we conducted a survey concerning flooding risk and countermeasures in major barley shipping ports overseas. As a result of this survey (Table 9), we found that flooding risk was low in Canada, Australia, and the United Kingdom, and that while there was a risk of future floods of between 0.5 and 5 meters in the Netherlands and Germany, planned countermeasures have been formulated and implemented. We also found that, even when flooding risk is not high in the bays themselves, disasters affecting railroads and roads linked to the bays, as well as adjacent cities, would cause obstacles to the functioning of the ports.

Response strategy

●Sharing of knowledge on responses to floods (adaptation measures)

We are developing a manual for responding when we anticipate disruptions to logistics over a wide area from natural disasters, etc. Immediately after we recovered from major damage to logistics networks from the 2018 West Japan Torrential Rain Disaster, we created a manual for responding to similar events. As a result, we were able to avoid any significant impact from subsequent typhoon damage on product distribution, including Typhoon Faxai, which caused significant damage, particularly in Chiba Prefecture, and Typhoon Hagibis, the first typhoon to receive the designation of a Disaster of Extreme Severity and a Specified Anomalous Disaster (both occurred in 2019).

●Diversification of suppliers (adaptation measures)

We reduce risk by having multiple suppliers.
We work with our suppliers as part of endeavors to sustain our supply chain, to ensure that we can stably deliver safe and secure products to customers, at the optimal price. We have diversified our procurement of malt, the main ingredient in beer, across three continents: North America, Europe, and Australia. We combine procurement measures for hops, such as adopting long-term contracts with producers, as part of efforts to secure the necessary amounts, and minimize the impact of market prices.

9 Assessment of water risk at main barley exporting ports

Country	Coast name	Flood risk	Recent disaster information	Flood control measures
Canada	Vancouver Bay	Risk of floods between 0.5 and 1m in 2100	Full-scale disruptions occurred to rail freight transportation and highways connected to the bay as a result of flooding and landslides caused by heavy rainfall in 2021	In cooperation with local NPOs, flood management strategies have been formulated and coastal lines have been repaired
Australia	Fremantle Perth Bay	Risk of floods between 0.7 and 2m between 2010 and 2080, and risk of floods between 0.5 and 5m from 2080 onward	No information about coastal disasters	On-site analysis is being conducted concerning the risk of climate change. Separately to climate change, there have been repairs to piers, bulkheads, and important facilities
United Kingdom	Southampton Bay	Low risk of flooding prior to 2050. Risk of floods between 0.5 and 5m in 2080	No information about coastal disasters. Damage from heavy rainfall occurred in the city in 2021	Coastal development is being promoted, including flooding countermeasures, and there are plans to complete the construction of bulkheads in rivers with a particularly high level of risk
The Netherlands	Rotterdam Bay	Risk of floods between 0.5 and 5m between 2010 and 2080	No information about coastal disasters	The government and companies collaborated to launch a program for managing flood risk in 2015. They are strengthening protective barriers and embankments, as it is urgently required
Germany	Bremerhaven Bay	Risk of floods between 0.5 and 5m between 2010 and 2080	No information about coastal disasters. Damage from heavy rainfall occurred in the city in 2021	Measures such as building and strengthening sea embankments and protective barriers are being implemented in accordance with plans. Repairs to 1.3km of quay walls were completed in January 2022

Details of physical risks

Disruption of operations owing to droughts [short to long term]

Water is essential in brewing and manufacturing processes for alcoholic beverages, soft drinks, pharmaceutical products, and biochemical products. Accordingly, there may be disruption or obstacles to brewing and manufacturing in the event of severe droughts caused by climate change.

In our assessment of water stress at manufacturing and brewing sites based on Aqueduct 3.0, internet surveys, interviews with business sites, and other resources, we found that water stress related to droughts, etc., was high at three Lion breweries in Australia and Thai Kyowa Biotechnologies, and we also judged that the level of risk would become high at six Lion breweries in Australia in the future. We have identified the estimated financial impact of droughts on breweries and manufacturing business sites based on the volume decline in brewing and manufacturing under certain assumptions at business sites with a "high" level of water stress. We estimated that the financial impact was between approximately 30 to 600 million yen, but in past examples, we have been able to minimize the impact of droughts, so we have judged that the risk is negligible.

More information on business site water risk assessments→P.81

More information on water usage at breweries and manufacturing sites in areas with water stress→P.101

Impact on agricultural products from floods and droughts [short to long term]

There is a possibility that water risk and water stress from climate change, as well as disasters, may result in a decline in agricultural yields and an increasing financial impact related to procurement.

In 2017, we used Aqueduct 2.1 to conduct detailed surveys of water risk in areas that produce agricultural raw materials, and we found that water stress would increase in many production areas(Table 10).

In 2021, such concerns materialized in many regions around the world.

We have summarized the main impacts of water risk and water stress, disasters, etc., in FY2021 in Table 11.

Response strategy

●Advanced technologies for water use reduction (adaptation measures)

We will appropriately reduce our use of water, taking into consideration the amount of water stress. The Kirin Group has operated businesses in Australia, where there is extremely high water stress, and Japan, where water is relatively abundant. As such, we have known from our experiences that water risk and water stress differs between countries and regions. Since as early as 2014, we have been conducting regular surveys of water risk and water stress, and we have continued these surveys as part of our scenario analysis since 2017. We conserve water in ways suited to the differing levels of water stress in each country and region, based on our understanding of the scientific evidence.

At Lion, in response to severe long-term droughts in Queensland, we collaborated with the state government to establish a reverse osmosis (RO) plant to collect and reuse water that has been used in brewing processes at Castlemaine Perkins Brewery in 2011. In 2019, we achieved world class level of water efficiency at 2.5 liters of water for every liter of beer produced.

More information→P.41

●Sharing of knowledge on responses to droughts (adaptation measures)

The scope to which we are able to utilize such insights differs depending on the details of the business, but we will enhance the resilience of each business while sharing insights on droughts.

Thai Kyowa Biotechnologies, which faced water intake restrictions due to drought in 2020, has been able to limit water intake and avoid negative impacts by holding enough inventories and switching temporarily to products that use less water. There are limits to the situations in which we can utilize this knowledge, but by sharing it within the Kirin Group, we are reinforcing our ability to respond.

●Responses to water stress in areas producing agricultural raw materials (adaptation measures)

We will accumulate knowledge as we continue initiatives such as water source conservation activities at tea farms in Sri Lanka.

At tea farms in Sri Lanka, we began water source conservation activities on the farms in 2018, and as a result, by the end of 2021, we have conserved water sources in 12 locations. In 2020, we began similar support for the acquisition of certification at coffee farms in Vietnam. As part of training for the acquisition of certifications, we teach subjects such as mulching and planting shade trees to ensure that the ground does not dry out in the event of droughts, as well as methods to store water to prepare for droughts.

More information→P.28~P.29, P.32

●Prevention of soil runoff in areas producing agricultural raw materials (adaptation measures)

At tea farms in Sri Lanka, we teach methods of preventing soil runoff from heavy rainfall by planting undergrowth with deep roots, as part of training in activities to support the acquisition of certification for sustainable agriculture. Our teaching is based on simple methods with a scientific core, such as working with local universities to develop methods that enable farm laborers to distinguish the right type of plants, because they must choose plants that do not harm the cultivation of tea trees.

At present, we have not taken any specific measures in relation to major agricultural products in Europe and Australia, where we anticipate significant water risk and water stress, but we hope to utilize the knowledge we have accumulated through our initiatives in Sri Lanka and elsewhere.

More information→P.28~P.29

A picture drawn by children in Sri Lanka who learned that we must treasure water

A micro watershed in a tea farm in Sri Lanka that was fenced off with Kirin's support

Landslide prevention implemented as part of training in support for the acquisition of certification (the slope with undergrowth on with deep roots)

10 Water stress in major agricultural product production areas (around 2050)

Agricultural products	America (North and South)	Asia	Europe/Africa	Oceania
Barley	Canada High~Extreamly high	Japan Medium to high	Ukraine High~Extreamly high United Kingdom Low in the North, high in the South Germany medium~High Czech Republic Medium to high in Moravia, low to medium in Bohemia Belgium High	Australia Extremely high in the East and Southeast Medium in the Southwest
Hops	United States Medium to high in Oregon, medium to high in Idaho (partially Extremely high)	Japan Medium to high in Tono, Yokote, Yamagata Low to medium in Odate	Germany Medium~High Czech Republic Medium to high in Moravia, low to medium in Bohemia	Australia Extreamly high New Zealand Low
Tea leaves		Sri Lanka Extremely high in the North, and medium to high in the South and central highlands India Low in Darjeeling and Assam, low to Medium in Nilgiri Indonesia Extremely high in Java, low in Sumatra Low in Sumatra	Kenya Low Malawi Low	
Wine grapes	Chile Extreamly high Argentine Extreamly high		Spain High in the North, extremely high in other areas	
Coffee beans	Brazil Low to medium in the Northeast, low in other regions		Tanzania Medium to high in the North, low in other areas	

11 Main natural disasters and impact on agricultural products in 2021

United States	Record droughts in California resulted in a 19% reduction in crop acreage for agricultural products and a loss of approximately 8,750 agricultural jobs. Fertilizer prices doubled
Canada	Droughts in Alberta resulted in a 45% decline in production of wheat. Wheat indices increased 65.7%
Germany	Heavy rainfall six times more than the average resulted in economic losses of 40 billion dollars. Most vineyards in the Ahr valley area were submerged
Russia	"Ice crusting" occurred, where surfaces froze for several weeks in the winter, causing spring production of wheat to fall 3%, and winter production of wheat to fall 7%
Brazil	Droughts, frost, and freezing caused corn production to fall 9% and many products did not meet the standard quality for sale, resulting in price increases. There was a bad harvest of sugar cane owing to droughts for two years in a row. This contributed to an increase in sugar price indices of 9.6% in just one month
Kenya	The government declared a national state of emergency as a result of droughts among the worst recorded in the past 40 years. The impact on agricultural products was devastating, and an estimated 2.8 million people faced starvation
Malaysia	Palm oil production fell 11% as a result of flooding from heavy rainfall and the prolonging of the COVID-19 pandemic. Palm oil prices remain at record high levels

Strategy | Transitional risk |

Type of transitional risk		Transitional risk and strategy		
Policy	Risk	**Carbon pricing and energy procurement costs [medium to long term]** ●Tax savings in 2030 of approximately 0.5 billion yen under the 4℃ scenario, 3.5 billion yen under the 2℃ scenario, and at least 4.8 billion yen under the 1.5℃ scenario	**Financial impact on the procurement of agricultural products from carbon pricing [medium to long term]** ●Approximately 0.7 billion yen to 3.0 billion yen in 2050 under the 2℃ scenario, and approximately 1.6 billion yen to 5.7 billion yen under the 4℃ scenario	**Impact on currently held assets [medium to long term]** ●The possibility that we may be unable to recover investments owing to facility renewals earlier than expected as a result of legal regulations, etc., affecting through-flow boilers, etc.
	Strategy	●Profit and loss neutral reduction of GHG emissions in brewing and manufacturing ●GHG emission reductions through logistics optimization	●Mass plant propagation technologies and support for farms to acquire certification for sustainable agriculture	●Identification of trends in technology and renewal of our road map
Technology	Risk	**Research and development capabilities [short to long term]** ●Possibility that research contributing to decarbonization will not be put to practical use at the expected timing	**Engineering capabilities [short to long term]** ●Possibility that engineering capabilities required for decarbonization will not be transferred and cannot be utilized	**Introduction of appropriate technology and facilities [short to long term]** ●Possibility that we cannot install energy-saving facilities and switch to renewable energy at an appropriate time or price
	Strategy	●In-house packaging development technology (mitigation measures/reduction)	●Strengthen engineering functions	●Identification of trends in technology and renewal of our road map
Markets	Risk	**Avoidance of fossil-derived raw materials [medium to long term]** ●Possibility that people's impression of containers and packaging using raw materials derived from fossils may be negative	**Concerns surrounding the destruction of forests [medium to long term]** ●Possibility that awareness of forests as a sink of GHG will become stronger, and there will be a stronger negative impression of forestry and agriculture	**Fluctuations in natural gas prices [medium to long term]** ●Possibility that natural gas prices will not fall significantly
	Strategy	●Plastic resource recycling	●Promotion of sustainable forestry and agriculture	●Steady implementation of our roadmap to achieve our science-based 1.5℃ target
Reputation	Risk	**Assessment of consumers [short to long term]** ●Decline in the assessment of our brand owing to inferior initiatives and insufficient appropriate communication	**Social responsibility toward renewable energy [short to long term]** ●Criticism from the inconsiderate introduction of renewable energy power generation	**Trust from long-term investors [short to long term]** ●Possibility of loss of opportunities to secure stable investment owing to a lack of appropriate disclosure
	Strategy	●Engagement with young generationgenerations	●Formulation and operation of basic policies concerning the introduction of environmental value	●Appropriate disclosure in line with the TCFD recommendations

Details of transitional risks

Carbon pricing and energy procurement costs [medium to long term]

Energy procurement and logistics costs may spike if governments introduce carbon taxes and carbon border adjustment mechanisms.
Table 12 shows the results of our estimation of the financial impact of carbon pricing on energy procurement.
We estimated tax savings in 2030 of approximately 0.5 billion yen under the 4℃ scenario, 3.5 billion yen under the 2℃ scenario, and at least 4.8 billion yen under the 1.5℃ scenario, in the event that we achieve our science-based 1.5℃ target. Under the 1.5℃ scenario, the expected range of carbon pricing is extremely large, and there is a risk that the financial impact will be a large value.
In order to reduce risk and lower our procurement costs, we must achieve or bring forward our GHG emissions reduction targets.
When assessing the impact of carbon pricing on energy procurement, we estimated the impact at Kirin Brewery, Kirin Beverage, Mercian, Lion, Kyowa Kirin, and Kyowa Hakko Bio in 2022. For power emissions factors and carbon taxes, we applied the 2℃ scenario and 4℃ scenario from the IEA scenarios, and set the IPCC "Special Report on Global Warming of 1.5℃" as the 1.5℃ scenario and the basis of forecast carbon prices for all three scenarios.

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Response strategy

●Profit and loss neutral reduction of GHG emissions in brewing and manufacturing

In order to minimize the financial impact of carbon pricing, we will achieve our targets of net zero emissions by 2050, our science-based 1.5℃ target by 2030, and renewable energy targets under RE100 by 2040, in accordance with our roadmap, under the basic principle of profit and loss neutrality. Specifically, the merit from saving energy will offset depreciation and amortization from the investment and the procurement costs increase of renewable energy.
Lion has already achieved carbon neutrality in both Australia and New Zealand.
Please refer to the "Introduction" and "Approach to investment" sections of this report for more information on our approach to environmental investment to contribute to reducing GHG emissions, the amount of investment, and our ICP.

More information→P.76

●GHG emissions reduction through logistics optimization

In order to reduce GHG emissions in logistics departments, we will develop the various initiatives such as modal shifts, joint deliveries with industry peers, and higher loading ratios.
GHG emissions from upstream transportation (category 4), including the transportation of products, account for approximately 12% of total Scope 3 emissions, and are a major target for the reduction of emissions. In recent years, reducing the impact of transportation has also been an important initiative from the perspective of reducing the risk that we will not be able to transport products owing to the shortage of truck drivers.

More information→P.66~P.67

12 Assessment of impact of carbon pricing

	Scenario	Group Scenario 3(4℃ Scenario)		Group Scenario 1(2℃ Scenario)		1.5℃ Scenario	
	Year	2030	2050	2030	2050	2030	2050
If GHG emissions are not reduced	Carbon taxes(Billions of yen) Percentage of revenue	10 0.05%	12 0.07%	69 0.38%	95 0.52%	95~4,270 0.52%~23.44%	130~7,587 0.71%~41.65%
If we reduce GHG emissions in line with targets	Carbon taxes(Billions of yen) Percentage of revenue	5 0.03%	0 0.00%	35 0.19%	0 0.00%	48~2,135 0.26%~11.72%	0 0.00%
Carbon taxes	Tax savings(Billions of yen) Percentage of revenue	5 0.03%	12 0.07%	35 0.19%	95 0.52%	48~2,135 0.26%~11.72%	130~7,587 0.71%~41.65%

Reference documents→P.103

13 Main Initiatives

Initiatives	Description and effects (2017-2022)
Introduction of large-scale solar power generation facilities with the PPA method	Already introduced at eight Kirin Brewery plants nationwide, excluding the Yokohama Brewery. When all facilities begin operating, we expect to reduce GHG emissions by approximately 5,800 tons per year, increasing the proportion of renewable energy in electric power used by Kirin Brewery as a whole from approximately 18% as of 2020 to approximately 34%
Achieved a proportion of 100% renewable energy in purchased electric power	Already implemented at the Kirin Brewery Nagoya Plant, Sendai Plant, all Mercian wineries (three locations), the Kyowa Kirin Fuji Plant, and Shanghai Kyowa Amino Acid
Joint deliveries	Reduced GHG emissions by approximately 330 tons per year through joint deliveries using railroad containers in the east Hokkaido area.
Joint collection of beer pallets	Reduced GHG emissions by a total of 5,158 tons of CO_2 per year (approximately 37% compared with previous levels) across four brewing companiesbeer companies

* Information concerning the calculation methods for joint deliveries and the joint collection of beer pallets is provided in Contribution to Avoided Emissions through the Global Value Chain, Third Edition, by Keidanren (Japan Business Foundation).
http://www.keidanren.or.jp/policy/2018/102.html

Details of transitional risks

Financial impact on the procurement of agricultural products from carbon pricing [medium to long term]

The prices of agricultural products may spike if governments introduce carbon taxes and carbon border adjustment mechanisms.
Graph 14 shows the results of our estimation of the financial impact of carbon pricing on agricultural product prices. In 2022, we estimated the impact for Kirin Brewery, Kirin Beverage, Mercian, Lion (excluding the non-alcoholic beverages business), Kyowa Kirin, and Kyowa Hakko Bio. Our estimates covered the following agricultural products: barley, hops, tea leaves, grape juice, starch, lactose, corn, and cassava.
In our estimates, we calculated that the impact would be approximately 0.7 billion yen to approximately 3.0 billion yen under the RCP2.6/SSP scenario and approximately 1.6 billion yen to 5.7 billion yen under the RCP8.5/SSP3 scenario in 2050. The range of the 25-75 percentile was 1.8 times larger for the RCP8.5/SSP3 scenario than the RCP2.6/SSP1 scenario, from which we can conclude that uncertainty is higher and the risk is more significant.

Impact on currently held assets [medium to long term]

There is a possibility that various policies and regulations, as well as demands from society for decarbonization, will make it difficult to use existing facilities that use fossil fuels, etc., and to continue using them for the period that we initially expected. Under the Kirin Group roadmap, we plan transition in the future to hydrogen and other forms of GHG-free energy to replace natural gas that we use in heating processes such as boiling in brewing and manufacturing. We may be unable to recover our investments if it becomes necessary to renew through-flow boilers and other facilities earlier than expected. In the same way, we may be unable to recover investments related to trucks that we hold if we are required to transition the trucks we use for transportation to electric vehicles sooner than initially expected.

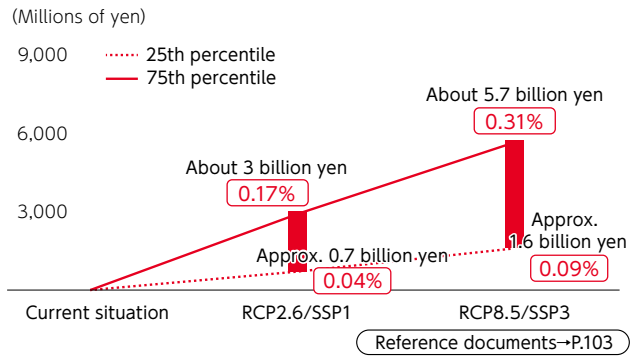
Response strategy

●Mass plant propagation technologies and support for farms to acquire certification for sustainable agriculture

We have judged that mass plant propagation technologies and support for farms to acquire certification for sustainable agriculture are effective as countermeasures.
Mass plant propagation technologies may be able to contribute to an increase in crop acreage in response to the issue of competition between alcoholic/non-alcoholic beverages and biofuels for raw materials as carbon pricing causes renewable energy to expand and the use of corn, soybeans, etc., as biofuels increases.
In response to the possibility of an impact on fertilizer prices from soaring prices of natural gas, which is a raw material in nitrogen fertilizer, we think that training for farmers on appropriate fertilizer management as part of support for the acquisition of sustainable farming certification will act as a countermeasure.

More information on mass plant propagation technologies→P.33
More information on support for the acquisition of certification→P.28～P.29, P.32

14 Impact on agricultural product procurement costs from carbon pricing in 2050 (percentage of revenue)



Reference documents→P.103

* The socioeconomic systems in the papers we used for our estimates differ from the Kirin Group scenarios, so we have created and disclosed our estimates under the RCP2.6/SSP1 and RCP8.5/SSP3 scenarios in these papers.

●Identification of trends in technology and renewal of our road map

The use of hydrogen, etc., will require technological innovation and infrastructure development, and we expect that full-fledged transition will not take place until 2030 or later. Until then, we think the probability is low that regulation, etc., will require us to renew our existing boilers and other brewery and plant equipment, and trucks, before they are depreciated.

If we misjudge the introduction of new technology, our technology and facilities may become obsolete as a result of regulatory and social trends. Accordingly, we will address this issue by formulating roadmaps for long-term facility renewal and introduction, and constantly update the roadmaps.

More information→P.15～P.17

Type of transitional risk

Technology

Details of transitional risks

Research and development capabilities [short to long term]

There is a possibility that research contributing to a decarbonized society will not be put to practical use at the expected timing.
Aluminum cans make up approximately 18.1% of the Kirin Group's Scope 3 emissions, while PET bottle preforms and resins make up approximately 2.7%. Accordingly, the reduction of GHG emissions related to containers and packaging is an important theme as we aim to achieve net zero emissions.

Engineering capabilities [short to long term]

There is a possibility that our engineering systems aimed at achieving decarbonization will not be sufficient, or that we will not be able to appropriately apply them because the technical expertise is not well succeeded.
Waste heat from brewing and manufacturing processes in the alcoholic and non-alcoholic beverages businesses is at a low temperature. As such, it is difficult to achieve the efficient cascading use of heat based solely on introducing the latest facilities, and engineering and technical expertise with a deep understanding of brewing and manufacturing processes is required.

Introduction of appropriate technology and facilities [short to long term]

Alongside rapid technological progress, in recent years, there have also been major delays to deliveries of facilities and equipment as a result of the tight supply and demand for semiconductors and other facility components, etc. As such, if we are unable to identify the timing of the introduction of technology and quickly make investment decisions, there is a possibility that we will not be able to reduce GHG emissions in line with plans. While momentum for the decarbonized society is rapidly increasing, there is a possibility that we will be unable to introduce renewable energy at an appropriate time and appropriate price in Japan, where the places for installing renewable energy facilities are particularly limited.

Response strategy

●In-house packaging development technology

We think we will be able to develop advanced containers and packaging with lower GHG emissions across the value chain, utilizing our strength – the fact that we have the Institute for Packaging Innovation, where we develop packaging and containers in-house, as one of the few research laboratories of its scale owned by a global alcoholic beverage company.
Based on the technologies it has developed over many years in areas such as glass bottles, cans, PET bottles, cardboard cartons, and other paper packaging, the Institute for Packaging Innovation utilizes AI technology, kansei (sensibility) engineering, and other technologies and takes advantage of its strength in possessing research facilities equivalent to a small plant to enable the technical support required to create products based on these technologies, as well as the development of new containers.
In terms of recycling PET bottles, we have created practical uses for R100 bottle technology, in which we recycle used PET bottles into new PET bottles, and we are focusing on the development of chemical recycling. We have estimated that external diseconomies related to PET bottles in the domestic alcoholic beverages and non-alcoholic beverages businesses amount to approximately 1.1 billion yen (results of estimation in 2019). We aim to use recycled resin for 50% of domestic PET bottles by 2027, and we will thereby contribute to reducing social costs by transitioning to a circular economy.

More information→P.12 Reference documents→P.103

●Strengthen engineering functions

We have established engineering teams in each group company and ensure that we are supporting brewing and manufacturing facilities, while training engineers and transferring technical expertise on an ongoing basis.
In the Kirin Group, engineers with a deep knowledge of brewing and manufacturing processes, production technologies, and safety technologies reliably support brewing and manufacturing facilities. Furthermore, the Kirin Group owns Kirin Engineering, a general engineering company specializing in the construction of plants producing beer, non-alcoholic beverages, pharmaceuticals, and other products. This company flexibly performs large-scale construction, expansion, and remodeling of production facilities for Kirin Group companies in Japan and overseas. By performing engineering in various businesses in-house, we make it possible for engineers to transfer expertise and technical capabilities related to building facilities. These technical capabilities that we have developed and our engineers will support the growth and development of our business domains, ranging from food and beverages to pharmaceuticals.

More information→P.12

●Identification of trends in technology and renewal of our road map

The Kirin Group will consistently follow trends in technology to reflect them in our roadmap appropriately.
Within the Kirin Group, the engineering departments of Kirin Brewery will monitor technological and social trends in a concentrated manner, and we will incorporate these trends in our roadmap. In this way, we will assess where in the Group and what facilities it would be effective to introduce, and ensure close communication among group companies as we flexibly respond.
When introducing renewable energy, we will also prioritize "additionality," which indicates the actual increase in renewable energy.

More information→P.15～P.17

Details of transitional risks

Avoidance of fossil-derived raw materials [medium to long term]

There is a possibility that people may have a more negative impression than before of containers and packaging using raw materials derived from fossils as interest in problems related to plastic spreads to issues related to all aspects of climate change, not just ocean pollution.
Problems related to plastics have attracted significant attention around the world, including the enactment of the "Act on Promotion of Resource Circulation for Plastics" on April 1, 2022, in Japan.
Plastics are a raw material derived from oil, and we expect that as interest in problems related to climate change increases, people will focus on global warming caused by GHG emissions when they are burned, as well as problems related to the depletion of resources from raw materials derived from oil.

Concerns surrounding the destruction of forests [medium to long term]

As awareness of the importance of forests as a sink of GHG spreads, concerns surrounding business activities linked to the destruction of forests may increase more than before, and cause negative impressions of forestry and agriculture to become stronger. The impact of climate change and its relationship with forests is attracting more attention than before, partly owing to the occurrence of the worst forest fires on record in Australia in 2019 and 2020, as well as forest fires that occur virtually every year in California.
Awareness of sustainable agricultural production has grown stronger than before, as we can see in the holding of the United Nations Food Systems Summit in 2021, and the formulations and announcements of the "Farm to Fork" strategy in the EU and the "Green Food System Strategy" in Japan.
At the same time, an increasing number of people have also become interested in food security as a result of the spread of COVID-19 and geopolitical problems.
We expect that interest in sustainable agriculture will also contribute to an interest in problems related to forestry.

Response strategy

●Plastic resource recycling

In accordance with the "Kirin Group Plastic Policy," which we formulated in 2019 in order to resolve problems related to plastics, we will promote PET bottles that use recycled PET resin.
In the "Kirin Group Plastic Policy," we have set forth our target of increasing the percentage of recycled resin to 50% of PET bottles in our operations in Japan by 2027.
We have previously promoted the utilization of recycled PET resin through mechanical recycling. As of April 2022, we use recycled PET resin for *Kirin Nama-cha Decaf*, *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* (600ml size for each), which are only available in convenience stores throughout Japan, and *Kirin Nama-cha Life Plus Immune Assist*. In addition, from April 2022, we also plan to use "R100 PET bottles," which use 100% recycled PET resin for *Kirin Nama-cha* products exclusive to vending machines (555ml size). We will promote technical development related to practical uses for chemical recycling to create highly pure recycled PET resin, even from dirty used PET bottles and other PET products. In addition, we will also create systems to recover used PET bottles and other PET products.

More information→P.45~P.46

●Promotion of sustainable forestry and agriculture

We are continuing initiatives to expand sustainable forestry and agriculture, and will also increase the proportion of certified paper and raw materials from certified farms that we use.
As one initiative targeting sustainable forestry, we are expanding the use of FSC-certified paper in paper containers.
In 2020, we adopted FSC-certified paper for 100% of paper containers at Kirin Brewery, Kirin Beverage, and Mercian. In 2021, we revised our Action Plan for the Sustainable Use of Biological Resources, and we intend to expand our use of sustainable paper to other group companies in Japan, as well as our overseas businesses.
As one initiative targeting sustainable agriculture, we support the acquisition of Rainforest Alliance certification, which is a certification for more sustainable farming, at tea farms in Sri Lanka and coffee farms in Vietnam. In August 2021, we began selling a year-round product in *the Kirin Gogo-no-Kocha* line that uses tea leaves from farms with Rainforest Alliance certification.

More information→P.28~P.29、P.32、P.34、P.48

Fluctuations in natural gas prices [medium to long term]

As initiatives targeting decarbonization accelerate around the world, it is possible that the balance of supply and demand for natural gas may become tight and prices may spike in the short term, owing to such factors as the transition toward sources of energy with low GHG emissions and divestment from coal.
For our future scenarios concerning natural gas prices, we have referred to "Net Zero by2050: A Roadmap for the Global Energy Sector" and "World Energy Outlook 2021 (WEO 2021)" by the IEA, and have conducted our survey based on three scenarios (Table 15): NZE (Net Zero Emissions by 2050 Scenario: an ambitious scenario in which the 1.5℃ target is achieved), APS (Announced Pledges Scenario: a scenario in which all commitments already announced by the governments of each country are executed), and STEPS (Stated Policies Scenario: a scenario that only reflects implemented policies in each country).
In each scenario, we forecast that demand for natural gas will increase through 2025, and we subsequently only expect it to fall significantly in the NZE scenario.
In our analysis, we expect natural gas prices to fall approximately 4% from current levels in the APS scenario, and rise approximately 8% in the STEPS scenario by 2050. In the NZE scenario, we expect prices will fall by around half by 2030, but these price forecasts do not reflect necessary investment and expenses related to Carbon dioxide Capture, Utilization and Storage (CCUS), so there is a possibility that prices may not decline significantly when these costs are taken into consideration.

●Steady implementation of our roadmap to achieve our science-based 1.5℃ target

We believe that we must surely execute our roadmap, which we formulated in order to achieve our science-based 1.5℃ target as we look to reduce our use of natural gas.
In the Kirin Group roadmap, we plan to shift our energy mix to electric power as much as possible, and use renewable energy as the source of that electric power.
We will steadily transition away from natural gas in our energy mix to electric power, and although we will continue to use natural gas for the time being for some heating processes where it is difficult to transition to electric power, we plan to ultimately replace it with hydrogen. We do not just expect technological innovation and infrastructure development, but instead we intend to take on the challenge of using hydrogen if it is possible.

More information→P.61

15 Forecast fluctuations in natural gas prices

Scenario	Current price 2020 USD/GJ	Future price 2030 USD/GJ	Future price 2050 USD/GJ
Net Zero Emissions by 2050	8.3	4.6	4.4
Sustainable Development	8.3	5.7	5.6
Announced Pledges	8.3	8.0	7.2
Stated Policies	8.3	9.0	9.4

World Energy Outlook 2021 (WEO 2021)

* Concept image

* Concept image

Type of transitional risk

Reputation

Details of transitional risks

Assessment of consumers [short to long term]

There is a possibility that consumers' assessment of our brand may decline if our initiatives related to climate change and other aspects of sustainability are inferior, and if we cannot engage in appropriate communication.
Since 2020, the SDGs have been gradually incorporated into Japanese study guidelines. In recent surveys, we have found that consumer awareness of environmental issues has risen, including a significant increase in awareness of various certification systems related to eco-friendly products.

Social responsibility toward renewable energy [short to long term]

In order to achieve our target of net zero emissions, we must introduce renewable energy, but the inconsiderate construction of power plants may harm scenery and nature and cause disasters, possibly resulting in criticism from society. Although the FIT system has contributed to the expansion of solar power facilities in Japan, it has become a significant burden on citizens, with total expenses associated with FIT purchases in Japan of 3.1 trillion yen in 2019, and estimates stating that this figure will hit 4.9 trillion yen by 2030. Even if we are able to achieve our net zero emissions target, it will not contribute to our true aim of preventing global warming if the amount of renewable energy on earth does not actually increase.

Trust from long-term investors [short to long term]

We may lose opportunities for securing stable investment if we lack appropriate disclosure on climate change, natural capital, the circular economy, and other environmental issues. The Kirin Group has declared our aim to be "a global leader in CSV, creating value across our world of Food & Beverages to Pharmaceuticals," and we aim to expand our business in the Health Science domain. We believe that the support of long-term investors is necessary for long-term initiatives and investment.

Response strategy

●Engagement with young generations

As we promote our initiatives, we will prioritize engagement with the young people who will take responsibility for the next generation. Since 2014, we have held Kirin School Challenge workshops for junior and senior high school students, based on the themes of our support for the acquisition of Rainforest Alliance certification at tea farms in Sri Lanka and the use of FSC-certified paper in paper containers. In these workshops, we do not just introduce certification systems, but we prioritize mutual communication with junior and senior high school students, as well as spontaneous discussion, thinking, and sharing information among junior and senior high school students about what they should communicate to members of their own generation, and how they should do it.
We are also teaming up with multiple companies on the free distribution of the SDGs Start Book (300,000 copies per year), which teaches elementary school students and junior high school students about the SDGs in a way that is easy to understand.
For young children in elementary school, we are collaborating with organizations such as after-school care clubs, Girl Scouts, and Boy Scouts on the "Environmental Mark Discovery Notebook" initiative, which starts from children learning to recognize environmental marks and finding out their meanings.

More information→P.111

●Formulation and operation of basic policies concerning the introduction of environmental value

In July 2021, the Kirin Group established our policy on the introduction of environmental value, with the basic policies of the "responsible introduction of renewable energy" and "additionality" when introducing renewable energy.
With regard to the "responsible introduction of renewable energy," we select that which "causes no harm to the environment and does not violate human rights when power plants are constructed and fuel is procured," and we also set forth examples of expected risks in relation to each source of power, including solar power, wind power, and biogas, and we check these risks in advance.
With regard to "additionality," our policy is to "replace thermal power by creating new renewable energy power generation facilities in society, and thereby contribute to the creation of a decarbonized society." Renewable energy that has "additionality" and does not rely on the FIT system will contribute to reducing the burden on citizens.

More information→P.61～63

●Appropriate disclosure in line with the TCFD recommendations

We will win the trust of long-term investors and secure stable investment by appropriately disclosing information related to climate change.
The Kirin Group has disclosed detailed information related to climate change and other environmental factors in our Integrated Report and Environmental Report. We have also continued to disclose information in line with the final recommendations of the TCFD since our 2018 Environmental Report. Going forward, we intend to comply with the requirements of the TNFD and ISSB.
The "Kirin Group Environmental Report 2020" won the Climate Change Reporting Grand Prize (Minister of the Environment Award) in the 24th Environmental Communication Award.
We have won a "Gold Award" for two years in a row in the environmentally sustainable company category of the "ESG Finance Awards Japan." In 2022, we received a high rating from eight asset management institutions, the highest number, in the selection of companies with "excellent TCFD disclosure," which the GPIF requested from asset management institutions to which it entrusts the management of domestic equity.

Strategy | Business opportunities |

Type of transitional risk	Business opportunity	Strategy
Markets	Increasing interest in infectious diseases caused by global warming [short to long term] ●Concerns related to increases in the number of infections and regions affected ●Northward movement of the habitat of the Aedes albopictus Increase in heatstroke caused by global warming [short to long term] ●The National Institute for Environmental Studies expects the number of excess deaths related to heat to increase between 4 and 10 times under the 4℃ scenario	Contribution in Health Science domain ●Long-term research related to immunity ●Wide range of products in the Health Science domain Contribution with products to address heatstroke ●Provision of non-alcoholic beverages that prevent heatstroke
Products and services	Products that contribute to decarbonization [medium to long term] ●Possibility that products will be required that contribute to decarbonization or the shift to a low-carbon society	Decarbonization products ●Provision of zero-carbon certified products
Resource efficiency	Social issues related to logistics [short to long term] ●Shortage of drivers and increase in GHG emissions from truck transportation Social demands for the shift to lightweight containers and the 3Rs [short to long term] ●Demands for the 3Rs and reduction in costs from the move to lightweight containers	Reduction in costs from more efficient transportation ●Modal shift, joint deliveries, and higher loading efficiency Shift to lightweight containers ●Promoting the shift to lightweight materials utilizing the strengths of the Institute for Packaging Innovation
Energy sources	Reduction in reliance on fossil fuels [short to long term] ●Demand gap and spike in prices of fossil fuels Securing of energy that can be controlled [short to long term] ●Increase in demand and tight supply and demand for renewable energy	Achievement of our energy mix ●Promotion to electric power in heating processes and introduction of renewable energy for electric power Use of renewable energy with a focus on additionality ●Introduction of solar power generation at our own breweries and plants utilizing PPAs
Resilience	Strengthening the supply chain [short to long term] ●Ensuring the stability of the procurement of agricultural raw materials ●Reduction of Scope 3 emissions	Enhancement of engagement ●Engagement and appropriate responses based on visits to areas producing raw materials ●Conducting surveys of suppliers and engagement

Details of business opportunities

Increasing interest in infectious diseases caused by global warming [short to long term]

WHO forecasts

A report from the WHO forecasts that approximately 250,000 additional people will die each year compared with a world where there is no climate change between 2030 and 2050, as a result of factors such as the spread of infectious diseases from expansions in the distribution of disease vectors. In Japan, the habitat of the Aedes albopictus, which carries dengue fever, was confirmed to have spread as far north as Aomori in 2015, and if global warming continues, it appears to be a matter of time before the northernmost limit of its habitat expands to Hokkaido.

Graph 16 shows the results of analysis that we conducted in relation to the impact of the spread of the dengue virus, based on the WHO scenario concerning climate change and the impact on people's health. The number of cases of dengue fever increased by more than 10 times in just under 20 years, from approximately 500,000 in 2000 to over 2.4 million in 2010, and approximately 5.2 million in 2019. We forecast that the total global population at risk of exposure to infection with the dengue virus will increase to a maximum of 4.4 billion by 2030.

Growth in immunity-related product market

In customer surveys that we conducted in Japan, customers' health awareness was most heightened in relation to their "interest in immunity." In response to this issue, we think we can contribute through Foods with Function Claims (FFCs) that "help maintain the immune system in healthy people." Sales in the global market for immunity and health supplements amounted to 19,040.3 million dollars in 2020, and we forecast that the market will grow by 50% or more, to 28,961.4 million dollars by the end of 2030 (Graph 17).

Increase in heatstroke caused by global warming [short to long term]

Heatstroke cases are expected to increase as a result of global warming. Based on observational and forecast data on climate change from the National Institute for Environmental Studies, under the RCP8.5 scenario (equivalent to the 4℃ scenario in Kirin Group Scenario 3), the number of heat-related excess deaths in Japan between 2080 and 2100 will be between almost four times and over 10 times the number between 1981 and 2000. In Kirin Group Scenario 3 (the 4℃ scenario), we have estimated that the Japanese market for beverages that prevent heatstroke will grow by between 94 billion yen and 188 billion yen, assuming that it is linked to the number of persons requiring emergency services as a result of heatstroke caused by global warming.

Response strategy

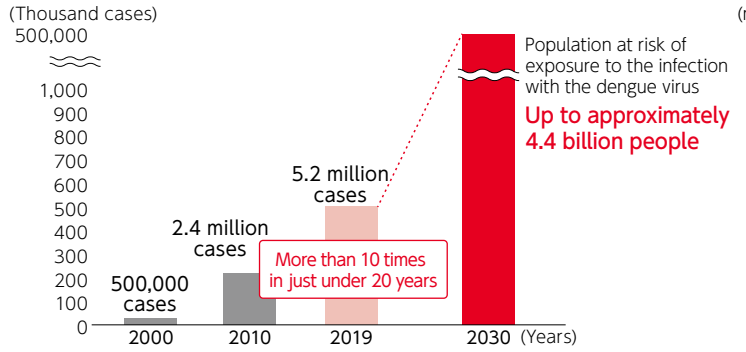
●Contribution to Health Science domain

In 2021, we expanded our lineup of FFC products that "help maintain the immune system in healthy people, as we began selling such products under the *Nama-cha* and *Gogo-no-Kocha* brands, which have a high level of brand awareness among consumers, in addition to yoghurt and supplement products. In our BtoB business, annual sales in 2021 were also at least 150% of the previous year while markets struggled in the COVID-19 pandemic, thanks to our licensing and provision of materials to external partner companies in Japan and overseas, as well as the launch of sales of a wide range of products, including snacks, protein, etc.

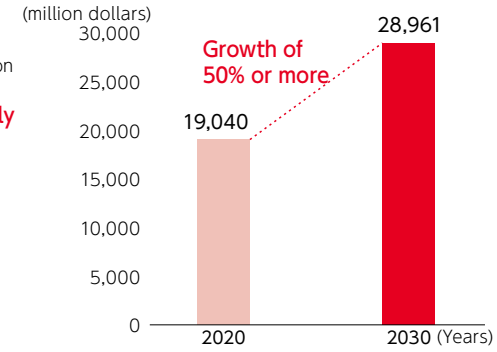
In order to offer products to more customers, we began selling immune-related beverages in 100ml PET bottles at general merchandise stores, drugstores, and convenience stores nationwide from the end of March 2022. In anticipation of the future expansion of the market for immunity-related products, we will invest approximately 10 billion yen in enhancing manufacturing facilities* for small PET bottles at the Kirin Beverage Shonan Plant, thus developing a supply system for immune-related beverages in small PET bottles, including 100ml PET bottles.

* Expected to begin operations in March 2023

16 Number of dengue fever cases reported to the WHO



17 Sales in the global market for immunity and health supplements



* Estimated based on the WHO's "Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s" report.

●Contribution with products to counter heatstroke

We think we will be able to contribute by selling products with high brand recognition as beverages that prevent heatstroke.

At present, the market for beverages that prevent heatstroke is not expanding significantly, but *the SALTY LITCHI* brand is becoming more popular as a beverage that prevents heatstroke, and we have judged that it may contribute when necessary. At Kirin Beverage, "heatstroke countermeasure advisors," who have received certification for completing training courses held by the Heat Illness Prevention - Communication Project, hold seminars on heat stroke countermeasures, etc., at schools and other institutions.

Type of business opportunity

Products and services

Details of business opportunities

Products that contribute to decarbonization [medium to long term]

As the momentum of decarbonization grows, there is a possibility that products will be required that contribute to decarbonization or the shift to a low-carbon society.
In Australia and New Zealand, there is a high level of interest in climate change, and carbon-neutral products have become popular with consumers to some extent. Although we cannot say that interest in carbon-neutral prducts is high in Japan at present, awareness of the SDGs has grown significantly, including progress on their incorporation into study guidelines. As such, we have judged that there is a strong possibility that interest in ethical products will increase in the future.

Response strategy

●Decarbonization products

Lion's *Steinlager* in New Zealand is a carbon zero product certified by the Toitu program. In 2021, we focused on the Toitu carbon zero mark in a marketing campaign, and used *Steinlager's* efforts toward reducing carbon to appeal to consumers.
In Japan, we have judged that consumers do not yet require decarbonized alcoholic or non-alcoholic beverages, but we have established standards for calculating the carbon footprint for each category of product (Product Category Rule: PCR) for beer and soft drinks, and we think it will be possible to address this need.

More information→P.68

Type of business opportunity

Resource efficiency

Details of business opportunities

Social issues related to logistics [short to long term]

By increasing transportation efficiency to reduce GHG emissions, we can also expect to solve chronic driver shortages.
Transportation distances from breweries and plants to areas of consumption are tending to become longer owing to factors such as a decline in the number of breweries and plants and the concentration of breweries and manufacturing plants for small-lot product varieties. Amid these condtions, a trend has become apparent among truck drivers to avoid long-distance journeys in recent years, and it has become difficult to secure drivers for such journeys. We must solve these logistics issues because it is inefficient to transport products for long distances using trucks, and it increases GHG emissions.

Response strategy

●Reduction in costs from more efficient transportation

We are implementing various initiatives to make deliveries more efficient and contribute to reducing logistics costs, such as a modal shift, joint deliveries, and more efficient loading.
We actively promote joint deliveries with other companies by positioning the logistics functions as non-competitive fields. For example, in our joint delivery initiative using railroad containers to transport products from breweries and plants in the Kansai area to the Hokuriku region, we have avoided long-distance truck transportation by completing a modal shift away from long-distance truck transportation equivalent to 10,000 vehicles a year, and we have also estimated that this will contribute to reducing annual GHG emissions by approximately 2,700 tons.

More information→P.66～P.67

Social demands for the shift to lightweight containers and the 3Rs [short to long term]

Society continues to demand that companies address the issue of the 3Rs for containers and packaging. At the same time, this will also contribute to reducing GHG emissions, make resource use more efficient, and reduce costs.
We can describe beer and soft drinks as products that represent mass production and mass consumption, and they thus use a fairly large amount of containers and packaging, which also accounts for a large proportion of costs.
In 2021, the total amount of packaging used by the Kirin Group as a whole amounted to 480,000 tons, most of which was in the alcoholic and non-alcoholic businesses.

●Shift to lightweight containers

We are promoting the shift to lightweight containers and packaging, utilizing our strength – the fact that we have the Institute for Packaging Innovation, where we develop packaging and containers in-house, etc., as one of the few research laboratories of its scale owned by a global alcoholic beverage company. Our "204-diameter can ends" for aluminum beer cans have reduced weight by approximately 29% for 350ml cans compared with when we used "209-diameter can ends." We also use beer bottles that reduce weight by 21% for large bottles and 19% for medium-size bottles compared with conventional bottles. "R100 PET bottles," which use 100% recycled PET resin, make it possible to reduce the use of resin derived from oil by 90% in manufacturing, and reduce GHG emissions from manufacturing by 50-60%.
The introduction of smart-cut cartons has contributed to cost savings of 0.17 billion yen per year, while lighter 2.0-liter PET bottles have contributed to cost savings of 0.16 billion yen per year.

For more information on our initiatives related to PET bottles→P.46～P.47, P.90

More information→P.49～P.51

Type of business opportunity

Energy sources

Details of business opportunities

Reduction in reliance on fossil fuels [short to long term]

It will be possible to use stable energy by reducing our use of fossil fuels and transitioning to renewable energy.
With demand expected to fall in the future, a demand gap has occurred as producing countries have avoided investment in fossil fuels, resulting in a spike in prices of fossil fuels. Producing countries are concentrated in places with high geopolitical risk, so reducing our reliance on fossil fuels will contribute to reducing risk.

Securing of energy that can be controlled [short to long term]

There are various methods for introducing environmental value, each of which have their own merits and demerits, including in-house power generation, purchasing from electricity retailers, purchase of certificates that power is derived from renewable energy, and corporate PPAs. We will aquire environmental value that satisfies the criteria set forth in RE100 by introducing renewable energy, but in Japan, we expect the balance of supply and demand to grow tight in the future as demand for renewable energy increases.

Response strategy

●Achievement of our energy mix

We will shift our energy mix to “electric power” and utilize electric power generated from renewable energy.
In the Kirin Group roadmap, we plan to make progress on energy conservation by 2030, while also shifting our energy mix toward “electric power” by promoting the shift to electric power for heating processes as much as possible, and utilizing electric power generated from renewable energy.
It will be possible to lower our reliance on fossil fuels directly by reducing our use of natural gas, and also reduce our reliance on the fossil fuels of thermal power plants by increasing the proportion of renewable energy in the electric power that we use.

More information→P.60

●Use of renewable energy with a focus on additionality

When introducing renewable energy, we prioritize “additionality,” which indicates the actual increase in the supply of renewable energy. We will replace thermal power plants and contribute to creating a decarbonized society by increasing renewable energy power plant facilities in society.
Specifically, we have been introducing solar power generation at breweries using the PPA model (excluding the Yokohama Brewery), and we have completed installation at all breweries. PPA stands for Power Purchase Agreement, and it refers to a type of business model where a PPA business operator installs solar power generation facilities at no charge on land, buildings, etc., owned by the party that requires the power, and sells the power generated by those facilities to the party that requires the power.
Installing solar panels in our own breweries and plants ensures that the renewable energy power plants can reliably add renewable energy, without any negative impact on the local community, while at the same time increasing resilience because it is possible to use it in a stable manner.

More information→P.61～P.67

Type of business opportunity

Resilience

Details of business opportunities

Strengthening the supply chain [short to long term]

We expect that our initiatives targeting the procurement of agricultural raw materials and the reduction of Scope 3 emissions will contribute to strengthening the supply chain.
It is possible that by enhancing our engagement with suppliers and producing areas, identifying various issues, and working to solve them together with the producing areas, it will contribute to enhancing the resilience of suppliers, producing areas, and the Kirin Group.

Response strategy

●Enhancement of engagement

In addition to producing regions, we will also enhance our engagement with suppliers.
Every year, we visit tea farms in Sri Lanka, where we engage with local managers. As part of these initiatives, we have gained an understanding of the severity of heavy rainfall associated with climate change that is affecting tea farms in Sri Lanka, which is contributing to strengthening our training to prevent soil outflow and our water source conservation activities. We are also conducting more detailed surveys related to the reduction of Scope 3 emissions, in addition to making requests and performing checks based on the Sustainable Supplier Code. We intend to base our engagement with stakeholders on the results of these surveys, and take steps to jointly solve issues as we target decarbonization.

More information→P.101～P.112

Strategy | Systemic Risk |

Details of systemic risk

The collapse of ecosystems owing to inconsiderate transition plans

The use of edible crops for biofuels as a source of renewable energy may compete with their use for food. The inconsiderate construction of renewable energy power plants may cause the deforestation of precious forests, resulting in landslides and flash floods when there are typhoons and heavy rainfall.

Ecological loss from accumulation

In joint research with National Agriculture and Food Research Organization (NARO) in Japan Wine vineyards, we found examples of a complete loss of ecosystems in vineyards with pergolas where weedkillers have been used continuously for many years. We have found that when we convert such places into hedgerow-style vineyards, ecosystems do not easily recover, even if there are abundant ecosystems in adjacent fields.

The spread of destruction of natural capital

The sudden import ban on chemical fertilizers and agricultural chemicals in Sri Lanka in the first half of 2021 (which was later withdrawn) led to a decline in harvests of many agricultural products, and significantly damaged the economy, which was already vulnerable. The effects have yet to surface, but land use change from tea farms to planted forests for producing timber, rubber farms, etc., and indirect land use change owing to a decline in harvests per unit land area may lead to deforestation. Without sufficient preparation, the transition to organic farming will weaken agriculture itself and result in destruction to nature in the area surrounding agricultural land.

Strategy

●Responsible approach

In transition plans related to climate change, the Kirin Group also considers ways to avoid any negative impact related to other environmental issues, such as “biological resources” and “water resources.”
When introducing renewable energy, our basic policy is to “responsibly introduce renewable energy.” When procuring renewable energy, we select that which “causes no harm to the environment and does not violate human rights when power plants are constructed and fuel is procured,” and we also set forth examples of expected risks in relation to each source of power, including solar power, wind power, and biogas, and we evaluate these risks in advance. At present, for the most part, there are no standards related to competition between renewable energy and foodstuffs, and the EU alone imposes certain restrictions when there is an impact on biomass used for food or indirect land use change (when precious forests are converted into farmland owing to the displacement of the production of crops from land where they were originally cultivated for the production of biofuel crops). Taking into consideration the lack of clear standards for making an assessment, we have lowered the priority of the use of renewable energy from biomass.

●Scientific approach

In ecological surveys with NARO, we found that converting idle farming land into hedgerow-style vineyards for Japan Wine enriches ecosystems. At the Mariko Vineyard (Ueda City, Nagano Prefecture) and Jyonohira Vineyard (Koshu City, Yamanashi Prefecture), we have also found endangered species listed in the Red Data Book of the Ministry of the Environment, Japan. Although these vineyards do not use organic farming, we confirmed that there is no negative impact on nature around the vineyards. Going forward, we will continue scientific research and surveys, while also cultivating grapes in ways that contribute to nature, including activities to regenerate vegetation. When supporting the acquisition of Rainforest Alliance certification by tea farms in Sri Lanka, we request that tea farms comply with a white list of agricultural chemicals that have been scientifically confirmed as safe for humans and having no negative impact on the natural environment. We also request that tea farms use no more than a certain amount of agricultural chemicals determined in standards, and take records. We also provide training concerning the appropriate use of fertilizer. We will provide continuous support toward the acquisition of certification and enhanceour engagement with local communities, as part of efforts to enhance the sustainability of producing regions as a whole.

See P.28~32 for details

●Holistic approach

In Sri Lanka, the quality of organic fertilizers introduced in place of chemical fertilizers was often poor, making them unusable. It could be said that efforts to transition to organic agricultural methods without preparation did not just harm agricultural production and ecosystems, which were interrelated and worked together to ensure stability, but also harmed the economy.
We believe that the study of climate change and natural capital, as well as a holistic approach are necessary to address the risk that one type of damage will spread to other types of damage and result in significant damage to ecosystems in this way. When promoting our initiatives, the Kirin Group has kept in mind the fact that environmental issues are strongly interrelated. We think we have developed a deeper understanding through our scenario analysis based on the TCFD recommendations. It is not easy, however, to understand the relationship between various environmental issues, and in reality, the initiatives we can take are limited. Therefore, at the Kirin Group, we prioritize initiatives based on engagement with various stakeholders, such as consortiums with NGOs and other companies, collaboration with local communities, and participation in global initiatives. By participating in the TNFD and SBTN and contributing to rulemaking, we will further develop our holistic approach.

See P.11~20 for details

Risk management

Promotion of risk management

The Kirin Group has established the Group Risk and Compliance Committee within Kirin Holdings to oversee risk management through activities such as quarterly monitoring of risk factors, including risks related to climate change, natural capital, the circular economy, and other aspects of the environment.
The Kirin Group has established a risk management system aimed at ensuring that we accurately understand and firmly address risks with the potential to seriously impede the accomplishment of business targets or impact business continuity. In particular, we define risks such as those associated with new strategies and initiatives and major changes in the external environment as key areas.
As part of the process for formulating fiscal year business plans, each group company selects and addresses important risks based on factors in the environment within and outside the Group.
Kirin Holdings provides risk management policies for the Group, and also checks whether each company has selected important risks and monitors plans to address risk and the implementation status thereof on a quarterly basis. In this way, we promote risk management for the Group as a whole, including risks related to climate change, natural capital, the circular economy, and other aspects of the environment.

Processes for confirming important risks

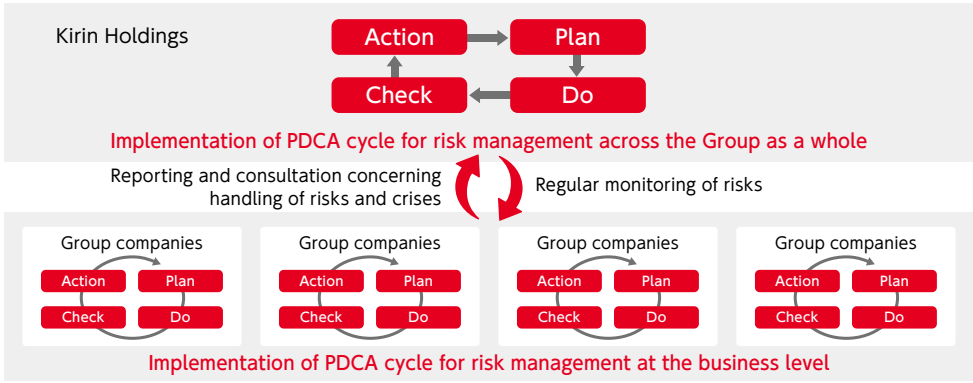
Each group company identifies and assesses risks specific to their businesses from both quantitative and qualitative perspectives, based on the risk management policies of the Kirin Group, and addresses those risks using four methods (reduce, contain, avoid, and transfer).

Business impact of risk and countermeasures

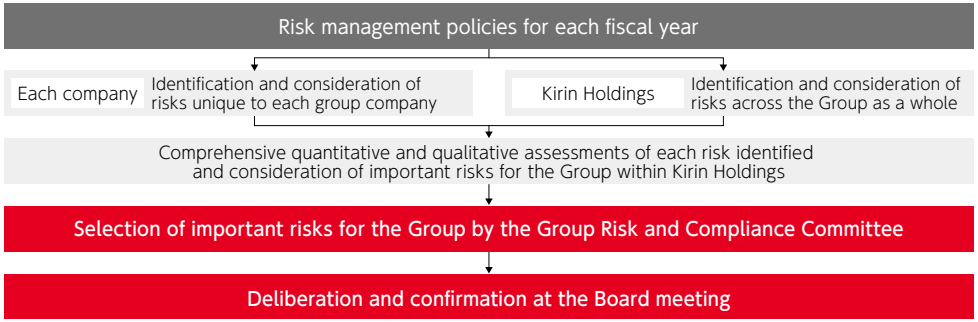
When selecting important risks for the Group, the Kirin Group incorporates qualitative assessments, after first performing quantitative assessments of the impact and likelihood of occurrence of each type of risk.
In response to risks that would significantly impact our businesses if they occurred, even if we do not know the probability that they will occur, such as climate change risks, we have adopted a new approach of identifying and considering important risks by setting, analyzing, and assessing scenarios. We ensure that the Group Risk and Compliance Committee receives reports on risks and opportunities identified through scenario analysis, and manage such risks and opportunities as part of day-to-day risk management.
We share important risks with group companies, responsible departments in Kirin Holdings, and others, clarify the roles of each company and department, and implement countermeasures. We monitor conditions on a regular basis and review our progress on related measures, as well as important risks, etc. The Group Environmental Meeting and Group CSV Committee share and discuss risks related to climate change, natural capital, the circular economy, and other aspects of the environment, as necessary, and submit agenda items and reports to the Board concerning matters we must reflect in policies and strategies for the Group as a whole.

Risk management system

PDCA cycle



Risk management policies



Metrics and targets

Financial impact

Financial impact from climate change	
Procurement costs from lower agricultural yields	2℃ scenario: Approximately 0.9 billion yen to 2.5 billion yen 4℃ scenario: Approximately 2.5 billion yen to 9.7 billion yen (Both by 2050. Assessed using the middle 50th percentile of the distribution of forecast data for price fluctuations)
Damage to business sites from water risk	Approximately 1.0 billion yen to 5.0 billion yen
Damage to business sites from water stress	Approximately 30 million yen to 600 million yen
Energy costs from carbon pricing	2℃ scenario: 1.0 billion yen 4℃ scenario: 6.9 billion yen (Both by 2030. If we do not take measures to reduce GHG emissions)
Agricultural product procurement costs from carbon pricing	2℃ scenario: Approximately 0.7 billion yen to 3.0 billion yen 4℃ scenario: Approximately 1.6 billion yen to 5.7 billion yen (Both in 2050. Assessed using 25-75 percentile range of the distribution of forecast data for price fluctuations)

Adaptation measures

Related indicator	Target	Actual results
Number of small farms in Sri Lanka that received training for the acquisition of certification in Sri Lanka	10,000 farms (2025)	2,120 farms
Ratio of certified palm oil used in Japan	Maintain 100%	100%
Lion water efficiency	2.4kl/kl (2025)	3.8kl/kl
Kyowa Hakko Bio water usage	32% reduction compared with 2015 (2030)	52% reduction compared with 2015
Ratio of FSC-certified paper used for paper consumers in the Japan Non-alcoholic Beverages Businesses	Maintain 100%	100%
Ratio of recycled materials used in PET bottles	50% (2027)	4.9%

Investment plans and fundraising

Climate-relate capital investment in the 2019 medium-term plan (2019 to 2021)	6.2 billion yen
Total amount allocated from green bonds in 2020 (cumulative)	3.4 billion yen
Climate-relate capital investment in the 2022 medium-term plan (2022 to 2024)	Approximately 10.0 billion yen
Main environmental investment policies Introduction of heat pump systems (2019 to 2028) Introduction of solar power generation (2021 to 2029)	 2.0 to 3.0 billion yen 2.0 to 3.0 billion yen
ICP (Internal Carbon Pricing)	7,000 yen/tCO_2e

Mitigation measures

Time when we set targets:February 3, 2020

GHG emissions reduction target (relative value)	Target	Actual results
GHG emissions across the entire value chain	Net zero (2050)	4,411 thousand tCO_2e
Scope1+2	50% reduction (2030 / vs. 2019)	13% reduction
Scope3	30% reduction (2030 / vs. 2019)	12% reduction
Proportion of renewable energy in electric power used	100% (2040)	17%

* We have received approval from SBTi for our "GHG emissions across the entire value chain","Scope 1 + 2" and "Scope 3" targets as an science-based net-zero and 1.5℃ targets . We have committed our renewable energy target under RE100.

Progress on medium-term GHG emissions reduction target from SBT (2021) (unit:tCO_2e)

■Scope1+2

		Total
Scope1+Scope2		721,553
	Scope1	367,742
	Scope2	353,811
Reduction rate(compared to 2019 base year)		-13%

■Scope3

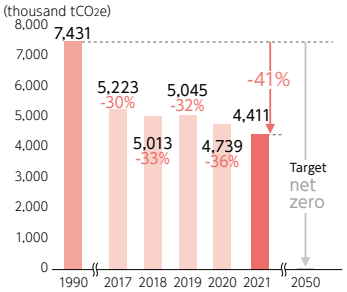
			Total
Scope3			3,688,961
Upstream	1	Products and services purchased	2,230,657
	2	Capital goods	—
	3	Fuel and energy-related activities not included in Scopes 1 and 2	173,449
	4	Transportation and delivery (upstream)	433,015
	5	Waste from operations	25,750
	6	Business travel	4,690
	7	Employee commuting	13,280
	8	Leased assets (upstream)	—
Downstream	9	Transportation and delivery (downstream)	765,018
	10	Processing of sold products	—
	11	Use of sold products	8,719
	12	Disposal of sold products	34,383
	13	Leased assets (downstream)	—
	14	Franchises	—
	15	Investments	—
Reduction rate (compared to 2019 base year)			-12%

* For water resources, we have set indicators and goals for countries and regions where there is major water stress, as non-financial targets for the Group. For other group companies, we have also set targets in CSV Commitments or EMS for each company, depending on the level of water stress.

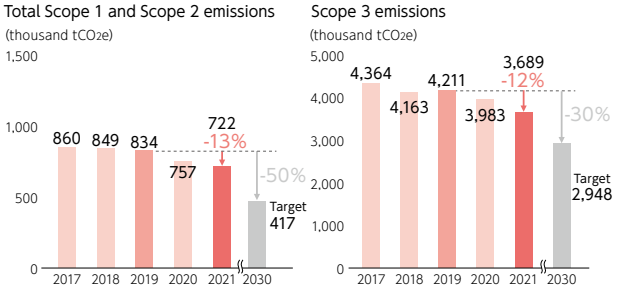
GHG emissions reduction performamce

Our reduction of GHG emissions for Scope 1, Scope 2, and Scope 3, as well as across the value chain as a whole, were as follows.

Changes in GHG emissions across the entire value chain

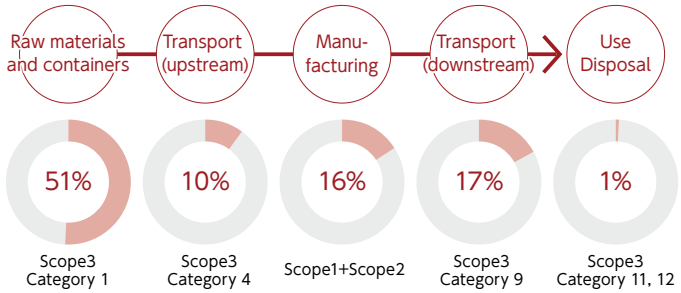


Progress against our medium-term target for reducing GHG emissions



* Since 2019, we have excluded Lion' s non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

Ratios of greenhouse gas emissions in value chain (2021)



* We passed a resolution concerning our GHG emissions reduction target on February 3, 2020, and announced it on February 10, 2020.

* Information related to the process for calculating GHG emissions is as follows.

- We base our calculation of Scope 3 emissions on the Kirin Group "Standards for Calculating CO_2 Across the Value Chain," which we created based on the "Corporate Value Chain (Scope 3) Standard" of the "GHG Protocol" in 2010.
- When calculating Scope 3 emissions, we use procurement data for the main ingredients and materials that the Kirin Group purchases (primary data from suppliers), published data on emission factors, such as the LCA database (IDEA) offered by AIST, and public data from other countries and regions.
- When calculating Scope 3 emissions, we identify the amounts of major items that the Kirin Group purchases per supply country and region based on procurement data, and multiply these amounts by the applicable emission factors.
- If there are any ingredients or materials that are not listed in public emission factors databases, we set and use emission factors by referring to other items with similar characteristics.
- At present, we have not obtained any emission factors directly from suppliers (including Tier 1 suppliers).

* For more information on boundaries, please refer to P121 and P122 of the "Environmental Data" section. For other detailed data related to climate change, please refer to the P127 to P131 of the "Environmental Data" section.

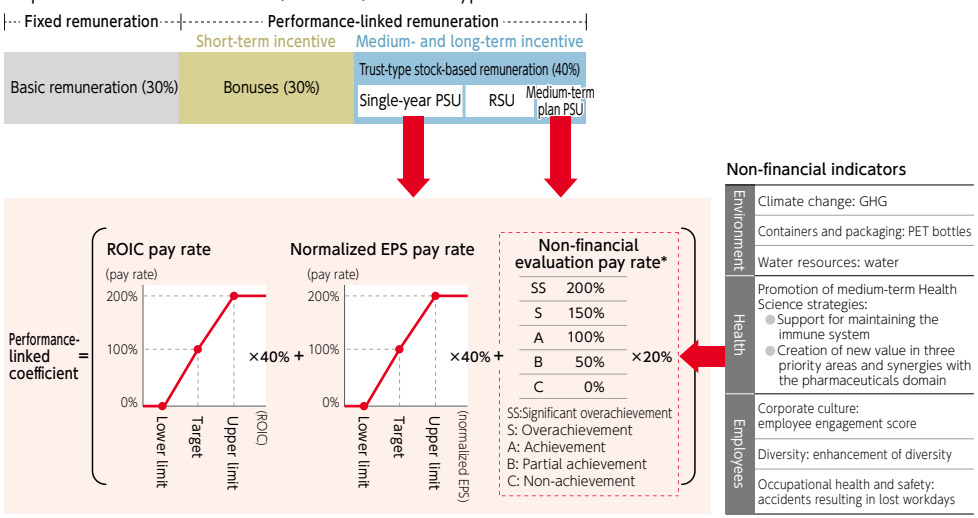
Link to performance

We have set the corporate performance indicators for executive remuneration such that they are also linked to non-financial indicators, which are one of the main management indicators in our Medium-Term Business Plan.

Kirin Group executive remuneration consists of fixed "basic remuneration," "bonuses" as short-term incentive remuneration, and "stock-based remuneration (trust-type stock-based remuneration)" as medium and long-term incentive remuneration. Within this remuneration, we include non-financial indicators, which are a key performance indicator, when calculating our assessment of business performance for single-year PSU and medium-term plan PSU, as the performance-linked component of trust-type stock-based remuneration.

We make decisions concerning the achievement of non-financial indicators based on a comprehensive assessment, after evaluating the level of achievement of specific indicators set for each of three items, "environment," "health," and "employees," and taking into consideration the results of our evaluations of these items and qualitative factors. The payment rate of single-year PSU and medium-term plan PSU moves within a range of 0% and 200%, assuming that the rate of payout is 100% if we achieve our targets.

Proportion of basic remuneration, bonuses, and trust-type stock-based remuneration for the President & CEO



* Trust-type stock-based remuneration consists of: (1) performance share units linked to the level of achievement of business performance in a single fiscal year (single-year PSU), (2) restricted share units without conditions related to the level of achievement of business performance (RSU), and (3) performance share units linked to the level of achievement of Medium-Term Business Plan targets in multiple fiscal years (medium-term plan PSU). Performance indicators for single-year PSU and medium-term plan PSU consist of ROIC, normalized EPS, and non-financial indicators, which are the key performance indicators that we have set forth in our Medium-Term Business Plan.

* We use non-financial indicators for 20% of the evaluation of performance for trust-type stock-based remuneration single-year PSU and medium-term PSU.

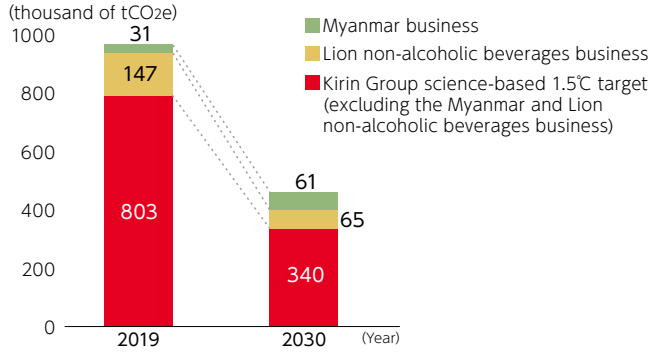
* Non-financial targets related to the environment are as follows.

Item	Theme	Non-financial indicators	2024 target
Environment	Climate change	GHG reduction rate	23%(50% by 2030)
	Containers and packaging	Rate of recycled resin for PET bottles	38% (50% by 2027)
	Water resources	Water use intensity at manufacturing sites with high water stress	3.0kl/kl or less (2.4kl/kl or less by 2025)

Impact from acquisitions, divestments, and policies

On January 25, 2021, the Kirin Group divested Lion-Dairy and Drinks, the non-alcoholic beverages business of Lion (Australia), and we intend to divest our business in Myanmar during 2022. In 2019, the base year for our science-based 1.5℃ target, GHG emissions amounted to 147,000 tCO_2e from Lion-Dairy and Drinks, and 31,000 tCO_2e from our businesses in Myanmar, equivalent to 15% and 3% of the Kirin Group's Scope 1 + 2 emissions, respectively. In the event of a divestment, the Kirin Group will split out GHG emissions and disclose the level of achievement of targets going back to the base year. At the same time, we will monitor the issue and will not change our targets based on such divestments. Our science-based 1.5℃ target prior to the divestment included the Myanmar business, in which we expected market growth. Accordingly, these divestments will make targets easier to achieve for the Group as a whole, but we have judged that there will be no significant impact on the required investment and expenses. These divestments will not result in any significant change in the structure of our businesses, we will keep our beer business in Australia, where water stress is high, and these will not contribute to any reduction of this risk. Accordingly, we have judged that will not be any significant change in our physical or transitional risk.

Impact on GHG emissions from the divestment



Results of natural disaster model AIR flood simulation

Occurrence interval (years)	Estimated amount of flood damage (yen)
200	1,030,581,609
150	175,176,917
100	2,590,244
70	164,572
50	52,859
25	0
20	0
10	0
5	0

* We have calculated the amount of flood damage for almost all property at applicable breweries and plants, including buildings, facilities, fixtures, and products.

Assets exposed to risk

We have judged that the following brewing and manufacturing business sites have a high level of water risk: China (Zhuhai), two in Australia, and four in Japan. We also judged that three Lion breweries in Australia and Thai Kyowa Biotechnologies were brewing and manufacturing business sites with a high level of water stress. Our asset exposure to general 200-year disasters (the total of 20 business sites in Japan) is approximately 1.0 billion yen. We have considered the possibility that regulations or social trends associated with climate change will force us to move away from diesel vehicles for delivery trucks, but we believe the possibility that such developments will force us to stop using diesel vehicles before the end of their service life is low, owing to the fact that large electric trucks are still uncommon, and there are no choices for commercially available trucks.
On our roadmap, we intend to change our boiler fuel to hydrogen. It is possible that reforms or facility renewals will be necessary in the future, but it will require time to develop the infrastructure to use hydrogen, so we have judged that the possibility that we will need to renew facilities without waiting for the end of their useful life is low. Mercian's Yatsushiro Plant is the only plant that uses heavy oil boilers, but we plan to renew this to a natural gas boiler next year.
We think these delivery trucks and boilers correspond to assets whose value may be harmed or that we may lose if the transition to a decarbonized society progresses, and we have calculated our related exposure at 1.1 billion yen (book value of delivery trucks and boilers) as of the end of March 2023.

Related assets

Item	Amount
Damage to business sites from water risk	Approximately 1.0 billion yen to 5.0 billion yen
Exposure to 200-year disasters across 20 locations in Japan	Approximately 1.0 billion yen
Residual value of related facilities*	Approximately 1.1 billion yen

* The residual value of related facilities refers to the total residual value of boilers held by Kirin Brewery, Kirin Beverage, and Mercian, and the residual value of trucks held by group logistics companies. We have judged that the possibility that regulations or social trends associated with climate change will force us to renew these boilers and trucks before the end of their useful life is low.

More information on the impact on currently held assets→P.88
More information on the results of wind and water damage simulation→P.81

Water usage at brewing and manufacturing sites in areas with water stress

Baseline Water Stress (WRI Aqueduct)	Number of brewing and manufacturing sites	Water usage (thousand m3)	Proportion of water usage*
Extremely High (>80%)	1	357	0.77%
High (40-80%)	4	2,366	2.1%

* The proportion of the total water usage for all brewing and manufacturing sites in the Kirin Group of 46,317,000 m3 (54 main brewing and manufacturing sites and small breweries)

More information on business site water risk assessments→P.81

Reference documents

P.79 Impact of climate change on yields of the main agricultural products

- Prioritizing climate change adaptation needs for food security in 2030. (Lobell, D.B. et al.)
- Potential impacts of climate change on agricultural land use suitability : barley (Van Gool, D. and Vernon, L.)
- Climatic changes and associated impacts in the Mediterranean resulting from a 2℃ global warming. (Giannakopoulos, C., Le Seger, P., Bindi, M.,Moriondo, M., Kostopoulou, E. & Goodess, C.)
- Negative impacts of climate change on cereal yields: statistical evidence from France (Gammans M. et al.)
- Extension of the CAPRI model with an irrigation sub-module (Blanco, M. et al.)
- Crop responses to temperature and precipitation according to long-term multi-location trials at highlatitude conditions. (Peltonen-Sainio, P., Jauhiainen, L. & Hakala, K.)
- Decreases in global beer supply due to extreme drought and heat (Xie, W. et al.)
- Climate change, wine, and conservation (Lee Hannah, Patrick R. Roehrdanz, Makihiko Ikegami, Anderson V. Shepard, M. Rebecca Shaw, Gary Tabor, Lu Zhi, Pablo A. Marquet, and Robert J. Hijmans)
- Climate change decouples drought from early wine grape harvests in France (Benjamin I. Cook & Elizabeth M. Wolkovich)
- Vineyards in transition: A global assessment of the adaptation needs of grape producing regions under climate change (David Santillán, Ana Iglesias, Isabelle La Jeunesse, Luis Garrote, Vicente Sotes)
- Assessment of climate change impact on viticulture:Economic evaluations and adaptation strategies analysis for theTuscan wine sector (Iacopo Bernettia, Silvio Menghinia, Nicola Marinellia, Sandro Sacchellia,Veronica AlampiSottinia)
- The impact of climate change on the global wine industry: Challenges &solutions (Michelle Renée Mozell, Liz Thachn)
- Climate change impacts on water management and irrigated agriculture in the Yakima River Basin, Washington, USA (Vano, J.A., et al.)
- The impact of climate change on the yield and quality of Saaz hops in the Czech Republic (Martin Mozny, Radim)Tolasz, Jiri Nekovar, Tim Sparks, Mirek Trnka, Zdenek Zalud
- Vulnerability of Sri Lanka tea production to global climate change (M. A. Wijeratne)
- Observing climate impacts on tea yield in Assam, India (J.M.A. Duncan, S.D. Saikia, N. Gupta, E.M. Biggs)
- THE FUTURE OF TEA A HERO CROP FOR 2030 (Ann-Marie Brouder, Simon Billing and Sally Uren)
- IDENTIFICATION OF SUITABLE TEA GROWING AREAS IN MALAWI UNDER CLIMATE CHANGE SCENARIOS (UTZ IN PARTNERSHIP WITH CIAT)
- Climate change adaptation in the Kenyan tea sector Ethical Tea Partnership)
- Diversity buffers winegrowing regions from climate change losses. 2864-2869, PNAS, February 11, 2020. (Morales-Castilla, et.al.)

P.79 Impact of lower yields on procurement costs for agricultural products in 2050 and P88 Estimation of the impact on agricultural product procurement costs from carbon pricing in 2050

- Barley: We calculated the impact by multiplying standard prices of beer per country, as indicated by the results of research using economic models from Xie, et al., by the future rates of change in beer prices (we assumed that beer prices would generally be linked to barley procurement costs)
  Decreases in global beer supply due to extreme drought and heat, Nature Plants, VOL.4, NOVEMBER 2018, 964–973 (Xie, etal.)
- Other than barley: We calculated the impact using rates of change in costs associated with agricultural products from climate change (impact on yields) and mitigation measures (carbon pricing), as indicated in the results of research from Hasegawa et al., and presented in the IPCC “Special Report on Climate Change and Land (SRCCL)”
  IPCC (2019) Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems Chapter 5: Food Security および Risk of increased food insecurity under stringent global climate change mitigation policy. Nature Climate Change,volume 8, pages 699–703 (Hasegawa T, Fujimori S, HavlíkP, Valin H, BodirskyBL, DoelmanJC, FellmannT, Kyle P et al. 2018)

P.80 Impact of climate change on corn

- Tigchelaaret al. (2018)“ Future warming increases probability of globally synchronized maize production shocks.”Proceedings of the National Academy of Sciences Jun 2018, 115 (26) 6644-649. (Tigchelaaret al. 2018)
- MAFF (2008) “Recent Trends in Prices of Agricultural Products and Food”
- Agriculture & Livestock Industries Corporation (2010) “FY2008 Overview of Survey on Actual Status of Sweetener Demand”
- Agriculture & Livestock Industries Corporation (2019) Usage of Sugar and Artificial Sweeteners Among Food Manufacturers

P.80 Impact of climate change on high-fructose corn syrup and soybeans

- The impact of climate change on Brazil's agriculture (Zilliet al.2020)
- Productivity and welfare impact of climate change in sugarcane and cotton producing regions of Ethiopia (Weldesilassieet al.2015)
- Assessing the impact of climate change on sugarcane and adaptation actions in Pakistan (Farooq and Gheewala 2020)
- Simulating the Impacts of Climate Change on Sugarcane in Diverse Agro-climatic Zones of Northern India Using CANEGRO-Sugarcane Model (Sonkaret al. 2020)
- Effect of climate change on cash crops yield in Pakistan (Akbar and Gheewala 2020)
- Future climate change projects positive impacts on sugarcane productivity in southern China (Ruanet al. 2018)
- Assessing the impact of climate change on wheat and sugarcane with the AquaCropmodel along the Indus River Basin, Pakistan (Alvar-Beltránet al. 2021)
- Climate Change and Potato Productivity in Punjab—Impacts and Adaptation (Rana et al. 2020)
- Impacts of Climate Change on the Potential Productivity of Eleven Staple Crops in Rwanda (Austin et al. 2020)
- Predicting the response of a potato-grain production system to climate change for a humid continental climate using DSSAT (Tooley et al. 2021)
- Potential Benefits of Potato Yield at Two Sites of Agro-Pastoral Ecotone in North China Under Future Climate Change (Tang et al. 2020)
- Response of potato biomass and tuber yield under future climate change scenarios in Egypt (Dewedaret al. 2021)
- Impacts of Climate Change on the Potential Productivity of Eleven Staple Crops in Rwanda (Austin et al. 2020)
- Estimating cassava yield in future IPCC climate scenarios for the Rio Grande do Sul State, Brazil (Tironi et al. 2017)
- Is Cassava the Answer to African Climate Change Adaptation? (Jarvis et al. 2012)
- Estimation of potential changes in cereals production under climate change scenarios (Tatsumi et al. 2011)
- Global crop yield response to extreme heat stress under multiple climate change futures (Derynget al. 2014)
- The combined and separate impacts of climate extremes on the current and future US rainfed maize and soybean production under elevated CO_2 (Jinet al. 2017)
- Climate impacts on crop yields in Central Argentina. Adaptation strategies (Rolla et al. 2018)
- Mitigating future climate change effects on wheat and soybean yields in central region of Madhya Pradesh by shifting sowing dates (Balvanshiand Tiwari 2019)
- Changing yields in the Central United States under climate and technological change (Burchfield et al. 2020)

P.88 Assessment of impact of carbon pricing

Estimation of impact of carbon pricing

1) We calculated the rate of decline in future electric power emission factors from the IEA "World Energy Outlook 2019" Annex A (Current Policies Scenario and SD Scenario).
2) We calculated actual electric power emission factors from the actual energy usage and GHG emissions of the Kirin Group in the base year (2019), and estimated future electric power emission factors under the two scenarios (Current Policies Scenario and SD Scenario) by multiplying actual emission factors by the rate of decline in emission factors calculated in Step 1.
3) We used the electric power emission factors that we calculated to forecast GHG emissions in the Kirin Group in 2030 and 2050. We categorized these forecasts depending on whether or not we take measures to reduce emissions.
4) We applied the IEA WEO 2019 Current Policies Scenario to the Kirin Group scenario 3, and the SD Scenario for the Kirin Group scenario 1, while also setting the IPCC "Special Report on Global Warming of 1.5℃" as our new 1.5℃ scenario, and we set the carbon prices indicated in each data source as the basis for the future carbon prices for each scenario (IEA WEO 2019 P758 and IPCC Special Report on Global Warming of 1.5℃ 2.5.2.1 Price of carbon emissions).
5) We calculated the impact by multiplying the forecasts of future GHG emissions that we calculated in Step 3 by the carbon prices that we set in Step 4. We calculated the increase in costs if we did not implement initiatives to reduce GHG emissions from the difference in impact depending on whether or not we take measures to reduce emissions.

P.89 External diseconomies related to Kirin Group PET bottles

We estimated that impairment losses related to marine ecosystem services would be approximately 0.36 to 3.56 million yen (approximately 3,300 US$ to 33,000 US$) per ton of plastic in 2011, based on the estimations of Beaumont et al. We estimated that the median proportion of PET bottles that flowed into the ocean from Japan would be 0.5%, based on the "Annual Report on the Recycling of PET Bottles" by the Ministry of the Environment. We set the total amount of PET materials used by Kirin Group major domestic companies at 66,894 tons in 2018, and multiplied this amount by the above estimates.

- Beaumontetal. (2019) Global ecological, social and economic impacts of marine plastic
- Ministry of the Environment (2018) Recent Trends Surrounding Ocean Waste, and the Council for PET Bottle Recycling, (2018) Annual Report on the Recycling of PET Bottles

P.94 Increasing interest in infectious diseases caused by global warming

- WHO: 「Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s」
- WHO: 「Dengue and severe dengue」10 January 2022

P.94 Increase in heatstroke caused by global warming [short to long term]

- S-8 2014 Report by Project Team of Comprehensive Study on Impact Assessment and Adaptation for Climate Change
- National Institute of Infectious Diseases, Expansion of Aedes albopictus in Japan, 2018 (IASR Vol. 41 p92-93: June 2020 edition)

Environmental Management

Environmental governance

Corporate Governance

The Kirin Group has adopted a pure holding company structure as a means of controlling our diverse and global business, which is centered on three domains: alcoholic beverages, non-alcoholic beverages, and pharmaceuticals. As a pure holding company, Kirin Holdings takes on roles such as devising and implementing the Group's overall strategies, monitoring individual businesses, creating synergies through coordination across the Kirin Group.

The Kirin Group's individual companies conduct their business autonomously with a sense of speed, while maintaining close ties with customers and other stakeholders. Kirin Holdings grants appropriate authority to match the strategic stages of individual Kirin Group companies and improves governance by dispatching directors to the Boards of individual Group companies. Directors or executive officers of Kirin Holdings serve concurrently as directors at key Group companies.

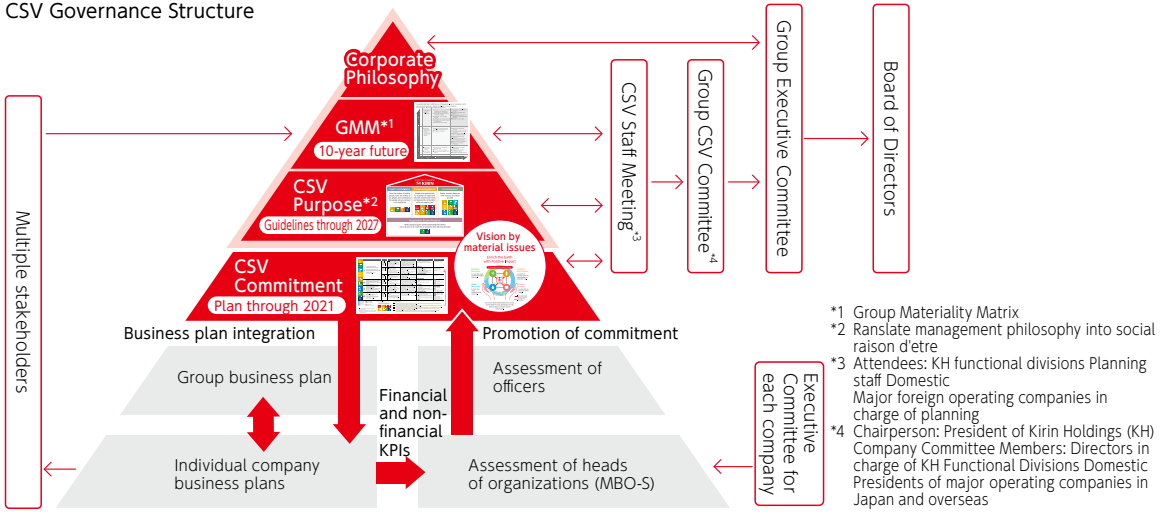
Kirin Holdings has adopted a Company with Audit and Supervisory Board system, and aims to maintain and improve on a highly transparent governance system for its stakeholders. The Board, which includes a number of independent non-executive directors, works closely with the Audit and Supervisory Board, which also includes a number of independent directors, and makes effective use of the functions of audit & supervisory board members to make final decisions on important matters and reinforce the monitoring function over management. Kirin Holdings has introduced an executive officer based system in order to implement strategies for each of its businesses and functions in an agile fashion and clarify executive responsibilities.

Environmental management and CSV

The Kirin Group engages in environmental management as part of its CSV management system. The Kirin Group has organized material issues, including the environment, as "Kirin Group's management issues for sustainable growth (Group Materiality Matrix: GMM)", as part of its commitment to sustainable development in partnership with society. We have set forth the following four issues as material issues related to the environment: "sustainable use of biological resources," "sustainable use of water resources," "sustainable recycling of containers and packaging," and "overcoming climate change." These issues are also consistent with the four priority themes of the Kirin Group's Environmental Vision 2050. To create shared value with society and promote sustainable growth, in our CSV Purpose developed as the guideline for the Long-Term Management Vision, KV2027, we set our purpose for the environment in line with the Kirin Group's Environmental Vision 2050: Enrich the sustainable Earth for future generations through positive impact. In response, Group companies have established CSV Commitments as mid-term targets to achieve our environmental vision and are using them as performance indicators.

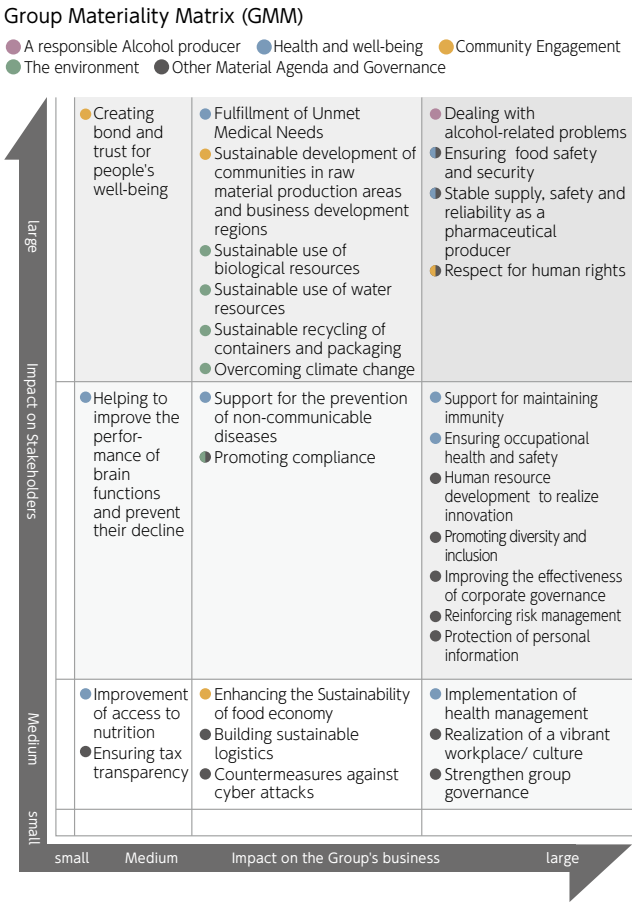
As we look to achieve our Environmental Vision, Purpose, and Commitment, the Kirin Group will gather the opinions of stakeholders in an appropriate manner, identify and assess the risks and opportunities related to the environmental activities of our businesses, and take necessary action from medium to long-term perspectives.

CSV Governance Structure

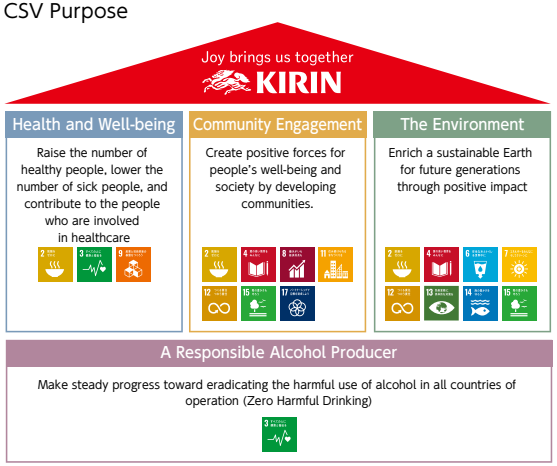


*1 Group Materiality Matrix
*2 Ranslate management philosophy into social raison d'etre
*3 Attendees: KH functional divisions Planning staff Domestic
Major foreign operating companies in charge of planning
*4 Chairperson: President of Kirin Holdings (KH)
Company Committee Members: Directors in charge of KH Functional Divisions Domestic
Presidents of major operating companies in Japan and overseas

Group Materiality Matrix (GMM)



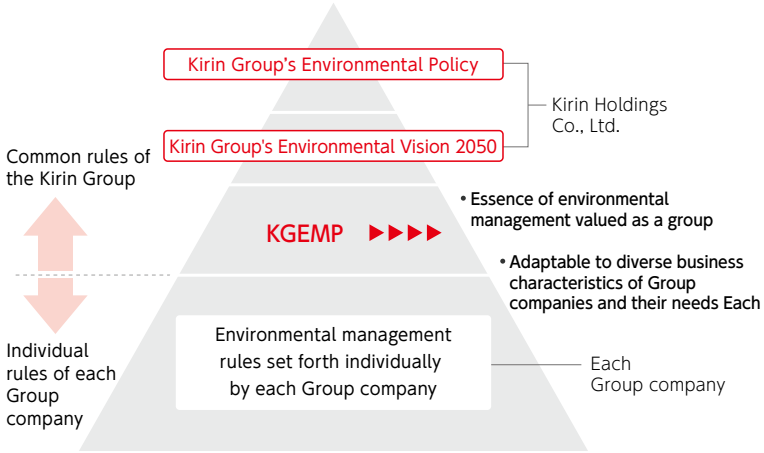
CSV Purpose



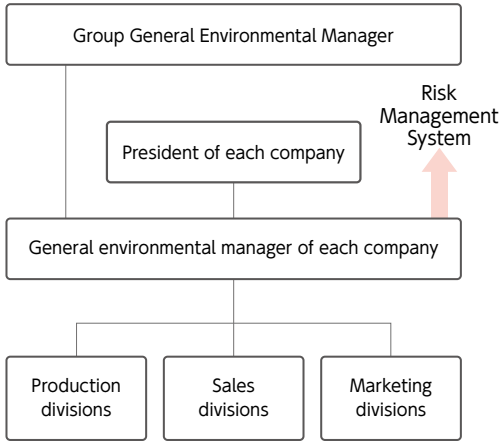
Environmental management structure

The Kirin Group has defined its environmental management structure in the Principle for Kirin Group's Global Environmental Management (KGEMP).
Under the KGEMP, a Group general environmental manager has been appointed as the chief executive officer for all Group environmental matters.As of April 2022, this role is held by the Senior Executive Officer of Kirin Holdings Company, Limited with responsibility for CSV strategy.The KGEMP requires the appointment of a general environmental manager, who has responsibility and authority for environmental matters in each operating company. In addition to monitoring to ensure that the company and its constituent companies are conducting their environmental activities appropriately, the general environmental manager conducts management reviews, identifies issues for improvement, and gives necessary directions to the relevant departments. In the event of an environmental crisis, the general environmental manager will have full authority to resolve the crisis. The KGEMP stipulates that all business sites comply with laws and regulations and other rules relevant to the business's environmental activities, reduce environmental load, such as GHG emissions and water intake, and prevent pollution under their own environmental management systems. All business sites must also conduct internal environmental audits to ascertain the appropriateness and legal compliance of their systems and confirm how well targets are being met. The results of these audits will then lead into management reviews.
We integrate the management of environment-related processes with company management processes in a manner suited to the companies' respective regions.
We incorporate CSV goals, including those for the environment, into the goal-setting for each organization and individual, and reflect the degree to which those goals are reached in assessments of the performances of those organizations and individuals.

Principle for Kirin Group's Global Environmental Management (KGEMP)



Environmental Management Structure



Development of Environmental Policy and Strategy

Environmental audits

Each of the operating companies in the Kirin Group complies with ISO 14001 and other environmental management system standards. Internal auditing is conducted in each business location and constituent company, and the environmental management divisions in the head offices of each Group company conduct auditing of business locations and constituent companies. These audits lead to improvements in the individual companies' environmental management systems. On an entire Group basis, Kirin Holdings' CSV Strategy Department conducts environmental audits of each Group company in accordance with criteria established by the Group. We then utilize these audits for management reviews.
In Japan, to guarantee further transparency and independence, we have been contracting an outside consultant to perform a strict environmental legal audit since 2009. By 2014, all global brewing and manufacturing sites had been audited in one round, and this has continued for all manufacturing sites since 2015. 2021 factory audits are being held remotely due to the Corona disaster.

Status of compliance with environmental laws and regulations

Each business location is thorough in its management of legal requirements through a ledger, and works exhaustively to prevent environmental pollution by establishing voluntary management targets that are more stringent than those required by the legislation.When an incident that constitutes an environmental accident occurs, an "Environmental Accident Report" is prepared in accordance with standards stipulated by each operating company and reported to Kirin Holdings.
We have established a system for the reporting of environmental accidents within the Group, in which we share *hiyari-hatto* (near-miss) examples and accidents that occurred within the Group and extend countermeasures to other sites. We use internal environmental audits to check the status of initiatives taken toward achieving environmental targets, see how measures to prevent environmental accidents and *hiyari-hatto* (near-miss) cases are being shared with operating companies and business sites, and confirm the status of legal compliance. In 2021, the Kirin Group has no significant accidents and violations affecting environmental pollution.

Appropriate management of waste

The Kirin Group is working toward its declared goal of the implementation and firm establishment of thorough appropriate management of waste. To this end, we established the Kirin Holdings Waste Management Rules and are promoting the appropriate treatment of waste within the common Group systems.
These rules standardize contract templates and the frequency and contents of contractor audit programs, and by keeping an updated list of staff in charge of waste management, we provide education to all staff who require it, based on standardized textbooks.
We collectively manage information on all waste disposal contractors for the Group, so if in the unlikely event that a problem arises, we can immediately search for and confirm details about the contractor, its permits, the waste it is being contracted to handle, and other details. We have standardized operations in this way so that anyone who is newly assigned to waste-related work will be able to perform it with certainty.

Recycling rate 100%

The Japanese alcoholic and non-alcoholic beverages businesses (Kirin Brewery, Kirin Beverage, Kirin Distillery) have set a recycling rate target of 100% for their plants and have continued to achieve that target.
Four plants, including the Kirin Brewery's Yokohama Plant, first achieved a recycling rate of 100% in 1994, and in 1998, all plants achieved 100%, the first time in the beer industry.

Preventing air pollution

The Kirin Group strives to comply with all laws and regulations relating to air pollution in the various countries in which we operate. We have established voluntary standards that exceed those required by environmental legislation and are working to reduce our emission of atmospheric pollutants.
In Japan, in addition to complying with the Automobile NOx and PM Law, we are also working to improve transportation efficiency and loading efficiency, and to utilize modal shifts.

Preventing water pollution

The Kirin Group thoroughly complies with laws and regulations for preventing water pollution in each of the countries where we operate and minimizes wastewater loads by setting our own strict control values, which go beyond those required by environmental laws.

Preventing soil contamination

When selling assets, the Kirin Group conducts thorough investigations of soil contamination, responding as necessary.

Managing chemical substances

The Kirin Group manages its chemical substances appropriately based on the Act on Confirmation, etc. of Amounts of Release of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Act) and other relevant legislation. Due to the nature of its business, the Kyowa Hakko Bio Group is committed to reducing volatile organic compounds (VOC), which account for the majority of chemical substance emissions.

Polychlorinated biphenyl (PCB)
Managing appropriately and disposing progressively according to the law.

Asbestos
Managing and isolating appropriately and treating progressively according to the law.

Sustainable Procurement

Group procurement management structure

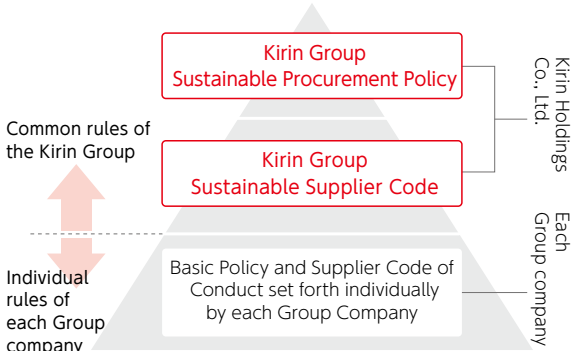
To fulfill its social responsibility, the Kirin Group manages progress toward procurement targets set forth in management plans, and strengthens governance through such means as managing procurement risks and compliance with laws and regulations, education, and internal audits, in accordance with the Kirin Group Sustainable Procurement Policy and the Kirin Group Sustainable Supplier Code. We have integrated procurement risk as part of corporate risk management. In the unlikely event that a procurement risk should materialize, under the leadership of the officer in charge of risk management, the relevant departments will promptly work together to share information, implement countermeasures, and prevent recurrence, and will involve other departments before similar events happen elsewhere. In these ways, we work to verify and address the problem.

Kirin Group Sustainable Procurement Policy

In April 2021, the Kirin Group revised its procurement policy and established the “Kirin Group Sustainable Procurement Policy,” and is working to realize this policy.

Kirin Group Sustainable Supplier Code

In April 2021, the Kirin Group established the “Kirin Group Sustainable Supplier Code”—a collection of conditions that suppliers must comply with, based on the “Kirin Group Sustainable Procurement Policy.” The Code respects international standards such as the OECD Guidelines of Multinational Enterprises, the UN Guiding Principles on Business and Human Rights, the Core Conventions of the International Labor Organization [ILO], the Ten Principles of UN Global Compact, and the Women's Empowerment Principles [WEPs], and strives to ensure that all upstream channels in the supply chain, as well as the Kirin Group’s own business operations, conform to these standards on an ongoing basis.



Basic procurement policy and supplier code of conduct for each Group company

Each Group company has established a basic procurement policy and supplier code of conduct tailored to the characteristics of its particular business and the laws and regulations of the countries in which it operates.

Kyowa Kirin’s approaches

Kyowa Kirin has established the Kyowa Kirin Group Procurement Policy and has prepared the Kyowa Kirin CSR Procurement Guidebook. In June 2021, we revised the Kyowa Kirin CSR Procurement Guidebook in order to promote "sustainable procurement" together with our suppliers.It has established the Supplier Code of Conduct with which it asks suppliers to cooperate. At Kyowa Kirin, we conduct CSR questionnaire surveys each year to analyze the current situation of CSR initiatives in the supply chain and identify issues. From 2019, we began conducting the CSR questionnaire survey for foreign suppliers. We are providing opportunities for suppliers to deepen understanding of CSR procurement activities by holding briefing sessions on CSR procurement and organizing supply chain participant meetings to exchange information on issues for the entire supply chain and measures to solve such issues.In FY2021, we received responses from 463 of the 593 companies we asked to complete the questionnaire.

Lion’s approaches

Lion has set forth three core principles for its Procurement Policy as follows:

1.Building strong commercial outcomes & productive partnerships
2.Promoting Human Rights and Ethical Sourcing
3.Promoting sustainable (environmental, social and inclusive) sourcing practices

At the end of 2019, Lion announced its Supplier Responsible Sourcing Code, in which it seeks to mitigate ethical, environmental, labor, and human rights risks, such as instances of forced and child labor. The Code sets out strict policies on anti-bribery and corruption, conflicts of interest and protecting privacy, as well as a whistleblower policy.
Lion requires key suppliers to complete SEDEX self-assessment questionnaires (SAQs) on an ongoing basis.
As of the end of 2020, 95% of Lion’s primary suppliers have taken risk assessments through the questionnaire, with Lion targeting 100% of suppliers by 2021 in the CSV Commitment.

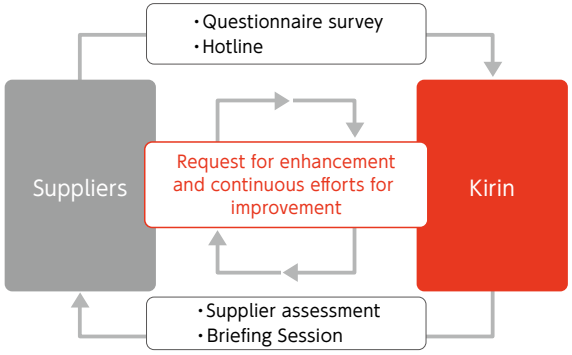
Kirin Group Sustainable Procurement Policy

The Kirin Group upholds the essential values in the areas of human rights, labor, the environment, and anti-corruption defined by the United Nations Global Compact, of which we are a signatory. We engage in procurement activities that follow five themes for initiatives in compliance with this principle and with Group policies, to improve sustainability from global perspectives, enhance corporate value, and contribute to society.

1. Steady focus on quality
   - We place a high priority on pursuing quality and safety in our procurement practices, in accordance with the Kirin Group’s Quality Policy.
2. Ensuring regulatory and ethical compliance
   - We observe social norms and the letter and spirit of laws and regulations and conduct business in a sensible and socially responsible manner, in accordance with the Kirin Group Compliance Policy.
3. Respecting human rights
   - We embody the ideas laid out in the Kirin Group Human Rights Policy and address human rights issues together with our suppliers.
4. Environmental stewardship
   - We strive to protect the global environment and prevent pollution and conduct environmentally sensible procurement practices in accordance with the Kirin Group’s Environmental Policy.
5. Coevolving relationships of mutual trust with suppliers
   - We establish long-term relationships of trust with suppliers through fair and open procurement practices and work with suppliers to solve social issues to achieve co-existence and co-prosperity.

Two-way communication with suppliers

The Kirin Group places importance on two-way communication with suppliers.
Prior to the start of business transactions, we request that suppliers comply with the Kirin Group Sustainable Supplier Code, and after business transactions start, we monitor the status of compliance on a regular basis through surveys and supplier assessments. We give feedback to the supplier based on the results of the survey and evaluation; and if we deem that risk countermeasures are insufficient, we conduct additional surveys and request that the supplier take the necessary corrective actions. We hold supplier briefing sessions to help suppliers deepen their understanding of the Kirin Group's procurement activities, the Kirin Group Sustainable Procurement Policy, and the Kirin Group Sustainable Supplier Code. At the same time, we have established a "Supplier Hotline" to collect feedback from suppliers and to ensure fair trade. In 2021, we held a three-day supplier information session, attended by 580 people from about 380 companies. With these actions driving our PDCA cycle, we will continue to work with our suppliers and promote CSR procurement.
In FY2019, we adopted and began implementing the CSR/Sustainable Procurement Self-assessment Questionnaire developed by Global Compact Network Japan in the Japan Beer and Spirits Business and the Japan Alcohol and Non-alcoholic Beverages Businesses.Survey results are fed back to suppliers by the person in charge of the Procurement Department, and we are continuously communicating with suppliers to make improvements.
In FY2020, we received responses from 412 of the 421 companies we asked to complete the questionnaire. Overall, we found that our suppliers had made progress in all areas compared with the previous fiscal year.



Environmental Education

Environmental Training

To mitigate environmental risk, the Kirin Group conducts an ongoing program for environmental training for its employees.
This systematized training consists of training for environmental staff and training by job grade, including new employees. The training conducted at the Technical Talent Development Center has been opened to Kirin Group companies in Japan.
In 2021, as part of new employee training, basic training sessions on wastewater treatment, waste management, etc. are provided. Training for those in charge of industrial waste is systematized and implemented by the Kirin Holdings CSV Strategy Department. 2021 was held remotely due to the spread of coronavirus infection, with a total of 753 people participating in four sessions. In response to the growing demand for TCFD disclosure, the Kyowa Kirin Group provides e-learning education related to TCFD for domestic Group companies, including directors, and measures understanding through a questionnaire after the course.


Scenery of environmental training

Raising environmental awareness within the Company

The Kirin Group uses in-house communications to expand the depth and breadth of interest in and understanding of the environment among employees. We utilize employee newsletters and the intranet, and at Group headquarters, use screen videos presenting Kirin's environmental initiatives on digital signage, in order to deepen understanding among employees.
On June 1, 2021, we launched the "KIRIN Now" website for Group employees. As more employees work from home owing to the COVID-19 pandemic, we are using this website to provide up-to-date information from the Kirin Group in a format accessible to all Group employees, in accordance with changes in work styles. As part of this initiative, we are communicating with employees about the Kirin Group's CSV activities, centered on the areas set forth in our CSV Purpose, i.e., "Health and well-being," "Community," "Environment," and "Responsible alcohol producer," in an easy-to-understand manner, and strengthening two-way communication through the use of comments and users' ability to indicate that they are "excited" about posts.

KIRIN Now

Stakeholder Engagement

Stakeholder Engagement

To grow sustainably together with society, the Kirin Group has positioned Creating Shared Value (CSV) as the core of its company management in its Long-Term Management Vision, Kirin Group Vision 2027.
CSV management means the creation of economic value and social value at the same time, with the aim of sustainable growth together with society by realizing both solutions to social issues and the provision of value to customers. . To achieve this, it is important that we establish and implement mechanisms for identifying and understanding the challenges, expectations, and demands of our diverse stakeholders.
To this end, the Kirin Group has a range of opportunities for dialogue with the stakeholders involved in its business. In addition to dialogue, we work together with many of our stakeholders and cooperate in voluntary activities that lead to policy recommendations.

Engagement with tea farms

In our support for Sri Lankan tea farms to get Rainforest Alliance Certified, which began in 2013, Kirin staff travel to Sri Lanka once a year* to exchange views with the plantation managers and local residents, to identify and address local issues.
We decided to expand support for small farms to obtain certification for sustainable agriculture in 2018 in response to the consultations received from managers of large tea farms that depend on small farms to cover the need to supply a large amount of tea leaves. We determined that support for small farms to obtain the certification would lead not only to increasing revenues and stabilizing the business of small and large tea farms but to securing stable procurement of tea leaves.
The activities for the conservation of water sources on the farms materialized as a result of our dialogue with managers of large farms and local residents who had significant concerns over the impact of climate change on water sources.
On November 18, 2020, in response to a request from the Rainforest Alliance, the Senior Executive Officer in charge of CSV remotely participated in the “Rainforest Alliance Tea Event 2020” event as a panelist.

* In 2021 and 2022, on-site visits could not be conducted due to the spread of the new coronavirus.

Visit to a Sri Lankan tea farms

Engagement with grape producers for Japan Wine

Mariko Vineyard’s has received support from an international NGO, Earthwatch Japan, and its volunteers for ecological surveys.
In 2018, Earthwatch Japan and its volunteers provided assistance in mapping the distribution of the shrubby sophora (Sophora flavescens), the sole grass eaten by the larvae of Shijimiaeoides divinus, a critically endangered species, on the sides of rice fields on the Jinba Plateau where Mariko Vineyard is located. Using the survey results, we have been conducting activities to increase the amount of shrubby sophora since 2019. We have been conducting activities to increase the plants of shrubby sophora in which, using the distribution map we created as a reference, we identify shrubby sophora and, with the permission of rice field owners, harvest cuttings of shrubby sophora. Volunteers then grow the cuttings at home and plant them in Mariko Vineyard once they have grown into healthy seedlings. In 2021, teachers from Shiogawa Elementary School, located at the foot of Mariko Vineyard, participated in taking shrubby sophora cuttings, which they then grew in a flower bed in the schoolyard, before students from the elementary school planted the seedlings in Mariko Vineyard at the end of May 2022.
Surveys of the distribution of violets in vineyards in 2019 and 2021 revealed that violets, which are an indicator species for grassland, had begun spreading deep into vineyards.

An environmental class at Shiogawa Elementary School

Survey of violet distribution in the vineyard

Future generations

The Kirin Group, based on its Environmental Vision 2050, promotes engagement with future generations in various ways to get the next generation involved in resolving environmental issues and have a positive impact to society.

The Kirin School Challenge

Since 2014, the Kirin Group has been holding workshops called the Kirin School Challenge, in which junior and senior high school students, who will lead the next generation, learn, think about, and discuss matters for solving various social issues in the world and convey those ideas to their peers. As of the end of 2021, a total of approximately 1,097 students had participated in the workshop.
Through 2019, we held these workshops as group learning sessions on the themes of sustainable agriculture, forestry, and containers and packaging, and the output consisted of posting photos of messages that participants wanted to convey to their generation on Twitter.
In response to the COVID-19 pandemic, however, we decided to hold the event online in 2020, and have changed the output to a sketchbook relay (a video showing a sketchbook filled with different messages). Although there are issues with holding the event online, such as maintaining concentration for long periods and difficulty in communication among participants, there is a positive side of no need to meet at the venue; participation can go beyond national borders, to encompass countries such as France, Ireland, and New Zealand.

Japan Environmental Youth Network

The Kirin Group has supported the Japan Environmental Youth Network, sponsored by the Environmental Restoration and Conservation Agency's Japan Fund for the Global Environment, since 2013 (from the time of its predecessor, the National High School Students Eco-Action Project).
The Japan Environmental Youth Network invites examples of day-to-day environmental activities from high school students, and selected students participate in the National Convention after passing through regional stages. At the national convention, the project presents various awards to outstanding efforts, including the Minister of the Environment Award. The Kirin Group serves as a judge at both the regional and national conventions. The environmental activities of high school students often reflect local issues, and they serve as a valuable forum for understanding the issues faced by the younger generation, who will lead the next generation.
As part of our support activities, we welcome high school students to visit our companies once a year. To date, the Head Office in Nakano, the Institute for Packaging Innovation and the Central Research Institute in Yokohama, and Mariko Vineyard, as well as BEER EXPERIENCE, an agricultural corporation in Tono that is funded by Kirin have all accepted visits, providing opportunities for the students to exchange views while observing actual research and production facilities.

Environmental mark program

In 2019, together with the Japan Network for Climate Change Actions (JNCCA), we began trialing the "Environmental mark program," in which children work together to find environmental marks. This program was developed with the support of the Japan Fund for the Global Environment as an opportunity for children to work together to find environmental marks on various products and services and think about environmental issues. The program targets elementary school students who participate in after-school care, Girl Scouts, and Boy Scouts.
Since 2020, we have been developing and deploying programs that use the "Environmental Mark Discovery Notebook," enabling us to conduct programs on a more continuous basis. When children find an environmental mark, the leader of the organization checks it and sticks a Kirin "Eco Panda" sticker in their "Environmental Mark Discovery Notebook," which increases their motivation.In 2020-2021, more than 200 organizations and approximately 5,000 elementary school students participated.

Free distribution of supplementary teaching material on SDGs

The Kirin Group is participating in the production of the section on "SDG 2: Zero Hunger" in the "SDGs Start Book," supplementary teaching material on the SDGs for elementary students. For this production, the Kirin Group collaborated with plans made by the "EduTown SDGs Alliance," a project that aims to nurture the creators of a sustainable society, primarily for elementary school students. We had originally planned to distribute 100,000 copies of the "SDGs Start Book" to elementary schools, etc., across Japan that applied. The number of applications, however, exceeded our expectations, so we printed additional copies and distributed 200,000 copies. So far, in FY2021, we have distributed 300,000 books free of charge.
On the "EduTown SDGs" website for children learning about the SDGs, there is a section called "Sustainable agriculture with Sri Lankan tea farms ~The efforts of the farms supporting the great taste of *Kirin Gogo-no-Kocha*~" as an example of initiatives for SDG 2. The brand manager of *Kirin Gogo-no-Kocha* makes an appearance in this section to explain the details of this initiative.

Decarbonization Challenge Cup

The Kirin Group supports the Decarbonization Challenge Cup which is held with the aim of building a decarbonized society for the next generation by announcing activities on global warming prevention undertaken by various organizations as a means of sharing knowhow and information to build collaboration and motivation for further activities.

Kirin School Challenge Award Ceremony


National Convention
of the Japan Environmental Youth Network

Environmental Mark Discovery Notebook

SDGs Start Book

Engagement with experts

The Kirin Group has always emphasized engagement with experts and NGOs to identify social issues and confirm the direction to take. With the adoption of the Paris Agreement at COP21 in 2015, the adoption of the SDGs by the UN, and the publication of the TCFD final recommendations in 2017, the Kirin Group believes that engagement with experts, NGOs, and ESG investors is becoming increasingly important.

Experts

In formulating the Kirin Group's Environmental Vision 2050, which was announced on February 10, 2020, we organized roundtable dialogue sessions with stakeholders, with cooperation from experts who had given us valuable advice in the past and we reflected many valuable comments received in our vision. In addition, when updating the Group Materiality Matrix in the 2022-2024 Medium-Term Business Plan that we announced on February 14, 2022, we engaged in dialogue with stakeholders such as labor unions representing employees, as well as sustainability NPOs and asset managers, and reflected the opinions that we received.

National Agricultural and Food Research Organization

In ecological surveys on the process of converting derelict farm land into vineyards, we ask the experts at the National Agriculture and Food Research Organization (NARO), our partner in joint research, to hold a joint research presentation once a year. In addition to sharing the insights obtained through this research, we discuss how to proceed into the future.

Contribution to development of various guidelines

The Kirin Group actively participates in the development of various public guidelines. In 2018 and 2019, at the request of the Ministry of the Environment, we sent a member to the Working Group on the Environmental Reporting Guidelines and Environmental Accounting Guidelines and the Working Group on guidance and technical notes supplementing Environmental Reporting Guidelines 2018, where he deliberated with experts about disclosure of environmental information.

In 2020, responding to a request from the Japan Food Industry Association, we sent a committee member to the TCFD Guidance by Industry Review Committee for the food industry. Since 2021, in response to a request from the Ministry of Economy, Trade and Industry, the officer responsible for CSV strategy at Kirin Holdings has participated in the Study Group on Disclosure Policies for Non-financial Information. In addition, in 2021 and 2022, we participated in various working groups organized by ministries and agencies.

SBTN Corporate Engagement Program

In February 2021, the Kirin Group became the first Japanese company in the pharmaceutical and food industry to participate in the Corporate Engagement Program held by the Science Based Targets Network. In this program, we cooperate on the development of a scientific approach to setting targets related to the corporate use of natural capital (fresh water, land, oceans, use of resources, climate change, pollution, and invasive species).

The TNFD Forum

In December 2021, we became the first Japanese food and beverage and pharmaceutical company to participate in the TNFD Forum, a network of supporters to share the mission and vision of the Taskforce on Nature-related Financial Disclosures (TNFD), a framework for disclosing information related to risk management, for companies to report and act on risks related to natural capital.

Engagement with investors

In June 2018, we held a CSV briefing for analysts and investors at Kirin Brewery's Yokohama Plant on the themes of "Environmental Initiatives" and "Kirin's Strengths in Technology." At the briefing, we explained the various initiatives on the four themes of the Long-Term Environmental Vision, and the weight reduction technologies for containers and packaging being developed by the Institute for Packaging Innovation. We gave attendees a tour of the Institute and the Yokohama Brewery.

In December 2021, we held the "KIRIN CSV DAY 2021" event in a hybrid online and face-to-face format, to report on the progress of our CSV management. With regard to our environmental efforts, we provided detailed explanations centered on the issues in our four important themes and Kirin's strengths in solving them. In the individual meetings with investors, we exchange opinions on our new Environmental Vision announced in February 2020 and responses to climate-related issues, including TCFD recommendations. We hope these meetings provide an opportunity for attendees to better understand the Kirin Group's initiatives.

Dialogue with CDP and TNFD

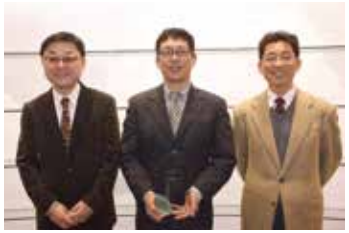
Since 2017, we have been taking the opportunity when the CDP's chairman or CEO visits Japan to set meetings with Kirin Holdings' officer responsible for CSV strategy and exchange opinions on responses to climate change.

In 2022, we welcomed the Executive Director of TNFD to Kirin to share information on the Kirin Group's initiatives related to natural capital and exchange views on the beta version of the TNFD Disclosure Framework.

TCFD Summit

In response to a request from the host, the Ministry of Economy, Trade and Industry (cosponsors: the TCFD Consortium and WBCSD), the Senior Executive Officer in charge of CSV appeared as a panelist on Panel Discussion 2 "Implementation of Scenario Analysis and Case Studies" at the TCFD Summit held on October 9, 2020.

Stakeholder Dialogue



Dialog with the National Agriculture and Food Research Organization

CDP Executive Chair
Paul Dickinson

CEO
Paul Simpson

TNFD
Executive Director
Mr. Tony Goldner

Voluntary participation leading to policy recommendations

Participation in consortium, government, and ministry activities

Organization	Nature of activity
TCFD Consortium	Kirin Holdings has participated in the TCFD Consortium since it was established in 2019. Kirin Holdings serves as a member of the Guidance by Industry Review Committee (food sector) from 2020.
WE MEAN BUSINESS	In the WE MEAN BUSINESS coalition, the Kirin Group has committed to "setting reduction targets by SBT," "report on climate change responses in mainstream reports by CDSB"
Science Based Targets Network	An organization that sets science-based targets related to natural capital and aims to create sustainable systems for the Earth. Kirin Holdings has set targets in line with the SBT Initiative (SBTi) standards for GHG emission reductions and has received approval for our science-based 1.5℃ target in 2020 and science-based net zero target in 2022. SBTs for Nature is a new initiative for setting targets related to natural capital after the SBTi. We were the first company in the Japanese pharmaceutical and food industry to participate in the Corporate Engagement Program (CEP), which discusses rulemaking.
United Nations Global Compact	The Kirin Group joined the United Nations Global Compact in September 2005.
Japan Sustainability Local Group (JSLG)	Kirin Holdings participates as a steering committee member and director of the JSLG.
Fun to Share/COOL CHOICE	Since 2014, the Kirin Group has supported the Japanese government's new climate change campaigns, Fun to Share and COOL CHOICE, and has registered with these campaigns.
Voluntary Action Plan of Japan Business Federation (Nippon Keidanren)	In consideration of the conservation of the global environment, the Brewers Association of Japan, of which Kirin Brewery is a member, and the Japan Soft Drink Association, of which Kirin Beverage is a member, participate in initiatives for the reduction of environmental load conducted by Nippon Keidanren (Japan Business Federation) and are tackling CO_2 reductions and the recycling of waste.
Eco-First	Eco-First is a program in which companies make a pledge to the Minister of the Environment to conduct their own environmental conservation initiatives, such as counter-measures to global warming. The Kirin Group became the first manufacturer to be Eco-First accredited. It also participates in the Eco-First Promotion Council whose members comprise accredited companies.

Organization	Nature of activity
Japan Business and Biodiversity Project	Kirin Holdings has joined the Japan Business and Biodiversity Partnership, which was established by Nippon Keidanren (Japan Business Federation), Japan Chamber of Commerce and Industry, and Keizai Doyukai (Japan Association of Corporate Executives) in 2010.
Forest Supporters	The Kirin Group participates in the activities of Forest Supporters, a civic movement that promotes the creation of beautiful forests. The National Land Afforestation Promotion Organization serves as secretariat for this movement.
Water Project	The Kirin Group is a founding member of and active participant in the Rainforest Alliance Consortium, which was established in September 2015 by the Rainforest Alliance (Japan) and companies that handle Rainforest Alliance Certified products with the aim of promoting the certification program and certified products recognition.
Rainforest Alliance Consortium	The Kirin Group is a founding member of and active participant in the Rainforest Alliance Consortium, which was established in September 2015 by the Rainforest Alliance (Japan) and companies that handle Rainforest Alliance Certified products with the aim of promoting the certification program and certified products recognition.
Consortium for Sustainable Paper Use (CSPU)	Five (now ten) companies engaged in leading-edge paper use initiatives and WWF Japan established the Consortium for Sustainable Paper Use. As a founding member of the CSPU, the Kirin Group pursues initiatives aimed at sustainable paper use.
Clean Ocean Material Alliance (CLOMA)	Kirin Holdings is a member of the Clean Ocean Material Alliance, which was established with a view to accelerating innovation through public-private partnerships that drive new 3R initiatives to make the use of plastic products more sustainable and promote the development and introduction of alternative materials.
Japan Sustainable Palm Oil Network (JaSPON)	Kirin participates in the "Japan Sustainable Palm Oil Network (JaSPON)," which was established in order to promote the procurement and consumption of sustainable palm oil.
Alliance To End Plastic Waste	The Kirin Group participates in the Alliance To End Plastic Waste, an international non-profit organization dedicated to solving the problem of plastic waste in the environment. By working to solve the plastic waste problem that surrounds the world from a global perspective, we aim to realize a "society where plastic continues to circulate" together with participating companies.
The TNFD Forum	The TNFD Forum is a network of supporters who share the mission and vision of the Taskforce on Nature-related Financial Disclosures (TNFD), a framework for disclosing information for the management of risks related to natural capital. In December 2021, Kirin Holdings became the first Japanese food and beverage and pharmaceutical company to participate in the TNFD Forum.

NGOs and environmental groups

Organization	Nature of activity
WWF Japan	We received support from the WWF Japan when developing our Guidelines for the Procurement of Sustainable Biological Resources and our Action Plan. The Consortium for Sustainable Paper Use was under joint efforts, and we are continuing to conduct activities.
Rainforest Alliance	We are working together to support the Sri Lankan tea farms and Vietnamese coffee plantations in getting Rainforest Alliance Certified.
FSC Japan	We jointly engage in activities to promote the wide use of FSC-certified paper. Kirin declared its commitment to the Vancouver Declaration on SDGs and FSC certification in 2017.
Roundtable on Sustainable Palm Oil (RSPO)	Kirin Holdings engages in activities as an associate member of the Roundtable on Sustainable Palm Oil (RSPO), a nonprofit organization that promotes the production and use of sustainable palm oil.
Earthwatch Japan	We are jointly pursuing ecological surveys at Mariko Vineyard and conducting activities to regenerate Sophora flavescens.

Industry organizations

Organization	Nature of activity
Brewers Association of Japan	We are jointly working on developing voluntary environmental action plans related to containers and packaging, global warming, creation of a recycle-based society, etc., and implementing associated measures and on conducting activities to prevent the scattering of beverage containers and promote community beautification.
Japan Soft Drink Association	We are jointly working on developing voluntary environmental action plans related to containers and packaging, global warming, creation of a recycle-based society, etc., and implementing associated measures and on conducting activities to prevent the scattering of beverage containers and promote community beautification.
Recycling related organizations	We are promoting 3R activities together with The Japan Containers and Packaging Recycling Association and various councils for promoting recycling.
The Beverage Industry Environment Beautification Association (BIEBA)	BIEBA brings together six beverage producer bodies to conduct activities aimed at beautification of communities.

Engagement with the next generation

Name of activity	Nature of activity
Kirin School Challenge	We hold environmental workshops for students in junior and senior high schools.
Japan Environmental Youth Network	We support the Japan Environmental Youth Network organized by the Ministry of the Environment and Environmental Restoration and Conservation Agency of Japan and serve on the adjudication panel at the regional and national conventions.

Environmental Data

Environmental Policy

Kirin Group's Environmental Policy

Basic policy
The Kirin Group places sustainable business growth based on solving social issues at the core of its management, and enriches society and the Earth for future generations through positive impact on people and the environment.

Activity policy
In all aspects of our business activities, we have set ambitious targets related to solving social issues connected to the environment as one of the most material management issues, and we will focus on achieving these targets under the leadership of top management and through the participation of all employees.

- **Compliance**
  We will comply with all environmental laws, regulations, and agreements as well as voluntary control standards related to our business activities with high moral values.
- **Technological development**
  In addition to creating and adopting innovative technologies and methods, we will work with our customers and broad stakeholders to resolve issues on a sustainable basis.
- **Environmental management**
  We will develop an environmental management system and make continuous improvements in accordance with our business strategy.
- **Human resources development**
  We will continuously develop human resources who can create and implement a positive impact on the environment and society as a whole, beyond our own company and its framework.
- **Communication**
  We will disseminate highly transparent and reliable information and broadly promote communication with stakeholders.

Revised on October 2021

Policies on Plastic Policy

The Kirin Group Plastic Policy

1. Promoting recycling of PET bottles

The plastic containers, packaging, and other materials provided by the Kirin Group are mostly PET used for beverage bottles and the Kirin Group has used recycled resin for a part of them. The Kirin Group will promote the recycling of PET bottles by aiming to increase this recycled plastic ratio to 50% by 2027.

The recycling of PET bottles cannot be promoted without an efficient method for collecting high-quality used PET bottles. At the Kirin Group, we will proactively work with national and local governments, and industry organizations to create an efficient collection and reuse system for high-quality used PET bottles.

2. Efforts to reduce single-use plastic* and replace it with other materials

Most plastic waste is comprised of what is referred to as single-use plastic. The Kirin Group will make efforts to reduce the single-use plastic provided by its group companies and replace it with other materials.

* Disposable plastic that is used only and not intended for reuse.

3. Improving sustainability of raw materials for PET bottle

At the Kirin Group, we have made continuous efforts to reduce the weight of our PET bottles from the standpoint of reducing our environmental impact. We will keep striving toward even lighter bottles in the future.

In addition, to improve the sustainability of raw materials for PET bottle, we will study the introduction of PET bottle materials derived from inedible plants to reduce our dependence on petroleum resources.

In addition to the above measures, we will proactively participate in educational programs to promote plastic recycling, coastal cleanup activities, and other programs.

Kirin Beverage Company, Limited also supports the Soft Drink Business Plastic Resource Reclamation Declaration 2018 announced last year by the Japan Soft Drink Association, and will take proactive measures to realize the “100% Effective Utilization of PET Bottles by 2030” plan put forth by the industry.

Established on February 2019

Related Information→P.46～P.47

Policies on biological resources

Kirin Group's Declaration of Support for Biodiversity Conservation

Kirin Group relies on the bounty of nature to make products. We utilize the power and wisdom nature has to offer in conducting its business activities. Because of that, we recognize the importance of conserving biodiversity as business challenges. Kirin Group actively pursues a broad range of activities to protect biodiversity in order to continue offering new joys of "food and well-being" into the future.

1. **Kirin Group promotes sustainable use of resources while ensuring conservation of biodiversity**
   The Kirin Group is committed to sustainable use of resources while taking biodiversity into consideration in all of its business activities so that all people around the world may continue to enjoy the bounty of nature.
2. **Kirin Group makes effective use of its technologies**
   As a company that offers new joys of "food and well-being," the Kirin Group makes effective use of its technologies when conducting business activities to contribute to the sustainable use of resources and protection of biodiversity.
3. **Kirin Group works in cooperation with stakeholders**
   Kirin Group adds a biodiversity perspective to the environmental protection activities which have continuously been engaged in and works in cooperation with customers and local partners to continue conserving biodiversity.
4. **Kirin Group properly complies with treaties and laws**
   Kirin Group complies with treaties, laws and regulations concerning biodiversity and strives to help people enjoy the blessings of biodiversity worldwide.

Established and announced in October 2010

Kirin Group's Guidelines on Sustainable Sourcing of Biological Resources

■Purpose
The purpose of the Guidelines is to present the fundamental principles of the Group so that it can continue to ensure the "sustainable sourcing of biological resources"based on the Kirin Group's Declaration of Support for Biodiversity Conservation.

■Applicable scope
The Guidelines apply to biological resources procured by the Kirin Group's operating companies in Japan for which the Group has specified that there is risk of illegal deforestation, environmental destruction and such like based on risk assessment performed.

■Guidelines on Sustainable Sourcing of Biological Resources
Kirin Group procures applicable biological resources based on the following principles.
1.Resources that the Group has confirmed;
not to derive from a plantation developed illegally, to have been produced through appropriate procedures in compliance with the laws and regulations of the areas where the raw material is produced.
2.Resources deriving from plantations, forests, etc. that have been certified by credible third parties.
3.Resources that have not been produced by entities which are considered to be involved in environmental destructions.*

■Implementation and operation
The Kirin Group regularly revises these Guidelines based on biodiversity risk assessments for products sourced, taking into account the issues associated with biological resources and the fact that sourcing conditions differ for each region. In addition, the Kirin Group also separately formulates action plans and implements them in phases, taking into consideration the unique characteristics of each country or region. When implementing initiatives, the Kirin Group cooperates with suppliers, specialists, NGOs, and other stakeholders, and adopts a long-term perspective that considers support to enable people working in areas producing raw materials to transition to means of production that take into account the sustainability of biological resources.

■Information disclosure and external communication
The Kirin Group is committed to maintaining transparency and disclosing the progress of its initiatives through sustainability reports, online, and other methods. At the same time, the Kirin Group also utilizes appropriate external communication to promote understanding among customers, partners, and society, and thereby increase the use of sustainable biological resources.

* Reference is currently made to the FSC' s Policy for the Association of Organization with FSC.

Established in December 2012, announced in June 2013

Related Information→P.26～P.35

Kirin Group Action Plan for the Sustainable Use of Biological Resources

1. Black Tea

Kirin Holdings aims to enhance sustainability of tea farms in Sri Lanka, the main raw material production area from which Kirin Beverage Company, Limited sources tea leaves.

- Kirin Holdings will support for farms to get Rainforest Alliance Certification by Sri Lankan tea farms that supply tea leaves, and thus increase the number of farms with certification*1.
- Kirin Holdings will enhance awareness through year-round products featuring the Rainforest Alliance Certified label.
- Kirin Holdings will conserve water sources at Sri Lankan tea farms.

2. Paper and Printed Materials

Kirin Holdings will maintain 100% usage of FSC-certified paper or recycled paper, which it achieved at Kirin Holdings Company, Limited, Kirin Brewery Company, Limited, Kirin Beverage Company, Limited, and Mercian Corporation in 2020, and Kirin Holdings will also expand this initiative to cover all Group companies, including those outside of Japan.

- For paper containers and packaging*2, by 2030, Kirin Holdings will 100% use paper that has been confirmed to be from sustainable sources*3*4.
- For other paper, Kirin Holdings will use paper that has been confirmed to take sustainability into consideration or recycled paper*5.

3. Palm Oil

In Kirin Holdings' domestic businesses, Kirin Holdings will ensure that 100% of transactions for palm oil used as a primary or secondary raw materials have RSPO*6 certification.

- For palm oil used as a primary raw material, Kirin Holdings will use RSPO Credits*7. By 2030, Kirin Holdings will begin sourcing RSPO-certified palm oil*8, and gradually transition palm oil procurement.
- For palm oil used as a secondary raw material, Kirin Holdings will use RSPO Credits. Kirin Holdings will work together with the RSPO, suppliers, NGOs, and various stakeholders to ensure that Kirin Holdings' suppliers are able to use RSPO-certified palm oil as a raw material.

4. Coffee

Kirin Holdings aims to enhance sustainability of coffee farms in Vietnam, the main production area from which Kirin Beverage Company, Limited sources coffee beans.

- Kirin Holdings will support to get Rainforest Alliance Certification by Vietnamese coffee farms, and thus increase the number of farms with certification.
- Kirin Holdings will enhance the ability of Vietnamese coffee farms to conserve water.

5. Soybeans

Kirin Holdings will use soybeans and processed goods*9 from highly sustainable farms at Kirin Brewery Company, Limited.

- Kirin Holdings will determine farms from which it will source soybeans.
- Kirin Holdings will confirm the sustainability of the soybean farms that it has determined.

*1 Kirin Holdings will set specific targets in Kirin Holdings' CSV commitment.
*2 Excludes limited-edition products, small-lot product varieties, special shapes, imported products, products regulated by law, etc.
*3 Kirin Holdings will prioritize FSC-certified paper. When the use of FSC-certified paper is cannot be used, Kirin Holdings will use paper complying with the following standards, in order: paper made with wood from FSC-managed forests (Controlled Wood), PEFC certification (for regions where sustainability has been confirmed only), and the Kirin Group Guidelines for the Procurement of Sustainable Biological Resources. When using paper that has not been third-party certified, etc., Kirin Holdings will confirm that sustainability has been taken into consideration through supplier surveys, etc.
*4 This will apply to the following operating companies: Kirin Holdings Company, Limited, Kirin Brewery Company, Limited, Kirin Beverage Company, Limited, Mercian Corporation, Kyowa Kirin Co., Ltd., KYOWA HAKKO BIO CO., LTD., Lion Pty Limited, and Koiwai Dairy Products CO., LTD. Kirin Holdings will determine the applicable container types, target year for achievement, etc., in Kirin Holdings' CSV commitment.
*5 This will apply to the operating companies listed in *4, as well as the following operating companies: KIRIN GROUP LOGISTICS CO.,LTD. Kirin City Co., Ltd., INTERFOOD SHAREHOLDING COMPANY, Myanmar Brewery Ltd., and Four Roses Distillery, LLC. Each company will set specific targets.
*6 Roundtable on Sustainable Palm Oil.
*7 Book and Claim model
*8 Complying with one of the following: IP (Identity Preserved), SG (Segregation), or MB (Mass Balance)
*9 Soybean protein

Established on February 2013
Revised on July 2021

Kirin Group' s Principles of Managing Access to Genetic Resources

1.The Group shall respect international agreements concerning biodiversity.

2.Access to genetic resources shall be based on prior informed consent of the country providing such resources, and no genetic resources whose backgrounds are unknown shall be carried in or used.

3.Use of genetic resources, including fair and equitable sharing of the benefits arising out of their utilization, shall be properly managed in accordance with international treaties.

Established and announced in October 2010

Consideration of the Environment in Product Development

Guidelines on Environmentally Conscious Design for Containers and Packaging

1. Purpose

In order to sustainably pass on the earth's bounty and environment to future generations and continue to provide value to our customers and society as a whole, we will contribute to the establishment of a resource recycling system by developing and promoting sustainable containers and packaging, reducing waste in our business activities, and promoting recycling through compliance with laws and regulations and the Environmentally Sound Design Guidelines for Containers and Packaging". and contribute to the establishment of a resource recycling system."

2. Basic Concept for Development, Design and Adoption of Containers and Packaging

(1) In development and design, maintain quality, safety and hygiene of product contents, safety of containers and packaging, and appropriate presentation of product information as prerequisites, and take into account environmental applicability, user-friendliness, transport efficiency and economic performance.

(2) In adoption, select containers and packaging that meet customers' purchasing and drinking styles, form of selling, and characteristics of product contents.

3. Concept of Caring for the Environment in Development, Design and Adoption of Containers and Packaging

(1) Strive to reduce the environmental impact associated with containers and packaging throughout the lifecycle, i.e., from procurement to recycling, and keep the impact on the natural environment to a minimum.

(2) In order to make effective use of resources and contribute to the realization of the circular economy, use materials that are easy to recycle or dispose of, that have minimal environmental impact, and materials that use recyclable resources.

(3) In order to contribute to realizing a decarbonized society, select materials that require low energy use and that generate minimal greenhouse gas emissions during processes of manufacturing containers and packaging and of transporting products.

(4) Select materials in consideration of preventing environmental pollution at the stage of disposal.

(5) Promote the 3R (reduce, reuse, recycle) + Renewable (sustainable resources) activities in accordance with the following.

4. Guidelines for promoting the 3R (reduce, reuse, recycle) + Renewable (sustainable resources)

(1) Reduce

1. Make efforts to reduce weight of containers and packaging, sales promotion tools, etc. and to reduce the amount of materials used.
2. Make efforts to design containers and packaging so that the volume can be reduced as much as possible by folding or crushing them when they are recycled or disposed of.
3. Shift to simple packaging, try to eliminate individual pieces of wrapping and outer packaging, and make efforts to keep packaging reasonable.

(2) Reuse

1. Make efforts to design containers and packaging so that the number of reuses and refills can be repeated as much as possible.
2. Make efforts to keep the environmental impact associated with reuse and refilling as small as possible.

(3) Recycle

1. Use single material as much as possible, and when using two or more types of materials, make efforts so as to enable their easy separation.
2. Make efforts to use recycled materials and those with high recycling rates.
3. Make efforts to adopt specifications and designs that facilitate separated discharge, sorted collection, and material sorting.

Revised December 24, 2021

* The Kirin Group performs LCA (Life Cycle Assessment) on major containers for alcoholic beverages and non-alcoholic beverages whenever necessary. We also take into account the product characteristics, unit of purchase by customer at each purchase, major sales store format, projection on collection of empty containers and other relevant factors on a comprehensive basis to select containers.

Environmental Data Calculation Methods

(1) Usage Factors

Energy Use Conversion Factors

	Japan	Overseas	
Fuel	"Act on the Rational Use of Energy" Factors	Lion	・Australia - National Greenhouse Account Factors ・New Zealand - Measuring Emissions：Detailed Guide ・USA - GHG Emission Factors Hub
		Other than the above	"Act on the Rational Use of Energy" Factors
Electricity	Used 3.6 (MJ/kWh), which is used by International Energy Agency (IEA) and other organizations		
Steam	Theoretical calorific value (1 MJ/MJ) on the consumption side.		

Emission factors for GHG Emissions

	Japan	Overseas	
Fuel, steam	Emission factors from Greenhouse Gas Emissions Calculation and Reporting Manual (Ministry of Environment/Ministry of Economy, Trade & Industry)	Lion	・Australia - National Greenhouse Account Factors ・New Zealand - Measuring Emissions：Detailed Guide ・USA - GHG Emission Factors Hub
		Other than the above	Emission factors from Greenhouse Gas Emissions Calculation and Reporting Manual (Ministry of Environment/Ministry of Economy, Trade & Industry)
Electricity	・Emission factors published by individual power companies →If none published: Emission factors by country from IEA's Emission Factors for the year in question		
Scope3	IDEA (Inventory Database for Environmental Analysis: LCA database provided by the National Institute of Advanced Industrial Science and Technology (AIST)) is used to the extent possible in calculations after 2019 (Using IDEA versions 2.3 and 3.1). In addition, literature values such as the Ministry of the Environment's emissions intensity database and LCA reports for each industry are used.		

(2) Calculation Method

The Kirin Group's GHG emissions are calculated in accordance with the GHG Protocol.

(3) Calculation boundaries

Entire Group

Business	Company
Japan Beer and Spirits Business	Kirin Brewery, Kirin Distillery,SPRING VALLEY BREWERY, Eishogen Kirin Brewery (Zhuhai), Brooklyn Brewery
Japan Non-Alcoholic Beverages Business	Kirin Beverage, Shinshu Beverage, Hokkaido Kirin Beverage, Kirin Maintenance Service, each site of Kirin Beverage Service (Hokkaido, Sendai, Tokyo, Chubu, Kansai) KIRINVIVAX, Tokai Beverage Service
Oceania Integrated Beverages Business	Lion, New Belgium Brewing
Pharmaceuticals Businesses	Kyowa Kirin, KYOWA KIRIN FRONTIER Co., Ltd., Kyowa Medical Promotion Co., Ltd., Kyowa Kirin plus Co., Ltd., Kyowa Hakko Kirin China Pharmaceutical, Kyowa Kirin
Other Businesses (all companies included)	Mercian, NIPPON LIQUOR, Daiichi Alcohol, Wine Curation, Myanmar Brewery Mandalay Brewery, Interfood, Vietnam Kirin Beverage, Four Roses Distillery Kyowa Hakko Bio, KYOWA PHARMA CHEMICAL, KYOWA ENGINEERING CO.,LTD, BioKyowa Inc., Shanghai Kyowa Amino Acid, Thai Kyowa Biotechnologies Co., Ltd., Kirin Holdings, Kirin Business Expert, KIRIN BUSINESS SYSTEM, KOIWAI DAIRY PRODUCTS, Kirin Echo, Kirin and Communications, Kirin Engineering Kirin City, Kirin Techno-System, KIRIN GROUP LOGISTICS

Breakdown of Calculations by Business

Refer to above “entire Group” calculation boundary table.

Breakdown of Calculations by Region

Region	Company
Japan	Kirin Brewery, Kirin Distillery, SPRING VALLEY BREWERY, Brooklyn Brewery, Japan、Eishogen, Kirin Beverage, Shinshu Beverage, Hokkaido Kirin Beverage, Kirin Maintenance Service, each site of Kirin Beverage Service (Hokkaido, Sendai, Tokyo, Chubu, Kansai) KIRINVIVAX, Tokai Beverage Service, Kyowa Kirin, KYOWA KIRIN FRONTIER Co., Ltd., Kyowa Medical Promotion Co., Ltd., Kyowa Kirin plus Co., Ltd., Kyowa Hakko Bio, KYOWA PHARMA CHEMICAL, KYOWA ENGINEERING CO.,LTD, KOIWAI DAIRY PRODUCTS, Kirin Echo, Kirin and Communications, Kirin Engineering, Kirin City, Kirin Techno-System, KIRIN GROUP LOGISTICS, Mercian, NIPPON LIQUOR, Daiichi Alcohol, Wine Curation, Kirin Holdings, Kirin Business Expert, KIRIN BUSINESS SYSTEM
Oceania	Lion
Southeast Asia	Myanmar Brewery, Mandalay Brewery, Interfood, Vietnam Kirin Beverag, Thai Kyowa Biotechnologies Co., Ltd.
Other	Kyowa Hakko Kirin China Pharmaceutical, Kyowa Kirin、Biokyowa、Shanghai Kyowa Amino Acid、Kirin Brewery (Zhuhai), Four Roses Distillery, New Belgium Brewing

Calculation boundary of Scope 3 emissions (P.16、17、23、25、59、70、71、99、100、129、130)

Business	Company
Japan Beer and Spirits Business	Kirin Brewery, Kirin Distillery,Kirin Brewery (Zhuhai)
Japan Non-Alcoholic Beverages Business	Kirin Beverage, Shinshu Beverage
Oceania Integrated Beverages Business	Lion, New Belgium Brewing
Pharmaceuticals Businesses	Kyowa Kirin, Kyowa Hakko Kirin China Pharmaceutical, Kyowa Kirin
Other Businesses (all companies included)	Mercian, Daiichi Alcohol, Myanmar Brewery, Interfood, Vietnam Kirin Beverage, Kyowa Hakko Bio, KYOWA PHARMA CHEMICAL, BioKyowa, Shanghai Kyowa Amino Acid, Thai Kyowa Biotechnologies Co., Ltd., Kirin Holdings, KOIWAI DAIRY PRODUCTS, KIRIN GROUP LOGISTICS

Breakdown of business locations subject to water risk assessments (P.81)

Constituent/Name of Group Company	Country	Number of manufacturing plants	Remarks
Kirin Brewery	Japan	9	Hokkaido Chitose, Sendai, Toride, Yokohama, Nagoya, Shiga, Kobe, Okayama, Fukuoka * Because Kirin Beverage Shiga Plant is attached to Kirin Brewery Shiga Plant, it is included in Kirin Brewery Shiga Plant
Kirin Distillery	Japan	1	Gotemba
Mercian	Japan	3	Yatsushiro, Fujisawa, Katsunuma Winery
Kirin Beverage	Japan	1	Shonan * Because Kirin Beverage Shiga Plant is attached to Kirin Brewery Shiga Plant, it is included in Kirin Brewery Shiga Plant
Shinshu Beverage	Japan	1	
Koiwai Dairy Products	Japan	2	Koiwai, Tokyo
Kyowa Kirin	Japan	3	Takasaki, Fuji, Ube
	China	1	Kyowa Hakko Kirin China Pharmaceutical
Kyowa Iryo Kaihatsu	Japan	1	
Kyowa Hakko Bio	Japan	2	Yamaguchi Production Center (Hofu), Yamaguchi Production Center (Ube)
Kyowa Pharma Chemical	Japan	1	Head office
Biokyowa	America	1	
Shanghai Kyowa Amino Acid	China	1	
Thai Kyowa Biotechnologies	Thai	1	
Kirin Brewery (Zhuhai)	China	1	
Interfood	Vietnam	1	
Vietnam Kirin Beverage	Vietnam	1	
Four Roses Distillery	America	2	Lawrenceburg, Cox's Creek
Myanmar Brewery	Myanmar	1	
Lion	Austraria	6	Castlemaine Perkins, James Boag Brewery, Little Creatures Brewery Fremantle, Tooheys Brewery, Little Creatures Brewery Geelong, Malt Shovel Brewery
	Newzealand	3	Pride Brewery, Speights Brewery, Wither Hills Winery
New Belgium Brewing	America	2	Fort Collins, Asheville

Environmental Accounting

Environment conservation costs

(Unit : million yen)

Category	Specific details	Investment amounts 2019	Investment amounts 2020	Investment amounts 2021	Expense amounts 2019	Expense amounts 2020	Expense amounts 2021
Environmental conservation costs to control environmental impact resulting from production and service activity within the business areas (total of ①②③ below)		1,243	1,406	2,671	5,854	4,856	4,750
① Pollution prevention costs	Air and water pollution prevention activities, analysis and measurement of air and water quality, etc.	536	319	1,995	2,330	2,075	2,301
② Global environmental conservation costs	Solar power generation, CO_2 recovery, energy saving, cogeneration, etc.	655	1,064	632	854	814	885
③ Resource circulation costs	Reduction of sludge, waste recycling, water recycling, etc.	53	23	45	2,669	1,968	1,565
Upstream / downstream costs	Containers and Packaging Recycling Act, Recycling contracting costs	86	54	221	375	475	464
Administration costs	Operation of environmental management systems, environmental education, greenification in business sites, etc.	35	65	13	300	301	278
Research and development costs	Container lightweighting, R&D regarding mitigation of environmental load of byproducts, wastewater, etc.	63	40	103	131	158	443
Social activities costs	Environmental conservation activity costs such as activities to protect the blessings of water, donations to nature conservation groups, etc.	0	0	0	49	38	48
Environmental remediation costs		0	0	0	0	5	0
Others		131	0	0	186	0	0
Total		1,559	1,566	3,008	6,895	5,834	5,983

Economic effect

(Unit : million yen)

Items	Details	2019	2020	2021
Proceeds from sales of valuables, etc.	Waste recycling, etc.	949	656	625
Resources saving effects	Energy saving, waste reduction, resources saving, etc.	591	548	409

Calculation boundaries : Kirin Brewery, Kirin Distillery, Eishogen, Kirin Beverages, Shinshu Beverages, Mercian, Kyowa Kirin, Kyowa Hakko Bio, KYOWA PHARMA CHEMICAL, Koiwai Dairy Products, Kirin Holdings

Material Balance

Material Flow (2021, entire Group)

		Unit	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses	Total		
								2021	2020	2019
Substance		thousand t	425	61	353	1	375	1,214	1,308	1,431
		%	35	5	29	0.05	31	100		
	Raw material	thousand t	263	25	153	0.1	294	735	784	889
	Packaging material	thousand t	162	36	200	0.5	81	480	524	542
Water (fresh water only)		thousand m³	14,132	1,916	3,001	1,673	29,556	50,278	55,702	65,823
		%	28	4	6	3	59	100		
Water recycling		thousand m³	1,000	279	236	3,717	85,552	90,784	93,651	121,334
Energy		TJ	3,885	825	1,203	613	4,396	10,922	11,182	11,421
		%	36	8	11	6	40	100		
Production volumes	Alcoholic and non-alcoholic beverages	thousand kl	2,737	611	782	0	542	4,672	4,994	5,055
	Food products/ Pharmaceuticals and biochemicals	thousand t	7	0	0	0.3	25	33	62	93
Wastewater		thousand m³	11,725	1,595	1,826	1,814	31,364	48,323	52,340	65,214
		%	24	3	4	4	65	100		
Greenhouse gas emissions (Scope1+Scope2)		thousand t-CO2e	214	49	75	41	343	722	757	834
		%	30	7	10	6	48	100		
NOx		t	131	22	161	4	37	356	403	380
SOx		t	1.3	0.1	1	0	10	12	10	13
Waste products		thousand t	135	11	80	2	85	312	272	431
		%	43	3	26	0.6	27	100		
	Volume disposed on site	thousand t	0	0	0	0.3	21	22	3	2
	Volume of recycled waste	thousand t	133	11	79	2	62	286	264	423
	Final disposed volume	thousand t	2	0	1	0.1	1	5	5	5

Water Resources

Trends in water use volumes and water consumption rate (entire Group)

	Water use volume (thousand m³)	Water consumption rate(by sales revenue) (m³/million yen)
2017	76,968	41
2018	73,675	38
2019	65,823	34
2020	55,702	30
2021	50,278	28

Trend in water use volumes (by business)

(Unit : thousand m³)

	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total
2017	13,190	2,341	2,854	3,047	55,534	76,968
2018	14,049	2,345	2,733	2,309	52,238	73,675
2019	14,470	2,211	2,658	2,232	44,252	65,823
2020	14,295	1,815	3,145	1,747	34,700	55,702
2021	14,132	1,916	3,001	1,673	29,556	50,278

Trend in water use volumes (by region)

(Unit : thousand m³)

	Japan	Oceania	Southeast Asia	Other	Total
2017	61,721	2,854	2,500	9,892	76,968
2018	58,120	2,733	2,811	10,011	73,675
2019	50,333	2,658	3,654	9,178	65,823
2020	40,187	2,689	3,449	9,377	55,702
2021	35,485	2,483	2,945	9,365	50,278

Trends in annual water use volumes by water source (entire Group)

		Fresh water*1					Total
	Unit	Service water	Rivers (including industrial water)	Underground water	Storm water	Gray water*2 (Reclaimed water)	
2017	thousand m³	7,200	42,150	27,616	1	0	76,968
	%	9	55	36	0.0	0.0	100
2018	thousand m³	7,717	40,415	25,543	0	0	73,675
	%	10	55	35	0.0	0.0	100
2019	thousand m³	8,283	35,679	21,861	0	0	65,823
	%	13	54	33	0.0	0.0	100
2020	thousand m³	8,657	24,936	22,109	0	0	55,702
	%	16	45	40	0.0	0.0	100
2021	thousand m³	8,253	21,035	20,989	1	0	50,278
	%	16	42	42	0.0	0.0	100

*1 No use of sea water or external wastewater or quarry water collected in the quarry.
*2 Externally supplied gray water

Trend in water use volumes of Japan Integrated Beverages Business

	Unit	Kirin Brewery	Kirin Distillery	Kirin Beverage	Shinshu Beverage	Mercian
2017	thousand m³	11,199	1,383	968	1,374	3,391
	m³/kl	5.3	3.2	2.2	5.2	25.5
2018	thousand m³	12,006	1,379	971	1,374	3,240
	m³/kl	5.3	3.1	2.1	5.3	22.5
2019	thousand m³	12,509	1,380	968	1,243	2,825
	m³/kl	5.3	3.1	2.2	4.8	19.8
2020	thousand m³	12,280	1,386	925	890	3,669
	m³/kl	5.3	3.3	2.3	4.2	19.6
2021	thousand m³	12,252	1,358	884	1,032	3,840
	m³/kl	5.4	3.6	2.5	4.0	18.8

* Because Kirin Beverage Shiga Plant is attached to Kirin Brewery Shiga Plant, it is included in Kirin Brewery Shiga Plant

Trend in use of recycled water in entire Group manufacturing plants and business locations

	Unit	Cyclical use			Recycling rate (%)
		Re-used water	Recycled water	Total	
2017	thousand m³	15,123	90,944	106,067	44
	%	14.3	85.7	100.0	
2018	thousand m³	18,993	105,010	124,003	63
	%	15.3	84.7	100.0	
2019	thousand m³	15,901	105,433	121,334	65
	%	13.1	86.9	100.0	
2020	thousand m³	3,864	89,788	93,651	63
	%	4.1	95.9	100.0	
2021	thousand m³	1,978	88,805	90,784	64
	%	2.2	97.8	100.0	

Trend in wastewater volume by destination (entire Group)

	Unit	Wastewater volume				
		Sewage water	Direct release into rivers, etc.	Indirect release into ocean	Other*	Total
2017	thousand m³	5,252	27,679	38,518	16	71,466
	%	7	39	54	0.0	100
2018	thousand m³	4,850	26,063	38,560	17	69,491
	%	7	38	55	0.0	100
2019	thousand m³	7,512	24,593	33,091	18	65,214
	%	12	38	51	0.0	100
2020	thousand m³	7,396	23,587	21,342	15	52,340
	%	14	45	41	0.0	100
2021	thousand m³	7,273	23,835	17,194	21	48,323
	%	15	49	36	0.0	100

* No drainage to basement or wells.

Containers and Packaging

Volume of resources used in containers and packaging

	Unit	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total
2017	thousand t	219	51	296	0.3	117	683
	%	32	7	43	0.04	17	100
2018	thousand t	179	51	281	0.2	115	626
	%	29	8	45	0.03	18	100
2019	thousand t	178	49	249	0.6	65	542
	%	33	9	46	0.1	12	100
2020	thousand t	181	37	239	0.5	66	524
	%	35	7	46	0.1	13	100
2021	thousand t	162	36	200	0.5	81	480
	%	34	7	42	0.1	17	100

Volume of resources used by container(Major companies in Japan) (Unit : t)

		Aluminum cans	Steel cans	PET bottles	Glass bottles	Drink boxes	Cartons	6-can packs
2017	Volume reduction	30,031	—	7,710	1,332	—	8,792	3,444
	Volumes used	66,915	11,295	60,561	31,276	6,311	102,693	13,974
2018	Volume reduction	19,226	—	12,218	870	—	5,798	3,629
	Volumes used	73,724	9,424	68,677	31,183	6,515	107,771	13,969
2019	Volume reduction	22,975	—	11,998	340	—	5,910	3,646
	Volumes used	77,912	8,542	74,894	27,844	7,825	109,526	14,611
2020	Volume reduction	24,177	—	12,244	248	—	6,237	4,008
	Volumes used	81,137	6,876	67,061	23,853	6,995	103,738	15,601
2021	Volume reduction	24,130	—	11,346	333	—	6,242	4,083
	Volumes used	81,200	6,495	67,089	20,719	7,623	103,682	15,852

* Reduction volumes are totals for Kirin Brewery and Kirin Beverage, use volumes are totals for Kirin Brewery, Kirin Beverage, and Mercian.

(Ref.) Trends in recycling rates of other containers in Japan

The Kirin Group pursues initiatives in cooperation with Japanese industry organizations involved in container recycling.

		2016	2017	2018	2019	2020	Target*
Aluminum cans	Weight of consumed (thousand t)	341	336	331	330	331	—
	Recycled weight (thousand t)	315	310	309	324	311	—
	Recycling rate (%)	92.4	92.5	93.6	97.9	94.0	≥92
Steel cans	Weight of consumed (thousand t)	463	451	439	427	393	—
	Recycled weight (thousand t)	435	422	404	398	369	—
	Recycling rate (%)	94.0	93.4	92.0	93.3	94.0	≥90
PET bottles	Sales volume of specified PET bottles (thousand t)	596	587	626	593	551	—
	Recycling volume in Japan (thousand t)	279	298	334	327	344	—
	Recycling volume outside Japan (thousand t)	221	201	195	182	144	—
	Recycling volume of used PET bottle (thousand t)	500	498	529	509	488	—
	Recycling rate (%)	83.9	84.8	84.6	85.8	88.5	≥85
Glass bottles	Melted weight (thousand t)	1,606	1,583	1,553	1,465	1,352	—
	Cullet usage volume (thousand t)	1,211	1,189	1,160	1,103	1,053	—
	Cullet usage rate (%)	75.4	75.1	74.7	75.3	77.9	—
	Recycling rate (%)	71.0	69.2	68.9	67.6	69.0	≥70

* Recycling target of 4th Voluntary Action Plan

State of sale and collection of returnable glass bottles (Kirin Brewery)

	Sale volumes(million bottles)	Collected volume(million bottles)	Collection rate (%)
2017	224.6	227.8	101
2018	205.1	203.2	99
2019	182.6	182.3	100
2020	107.3	114.6	107
2021	89.5	88.1	98

* Total of major returnable bottles (large, medium, small bottles)
* Kirin Brewery is engaged in the re-use of beer bottles and commercial large draft kegs. With the diversification of containers, the volume of returnable bottles used has fallen, but the collection rate is 95%.

Climate Change

Actual results for Fiscal 2021 marked with ☑ have received independent assurance by KPMG AZSA Sustainability Co., Ltd.in accordance with International Standard on Assurance Engagements (ISAE) 3000 and ISAE3410.

Trends in greenhouse gas emissions

■Scope 1 (direct emissions) + Scope 2 (indirect emissions from energy use)

Trends in greenhouse gas emissions and emissions intensity (entire Group)

	Greenhouse gas emissions (thousand tCO_2e)		Greenhouse gas emissions intensity (per unit of sales) (tCO_2e/million yen)
		(of which, CO_2)	IFRS
2017	860	(858)	0.46
2018	849	(847)	0.44
2019	834	(833)	0.43
2020	757	(756)	0.41
2021	722	(721)	0.40

Trends in greenhouse gas emissions (by business)

(Unit:thousand tCO_2e)

	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total ☑
2017	231	61	110	62	396	860
2018	232	59	98	55	405	849
2019	232	56	104	56	386	834
2020	224	52	81	44	356	757
2021	214	49	75	41	343	722

Trends in greenhouse gas emissions (by region)

(Unit:thousand tCO_2e)

	Japan	Oceania	Southeast Asia	Other	Total ☑
2017	581	110	50	119	860
2018	570	98	57	124	849
2019	520	84	78	152	834
2020	463	62	73	159	757
2021	446	57	63	155	722

Trends in greenhouse gas emissions and emission intensities from manufacturing plants

(a) Kirin Brewery

	Greenhouse gas emissions (thousand tCO2e)	Greenhouse gas emissions intensity (kgCO2e/kl)
2017	191	90
2018	195	85
2019	196	84
2020	189	82
2021	182	80

*Greenhouse gas emissions include the greenhouse gas emissions from sold electricity.

(b) Kirin Beverage

	Shonan Plant	
	Greenhouse gas emissions (thousand tCO_2e)	Greenhouse gas emissions intensity ($kgCO_2e$/kl)
2017	28	64
2018	27	60
2019	26	59
2020	25	62
2021	23	66

(c) Mercian*

	Greenhouse gas emissions (thousand tCO_2e)
2017	29
2018	30
2019	25
2020	44
2021	59

*Alcohol business was transferred from Kyowa Hakko Bio to Mercian in July 2020.

(d) Kyowa Kirin (global)

	Greenhouse gas emissions intensity (thousand tCO_2e/t)
2018	253
2019	124
2020	106
2021	113

Trends in energy usage (entire Group)

Energy usage by type	2017	2018	2019	2020	2021
Total usage (TJ)	11,750	11,843	11,421	11,182	10,922
Coal (t)	2,294	2,339	2,079	1,613	1,678
Gasoline (kl)	3,599	3,619	4,751	3,706	3,518
Kerosene (kl)	1,466	1,399	1,342	1,379	1,398
Diesel oil (kl)	13,762	12,548	14,836	14,572	13,028
Heavy fuel oil (kl)	12,475	14,006	9,430	7,429	7,313
LPG (t)	2,673	2,737	2,832	2,672	2,652
Town gas (thousand Nm^3)	110,950	112,987	96,747	95,972	96,751
LNG (t)	0	0	0	0	0
Purchased electricity (MWh)	674,012	676,770	648,373	610,613	525,146
Renewable electricity (MWh)	23,848	31,657	31,943	74,439	114,912
Purchased steam (TJ)	1,925	1,886	1,654	1,461	1,496
Other (TJ)	1,078	1,092	1,721	1,760	1,659

Breakdown and Trends in Greenhouse Gas Emissions

Scope 1 (direct emissions)

Trends in greenhouse gas emissions from fuel use (by business)

(Unit : thousand tCO_2e)

	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total ☑
2017	164	44	41	21	103	372
2018	168	42	40	18	110	377
2019	169	40	53	20	110	393
2020	162	38	46	19	106	372
2021	164	36	44	19	104	368

Trends in greenhouse gas emissions from fuel use (by region) (Unit: thousand tCO_2e)

	Japan	Oceania	Southeast Asia	Other	Total ☑
2017	266	41	21	44	372
2018	271	40	21	46	377
2019	264	41	27	60	393
2020	253	36	24	60	372
2021	251	33	24	60	368

Breakdown of greenhouse gas emissions in Scope 1(2020) (Unit: thousand tCO_2e)

CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
368	0.1	0.1	0	0	0

Scope 2 (indirect emissions from energy use)

Trends in greenhouse gas emissions from electricity and steam purchases (by business) (Unit: thousand tCO_2e)

	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total ☑
2017	67	17	69	41	293	488
2018	64	17	59	37	295	472
2019	62	16	51	35	277	441
2020	61	14	34	24	250	384
2021	50	13	31	22	238	354

Trends in greenhouse gas emissions from electricity and steam purchases (by region) (Unit: thousand tCO_2e)

	Japan	Oceania	Southeast Asia	Other	Total ☑
2017	315	69	28	75	488
2018	299	59	36	79	472
2019	256	43	50	92	441
2020	209	26	50	99	384
2021	195	24	40	95	354

Scope3 (other indirect emissions)

* For Scope 3 emissions, Lion's beverage business is excluded after 2019 and emission intensity is changed to the LCA database (IDEA) provided by AIST.

Trends in CO_2 emissions by other parties related to business activities (by business)

See P. 122 for calculation boundaries

(Unit: thousand tCO_2)

	Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total
2017	1,413	1,060	1,083	15	793	4,364
2018	1,483	1,060	761	14	845	4,163
2019	1,653	1,128	487	18	926	4,211
2020	1,587	989	486	12	908	3,983
2021	1,519	911	465	13	781	3,689

Trends in CO_2 emissions by other parties related to business activities (by region)

See P. 93 for calculation boundaries

(Unit: thousand tCO_2)

	Japan	Oceania	Southeast Asia	Other	Total
2017	3,081	1,083	152	47	4,364
2018	3,145	761	209	48	4,163
2019	3,340	369	314	188	4,211
2020	3,103	354	319	206	3,983
2021	2,919	338	235	197	3,689

Trends in CO_2 emissions* accompanying transportation volumes and distances (Japan)

		Kirin Brewery	Kirin Beverage	Mercian	Total
2016	Transport volumes (thousand ton kilometer)	641,171	830,808	87,036	1,559,015
	CO_2 emissions (thousand tons-CO_2)	52	71	8	131
2017	Transport volumes (thousand ton kilometer)	735,996	822,256	87,904	1,646,156
	CO_2 emissions (thousand tons-CO_2)	55	68	8	131
2018	Transport volumes (thousand ton kilometer)	823,267	906,144	94,212	1,823,623
	CO_2 emissions (thousand tons-CO_2)	62	84	8	155
2019	Transport volumes (thousand ton kilometer)	755,308	963,748	90,991	1,810,047
	CO_2 emissions (thousand tons-CO_2)	55	76	8	139
2020	Transport volumes (thousand ton kilometer)	798,798	800,682	114,687	1,714,167
	CO_2 emissions (thousand tons-CO_2)	56	64	9	129

* Tally period is April to March of following year for each year. Calculated within the reporting scope of specified consigners, in line with the calculation standards of the Act on the Rational Use of Energy.

Independent Assurance

The Kirin Group has been receiving independent assurances to ensure the reliability and transparency of information disclosed.
The Kirin Group has engaged an independent third party to provide assurance on the 2021 GHG emissions in Scope 1 and 2 from the entire Kirin Group and those in Scope 3 from Kirin Brewery, Kirin Beverage and Mercian. The independent assurance report is shown on P.143.

Calculation results of Scopes 1 and 2 for the entire Kirin Group*1 (2021)

(Unit:tCO2e/year)

Scope1	Scope2
367,742	353,811

Calculation results of Scope 3 for Kirin Brewery, Kirin Beverage and Mercian*2 (2021)

(Unit:tCO2/year)

Upstream／Downstream		Scope3 Categories	Calculation results	Remarks
Upstream	1	Products and services purchased	1,591,062	Calculated by multiplying the purchased volume of raw materials, etc. by the CO2 emission factor for producing each type of raw material, etc. CO2 emission factors are based on IDEA v3.1, etc.
	2	Capital goods	—	Not calculated
	3	Fuel and energy-related activities not included in Scopes 1 and 2	72,986	Calculated by multiplying the purchased volume of fuel or electricity by CO2 emission factor for each energy type. CO2 emission factors are based on the emission factors database (Ver. 3.1) published by Ministry of the Environment for electricity and steam, and on IDEA v3.1 for fuels.
	4	Transportation and delivery (upstream)	332,903	Calculated by multiplying the shipping volume of products as shipper and the purchased volume of raw materials, etc. by the distance of transportation and then by the CO2 emission factor for each transportation method (the amount of CO2 emissions based on shipping volume of products as shipper is calculated using FY2020 data). CO2 emission factors are based on IDEA v3.1.
	5	Waste from operations	6,546	Calculated by multiplying the amount of waste discharged, etc. by the CO2 emission factor for each disposal method. CO2 emission factors are based on IDEA v3.1 and the emission factors database (Ver. 3.1) published by Ministry of the Environment.
	6	Business travel	763	Calculated by multiplying the number of employees by the annual average distance of transportation and then by the CO2 emission factor for each means of transportation, considering the percentage of travel restrictions to prevent the spread of COVID-19. CO2 emission factors are based on IDEA v3.1.
	7	Employee commuting	4,769	Calculated by multiplying the number of employees by the annual average distance of transportation and then by the CO2 emission factor for each means of transportation, considering the percentage of employees who are restricted from coming to work to prevent the spread of COVID-19. CO2 emission factors are based on IDEA v3.1.
	8	Leased assets (upstream)	—	Included in Scopes 1 and 2
Downstream	9	Transportation and delivery (downstream)	617,740	Calculated as emissions during storage and sales at the distribution stage to consumers. Retail : Calculated by multiplying the product sales volume by the CO2 emission factor for selling products for each sales method. Vending machines: Calculated by multiplying the estimated power consumption of vending machines in operation by the CO2 emission factor for electricity. (Transportation from wholesalers to sales outlets is not included in the calculation.) CO2 emission factor is taken from carbon footprint data for the distribution industry.
	10	Processing of sold products	—	Not applicable
	11	Use of sold products	2,498	CO2 contained in carbonated drinks were calculated from product specifications and included as emissions to the atmosphere (emissions from the refrigeration stage of products after purchase by end consumers were excluded from the calculation from this time onward, as it is an optional calculation item in the GHG Protocol).
	12	Disposal of sold products	27,380	Calculated by multiplying the amount of containers and packaging disposed by the CO2 emission factor for each type of container and packaging. CO2 emission factors are based on IDEA v3.1 and the emission factors database (Ver. 3.1) published by Ministry of the Environment.
	13	Leased assets (downstream)	—	Not applicable
	14	Franchises	—	Not applicable
	15	Investments	—	Not applicable
		Total	2,656,645	

Progress toward Mid-Term Greenhouse Gas Emission Reduction Targets Through SBTs*3 (2021)

(Unit:tCO2e)

■Scope1+2		Total
Scope1+Scope2		721,553
	Scope1	367,742
	Scope2	353,811
Reduction rate (compared to 2019 base year)		-13%

■Scope3 See P. 122 for calculation boundaries			Total
Scope3			3,688,961
Upstream	1	Products and services purchased	2,230,657
	2	Capital goods	—
	3	Fuel and energy-related activities not included in Scopes 1 and 2	173,449
	4	Transportation and delivery (upstream)	433,015
	5	Waste from operations	25,750
	6	Business travel	4,690
	7	Employee commuting	13,280
	8	Leased assets (upstream)	—
Downstream	9	Transportation and delivery (downstream)	765,018
	10	Processing of sold products	—
	11	Use of sold products	8,719
	12	Disposal of sold products	34,383
	13	Leased assets (downstream)	—
	14	Franchises	—
	15	Investments	—
Reduction rate (compared to 2019 base year)			-12%

*1 Methods of calculating Scope 1 and 2 emissions
- Fuel and steam : Lion calculates emissions using heating values and emission factors set by the Australian, New Zealand and U.S. governments.
  All other manufacturing sites calculate emissions using heating values and emission factors in Japan' s Act on Promotion of Global Warming Countermeasures and Act on Rationalizing Energy Use.
- Electricity:Calculated by multiplying the amount of purchased electricity by the adjusted emission factors of the individual power companies (or, if there are no published figures, by the country-specific emission factor published by the IEA).
- Greenhouse gas emissions include the greenhouse gas emissions from sold electricity.

*2 The source of emission factors used in Scope 3 calculations has been changed to IDEA (Inventory Database for Environmental Analysis: LCA database provided by the National Institute of Advanced Industrial Science and Technology) to the extent possible starting with the calculation of 2021 results.

*3 By 2030, reduce GHG emissions of Scope 1+2 by 50% and Scope 3 by 30% compared to 2019.

Trends in biogas electricity and biogas generated at Kirin Brewery plans

	Biogas electricity generated (Unit: million kWh)	Biogas generated (Unit: thousand Nm³)
2017	19.2	8,115
2018	18.6	8,689
2019	21.9	9,009
2020	22.5	8,526
2021	18.6	7,547

Breakdown of electricity usage (entire Group)

(Unit:thousand kWh)

			2019	2020	2021
Purchased electricity	Renewable energy	Solar power	—	18,546	36,380
		Hydro-electric power	30,476	53,753	65,335
		Wind power	499	403	283
		Biomass	—	—	10,563
		Total	30,974	72,703	112,561
	Non-renewable energy		648,373	610,613	525,146
Private power generated	Biogas-generated electricity		22,291	25,313	22,474
	Solar-generated electricity		968	1,736	2,351
	Other than renewable energy		162,120	135,476	146,142
Electricity usage			864,727	845,842	808,674
	Of which, renewable energy (excluding energy mix)		54,233	99,752	137,386

Trend in annual electricity consumption per one can and bottle vending machine shipped

	Annual electricity consumption (Unit: kWh/year)
2016	724
2017	712
2018	702
2019	704
2021	715

Source: Japan Vending Machine Manufacturers Association

Green bonds

18th Series of Unsecured Corporate Bonds (Green Bonds) funding allocation and impact reporting (as of December 2021)

Amount raised	Unallocated amount
10.0 billion yen	6.6 billion yen

Project name	Summary		Impact reporting
Procurement of recycled PET resin	Recycled PET resin is produced by mechanical recycling of used PET bottles. By using recycled PET resin as the raw material for PET bottles, it is possible to recycle PET bottles into PET bottles, which contributes to reducing the use of fossil resources.It has been shown that this process reduces CO_2 emissions at the manufacturing stage by approximately 50-60% compared with the production of petroleum-derived PET bottles. While 613,000 tons of PET bottles are manufactured annually in Japan, the total amount of recycled PET resin used as a raw material for PET bottles is only 72,700 tons. As such, there is a need to expand the use of recycled PET resin in PET bottle manufacturing. Amount allocated (cumulative): 3.2 billion yen (65.8% refinanced)		The percentage of recycled PET resin in the entire Group in 2021 is 4.9%.
Introduction of heat pump systems at plants	A heat pump system is a technology that recovers low-temperature heat sources from air and water and converts them into high-temperature energy by adding energy. In industrial applications, unutilized heat sources such as waste air and waste heat are used to generate high-temperature energy, which is then applied to production processes such as heating, insulation, sterilization, drying, cleaning, and distillation. The Kirin Group plans to replace the burning of fossil fuels in the heating process, which accounts for the majority of GHG emissions from manufacturing processes, with heat pump systems. We are working to develop a manufacturing system that emits less GHGs by sourcing the electric power we use as a source of energy from renewable energy. We have completed the introduction of heat pump systems at five plants in Japan. Amount allocated (cumulative): 0.2 billion yen (89.2% refinanced)		The Kirin Group reduced GHG emissions by 2,500 tons in FY2021 through the introduction of heat pump systems.

Reduction of waste and prevention of pollution

Volume of waste generated (2021)

(Unit: thousand tons. Figures in brackets: %)

Japan Beer and Spirits Business	Japan Non-Alcoholic Beverages Business	Oceania Integrated Beverages Business	Pharmaceuticals Businesses	Other Businesses (all companies included)	Total
135 (43)	11 (3)	80 (26)	2 (0.6)	85 (27)	312 (100)

Trends in volume of waste generated and recycling rates (Japan)

	Volume of waste generated (thousand t)	Volume disposed on site (thousand t)	Volume of recycled waste (thousand t)	Final disposed volume (thousand t)	recycling rates (%)
2017	243	24	219	0.6	99.7
2018	245	12	233	0.7	99.7
2019	230	2	227	0.6	99.8
2020	151	3	148	0.3	99.8
2021	155	3	151	0.4	99.7

Wastewater quality

	COD (t)				Nitrogen (t)			Phosphorous (t)		
	Japan	Overseas	Total	load / tonne product*	Japan	Overseas	Total	Japan	Overseas	Total
2019	735	3,682	4,417	5.6	315	754	1,069	47	265	312
2020	620	5,010	5,630	6.8	205	766	971	48	265	313
2021	546	1,792	2,338	8.3	209	529	739	34	66	101

* Kyowa Kirin (global) (Unit:kg/ t)

Trend in emissions of air pollutants

Trends in emissions of NOx and SOx (entire Group)

(Unit:t)

	NOx	SOx
2017	400	94
2018	397	19
2019	380	13
2020	403	10
2021	356	12

Trends in emissions of VOCs (Kyowa Kirin Group, Kyowa Hakko Bio Group)

(Unit:t)

	Methanol	Acetone	Substances subject to PRTR Act	Ethyl acetate, etc.	Total
2017	417	21	62	97	596
2018	308	13	57	103	481
2019	183	8	49	74	314
2020	144	6	35	57	242
2021	232	4	47	110	393

Soil Investigations Status (2021)

Number of investigations	Area of investigations (m²)
2	7,469

Status of PCB management (2021)

High-concentration capacitors, reactors, etc.	Trace-quantity capacitor reactors, etc.	High-concentration stabilizers	Trace-quantity stabilizers
1	31	5	0

Status of asbestos management (2021)

Number of buildings	Area (m^2)
4	2,440

Status of HCFC management (2021)

Number of offices	Weight (kg)
14	23,094

Status of HFC management (2021)

Number of offices	Weight (kg)
9	15,246

Site Data

Kirin Brewery (2021) *1

Brewery	Energy intensity (GJ/kl)	Water use per unit of production (m^3/kl)	GHG emissions per unit of production ($kgCO_2e$/kl)	Wastewater intensity (m^3/kl)
Hokkaido Chitose	1.53	4.6	138	3.4
Sendai	1.57	11.9	82	11.9
Toride	1.06	4.8	46	4.1
Yokohama	3.67	6.6	181	4.6
Nagoya	1.11	4.6	54	4.0
Shiga*2	1.27	4.1	77	3.4
Kobe	1.20	3.9	68	3.7
Okayama	1.05	5.3	68	4.2
Fukuoka	1.42	5.5	81	5.3

*1 Energy intensity and unit GHG emissions include electricity sold.

Kirin Beverage*2 (2021)

Plant	Water use (thousand m^3)	GHG emissions (thousand tCO_2e)	Waste emissions (t)	Recycling rate (%)
Shonan	884	23	6,770	100

*2 The Shiga Plant of Kirin Beverage is included in Kirin Brewery because it is co-located with the Shiga Plant of Kirin Brewery.

Mercian (2021)

Plant	Water use (thousand m^3)	GHG emissions (thousand tCO_2e)	Waste emissions (t)	Recycling rate (%)
Fujisawa	284	6	132	100
Yatsushiro	2,035	20	1,034	100
Hofu	1,482	32	1	100
Château Mercian	39	0.4	27	100

Kyowa Kirin Group (Japan, 2021)

Plant	Water use (thousand m^3)	GHG emissions (tCO_2e)	Waste emissions (t)
Kyowa Kirin Tokyo Research Park	15	2,536	59
Kyowa Kirin Fuji Research Park / CMC Research Center	1,284	13,635	198
Kyowa Kirin Bio Production Technology Laboratories / Takasaki Plant	276	10,100	659
Kyowa Kirin Ube Plant	77	7,927	414

KOIWAI DAIRY PRODUCTS

Plant	Water use per unit of production(m^3/t)*3		
	2019	2020	2021
Koiwai Plant	59	58	53

*3 Unit water consumption for dairy products

Status of Environmental Management Certifications

Status as of June 2022

Japan

Number of independently certified business locations	4
Number of business locations making self-declaration of conformity	21
Number of uncertified business locations	2
Certification rate (%)	93

Overseas

Number of certified business locations	14
Number of uncertified business locations	8
Certification rate (%)	64

Other information disclosure

Disclosure of environmental information through products

Label name	Nature of disclosure
Eco-Rail	In 2006, Kirin Beverage, and in 2010, Kirin Brewery were selected as “Eco-Rail” mark-certified companies by the Ministry of Land, Infrastructure, Transport and Tourism for proactively tackling global environmental issues with the use of rail freight transport.(Only Kirin Brewery continues to do so as of 2022)
Carbon Footprint	Kirin Brewery launched Carbon Footprint initiatives together with the beer industry in 2008. The Product Category Rule (PCR), which is the rule for the calculation of beer categories, was certified in February 2011 and revised in December 2013.
Rainforest Alliance certification seal	In August 2021, we began year-round sales of 500ml paper packs of Kirin Afternoon Tea Straight Tea, which displays the Rainforest Alliance certification mark given to farms recognized for their commitment to more sustainable farming methods while protecting nature and its creators.
FSC Certification Label	Kirin Brewery and Kirin Beverage (including Tropicana) display the FSC certification label on many of their paper containers to encourage understanding among consumers about the importance of protecting the forests. Mercian displays the label on some of its paper containers.
Organic Wine	Mercian sells organic wines certified by Euro Leaf, ECOCERT, BIODYVIN, bioagricert, SOHISCERT and so on.

GRI Contents Index

This report uses the following disclosure matters of the GRI Standard 2021 as reference.

GRI Contents Index Standard	Disclosure matters	Page number or URL
General Disclosures		
GRI 2: General Disclosures 2021	2-1 Organizational details	P.3, 5, 38 Corporate Overview (https://www.kirinholdings.com/en/profile/overview/) Group Companies (https://www.kirinholdings.com/en/profile/organization/)
	2-2 Entities included in the organization's sustainability reporting	P.3, 121-122 Group Companies (https://www.kirinholdings.com/en/profile/organization/)
	2-3 Reporting period, frequency, and contact point	P.3, Back cover. Reporting frequency is annual.
	2-4 Redescription of information	P.3, 15, 59, 70-71, 130
	2-5 External assurance	P.153
	2-6 Activities, value chains, and other business relationships	P.5, 12, 26, 36, 38, 44, 58 Business domains (https://www.kirinholdings.com/en/domains/)
	2-7 Employees	P.5 ESG data(Kirin Group profile, Employee) (https://www.kirinholdings.com/en/investors/esg/esg/)
	2-8 Workers who are not employees	Annual Securities Report (https://pdf.irpocket.com/C2503/DZdo/ZsII/cQYx.pdf#page=14)
	2-9 Governance structure and composition	P.77, 105-106 Management Structure (https://www.kirinholdings.com/en/purpose/governance/management/) Management (https://www.kirinholdings.com/en/purpose/governance/provisions/) ESG data (Governance) (https://www.kirinholdings.com/en/investors/esg/esg/)
	2-10 Nomination and selection of the highest governance body	Management Structure (https://www.kirinholdings.com/en/purpose/governance/management/)
	2-11 Chair of the highest governance body	Management (https://www.kirinholdings.com/en/purpose/governance/provisions/) ESG Data Collection Governance (https://www.kirinholdings.com/en/investors/esg/esg/)
	2-12 Role of the highest governance body in overseeing the management of impacts	P.77, 98, 105-106 CSV Management (https://www.kirinholdings.com/en/impact/csv_management/) Environmental Management Structure (https://www.kirinholdings.com/en/impact/env/e_management/)
	2-13 Devolving Responsibility for Management of Impact	P.77, 98, 105-106 Group CSV Committee (https://www.kirinholdings.com/en/impact/csv_management/promotion_impact/)
	2-14 Delegation of responsibility for managing impacts	The Kirin Group Environmental Vision 2050 is approved by the Kirin Holdings Board of Directors. The overall Kirin Group Environmental Report is overseen by the Kirin Holdings Company Managing Executive Officer (in charge of CSV strategy and responsible for overall Group environmental management). Group CSV Committee (https://www.kirinholdings.com/en/impact/csv_management/promotion_impact/)
	2-15 Conflicts of interest	Corporate Governance Policy (https://www.kirinholdings.com/en/purpose/files/pdf/governance_policy.pdf)
	2-16 Communication of critical concerns	P.77, 98, 105-106 Group CSV Committee (https://www.kirinholdings.com/en/impact/csv_management/promotion_impact/)
	2-17 Collective knowledge of the highest governance body	P.77 Group CSV Committee (https://www.kirinholdings.com/en/impact/csv_management/promotion_impact/)
	2-18 Evaluation of the performance of the highest governance body	Management Structure (https://www.kirinholdings.com/en/purpose/governance/management/)
	2-19 Remuneration policies	P.77, 100 Remuneration of Officers (https://www.kirinholdings.com/en/purpose/governance/conpensation/)
	2-20 Process to determine remuneration	Remuneration of Officers (https://www.kirinholdings.com/en/purpose/governance/conpensation/)
	2-22 Statement on sustainable development strategy	P.4, 6 Top Message (https://www.kirinholdings.com/en/impact/env/message/)

GRI Contents Index Standard	Disclosure matters	Page number or URL
GRI 2: General Disclosures 2021	2-23 Policy commitments	P.5, 7, 21, 108, 116-120 Corporate Policies (https://www.kirinholdings.com/en/profile/philosophy/) Policies (https://www.kirinholdings.com/en/impact/csv_management/various_policies/) List of CSV Commitments for 2022-2024 (https://www.kirinholdings.com/en/impact/csv_management/commitment/) UNGC and Kirin Group (https://www.kirinholdings.com/en/impact/csv_management/gc/)
	2-24 Embedding policy commitments	P.12-13, 73, 98, 105-106, 109 CSV Management (https://www.kirinholdings.com/en/impact/csv_management/) Environmental Management System (https://www.kirinholdings.com/en/impact/env/e_management/)
	2-25 Processes to remediate negative impacts	P.9, 97-98, 106, 109 Kirin Group Environmental Vision 2050 (https://www.kirinholdings.com/jp/impact/env/mission/) Environmental Management Structure (https://www.kirinholdings.com/en/impact/env/mission/) Sustainable Supply Chain (https://www.kirinholdings.com/en/impact/procurement/) Compliance (https://www.kirinholdings.com/en/purpose/governance/compliance/)
	2-26 Mechanisms for seeking advice and raising concerns	P.109 Compliance (https://www.kirinholdings.com/en/purpose/governance/compliance/)
	2-27 Compliance with laws and regulations	P.107 ESG Data Collection Environmental, Social (https://www.kirinholdings.com/en/investors/esg/esg/)
	2-28 Membership associations	P.113-114
	2-29 Approach to stakeholder engagement	P.110-114 Stakeholder Engagement (https://www.kirinholdings.com/en/impact/csv_management/stakeholders/) List of CSV Commitments for 2022-2024 (https://www.kirinholdings.com/en/impact/csv_management/commitment/) Policies and Systems to Fulfill Our Responsibilities as an Alcoholic Beverage Manufacturer (https://www.kirinholdings.com/en/impact/alcohol/policies/) Kirin Group Human Rights Policy (https://www.kirinholdings.com/en/impact/community/2_1/policies/)
	2-30 Collective bargaining agreements	ESG Data Collection Society (Employees) (https://www.kirinholdings.com/en/investors/esg/esg/)

GRI Contents Index Standard	Disclosure matters	Page number or URL
Material topics		
GRI 3: Material Topics 2021	3-1 Process to determine material topics	P.105 Management Issues for Sustainable Growth (Group Materiality Matrix) (https://www.kirinholdings.com/en/impact/materiality/)
	3-2 List of material topics	P.9-10, 20-22, 105 Our CSV Commitment (https://www.kirinholdings.com/en/impact/csv_management/commitment/#sect03) Management Issues for Sustainable Growth (Group Materiality Matrix) (https://www.kirinholdings.com/en/impact/materiality/)
Biological Resources		
GRI 3: Material Topics 2021	3-3 Management of material topics	P.9-13, 17-18, 20-22, 25, 26-35, 80, 89-90, 97, 116, 118-120
GRI 304 : Biodiversity 2016	304-2 Significant impacts of activities, products, and services on biodiversity	P.17-18, 28-35, 89, 97, 103
	304-3 Habitats protected or restored	P.28-32, 35
	304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations	P.30-32, 35
Water Resources		
GRI 3: Material Topics 2021	3-3 Management of material topics	P.9-13, 17-18, 20-22, 25, 36-43, 84-85, 116, 120

GRI Contents Index Standard	Disclosure matters	Page number or URL
GRI 303: Water and Effluents 2018	303-1 Interactions with water as a shared resource	P.17-18, 36-43, 81 Water Resources (https://www.kirinholdings.com/en/impact/env/3_2/)
	303-2 Management of water discharge related impacts	P.42
	303-3 Water withdrawal	P.37-38, 43, 101, 123-125, 135 ESG data (Water resources) (https://www.kirinholdings.com/en/investors/esg/esg/)
	303-4 Water discharge	P.37-38, 43, 123-124, 126, 133, 135 ESG data (Water resources) (https://www.kirinholdings.com/en/investors/esg/esg/)
	303-5 Water consumption	P.123-125, 135
Containers and Packaging		
GRI 3: Material Topics 2021	3-3 Management of material topics	P.9-12, 19-22, 25, 44-57, 90, 95, 117, 120
GRI 301 : Materials 2016	301-1 Materials used by weight or volume	P.45, 56, 124, 126-127 ESG data (Containers and packaging) (https://www.kirinholdings.com/en/impact/env/3_4/)
	301-2 Recycled input materials used	P.22, 25, 45-46, 53-54, 127, 135 Sustainable recycling of containers and packaging (https://www.kirinholdings.com/en/impact/env/3_3a/)
	301-3 Reclaimed products and their packaging materials	P.56-57, 127 Sustainable recycling of containers and packaging (https://www.kirinholdings.com/en/impact/env/3_3a/)
Climate Change		
GRI 3: Material Topics 2021	3-3 Management of material topics	P.9-16, 20-22, 25, 58-71, 73-103
GRI 201 : Economic Performance 2016	201-2 Financial implications and other risks and opportunities due to climate change	P.14-15, 20, 73-103 Scenario Analysis(TCFD) (https://www.kirinholdings.com/en/impact/env/tcfd/)
GRI 302 : Energy 2016	302-1 Energy consumption within the organization	P.59, 71, 121, 124, 128, 131 ESG data (Climate change) (https://www.kirinholdings.com/en/investors/esg/esg/)
	302-2 Energy consumption outside of the organization	P.68, 131
GRI 302 : Energy 2016	302-3 Energy intensity	P.135
	302-4 Reduction of energy consumption	P.121, 124, 128
	302-5 Reductions in energy requirements of products and services	P.68, 131
GRI 305 : Emissions 2016	305-1 Direct (Scope 1) GHG emissions	P.70, 99, 121-122, 128-130 ESG data (Climate change) (https://www.kirinholdings.com/en/investors/esg/esg/)
	305-2 Energy indirect (Scope 2) GHG emissions)	P.70, 99, 121-122, 129-130 ESG data (Climate change) (https://www.kirinholdings.com/en/investors/esg/esg/)
GRI 305 : Emissions 2016	305-3 Other indirect (Scope 3) GHG emissions	P.15, 59, 70, 99-100, 121-122, 129-130 ESG data (Climate change) (https://www.kirinholdings.com/en/investors/esg/esg/)
	305-4 GHG emissions intensity	P.71, 121-122, 127-128, 135 ESG data (Climate change) (https://www.kirinholdings.com/en/investors/esg/esg/)
	305-5 Reduction of GHG emissions	P.21, 59, 63-64, 66-67, 70-71, 99, 121-122, 130 Overcoming climate change (https://www.kirinholdings.com/en/impact/env/3_4a/)
	305-6 Emissions of ozone-depleting substances (ODS)	P.133
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	P.124, 133-134 ESG data (Reducing industrial wastes and preventing pollution) (https://www.kirinholdings.com/en/investors/esg/esg/)
Waste and prevention of pollution		
GRI 3: Material Topics 2021	3-3 Management of material topics	P.9-12, 19-22, 25, 34, 44-57, 107, 117, 120
GRI 306 : Waste 2020	306-1 Waste generation and significant waste-related impacts	P.34, 46, 89, 103, 107
	306-2 Management of significant waste-related impacts	P.11, 18-22, 34, 44-55, 89, 107
	306-3 Waste generated	P.121, 124, 133, 135 ESG data (Reducing industrial wastes and preventing pollution) (https://www.kirinholdings.com/en/investors/esg/esg/)

GRI Contents Index Standard	Disclosure matters	Page number or URL
GRI 306 : Waste 2020	306-4 Waste diverted from disposal	P.57, 121, 124, 127, 133, 135 ESG data (Reducing industrial wastes and preventing pollution) (https://www.kirinholdings.com/en/investors/esg/esg/)
	306-5 Waste directed to disposal	P.121, 124, 133
GRI 307 : Environmental Compliance 2016	307-1 Non-compliance with environmental laws and regulations	ESG data (Environmental management) (https://www.kirinholdings.com/en/investors/esg/esg/)
Supply chain		
GRI 3 : Material Topics 2021	3-3 Management of material topics	P.9-22, 25, 108-109 List of CSV Commitments for 2022-2024 (https://www.kirinholdings.com/en/impact/csv_management/commitment/) Sustainable Supply Chain (https://www.kirinholdings.com/en/impact/procurement/)
GRI 308 : Supplier Environmental Assessment 2016	308-2 Negative environmental impacts in the supply chain and actions taken	P.15, 17-18, 28, 32, 34, 37-38, 46, 89-90, 103 ESG data (Supplier) (https://www.kirinholdings.com/en/investors/esg/esg/)

TCFD Recommendations' Recommended Disclosure Index(2017 Edition)

Recommended Disclosure		Page
Governance	a) Describe the board's oversight of climate-related risks and opportunities.	P.75, 77, 105-106
	b) Describe management's role in assessing and managing climate-related risks and opportunities.	P.75, 77, 105-106
Strategy	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	P.14, 20, 75, 78-97
	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	P.14, 60, 75-76, 78-97, 99
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2° C or lower scenario.	P.10, 14-16, 59-61, 73-76, 78-97
Risk Management	a) Describe the organization's processes for identifying and assessing climate-related risks.	P.75, 98
	b) Describe the organization's processes for managing climate-related risks.	P.75, 98
	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	P.75, 98
Metrics and Targets	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	P.14-16, 21-22, 25, 59-61, 70-71, 75, 99-101, 127-130
	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	P.15-16, 22, 25, 59, 70-71, 75, 99-101, 127-130
	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	P.14-16, 21-22, 25, 59-61, 70-71, 75, 99-101, 127-130

SASB Content Index(October 2018 Edition)

Food & Beverage sector/ Alcoholic beverages industry　October 2018 version

Sustainability Disclosure Topics & Accounting Metrics

Topics	Accounting Metrics	Code	Disclosure
Energy Management	(1) Total energy consumed, (2) percentage grid electricity, (3) percentage renewable*a	FB-AB-130a.1	P.71, P.124, P.128
Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress*b	FB-AB-140a.1	P.101, P124
	Description of water management risks and discussion of strategies and practices to mitigate those risks	FB-AB-140a.2	P.10, P.18-19, P.21-23, P.36-43, P.73-85, P.101,P.106
Responsible Drinking & Marketing	Percentage of total advertising impressions made on individuals at or above the legal drinking age*c	FB-AB-270a.1	n/a
	Number of incidents of non-compliance with industry or regulatory labeling and/or marketing codes*d	FB-AB-270a.2	ESG Data (Social, Customer) (https://www.kirinholdings.com/en/investors/esg/esg/)
	Total amount of monetary losses as a result of legal proceedings associated with marketing and/or labeling practices*e	FB-AB-270a.3	ESG Data (Social, Customer) (https://www.kirinholdings.com/en/investors/esg/esg/)
	Description of efforts to promote responsible consumption of alcohol	FB-AB-270a.4	A Responsible Alcohol Producer (Our CSV Commitment) (https://www.kirinholdings.com/en/impact/csv_management/commitment/#sect01) A Responsible Alcohol Producer (Policy and System) (https://www.kirinholdings.com/en/impact/alcohol/policies/) Dealing with alcohol-related problems (https://www.kirinholdings.com/en/impact/alcohol/0_1/)
Packaging Lifecycle Management	(1) Total weight of packaging, (2) percentage made from recycled and/or renewable materials, and (3) percentage that is recyclable, reusable, and/or compostable*f	FB-AB-410a.1	P.23, P.45, P.56-57, P.124, P.126-127
	Discussion of strategies to reduce the environmental impact of packaging throughout its lifecycle	FB-AB-410a.2	P.10, P.20-23, P.44-57
Environmental & Social Impacts of Ingredient Supply Chain	Suppliers' social and environmental responsibility audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances*g	FB-AB-430a.1	Initiative for sustainable procurement (https://www.kirinholdings.com/en/impact/procurement/promotion/) ESG Data (Social, Supplier) (https://www.kirinholdings.com/en/investors/esg/esg/)
Ingredient Sourcing	Percentage of beverage ingredients sourced from regions with High or Extremely High Baseline Water Stress*h	FB-AB-440a.1	P.38
	List of priority beverage ingredients and description of sourcing risks due to environmental and social considerations	FB-AB-440a.2	P.18-19, P.21, P.26-35, P.36-40

Activity Metrics

Activity Metrics	Code	Disclosure
Volume of products sold*i	FB-AB-000.A	P.124
Number of production facilities*j	FB-AB-000.B	P.123 Group Companies (https://www.kirinholdings.com/en/profile/organization/)
Total fleet road miles traveled*k	FB-AB-000.C	P.129

*a Percentage of grid electricity and renewable energy can be estimated from the amount of energy consumed.
*b Total water consumed can be estimated based on (water consumed - wastewater volume).
*c Not disclosed.
*d Only the information on alcoholic beverages is disclosed.
*e Monetary losses are not disclosed. In addition, for some cases of violation of laws concerning alcoholic beverages, a reference URL is provided in the notes.
*f The content ratio of recycled materials is disclosed in some containers.
*g Kirin Holdings discloses the self-assessment rate of suppliers, but not the rate of non-conformance. In the event of non-conformance, Kirin makes requests for correction.
*h The percentage of procurement from regions with high water stress is not disclosed, but water stress by country and the amount of water used in the raw agricultural commodity production area by country and its percentage by raw agricultural commodity are disclosed.
*i Volume of products sold is not disclosed, but volume of products manufactured is disclosed.
*j Number of major production facilities is disclosed.
*k While the total distance traveled is not disclosed, freight transport volume (= freight weight x distance of transport) within the reporting boundaries of specified consignors in the Act on the Rational Use of Energy is disclosed only for Japan.

Sustainability Disclosure Topics & Accounting Metrics

Topics	Accounting Metrics	Code	Disclosure
Fleet Fuel Management	Fleet fuel consumed, percentage renewable*a	FB-NB-110a.1	P.128-129
Energy Management	(1) Operational energy consumed, (2)percentage grid electricity, (3) percentage renewable*b	FB-NB-130a.1	P.71, P.124, P.128
Water Management	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress*c	FB-NB-140a.1	P.101, P.124
	Description of water management risks and discussion of strategies and practices to mitigate those risks	FB-NB-140a.2	P.10, P.18-19, P.21-23, P.36-43, P.73-85,P.101,P.106
Health & Nutrition	Revenue from (1) zero- and low-calorie, (2) noadded- sugar, and (3) artificially sweetened beverages*d	FB-NB-260a.1	ESG Data (Social, Customer) (https://www.kirinholdings.com/en/investors/esg/esg/)
	Discussion of the process to identify and manage products and ingredients related to nutritional and health concerns among consumers*e	FB-NB-260a.2	List of Commitments and Outcome Indicators (1.1 Self-care support in the area of health and unwellness) (https://www.kirinholdings.com/en/impact/csv_management/commitment/#headline-1617243715)
Product Labeling & Marketing	Percentage of advertising impressions (1) made on children and (2) made on children promoting products that meet dietary guidelines*f	FB-NB-270a.1	n/a
	Revenue from products labeled as (1) containing genetically modified organisms (GMOs) and (2) non-GMO*g	FB-NB-270a.2	n/a
	Number of incidents of non-compliance with industry or regulatory labeling and/or marketing codes*h	FB-NB-270a.3	ESG Data (Social, Customer) (https://www.kirinholdings.com/en/investors/esg/esg/)
	Total amount of monetary losses as a result of legal proceedings associated with marketing and/or labeling practices*i	FB-NB-270a.4	ESG Data (Social, Customer) (https://www.kirinholdings.com/en/investors/esg/esg/)
Packaging Lifecycle Management	(1) Total weight of packaging, (2) percentage made from recycled and/or renewable materials, and (3) percentage that is recyclable, reusable, and/or compostable*j	FB-NB-410a.1	P.23, P.45, P.56-57, P.124, P.126-127
	Discussion of strategies to reduce the environmental impact of packaging throughout its lifecycle	FB-NB-410a.2	P.10, P.20-23, P.44-57
Environmental & Social Impacts of Ingredient Supply Chain	Suppliers' social and environmental responsibility audit (1) non-conformance rate and (2) associated corrective action rate for (a) major and (b) minor non-conformances*k	FB-NB-430a.1	Initiative for sustainable procurement (https://www.kirinholdings.com/en/impact/procurement/promotion/) ESG Data (Social, Supplier) (https://www.kirinholdings.com/en/investors/esg/esg/)
Ingredient Sourcing	Percentage of beverage ingredients sourced from regions with High or Extremely High Baseline Water Stress*l	FB-NB-440a.1	P.38
	List of priority beverage ingredients and description of sourcing risks due to environmental and social considerations	FB-NB-440a.2	P.18-19, P.21, P.26-35, P.36-40

Activity Metrics

Activity Metrics	Code	Disclosure
Volume of products sold*m	FB-NB-000.A	P.124
Number of production facilities*n	FB-NB-000.B	P.123 Group Companies (https://www.kirinholdings.com/en/profile/organization/)
Total fleet road miles traveled*o	FB-NB-000.C	P.129

*a Fuel consumed by energy type and CO_2 emissions from transportation as a shipper are disclosed, but fleet fuel consumed is not disclosed."The percentage of recyclable vehicle fuel is not disclosed (not used).

*b Total energy consumption by energy type and GHG emissions from plants are disclosed, but operational energy consumed is not disclosed. The data of some plants, the amount of purchased electricity, and the amount of renewable electricity are disclosed.

*c Total water consumed can be estimated based on (water consumed - wastewater volume). Although data on water stress by country is disclosed, the percentage of regions with high baseline water stress to total water withdrawn and total water consumed is not disclosed.

*d Revenues from no-added sugar beverages are not disclosed, but revenues from low-sugar and low-fat products are disclosed. Revenue from artificially sweetened beverages is not disclosed.

*e Commitment is disclosed, but no specific management process is disclosed.

*f Not disclosed.

*g Not disclosed.

*h Only the information on alcoholic beverages is disclosed.

*i Monetary losses are not disclosed. In addition, for some cases of violation of laws concerning alcoholic beverages, a reference URL is provided in the notes.

*j The percentage of recycled material content in some containers is disclosed.

*k Kirin Holdings discloses the self-assessment rate of suppliers, but not the rate of non-conformance. In the event of non-conformance, Kirin makes requests for correction.

※l The percentage of procurement from regions with high water stress is not disclosed, but water stress by country and the amount of water used in the raw agricultural commodity production area by country and its percentage by raw agricultural commodity are disclosed.

*m Volume of products sold is not disclosed, but volume of products manufactured is disclosed.

*n Number of major production facilities is disclosed.

*o While the total distance traveled is not disclosed, freight transport volume (= freight weight x distance of transport) within the reporting boundaries of specified consignors in the Act on the Rational Use of Energy is disclosed only for Japan.

Independent Assurance Report

KPMG

Independent Assurance Report

To the President and CEO of Kirin Holdings Company, Limited

We were engaged by Kirin Holdings Company, Limited (the "Company") to undertake a limited assurance engagement of the GHG emissions in Scopes 1 and 2 from the entire Kirin Group and those in Scope 3 from Kirin Brewery Company, Limited, Kirin Beverage Company, Limited and Mercian Corporation marked with ☑ (the "Indicators") for the period from January 1, 2021 to December 31, 2021 included in its Kirin Group "Environmental Report 2022" (the "Report") for the fiscal year ended December 31, 2021.

The Company's Responsibility

The Company is responsible for the preparation of the Indicators in accordance with its own reporting criteria (the "Company's reporting criteria"), as described in the Report.

Our Responsibility

Our responsibility is to express a limited assurance conclusion on the Indicators based on the procedures we have performed. We conducted our engagement in accordance with the 'International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements other than Audits or Reviews of Historical Financial Information' and the 'ISAE 3410, Assurance Engagements on Greenhouse Gas Statements' issued by the International Auditing and Assurance Standards Board. The limited assurance engagement consisted of making inquiries, primarily of persons responsible for the preparation of information presented in the Report, and applying analytical and other procedures, and the procedures performed vary in nature from, and are less in extent than for, a reasonable assurance engagement. The level of assurance provided is thus not as high as that provided by a reasonable assurance engagement. Our assurance procedures included:

- Interviewing the Company's responsible personnel to obtain an understanding of its policy for preparing the Report and reviewing the Company's reporting criteria.
- Inquiring about the design of the systems and methods used to collect and process the Indicators.
- Performing analytical procedures on the Indicators.
- Examining, on a test basis, evidence supporting the generation, aggregation and reporting of the Indicators in conformity with the Company's reporting criteria, and recalculating the Indicators.
- Making inquiries and reviewing materials including documented evidence of the Kyowa Pharma Chemical Co., Ltd. selected on the basis of a risk analysis, as alternative procedures to a site visit.
- Evaluating the overall presentation of the Indicators.

Conclusion

Based on the procedures performed, as described above, nothing has come to our attention that causes us to believe that the Indicators in the Report are not prepared, in all material respects, in accordance with the Company's reporting criteria as described in the Report.

Our Independence and Quality Control

We have complied with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. In accordance with International Standard on Quality Control 1, we maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Kazuhiko Saito

Kazuhiko Saito, Partner, Representative Director
KPMG AZSA Sustainability Co., Ltd.
Tokyo, Japan
October 21, 2022

The KIRIN,
the messenger of Good Luck.

The KIRIN is a mythical creature, a messenger of good luck. Derived from various ancient legends, it is said to appear as a prelude to joyous times to come. The KIRIN, a gentle creature, flies the skies; its feet never touching the ground as not to harm any insects or plants.The KIRIN, which creates the rich natural environment for future generations, is a symbol of the Kirin Group.