

Kirin Group Long-Term Environmental Vision

Many people want to leave a beautiful earth to their children's generation. Kirin feels the same way. Kirin's beverages are made with agricultural produce and water, poured into containers, and delivered to consumers, but the global warming caused by the CO₂ generated in those processes have an impact on that agricultural produce and water. Our business is truly underpinned by the blessings of nature. In order that we may pass this beautiful earth onto our children's

generation and continue to deliver beverages to consumers, we aim to use the important raw materials of biological resources, water resources, and containers and packaging in sustainable ways, as well as to halve the carbon emissions generated from our business by 2050 so as to respond to global warming. Through these activities, we aim to balance the environmental burden of our business with the earth's capacity to cope with it in 2050.

Kirin Group Long-Term Environmental Vision

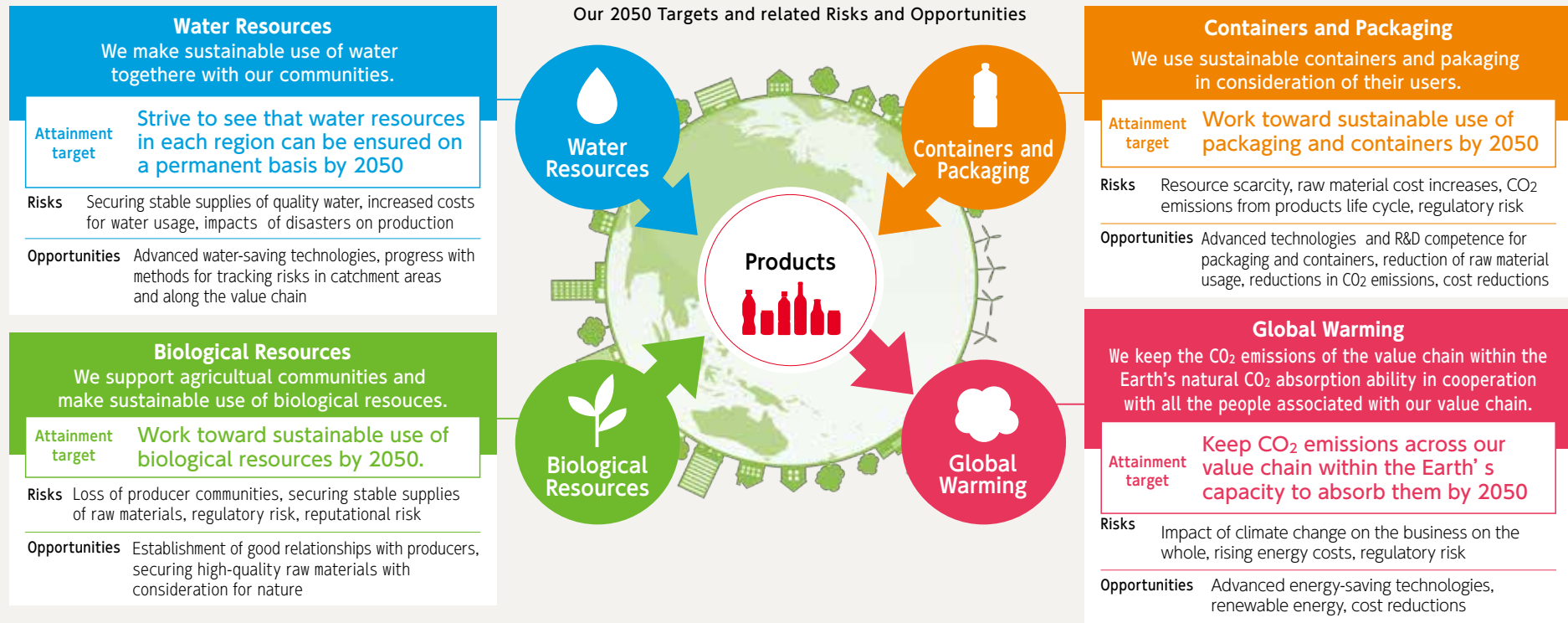
The Kirin Group shares with all the people associated with its value chain its aspiration to continue to enjoy the bounty of nature and pass it down to the generations to come.

■ Our direction: Realization of society that is based on 100% recycling

The Kirin Group will use resources in a cyclical manner, so as to keep their use at or below the level that the Earth can replenish them, while reducing the environmental loads that the Kirin Group generates through its value chain.

■ Our efforts


We will share responsibilities in the implementation of activities, working in cooperation with non-governmental organizations and industry groups, maintaining close communication with a wide range of stakeholders.



CSV Commitment

Our CSV Commitment was formulated alongside the identification of four key social issues, including the environment, that affect the Group. It sets out 19 commitments that clarify the medium to long-term action plan we should work on through our business. Five of them are related to the environment and have target years

between 2020 and 2030 to meet our Long-Term Environmental Vision. Five other commitments related to community engagement will also contribute to solve issues related to the environment. The entire Group will strive to raise the effectiveness of CSV and actively disclose information about its outcomes.

Kirin Group Long-Term Environmental Vision	SDGs Target	Our Commitment	Our Approach	Our Achievement	Goals for 2021
<p>Realize a society based on 100% resource circulation by 2050*</p>  <p>We support agricultural communities and make sustainable use of biological resources.</p> <p>Attainment target: Work toward sustainable use of biological resources by 2050.</p> <p>We make sustainable use of water together with our communities.</p> <p>Attainment target: Strive to see that water resources in each region can be ensured on a permanent basis by 2050.</p> <p>We use sustainable containers and packaging in consideration of their users.</p> <p>Attainment target: Work toward sustainable use of packaging and containers by 2050.</p> <p>We keep the CO₂ emissions of the value chain within the Earth's natural CO₂ absorption ability in cooperation with all the people associated with our value chain.</p> <p>Attainment target: Keep CO₂ emissions across our value chain within the Earth's capacity to absorb them by 2050.</p>	<p>Target 15.4 Target 17.16 Target 17.17</p>	<p>3.3 Actions regarding biological resources</p> <p>We will protect the natural environment and preserve the ecosystems surrounding our business sites as well as areas producing raw materials.</p>	<ul style="list-style-type: none"> ● We will promote our efforts related to biological resources at major material production sites. ● We will strive to secure resources that may lead to deforestation in a sustainable manner. 	<p>① Use of FSC-certified paper or recycled paper for office paper ② Use of FSC-certified paper for paper containers and packaging*1 ③ Actions regarding sustainable palm oil</p> <p>KH KB KBC ME</p>	<p>① 100% (in 2020) ② 100% (in 2020) ③ 100%*2</p>
	<p>Target 2.4 Target 12.3 Target 17.16 Target 17.17</p>	<p>3.5 Reduction of food waste</p> <p>We will reduce the amount of product waste generated stemming from factory shipment to delivery to our partners.</p>	<ul style="list-style-type: none"> ● We will reduce inventory excess (which leads to waste) through more accurate supply and demand predictions. ● We will reduce product waste by implementing thorough quality control. 	<p>Rate of product waste reduction</p> <p>KB KBC ME</p>	<p>75% (in 2025, compared with 2015)</p>
	<p>Target 3.9 Target 6.4 Target 17.16 Target 17.17</p>	<p>3.2 Actions regarding water resources</p> <p>We will reduce water use in production activities and continuously preserve water sources.</p>	<ul style="list-style-type: none"> ● We will promote water saving at our plants. ● We will investigate major hydrographic vulnerabilities at our production sites. ● We will continue to conserve water sources at our production sites. 	<p>① Water consumption reduction rate in 2020 ② Amount of water use in 2030</p> <p>MBL KKC</p>	<p>MBL ① 25% (in 2020, compared with 2015) KKC ② 30% (in 2030, compared with 2015)</p>
	<p>Target 12.2 Target 12.4 Target 14.1 Target 17.16 Target 17.17</p>	<p>3.4 Actions regarding containers and packaging</p> <p>We will continue to reduce the weight of containers and packaging while relying less on non-renewable resources and increasing the sustainability of materials.</p>	<ul style="list-style-type: none"> ● We will strive to maintain the 3Rs and resource circulation for containers and packaging. ● We will increase use of sustainable materials for our containers. ● We will introduce Life Cycle Assessment (LCA) and select container raw materials at an early stage of container / product development. 	<p>① Conversion rate of PET bottle resin to recycled resin ② Recyclability of container material ③ Recycled material ratio for containers and packaging materials</p> <p>KB KBC ME LN</p>	<p>KBC KB ME ① 50% (in 2027)</p> <p>LION ② Over 90% (in 2030) ③ Over 50% (in 2030)</p>
<p>Target 7.2 Target 13.1 Target 17.16 Target 17.17</p>	<p>3.1 Actions regarding climate change</p> <p>We will work to further reduce Green house gas (GHG) emissions through various initiatives, including the introduction of renewable energy.</p>	<ul style="list-style-type: none"> ● We will promote the introduction of renewable energy. ● We will promote energy conservation. 	<p>① Renewable energy ratio for plant purchased electric power ② Install solar power generation facilities ③ Reduction ratio of GHG emission (Scope 1 and 2) ④ Reduction ratio of GHG emission (Scope 3)</p> <p>KG</p>	<p>KB ① 50% (in 2030) LION ② 10MW (in 2026) KG ③ 30% (in 2030, compared with 2015) ④ 30% (in 2030, compared with 2015)</p>	

As a company that benefits from the many blessings of nature, including water and agricultural products, we recognize that the sustainability of the global environment is essential to ensuring the continuity of our business. By reducing the environmental burden in our value chain through such means as creating eco-friendly containers and packaging and addressing the issue of global warming, we are able to strengthen our business foundation. Under the Kirin Group Long-Term Environmental Vision, introduced in 2013, we aim to realize a society based on 100% resource circulation by 2050.

KG Kirin Group
KH Kirin
KB Kirin Brewery
KBC Kirin Beverage
ME Mercian
KKC Kyowa Kirin
LN Lion
MBL Myanmar Brewery
*1 6-can packs, gift boxes, drink boxes, cardboard cartons for products
*2 Using Book and Claim model, which is a model for the trading of certificates approved by the Round Table of Sustainable Palm Oil

Key CSV Issues

Community Engagement



Our Commitment

- 2.2.a We will work on improving the quality and stable procurement of Japanese hops and brew unique beers that can only be made with them while contributing to the revitalization of key producing areas.
- 2.2.b We will drive development of Japanese wines to ensure their global recognition and contribute to revitalizing key producing areas and local communities, which are the foundations of growing grapes and making wines.
- 2.2.c We will create highly sustainable conditions for procuring Myanmar rice for brewing while fulfilling our social responsibilities to the region.
- 2.2.d We will support Sri Lankan black tea farmers through such long-term initiatives as facilitating the acquisition of Rainforest Alliance certification, and expand the use of certified tea leaves.
- 2.2.e We will develop long-term, sustainable mutually beneficial partnerships with our raw material and packaging suppliers, which build a favorable demand for our product and ensure sustainable returns and the creation of value through the supply chain.

Identification of Materialities

For the identification of environment-related materialities (important issues), we extract a variety of issues, considering the state of the natural capital, local communities and global environment, all of which are essential to the businesses of the Kirin Group, and taking into consideration trends in debate in Japan and abroad, and the perspectives of our diverse stakeholders. The executives then discuss these issues, identify the priority issues that impact on the sustainability of society and on the Group's business, and incorporate them into our business plans.

Materialities Decision-Making Process

STEP 1 Extraction of relevant issues	Considers the circumstances surrounding the Kirin Group and extracts the relevant issues, referring to international standards and trends in domestic and international debate.
STEP 2 Confirmation of appropriateness	Consults extensively with various stakeholders, including external experts and NGOs, reflecting their views in internal discussions within Kirin.
STEP 3 Identification of Materialities	Holds discussions at the executive management level, determines risks and opportunities for business and society, and develops an action plan, which includes target indicators.
STEP 4 Ongoing Review	Ongoing consideration of the need for review of the materialities, reflecting the constantly changing state of social and environmental issues and the Kirin Group's circumstances.

Ascertaining risks and opportunities

Consideration of the environmental needs of 2050

The Kirin Group has three core businesses: alcoholic beverages; non-alcoholic beverages; and pharmaceuticals and bio-chemicals. All of these products are made with the blessings of nature. These businesses are built directly on the blessings of natural capital. In 2050, the global population is forecast to increase greatly from the current 7.6 billion to 9.8 billion. This has the potential to wreak major harm on natural capital. We determined that, for the sake of a sustainable society and business, we needed to respond to these kinds of long-term risks.

Determination of environmental materialities

Identification of key environmental issues through dialogue and discussions

Through wide-ranging dialogue with external experts, NGOs and other diverse stakeholders of the Kirin Group, as well as discussions with the Kirin Group operating companies and the executives, we identified and considered the risks and opportunities for our business and society. Based on this, we identified biological resources, water resources, containers and packaging, and global warming as the most important environmental issues. At the Management Meeting in 2012, we established our Long-Term Environmental Vision, the ideal image for the year 2050.

Integration with Group CSV Strategy (Determination of Group materialities)

Integration into the Long-Term Business Plan

In our Long-Term Business Plan, New KV2021, in addition to the creation of value that will meet our customers' expectations, we positioned the creation of value by addressing social issues as a new opportunity for growth, and revealed our 2021 Vision and our Strategic Framework for Value Creation. We also defined "technical expertise" as a strength of the Kirin Group. Through our core businesses of alcoholic beverage, non-alcoholic beverages, and pharmaceuticals and bio-chemicals, while leveraging the Group's strength of technical expertise across the Group, we aim to balance solutions to social issues with the provision of value to consumers and realize the creation of both economic and social value. Through this, the Kirin Group's own unique CSV, we aim to achieve sustainable growth together with society.

Consideration of management issues for sustainable growth

We have identified the management issues for sustainable growth, mapped out their impact on social sustainability and on the Group's business, and organized them into a Group Materiality Matrix. In February 2017, the Group CSV Committee decided on an order of priority to the issues within that Matrix, after taking into consideration the various guidelines and the perspectives of our stakeholders. We established that our responsibility as an alcoholic beverages manufacturer, health and well-being, community engagement, and environment as our CSV Priority Issues. For the environment, targets to be achieved in the medium term were set for the four themes of the Long-Term Environmental Vision.

Positioning the CSV commitment targets as non-financial targets in the Medium-Term Business Plan

Establishment of CSV Purpose

In February 2019, the Kirin Group established the long-term management vision, the Kirin Group Vision 2027 (KV2027), which calls upon the Group to become a global leader in CSV by 2027 by creating value in domains ranging from food & beverages to pharmaceuticals. Having referenced the SDGs to set the targets and goals for the key issues selected in 2017, in the face of these social issues, we have established and released our CSV Purpose as KV2027's long-term and non-financial targets and as a guideline to create shared value with society and promote sustainable growth. We have also repositioned the 19 CSV Commitments, which represent our medium to long-term action plan for our individual businesses to realize the CSV Purpose, as non-financial targets for the 2019-2021 Medium-Term Business Plan, and will strive to achieve those targets.










2050 Toward the Realization of Our Long-Term Environmental Vision

Integration into business strategies and business plans

The Kirin Group has incorporated initiatives designed to achieve its Long-Term Environmental Vision and CSV Commitment into its business strategies, and we aim to create both social and economic value (CSV).

Key environmental issues - strategies for addressing risks and opportunities

The risks and opportunities related to key environmental issues that are believed to affect the Kirin Group's business, and the strategies for addressing them are as follows. We have assumed short-term (within three years), medium-term (until 2030), and long-term (until 2050) periods in which these risks and opportunities will manifest.

	Key environmental and social issues	Major risks	Time period	Major opportunities	Time period
 Biological Resources	 2 ZERO HUNGER  15 LIFE ON LAND	<ul style="list-style-type: none"> ● Contraction of agricultural production ● Expansion of idle and devastated land ● Environmental destruction and human rights problems caused by unsustainable agriculture ● Impact of climate change on agricultural production regions 	<ul style="list-style-type: none"> ● Procurement risks of Japan-grown key agricultural products by Japanese farmers ● Reputation risk caused by environmental destruction and human rights issues caused by unsustainable agriculture mainly in developing countries ● Procurement risks due to harvest depletion and decline in quality of key agricultural products as a result of climate change ● Regulatory risks 	<ul style="list-style-type: none"> ● Protection of the natural environment and community revitalization in agricultural production areas and stable procurement of key agricultural products ● Securing of agricultural products and improvement of reputation through support to sustainable farm certification ● Expectations of ethical consumption 	<ul style="list-style-type: none"> Short – medium Short – medium Medium – long Short – long
 Water Resources	 6 CLEAN WATER AND SANITATION	<ul style="list-style-type: none"> ● Increase of drought in areas of high water stress ● Securing of water resources for the region's residents ● Reduction of water stress in agricultural production regions 	<ul style="list-style-type: none"> ● Suspension of manufacture and decline in production efficiency due to water shortages, reputation decline caused by continuation of production ● Decline in efficiency of water use due to high-mix low-volume production ● Procurement risks due to reduced harvest yields and decline in quality caused by drought in agricultural production regions ● Regulatory risks 	<ul style="list-style-type: none"> ● Securing of water resources and continuation of good relationships with the local community through water source conservation activities ● Cost savings through water conservation ● Continued stable procurement of key agricultural products through assistance with action against water stress in production regions ● Expectations of ethical consumption 	<ul style="list-style-type: none"> Short – long Short – medium medium – long Short – long
 Containers and Packaging	 12 RESPONSIBLE CONSUMPTION AND PRODUCTION	<ul style="list-style-type: none"> ● Solutions to ocean plastics problem ● Containers and packaging that are easier to use and recycle ● Sustainable use of raw materials for containers and packaging 	<ul style="list-style-type: none"> ● Reputation risk to PET bottles ● Depletion and procurement risks of petroleum resources for PET bottle containers ● Loss of precious forests caused by pulp used for paper containers ● Regulatory risks 	<ul style="list-style-type: none"> ● Cost reductions resulting from reducing weight of containers ● Sustainable use of containers and packaging ● Expectations of ethical consumption 	<ul style="list-style-type: none"> Short – long medium – long Short – long Short – long
 Global Warming	 13 CLIMATE ACTION	<ul style="list-style-type: none"> ● Curbing of global warming ● Reduction of impacts of climate change 	<ul style="list-style-type: none"> ● Criticism of failure to reduce GHG emissions and decline in investor evaluations ● Skyrocketing of energy costs ● Physical risks such as failure of modal shift to function due to climate change ● Regulatory risks 	<ul style="list-style-type: none"> ● Cost savings through reduction of energy use ● Cost savings through reduction of GHG emissions and introduction of renewable energies ● Reduction of physical damage caused by climate change 	<ul style="list-style-type: none"> Short – long Short – long Short – long Short – long



Biological Resources

In the short term, envisaged risks and opportunities include the opportunity for expansion of the craft beer market and Japan-grown hops procurement risk, opportunities for expansion of the Japan Wine market and improvement of biodiversity in the vineyards, and procurement risk for tea leaves imported from regions on which Kirin depends heavily for its ingredients. With the remarkable growth in the craft beer market of recent years, there has been a renewed recognition of the importance of Japan-grown hops as a key feature of such beers. However, due to aging and other factors, the number of hops farmers is now less than a quarter of what it was at its peak. In addition to fulfilling our responsibility as the purchaser of 70% of Japan's hops harvest, the Kirin Group also sees this as an opportunity. As a strategy for the revitalization of various production regions, we are conducting living species surveys in the hops fields of Tono. With the expansion of the Japan Wine market, Mercian has a plan to increase its production capacity of Japan Wine to 1.5 times its current level by 2027. Because this will require converting idle and devastated land into new vineyards, it is conducting ecological surveys jointly with National Agriculture and Food Research Organization (NARO) to determine the impact of that conversion. As a result, we have learned that vineyards cultivated in hedgerow style, with grasses grown in the vineyard, play a role as good-quality grasslands, creating rich ecosystems. This means that increasing the number of vineyards will contribute to the creation of Japan's traditional Satochi-Satoyama landscapes, which support biodiversity. Biological resources have the potential to lead to regulatory risk and reputational risk, and it is important to respond to the environmental and human rights issues caused by agriculture. The Kirin Group conducted a biological resources risk survey around 2012, based on which it formulated action plans for appropriate action on paper and palm oil, due to their high risks. Today, the Group has switched completely to FSC® certified paper and RSPO-certified palm oil for almost all of its requirements. Also, given the high dependence on Sri Lanka for the black tea leaves used to make Kirin Gogo-no-Kocha, which has been a top brand in Japan since it was first launched more

than 30 years ago, we began helping Sri Lanka's tea farmers to obtain certification under the Rainforest Alliance (RA) sustainable farming certification scheme.

Over the medium term, in addition to these issues, we believe there to be physical risks to agricultural production regions due to climate change. The effects of climate change are already becoming a reality, with some tea farms in Sri Lanka continuing to suffer damage from drought or localized torrential rain. As a way to adapt to these circumstances, in 2018, we began assisting small tea farms, as well as the larger estates, to obtain RA certification, with the goal of having 10,000 small farms certified by 2025. In the course of the certification process, these small farms can learn something like how to prevent their soil from washing away in heavy rains.

In the long term as well, we envisage major physical risks of climate change to ingredient agricultural products. The Kirin Group has conducted surveys to identify the impact of climate change over the medium to long term on yields of our main ingredient agricultural products, including barley, hops, grapes, and black tea leaves, as well as the water risks in agricultural production regions. In terms of barley and hops, we found that the impact would be great in southern Europe and Australia. However, there are variations in the degree of impact, with yields predicted to increase in some countries and regions. There is potential to leverage the Kirin Group's procurement know-how, technological capabilities, and experience assisting with sustainability certifications to deal with those impacts, so we have launched strategies for those risks and opportunities. Going forward, we will assess and review those strategies using scenario analysis and other methods, and incorporate the outcomes in the Long-Term Environmental Vision, which is scheduled for revision this fiscal year.



Water Resources

In the short term, water stress in Australia is a challenge, but we believe the impact will be more moderate in other regions. Surveys of the water risk to manufacturing sites conducted in Australia in 2014 and 2017 had envisaged a high risk, and more recently, some areas are facing continued severe drought. Leveraging its experience of past droughts, Lion has realized an industrial water consumption rate of 3.22

m³/kL, which is the highest level of water saving in the Group. Severe drought could potentially lead to stringent water restriction risk and reputational risk, so initiatives in this area will need to be ongoing. Our surveys have found that water stress is not great in other regions, but we continue to pursue initiatives to reduce water use for the cleaning of tanks and pipes in the manufacturing process. For example, in 2018, Kirin Breweries reduced its total industrial water use by 66% compared to 1990 levels, and halved its water consumption rate. Myanmar Brewery has set a target of reducing water consumption rate in 2020 by 25% compared to 2015 levels, and the Kyowa Kirin Entire Group (Global) has set a target of reducing water use in 2030 by 30% compared to 2015 levels. These two companies are currently engaged in water conservation initiatives to meet those targets. We continue to engage in activities to protect water sources, which we began in 1999, with initiatives underway in 12 locations throughout Japan.

Risks envisaged over the medium term include procurement risk resulting from water stress in ingredient production areas and the risk of a decline in water use efficiency due to high-mix low-volume production. At the tea farms in Sri Lanka, water sources known as micro-watersheds located on the farms were used as farming and grazing land, causing them to deteriorate in quality. To protect these precious sources of water, in 2018, we launched water source conservation initiatives with the cooperation of local NGOs and the people involved on the tea farms. There is a risk that the increased frequency of switching between products that comes with high-mix low-volume production will cause a decline in water use efficiency. This makes it important to continue with water conservation activities.

Over the long term, we envisage procurement risks due to water stress in ingredient production areas. The Kirin Group has conducted surveys to identify the water risks over the medium to long term due to the climate change in agricultural production regions of our main ingredient agricultural products. Surveys have shown that there are regions in which we envisage large water stress over the medium to long term for all ingredients, and we have started deliberations on strategies for addressing the risks and opportunities they present. Going forward, we will assess and review those strategies using scenario analysis and other methods, and incorporate the outcomes

in the Long-Term Environmental Vision, which is scheduled for revision this fiscal year.



Containers and Packaging

Over the short term, there are reputational and regulatory risks presented by the ocean plastics problem and other issues, but we also envisage opportunities for reducing costs through weight reductions. Ocean plastics has been set as an important management issue, and we are pursuing initiatives based on the Kirin Group Plastics Policy, which we established in February 2019. This Policy calls for 50% of PET plastics used in Japan to come from recycled plastic by 2027. Recycled PET plastic is already being used for the “Kirin Gogo-no-Kocha Oishii Muto (sugar-free) 500 mL PET Bottle” black tea beverage, and since May 2019, it is also being used on 100% for “Kirin Nama-cha Decaf 430 mL PET Bottle” green tea beverage production. There are ever growing societal expectations for containers and packaging that are lighter and easier to use and recycle. Leveraging the advantage it has in the Research Laboratories for Packaging Technologies, which makes the Kirin Group one of the few alcoholic and non-alcoholic beverage manufacturers in Japan to develop containers and packaging in-house, the Kirin Group has developed and commercialized Japan’s lightest returnable beer bottles, aluminum cans, and 2.0-liter PET bottle. These initiatives have helped us to reduce our manufacturing and transport carbon footprints, and to mitigate environmental burden and reduce costs through reductions in the volumes of resources used. We can expect to distinguish ourselves from our competitors through R&D in the area of containers and packaging in the future as well. In our non-alcoholic beverages business, we use large volumes of paper containers for transport. The sustainable use of those containers is an important challenge. We established an Action Plan and launched actions in 2013. In 2017, we declared that we would switch to FSC®-certified paper for all 6-can packs, gift boxes, drink boxes, and product cardboard boxes by 2020 for Japanese alcoholic and non-alcoholic beverages businesses. We have already switched to FSC-certified paper for almost all paper containers.

In the medium term, the plastics problem will continue to be a major

challenge, and we also expect to see opportunities for capturing markets through ethical consumption. In the area of responses to the ocean plastics problem, we will draw up a roadmap for realizing the Kirin Group Plastics Policy. For action on paper containers, the Kirin Group is pursuing initiatives, but social awareness of this issue is not very high, and the problem of forest destruction itself has not been resolved. For this reason, working with international NGOs and other agencies, we have launched activities to increase awareness about FSC certification and the issues behind it in Japan.

Our challenge over the long term will be securing the requisite volume of recycled PET of the requisite quality towards the realization of the Kirin Group Plastics Policy. As it is difficult for a single company to achieve, we are pursuing initiatives toward action that transcends corporate boundaries, maintaining contact with diverse stakeholders. Going forward, we will continue to assess and review those strategies using scenario analysis and other methods, and incorporate the outcomes in the Long-Term Environmental Vision, which is scheduled for revision this fiscal year.



Global Warming

In the short term, there are opportunities for cost reductions through reductions of energy consumption, and physical risks due to climate change are also apparent. As early as 2009, the Kirin Group set a target of reducing CO₂ emissions across its entire value chain to half of 1990 levels by 2050, and has been working toward that goal. It was one of the first companies in Japan to calculate and publicize its Scope 3 emissions targets. As the result of various initiatives, at Kirin Brewery, for example, combined Scope 1 and Scope 2 emissions in 2018 were reduced by 67% compared to 1990 levels. GHG emissions across the Group’s entire value chain have also been reduced by 30% compared to 1990 levels. On the other hand, in 2018, localized torrential rain, believed to be caused by climate change, caused the disruption of railway networks, reconfirming the physical risks of climate change. In addition to keeping the impact of this incident to a minimum, we have formulated and begun implementing measures for taking immediate action in the event of a similar crisis in the future.

In the medium term, we envisage further regulatory risks concerning GHG emissions, as well as opportunities for leveraging those regulations to improve energy efficiency. In 2017, the Kirin Group set and publicized medium-term targets for GHG emission reduction of a 30% reduction compared to 2015 levels for combined Scope 1 and Scope 2 emissions, and the same 30% reduction for Scope 3 emissions by 2030. These were the first targets of a Japanese food and beverage manufacturer to be approved by the international Science Based Targets (SBT) initiative as targets for the reduction of GHG emissions based on scientific grounds to hold global average temperature rises to below 2°C over pre-industrial levels. We are now working on drawing up a concrete roadmap to meet these targets. As a first step, we are proceeding with plans to install heat-pump systems to all Kirin Brewery manufacturing plants. It is envisaged that this initiative will bring major improvements to energy efficiency as well as the shift in our energy use to electricity. This energy shift will also make it easier to use renewable energies in the future.

In the long term, it is envisaged that the impact of climate change, including regulatory, physical, and transition risk, will become increasingly serious. There is also a growing need for appropriate disclosure to investors of risks and opportunities. To that end, in December 2018, we became the first Japanese food company to endorse the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). After a trial scenario analysis in 2018, a more detailed survey and analysis were conducted in 2019. The Group CSV Committee convened in June 2019, with the President of Kirin Holdings as Committee Chair, and the Kirin Holdings directors and Group company presidents as members, to begin discussions on transition and adaptation strategies based on environmental risk scenarios. In the scenario analysis, we studied and analyzed the impact that carbon pricing would have on energy costs in the medium to long term. Demands for businesses to reduce their GHG emissions are growing every year, and communities and businesses are moving quickly to respond to those demands. Going forward, we will continue to assess and review those strategies using scenario analysis and other methods, and incorporate the outcomes in the Long-Term Environmental Vision, which is scheduled for revision this fiscal year.

Scenario Analysis

Based on the recommendations released by the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board (FSB) in 2017, the Kirin Group assesses the potential impacts of climate change-related risks and opportunities to Kirin's businesses and the resilience of its environmental strategies defined in the Kirin Group Long-Term Environmental Vision and CSV Commitment.

In 2018, we used the IPCC's Representation Concentration Pathways (RCP) as the main pathways, supplemented by the IPCC's Shared Socioeconomic Pathways (SSP), to establish three Group Scenarios and analyzed the impact of climate change on agricultural products that are important ingredients for the Group's businesses. As a result, we determined anew the potential for climate change to have a major impact on agricultural products.

In 2019, we assessed the future impact of climate change on agricultural product yields, water risks such as flooding and water stress on agricultural regions that produce our ingredients, our Japanese production sites and logistics channels, and the impact of carbon pricing on the Kirin Group's carbon emission costs.

Regarding agricultural product yields, we studied more than 25 papers concerning barley, hops, wine grapes, and black tea leaves. Using Group Scenario 1 (2°C scenario, SSP1, sustainable development) and Group Scenario 3 (4°C scenario, SSP3, unwanted world) that were established in 2018, we analyzed the impact of climate change in the main individual supplier countries in 2050 and 2100.

Regarding water risk in agricultural production regions, targeting barley, hops, black tea leaves, wine grapes, coffee beans, and corn, we made the flooding risks and water stress in the main supplier regions visible on a map and investigated them.

Regarding water risk in manufacturing locations and logistics routes in Japan, we assessed the risk of flooding for four major products in beverage manufacturing locations, including outsourced manufacturers, and their logistics routes.

Regarding the impact of carbon pricing on the Kirin Group's carbon emission costs, we divided our assessment into the event that GHG emission reduction targets were met and the event that we did not engage in the reduction of emissions, for each of Group Scenario 1 and Group Scenario 3.

Agricultural product yields and water stress

In both Group Scenario 1 and Group Scenario 3, significant drops in yields were forecast for barley and hops. The assessment was also that water risks would rise considerably in agricultural production regions. Meanwhile, due to the lack of common models for estimating the impact of price fluctuations of agricultural products at this point in time, it is not easy to assess the financial risks.

Impact of climate change on major agricultural product yields/land suitable for cultivation

Legend: Negative/positive impact of less than 10% ▲/+
From 10% to less than 50% ▲▲/++
50% or more ▲▲▲/+++

Agricultural products	Kirin Group Scenario3: 4°C, unwanted world, 2050			
	United States	Asia	Europe/Africa	Oceania
Barley		West Asia Yield▲/+ South Korea Yield+	Finland Spring wheat yield▲ Mediterranean coast (West) yield▲, (East) yield+ France Winter barley and spring barley: Both yields▲	Western Australia Yield▲▲
Hops			Czech Republic Yield▲	
Black tea		Sri Lanka Yields down in lowlands Little impact of temperature rise in highlands India (Assam region) For each 1°C temperature rise above average temperature of 28°C, yields down 3.8% India (Darjeeling region) Yield▲▲~▲▲▲ (Sources from tea industry, not academic papers)	Kenya Rise in altitude of suitable cultivation land Major contraction of suitable cultivating land in Nandhi region and western Kenya Kenyan mountain regions will remain suitable for cultivation Malawi Chitipa district: Suitable land▲▲▲ Nkhata Bay district: Suitable land▲▲▲ Mulanje district: Suitable land+++ Thyolo district: Suitable land++	
Wine grapes	United States (California) Suitable land: ▲▲▲ Northwestern United States Suitable land: +++ Chile Suitable land: ▲▲	Japan (Hokkaido) Expansion of suitable land Enable cultivation of Pinot Noir Japan (Central Honshu) Suitable land expanded on the one hand, but high-temperature damage also caused	Northern Europe Suitable land: +++ Mediterranean coast Suitable land: ▲▲▲ Spain Production volumes▲to▲▲ Western Cape, South Africa Suitable land: ▲▲▲	New Zealand Suitable land: +++ Southern coastal regions of Australia Suitable land: ▲▲▲ Outside southern coastal regions of Australia Suitable land: ▲▲
Coffee beans	Brazil Suitable land for Arabica: ▲▲▲ Suitable land for Robusta: ▲▲▲	Southeast Asia Suitable land for Arabica: ▲▲▲ Suitable land for Robusta: ▲▲▲	East Africa Suitable land for Arabica: ▲▲ Suitable land for Robusta: ▲▲	
Corn	Southwestern United States Yield ▲▲ United States (Iowa in mid-West) Yield ▲~▲▲			

There is a large potential risk for future declines in yields of barley and hops, but it is also possible to mitigate that impact through our own knowledge and technology. The Kirin Group has developed advanced brewing technologies that do not rely on barley, such as happo-shu (low-malt beer) and new genres, and is able to use alternative sugars, so it is believed to be highly adaptable to those declines in yields. These technologies can be used in other countries and regions, which may give us an advantage in those regions. Also, in the event that agricultural products that can adapt to higher temperatures are developed, there is a possibility that the Kirin Group will be able to contribute to the speedy expansion of acreage planted with such crops, using its original plant propagation technologies. The knowledge that we have acquired through our support of farms in Sri Lanka to obtain sustainability certification and our activities to conserve water sources on tea farms in that country could also be adapted for use on other crops if the need arose.

While significant barley yield declines are projected for southern Europe and Australia, it is projected that northern Europe and West Asia will see yield increases, and the impact is also expected to be minor in Japan. For black tea leaves, yield declines are projected for the lowlands of Sri Lanka and certain parts of Malawi, but no significant potential impact was recognized for Sri Lanka's highlands and for other production countries and regions. In this way, the degree to which climate change will have an impact on agricultural products varies greatly between countries and regions. Current initiatives and knowledge, which disperse the risks by procuring ingredients from multiple production regions to mitigate the impacts of drought and market conditions, could be used in medium to long-term responses to climate change.

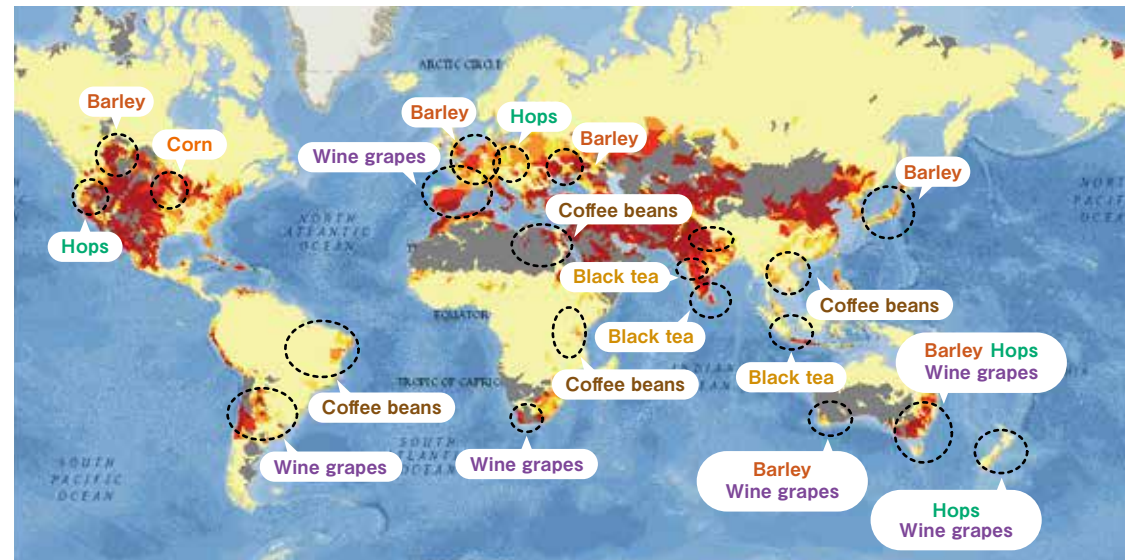
Water risk in manufacturing locations and logistics routes

We were able to identify that some of our production bases for the non-alcoholic beverages covered by the survey were located in places with high risk of flooding. Kirin Beverage suffered from the disruption of their logistics channels, including rail networks, due to the torrential rain in western Japan in 2018. As well as taking action to minimize the impact of this, it has also prepared a manual for action in the event of a similar disaster. This experience of responding to the disaster in the short term and re-working systems in preparation of disasters that could occur in the future may prove effective in the event of a similar occurrences.

Carbon Pricing

In Group Scenario 1 (2°C scenario, SSP1, sustainable development), it was determined that achieving the 2030 GHG emission reduction targets would save approximately 4.7 billion yen in annual carbon emission costs compared to not taking action to reduce emissions. This is due to the effectiveness of the Kirin Group's high GHG reduction targets, which were the

Water stress in major agricultural production regions (2040, equivalent to Kirin Group Scenario 3)



source : World Resources Institute

Assessment of impact of carbon pricing

In event of inaction on medium-term
GHG emission reduction target of 30% by 2030

Kirin Group Scenario1:2°C, sustainable development
Kirin Group Scenario1:4°C, unwanted world

	Kirin Group Scenario 3		Kirin Group Scenario 1	
	2025	2040	2025	2040
Estimate cost of impact (unit: 1,000 USD)	10,944	14,448	51,268	80,374
Estimate cost of impact (unit: 1 million JPY)	1,215	1,604	5,691	8,921

In event of achievement of medium-term GHG emission reduction target of 30% by 2030

	Kirin Group Scenario 3		Kirin Group Scenario 1	
	2025	2040	2025	2040
Estimate cost of impact (unit: 1,000 USD)	8,956	6,905	41,958	38,411
Estimate cost of impact (unit: 1 million JPY)	994	766	4,657	4,264

* Calculated by multiplying assumed CO₂ emissions in 2025/2040 by carbon price forecasts

first such targets established in Japan's food and beverages industry as reduction targets based on scientific grounds, to keep temperature rises to less than 2°C from pre-industrial levels, according to the Science Based Targets (SBT) initiative. However, we must take into account the fact that carbon pricing is influenced by the policies of individual countries, which makes accurate predictions difficult.

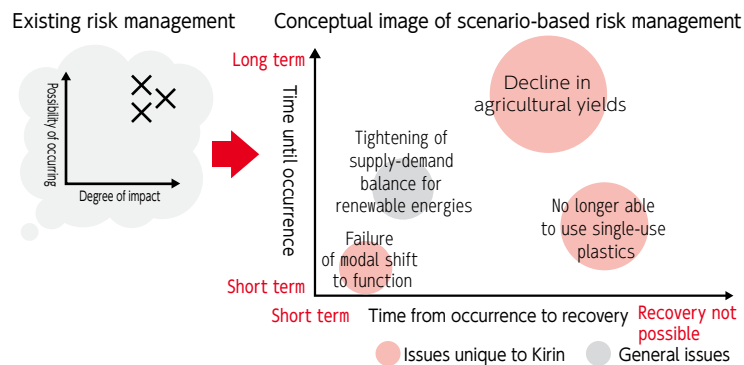
Future steps

These analysis results have reaffirmed that we are not mistaken in the vision we are aiming for, our targets, and the directions of our initiatives in the Kirin Group Long-Term Environmental Vision and the CSV Commitment. We also confirmed a certain level of resilience in the Kirin Group's environmental strategies at this point in time.

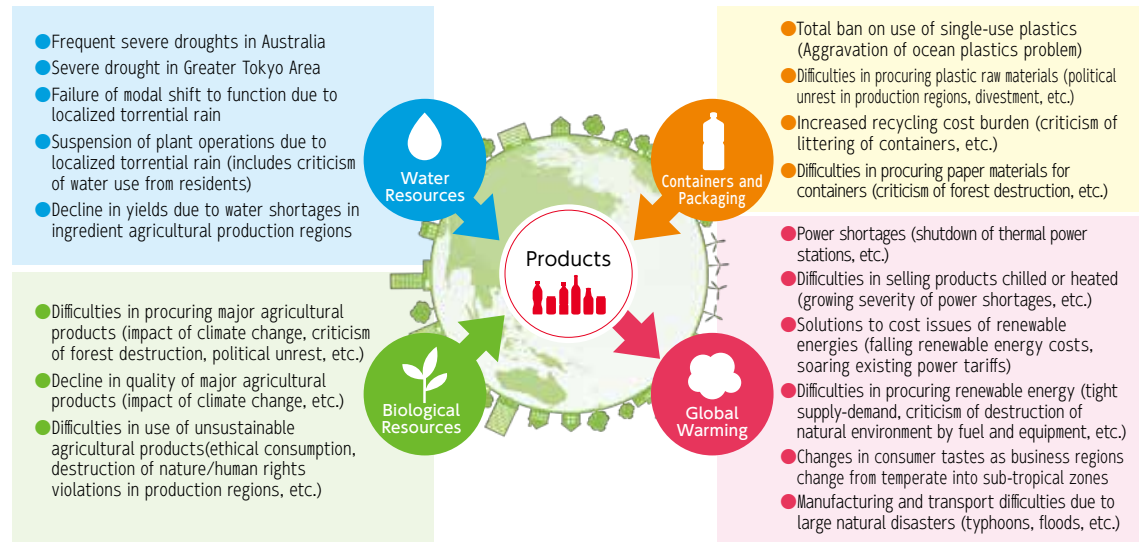
However, the conclusions drawn in the literature regarding the impact of climate change on agricultural products, which formed the basis of our assessments, varied greatly, and the precision of the water risk assessments could not be described as high. With the physical crisis in the form of the disruption of railway transport, the leading form of modal shift, becoming a reality, community concerns about the natural environment and the expectations placed on businesses are predicted to increase even further.

To respond to them, we need to review the entire value chain and raise the resilience of our strategies. To this end, leveraging the findings of these recent analyses, we plan to revise the Kirin Group Long-Term Environmental Vision within the current fiscal year. In addition to accelerating the initiatives that are already underway, we will set higher targets and medium to long-term challenges for achieving them, and formulate roadmaps.

Regarding risks that would have an extremely significant impact if they were to eventuate, even though we may not know the chances of their eventuating, the establishment of new risk management systems that set scenarios and assess risks is a challenge. In the Group CSV Committee and other forums, the executive level will deepen their debate on the assessment of environmental risks based on those scenarios and adaptation strategies, with plans to steadily incorporate them into management strategies.



Examples of climate-related risks that will require consideration going forward



Examples of adaptation strategies in response to extracted medium and long-term risks

Category	Conceivable risk	Proposed response
Biological Resources	Extreme drop in yields of core agricultural products (barley, hops, black tea leaves, grapes, etc.) due to climate change makes them difficult to obtain	<ul style="list-style-type: none"> Decentralization/changes in supplier countries/regions based on assumption of climate change impact Increased production of climate-resistant plant seeds and seedlings with Kirin's plant propagation technologies Use of happo-shu (low-malt beer) and new genre (limitations on use of barley, etc.) technologies
	Supplier farms face wave of criticism that they are destroying forests or violating human rights	<ul style="list-style-type: none"> Expansion of assistance for farms to obtain sustainability certification, e.g. Rainforest Alliance certification
Water Resources	Water use in manufacturing plants becomes difficult due to severe water shortages and criticism of plants' water intake heightens	<ul style="list-style-type: none"> Set further water conservation targets and work toward them Water source conservation activities
	Drought makes production of ingredients (barley, hops, black tea leaves, etc.) difficult	<ul style="list-style-type: none"> Activities to preserve water sources in production regions Use Kirin's plant propagation technologies to increase production of seeds and seedlings of plants that will grow with less water
	Plant operations are shut down due to flooding, making it impossible to supply product	<ul style="list-style-type: none"> Change to concentration of manufacturing in one place, review of locations
Containers and Packaging	Ocean plastics problem becomes increasingly serious and plastic materials and containers/packaging can no longer be used	<ul style="list-style-type: none"> Promotion of resource circulation of PET plastics Use of plant-derived plastics Shift to alternative materials such as paper, conserve plastic
	Criticism grows that forests are being destroyed for raw materials for paper containers	<ul style="list-style-type: none"> Expand use of FSC-certified paper
Global Warming	Energy costs increase due to soaring fossil fuel prices	<ul style="list-style-type: none"> Introduction of internal carbon pricing Expansion of renewable energies
	Unable to expand introduction of renewable energies due to excessive demand	<ul style="list-style-type: none"> Early securing of renewable energies Commencement of in-house power generation with renewable energies
	Use of fossil fuels becomes difficult	<ul style="list-style-type: none"> Promotion of total electrification of plant manufacturing processes Introduction of hydrogen fuel
	Global warming advances and consumers' tastes change	<ul style="list-style-type: none"> Insight learning and application
	Transport networks are disrupted due to localized torrential rainfall	<ul style="list-style-type: none"> Formulation of BCP, review of logistics networks