Global Trends and Kirin's Actions

Using the blessings of nature as ingredients to deliver its products to customers, the Kirin Group has been proactively addressing environmental concerns and needs from society. In 1997, the year of the Kyoto Summit, Kirin Brewery Kobe Plant was completed as a low-carbon model brewery, and it has achieved the highest level of water conservation in the industry. In 1999, we became the first company in the Japanese beverage industry to launch Water Source Forestation Activities, tree planting projects to protect the forests that nourish abundant water, one of our essential raw materials.

In 2013, we formulated our long-term strategy, the Kirin Group's Long-Term Environmental Vision, and set the then leading-edge target - "Realization of a society that is based on 100% resource circulation" - that we will achieve by 2050.

We have since been accelerating our efforts in carrying out the initiatives set under the four material issues: Biological resources, water resources, containers and packaging, and global warming.

Specifically, we have been supporting tea farms in obtaining sustainable certification, adopting 100% FSC®-certified paper for paper containers, and using containers made of 100% recycled PET resin. In addition, we actively participate in international initiatives and lead the industry, such as becoming the first Japanese food company to set targets for reducing greenhouse gas emissions approved by the Science Based Targets initiative (SBTi) and to express our support for the Task Force on Climate-related Financial Disclosures (TCFD) recommendations.

Further, the Kirin Group has formulated the Kirin Group Vision 2027 (KV2027), which is a long-term management concept started in 2019, with the aim of becoming "a global leader in CSV, creating value in domains ranging from food & beverages to pharmaceuticals" by 2027. As a long-term non-financial target of KV2027, we have established the "CSV Purpose," guidelines to co-create value with society and achieve sustainable growth, and set the environment as one of our four priority themes. "Kirin Group's management issues for sustainable growth (Group Materiality Matrix)" selects priority themes. We have established CSV Commitment as a medium to long term action plan for our individual businesses in order to realize the CSV Purpose and, by linking it with our business strategy, we are creating social value as a Group and driving our efforts to attaining the economic values of strengthening competitiveness and business growth.

Kyoto Protocol | COP10 Nagoya Protocol on Biological Diversity | Paris Agreement; SDG | TCFD | IPCC Special Report on Global Warming of 1.5°C

1997 | 2010 | 2015 | 2017 | 2019 | 2020

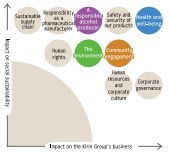
- 1997: Completion of Kirin Brewery Kobe Plant, a low-carbon model factory (1997)

- 1997: 100% recycling achieved at all breweries (1998)
- 1997: Start of "Water Source Forestation Activities" (1999)

- 1997: Reduced weight for all large bottles (2003)

- 2010: Action Plans for Becoming a Low-Carbon Corporate Group announced (2009)
- 2010: Declaration of Support for Biodiversity Conservation announced (2010)
- 2010: Guidelines for the Procurement of Sustainable Biological Resources and an Action Plan announced (2012)
- 2010: Kirin Group's Long-Term Environmental Vision announced (2013)
- 2010: Survey of water risks to natural capital and major global business sites (2014)
- 2010: Start of support for tea farms in Sri Lanka to acquire Rainforest Alliance certification (2013)

- 2010: Start of development and deployment of lightweight medium bottles (2014)
- 2010: Use of 100% recycled PET bottles started (2014)
- 2015: Group Materiality Matrix announced (2016)
- 2017: CSV Commitment announced as SDGs Initiative (2017)
- 2017: Becomes the first food and beverage manufacturer in Japan to be approved by SBT (2017)
- 2019: First Japanese company to support the TCFD recommendations (2018)
- 2019: Start of water source conservation activities in Sri Lankan tea farms (2018)



- 2019: Announcement of CSV long-term and non-financial targets "Kirin Group CSV Purpose" (2019)

- 2019: Kirin Group Plastic Policy announced (2019)
- 2019: Kirin Brewery and Kirin Beverage achieve adoption of FSC-certified paper for all paper container and packaging (2019)
- 2020: Kirin Group's Environmental Vision 2050 announced (2020)

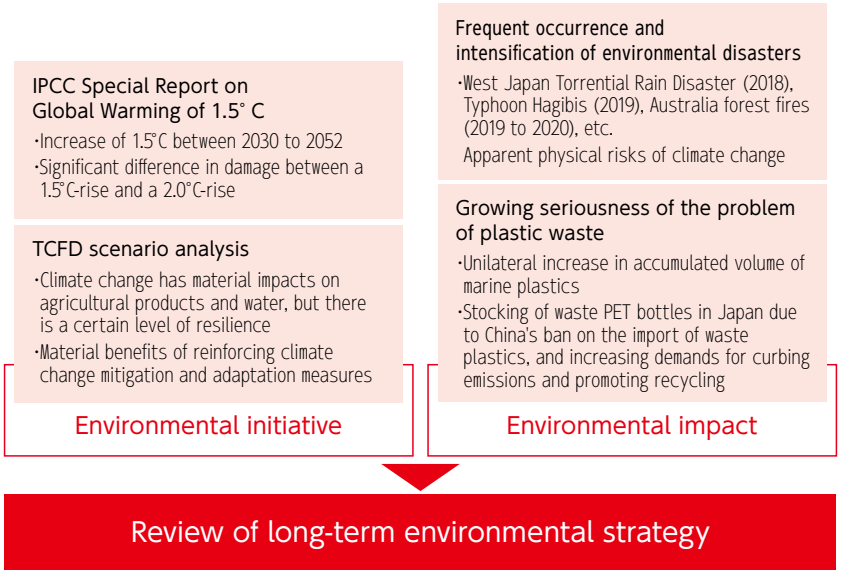
FSC® C137754

Determination of Materiality

The Kirin Group has been working to realize its Long-Term Environmental Vision by addressing a number of issues and achieving results. However, the global trends surrounding the environment are significantly changing after the Paris Agreement. The Special Report on Global Warming of 1.5° C released by the Intergovernmental Panel on Climate Change (IPCC) two years ago pointed out the seriousness of a temperature increase of 2.0° C and the importance of keeping the rise below 1.5° C.

The impact of climate change is already becoming a reality. In Japan, the 2018 West Japan Torrential Rain Disaster (the Heavy Rain Event of July 2018) caused serious damage to a wide range of areas in the region and disrupted our company's distribution network. Typhoon Faxai (Reiwa 1 Boso Peninsula Typhoon) and Typhoon Hagibis (Reiwa 1 East Japan Typhoon) in October 2019 caused serious damage, including power outages that continued in eastern Japan. Also, in Australia, home to our group company Lion, major bushfires broke out after three years of having been affected by severe drought.

The scenario analysis conducted by the Kirin Group in accordance with the TCFD recommendations also revealed significant potential impacts on agricultural products and water resources, which are important ingredients. On the other hand, we are finding that reinforcing measures to mitigate and adapt to climate change leads to the possibility of reducing such impacts and creating unique opportunities.



Against this backdrop, the Kirin Group determined the need for a new long-term strategy to enhance the resilience of society and the company.

All of the Kirin Group's businesses directly benefit from the bounty of natural capital. For example, drinks are made from agricultural products and water, poured into containers, and delivered to customers. Greenhouse gases (GHG) generated in the process bring about climate change and have a major impact on ingredient agricultural products and water. In order for the Kirin Group to continue its business, which is underpinned by the blessings of nature, it is essential to take measures to protect the environment. Resolving environmental issues not only reduces business risks, but also helps create value for society.

Based on this recognition, the Kirin Group identifies and determines material environmental issues (materiality) and comprehends risks and opportunities.

STEP1

Identification of relevant issues

We examine the circumstances surrounding the Kirin Group and identify relevant issues. In formulating the Environmental Vision 2050, we identified relevant issues by referring to international standards and policies, domestic and international discussions, trends of international initiatives, results of scenario analyses based on recommendations by TCFD, as well as the seriousness of environmental impacts, including natural disasters that have occurred, and opinions obtained through workshops with investors and younger generations.

STEP2

Confirmation of appropriateness

We reflect diverse dialogue with various stakeholders, including external experts and NGOs, in our internal discussions. In formulating our Environmental Vision 2050, we confirmed the appropriateness of the vision through consultation with experts and stakeholders and holding dialogue with the Group's operating companies and management teams.

STEP3

Determination of materiality

By holding discussions at the executive management level, we identify risks to and opportunities for businesses and society, assess their materiality and develop action plans that include metrics. In formulating the Environmental Vision 2050, based on the issues identified and information gathered in STEPs 1 and 2, we determined the four most material environmental issues as "biological resources", "water resources", "containers and packaging" and "climate change", and identified relevant risks and opportunities.

STEP4

Continual review

We continue to consider the need to review material issues, reflecting the constantly changing state of social and environmental issues and the Kirin Group's circumstances. The Environmental Vision 2050 was formulated and resolved by the Board of Directors following an exchange of opinions by the Executive Committee. Going forward, we will integrate our environmental vision with our business strategies and management plans by revising or newly setting the CSV Commitment, our medium-to-long-term action plan. In addition, we will perform periodic reviews to update issues and KPIs that need to be addressed on an ongoing basis.

Kirin Group's Environmental Vision 2050

The Kirin Group has revised its conventional environmental vision and formulated a new long-term strategy, Kirin Group's Environmental Vision 2050, with the aim of enhancing the resilience of society and the company, which was announced in February 2020.
Our goal is not only to minimize negative impacts and neutralize them, but also to have a positive impact on society beyond our own boundaries.
Under this new vision, we will expand our efforts from our value chain to society as a whole and work together with young generations who will inherit the world and other members of society to create a prosperous world for future generations.

Kirin Group's Environmental Vision 2050

Enrich the Earth with Positive Impact

Biological Resources
A society that values sustainable biological resources.

Water Resources
A society that values sustainable water resources.

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

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.

New initiatives aimed at positive impacts

The most important message in the Kirin Group's Environmental Vision 2050 is "positive impact". The Kirin Group' s goal is not only to minimize negative impacts and neutralize, but also to have a positive impact on society beyond our own framework. We aim to solve environmental issues by reaching out beyond the boundaries of the Group and also getting the next generation involved. We believe that this will also enhance the resilience of society and the company.

To this end, we will expand initiatives that had been centered on our business sites and value chains to society and widen our activities from a domestic focus to global deployment. We will also actively participate in global initiatives, such as TCFD and SBT, to lead international cooperation.

To a higher target level

In light of the changes in the social environment, we aim to achieve our goal at a higher level than our previous target by focusing on the issues we currently face and the challenges we will likely face in the future.

Think of society as a whole

We aim to conduct activities that not only reach to our business sites and value chains, but also go beyond our own business boundaries and spread across society.

Differences from the previous vision

Across all our global businesses

The entire Kirin Group, including its overseas operations, will work to resolve environmental issues.

Creating a positive impact

We will not only minimize the negative impact on the environment but also generate positive impacts on our business and society.

Initiatives scheduled from 2020

Biological Resources	●Support for coffee plantations in Vietnam to acquire Rainforest Alliance certification (start in 2020)
Water Resources	●Expansion of water source conservation activities in Sri Lankan tea farms and launch of these activities in other raw material production areas
Containers and Packaging	●Lion to start container-collecting service in all states where container recycling law is introduced (by the end of 2020) ●Working toward 100% sustainable containers and packaging using recycled materials and biomass by 2050
Climate Change	●Lion became Australia's first large-scale carbon neutral brewery (Certified in 2020)) ●Lion to adopt 100% renewable electricity (by 2025) ●Kyowa Kirin became the first* in the pharmaceuticals industry to introduce Aqua Premium and achieve 75% renewable power at its Takasaki Plant (already introduced in 2020) ●RE100 (to join by the end of 2020) ●Raising GHG target to SBT 1.5°C (to be set by the end of 2020)

* Kirin Brewery's Toride Plant and Kirin Beverage's Shonan Plant introduced in 2017.

Efforts to create positive impacts on nature and people have already begun.

As for biological resources, we are expanding our support for acquiring Rainforest Alliance certification, which we have been providing to Sri Lankan tea farms, to coffee plantations in Vietnam.

As for water resources, we are considering expanding our water source conservation activities, which we are currently conducting at tea farms in ingredient agricultural production regions, to other regions and countries.

As for containers and packaging, we are aiming to establish a recycling system for PET bottles on a global basis and are developing a concrete roadmap with the aim of achieving 100% sustainable containers and packaging using recycled materials and biomass by 2050.

In response to climate change, we will strive in Japan to further reduce energy consumption, shift energy from fossil fuels to electricity, and utilize electricity generated from renewable energy sources. In Australia, we are aiming to achieve 100% renewable electricity by 2025. In addition, we will raise our GHG reduction target to SBT 1.5° C standard, achieve RE100 prior to 2050, and lead to build a decarbonized society.

We will also expand the provision of environmental education and dialogue with the next generation, who are the stakeholders to be affected most by environmental issues.

Under this new vision, we will work together with the young generation who will inherit the world and other members of society to create a prosperous world for future generations.

Supplementary teaching material on SDGs for elementary school students "SDGs Startup"

The Kiwi Pale Ale is New Zealand's first carbon zero certified beer with all emissions.

Begin support for coffee plantations in Vietnam to acquire Rainforest Alliance certification

Kirin School Challenge workshops for junior and senior high school students

Disclosure based on TCFD recommendations

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 impacts of climate change-related issues on society and businesses, as well as the resilience of its strategies, and has been working to disclose in line with the recommendations in approximately five years. We began disclosures in 2018, and the assessment results of 2019 serve as important input for our Environmental Vision 2050. In December 2018, the Kirin Group became the first Japanese food company to support the recommendations of the TCFD.

Schedule for information disclosure

2018	・Assessment of impacts on agricultural products
2019	・Detailed examination, evaluation and presentation of measures for the impacts on agricultural products ・Assessment of physical risks in non-agricultural products ・Management discussions at the Group CSV Committee meetings
2020	・Assessment of financial impact ・Assessment of resilience in Environmental Vision 2050 ・Formulation of Environmental Vision 2050 ・Thorough discussions by management
2021	・Ongoing in-depth examinations ・Start of disclosure in the pharmaceuticals businesses ・Formal integration into the Management Committee, etc.
2022	・Ongoing in-depth examinations ・Deployment and disclosure throughout the Group ・Integration with management strategy

Governance

To support the proactive, self-driven CSV management by the individual Group companies, the Group CSV Committee meets once a year in principle, with the meeting attended by all executives of Kirin Holdings and the presidents of major operating companies, and discusses climate change-related issues. In 2019, based on the results of the scenario analysis, top management actively discussed the risks and opportunities related to climate change. In response, an environmental strategy project was launched with the director in charge of SCM as the project owner. The Environmental Vision 2050 was discussed and drafted as part of this project, followed by discussions by the Executive Committee and deliberation by the Board of Directors.

Details on the Kirin Group's management structure→P.75

Strategy

The Kirin Group formulated the Kirin Group Long-Term Environmental Vision in 2013 as the long-term strategy directed towards 2050 and has been working to realize that vision. However, the global trends surrounding the environment are changing dramatically, including the launch of international initiatives related to climate change after the Paris Agreement and the emergence of the problem of marine pollution caused by plastics. In addition, scenario analyses conducted in 2018 and 2019 have revealed the significant impacts of climate change on agricultural products, such as decline in yields of agricultural products that are important ingredients and increased water stress and risk of flooding in agricultural production regions. At the same time, they have uncovered the possibility of reducing such impacts and capturing opportunities by reinforcing measures to mitigate and adapt to such impacts.

Accordingly, we revised our conventional strategy and established the Environmental Vision 2050, which was announced on February 10, 2020. The vision aims at enhancing the resilience of society and the company and providing positive impacts to society beyond the boundaries of our organization. The Environmental Vision 2050 is positioned as an important agenda item under our CSV Purpose and is incorporated in CSV management.

Details on the Environmental Vision 2050→P.10
Scenario analysis→P.13～P.17
Identified risks, opportunities and responses→P.18～P.19

Risk management

The Kirin Group facilitates risk management and has established a system to accurately recognize and steadily respond to risks that may seriously impede the accomplishment of business targets or impact business continuity. In particular, we focus on risks associated with new strategies and initiatives, as well as risks associated with significant changes in the external environment. Kirin Group companies, in conformance with the group risk management policy, identify and examine material risks, including those related to climate change. The Administrative Office of the Kirin Group Risk and Compliance Committee, which comprises Kirin Holdings internal directors and executive officers, surveys and investigates these risks. The committee deliberates on risks that have a potentially significant impact and a high likelihood of occurring, and risks common to the Kirin Group, and manages them as material risks for the Group.

On the other hand, when we look at the occurrence of large-scale natural disasters that are considered to be caused by impacts of climate change, it is not sufficient to adopt only the conventional risk management methods that determine the level of materiality of risks based on the magnitude of impact and probability of occurrence. Regarding risks that would have an extremely significant impact on our business if they were to eventuate, even though we may not know the chances of their eventuating, we will introduce new risk management systems that set scenarios and assess risks.

Details of risk management→P.76～P.79
Scenario analysis→P.13～P.17

Metrics and targets

In the Kirin Group's Environmental Vision 2050 announced on February 10, 2020, we significantly raised our targets for climate change-related issues.

As for the reduction of GHG emissions, which is a mitigation measure, we have set a target to achieve net zero emissions throughout our value chains by 2050. Our adaptation measures include efforts to cultivate, expand and procure sustainable agricultural raw materials and to bring water, used as a raw material, to a sustainable state.

As for our medium-term KPIs, we plan to set numerical targets as CSV commitments and draw up a roadmap as soon as possible.

Key metrics and targets are listed→P.21
Accomplishments under GHG Scope 1, Scope 2, and Scope 3→P.72
More detailed data→P.86～P.111

Scenario Analysis

The Kirin Group began studying the TCFD final recommendations immediately after they were announced in 2017. In late June 2018, we promptly disclosed the trials, including the results of our scenario analysis, in accordance with the TCFD recommendations in the Kirin Group Environmental Report 2018. We have since been continuously striving to ensure that our disclosure complies with the recommendations.

Results of the 2018 analysis

In 2018, we adopted the IPCC's Representation Concentration Pathways (RCP) as the main pathways, supplemented by the IPCC's Shared Socioeconomic Pathways (SSP), to develop 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 July 2018, immediately after the disclosure of trials, the 2018 West Japan Torrential Rain Disaster happened, causing extensive damage in the western region of Japan and disrupting the railway networks. As a result, Kirin Beverage, which had been actively pursuing the modal shift to reduce GHG emissions and address the shortage of truck drivers, experienced a significant impact on product delivery, which was also in the peak period. In September 2018, Kirin Brewery Hokkaido Chitose Plant suspended operations due to a blackout (total power failure) caused by the Hokkaido Eastern Iburi Earthquake. It was also in 2018 that the marine plastic problem attracted close attention.
Although the risks associated with such events had been recognized even under conventional risk management, they were judged to have a large impact but a low probability of occurrence, and while measures were taken in part to reduce such risks, most of them were treated as risks to hold. The emergence of a number of natural disasters and environmental problems in 2018 prompted us to once again recognize the effectiveness of the new risk management system, which sets up scenarios and assesses risks that are unlikely to occur but would have an enormous impact on our business should they occur. Taking advantage of the experience of the 2018 West Japan Torrential Rain Disaster, the Kirin Group immediately established a manual to follow in the advent of a similar disaster and put it into use. This has helped us avoid a major impact from Typhoon Faxai (Reiwa 1 Boso Peninsula Typhoon) and Typhoon Hagibis (Reiwa 1 East Japan Typhoon) in October 2019.

Results of the 2019 analysis

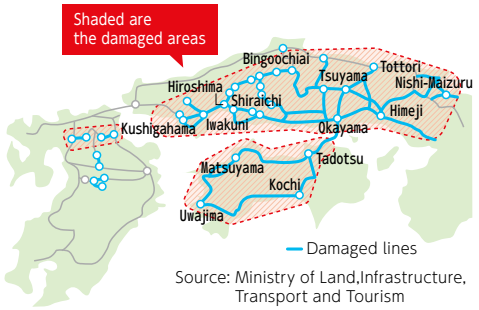
In recognition of the effectiveness of scenario analysis, in 2019 we conducted a more detailed analysis with the aim of assessing the resilience of our long-term strategy, the Kirin Group Long-Term Environmental Vision, formulated in 2013.
Specifically, we studied more than 25 research papers and analyzed the impact of climate

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

Agricultural products	Kirin Group Scenario3: 4℃, 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 ▲~▲▲ Brazil, Argentine Yield ▲~▲▲	China Yield ▲▲		

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

2 Disruption of railway networks due to the West Japan Torrential Rain Disaster in July 2018



Source: Ministry of Land,Infrastructure, Transport and Tourism

3 Assessment of impact of carbon pricing (Excerpt from the 2019 disclosure)

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

	Kirin Group Scenario 3	Kirin Group Scenario 1
Estimate cost of impact (unit: 1 million JPY)	2040	2040
	1,604	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
Estimate cost of impact (unit: 1 million JPY)	2040	2040
	766	4,264

Kirin Group Scenario1:2℃, sustainable deveropment
Kirin Group Scenario1:4℃, unwanted world
*Calculated by multiplying assumed CO_2 emissions for 2040 by carbon price forecasts.

4 Assessment of resilience against climate change impacts

Assessment of water risk associated with agricultural yields/production regions
Brewing technologies that do not rely on barley in categories, such as happo-shu (low-malt beer) and new genres, enables the deployment of products using alternative sugars for barley in other countries and regions.
In the event that agricultural breeds that can adapt to climate change are developed, our mass plant propagation technologies can contribute to speedy expansion of acreage.
The insights gained through the activities to support farms obtain sustainability certification can be deployed for other crops.
Use of insights on diversified procurement from multiple agricultural production countries and regions.

Assessment of water risk in domestic production sites and logistics routes
Rapid restructuring of logistics system based on lessons learned from the 2018 West Japan Torrential Rain Disaster.
No major impact from Typhoon Faxai and Typhoon Hagibis.

Assessment of impact of carbon pricing on electricity prices
Impact can be reduced by achieving GHG reduction targets.

change in the main individual supplier countries in 2050 and 2100, based on Group Scenario 1 (2° C scenario, SSP1, sustainable development) and Group Scenario 3 (4° C scenario, SSP3, unwanted world) that were developed in 2018.
In addition, we examined water stress and water risks in agricultural production regions, identified water risks in production and distribution sites, and evaluated the impact of carbon pricing. The previous page provides an excerpt of these initiatives. Please refer to the Kirin Group Environmental Report 2019 pages 14 to 16 for further results of our analysis.
The scenario analysis has further clarified the significant impacts on agricultural products and water resources, but it also reveals the potential to reduce these impacts and capture opportunities by reinforcing measures to mitigate and adapt to climate change. The results of this analysis provide important input into our new vision, the Kirin Group's Environmental Vision 2050, announced on February 10, 2020, which is aimed at enhancing the resilience of society and the company.

Results of the 2020 analysis

We estimated the financial impact based on the results of analyses in 2018 and 2019. Please note that the results of these estimations are based on the conditions of the scenarios developed to visualize the impacts on society and businesses. We performed calculations also on the marine plastic problem, although it is not a climate change issue.

Negative impact

As for the impact of decline in agricultural yields, we estimated the cost impact associated with barley, hops, black tea leaves, and wine grapes, which are important ingredients for alcoholic and non-alcoholic beverages businesses in Japan, based on the calculation conditions disclosed in published papers.
We found that the cost impact of raw materials was approximately 7 times greater in Group Scenario 3 (4℃ scenario) compared with that in Group Scenario 1 (2℃ scenario, SSP1, sustainable development). The results of the trial calculations show that in order to mitigate the financial impact of decline in agricultural yields, it is necessary to also take measures to mitigate the temperature rise at a high level.
In calculating estimates on water risks and water stresses associated with natural disasters, as well as on the impacts of infectious diseases on operations and logistics, since there is a lack of appropriate insights, we made assumptions based on past cases and other factors for each scenario and estimated the impact should such assumptions become a reality.
Regarding water risk, we performed calculations in Group Scenario 3 (4℃ scenario) based on the assumption that damage equivalent to that of Kirin Brewery Sendai Plant, which was affected by the Great East Japan Earthquake, would occur. As for the impact of flooding on modal shift, we estimated based on the assumption that damage due to modal shift caused by flooding would occur in the same way as in the past under the same scenario. The impact of infectious diseases on operations was estimated based on the assumption that the brewery would cease production at its peak under the same scenario.
Impact of water stress was estimated based on the assumption that plants with high water stress in Australia would cease operations at their peak.
Since there is a lack of appropriate insights about the difference in the degree of impact in Group Scenario 1 (2℃ scenario) and Group Scenario 3, we performed calculations based on the assumption that the impact in Group Scenario 1 would be about one-third of that in Group Scenario 3.
In addition, Graph 6 (page 15) shows the impact of carbon pricing estimated in 2019, and the results of estimating the external cost of the problem of ocean plastics based on the share in the domestic soft drinks market based on published papers.
The vertical axis shows the magnitude of difficulty for society and businesses to return to their original state when a risk occurs, the horizontal axis shows the magnitude of the negative impact on society, and the size of the circle reflects the approximate magnitude of the financial impact on the Kirin Group. As a result of the calculations, the cost impact was approximately 1 to 8% of operating revenues. However, the impact on the decline in agricultural yields is greater because it continues to be affected. Regarding the impact of the spread of infectious diseases due to climate change, we expect that depending on the outcomes of the impact of COVID-19 spreading in 2020, there will be a need to change the calculation method.

Positive impact

As for opportunities due to climate change, we performed calculations regarding “impact of

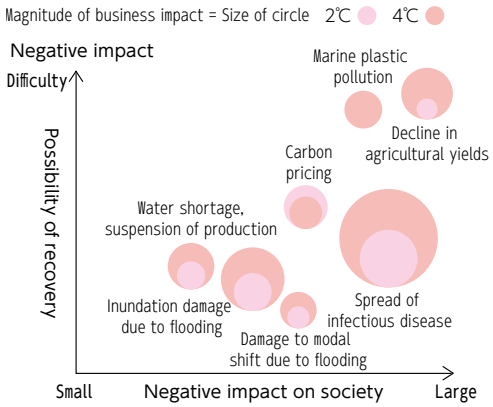
5 Increase rate of population at risk under Kirin Group Scenario 3 (4℃ scenario) in 2050

Item	Malaria		Dengue fever	
Summary	One of the three major infectious diseases in the world along with tuberculosis and AIDS. Main symptoms are fever, anemia, and splenomegaly.		An acute febrile infection caused by the dengue virus. Major symptoms include fever, headache, muscle aches, and skin rashes.	
Occurrence status	Many infected people mainly in subtropical and tropical regions. It has been reported that approximately 220 million people worldwide are affected annually, and an estimated 435,000 people die each year. The mosquito vector, Anopheles mosquito, is also found in Japan. Cases of onset have also been noted in Japan.		It is endemic throughout the tropics and subtropics and has been reported most commonly in Southeast Asia, South Asia, and Central and South America, but also in Africa, Australia, and South Pacific islands. Cases of onset have been noted even in Japan in recent years. The main vector mosquito is Aedes aegypti (not normally resident in Japan), but it can also be transmitted by Aedes albopictus, which lives in the south of Honshu.	
Analysis results Rate of increase in population at risk from present *1	Climate change + GDP taken into consideration	Only climate change taken into consideration	Aedes aegypti	Aedes albopictus
Asia Pacific high income countries *2	-4.0%	4.0%	0.4%	-1.2%
Southeast Asia *3	-76.8%	73.2%	0.4%	-1.1%
Australia	-50.0%	0.0%	51.9%	27.1%

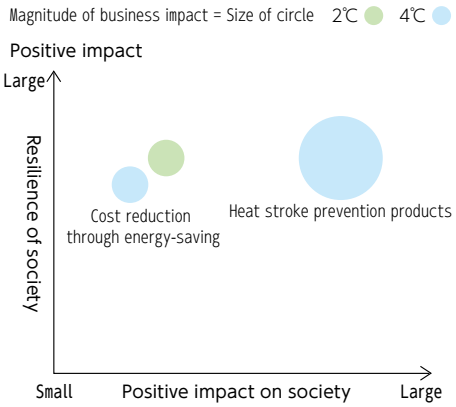
*1 The data represents the rate of increase for malaria in the number of people at risk in 2050 from the base years (1961 to 1990), and for the rate of increase for dengue fever in the number of people at risk in 2050 from the present. Both calculated at 4°C.
*2 Japan, Korea, Singapore, Brunei
*3 ASEAN countries, Myanmar, Vietnam, etc.

infectious diseases," "impact of heat stroke" and "cost reduction through investment in energy conservation and renewable energy."
The effects of infectious diseases and heat stroke caused by climate change may lead to expanding the market for plasma lactic acid bacteria (Lactococcus lactis strain Plasma), which directly activates plasmacytoid dendritic cells that act like the "commander-in-chief" of the immune system, and "Kirin Sekai-no-Kitchen-Kara SALTY LITCHI" a heat stroke prevention product.
Table 5 shows the results of an analysis of the impact of infectious diseases performed based on the Scenario *4 on WHO's health impacts of climate change.
We examined the effects of heat stroke based on the National Institute for Environmental Studies' climate change observations and predictions data *5. According to the RCP 8.5 scenario (equivalent to Group Scenario 3, 4℃ scenario), the number of heat-related excess deaths in Japan between 2080 and 2100 is estimated to be nearly 4 to 10 times or more than in the base period of 1981 to 2000. In this estimation process, we calculated the number of persons taken to hospital by ambulance in Japan due to heat stroke, which is considered to be highly correlated to temperature.
In the RCP 8.5 scenario for 2050, the number of heat stroke sufferers taken to hospital by ambulance is expected to be approximately 2 to 4 times higher than that in the base years (1981 to 2000). Assuming, based on these results, under the Kirin Group's Scenario 3 (4℃ scenario) that the market for heat stroke preventing non-alcoholic beverages would correlate accordingly, we estimated that the domestic market would expand by approximately 94.0 billion to 188.0 billion yen.
Regarding cost reduction through investment in energy conservation and renewable energy, we reflected the energy cost reduction of 1 billion yen-level disclosed in the news release dated June 25, 2019, on acceleration of efforts to reduce GHG emissions, promote further energy conservation, and shift energy to electricity, in our result.
Graph 7 shows these results. The vertical axis shows the degree of contribution to increasing the resilience of society, the horizontal axis shows the size of positive impact on society, including customers and local communities, and the size of the circle reflects the approximate magnitude of the financial impact on the Kirin Group.

6 Negative impact on businesses



7 Potential to capture business opportunities



*4 World Health Organization (2014) Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. https://apps.who.int/iris/handle/10665/134014
*5 S-8 Comprehensive Research on Impact Assessment and Adaptation for Climate Change 2014 Report https://www.nies.go.jp/s8_project/scenariodata2.html#no3

Assessment of resilience in our long-term environmental strategy

Based on the scenario analysis described above, we conducted an assessment of resilience for our long-term strategy Kirin Group's Long-Term Environmental Vision announced in 2013, and the results are reflected in the Kirin Group's Environmental Vision 2050 announced in 2020.

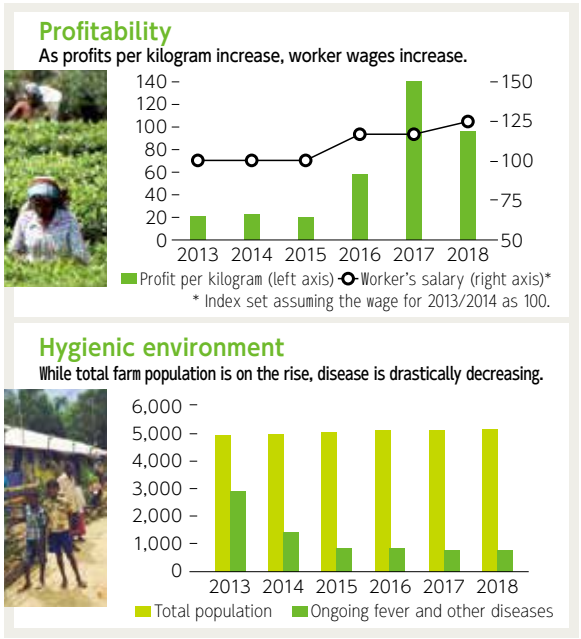
Biological resources

In the Kirin Group' s Long-Term Environmental Vision announced in 2013, we defined the goal to be achieved in 2050 as "Make sustainable use of biological resources." In our CSV Commitment, we continued to work on supporting Sri Lanka tea farms to obtain the Rainforest Alliance certification on top of responding to FSC and RSPO.

The results of the scenario analyses conducted in 2018 and 2019 predicted significant reductions in barley and hop yields in both Group Scenario 1 and Group Scenario 3. As for wine grapes, while some production regions are expected to see a significant decline in agricultural yields, there are new areas where a yield increase is expected. We found that there is a possibility of black tea leaves also being affected. The expected increase in procurement costs due to changes in the yields of these major raw materials came out to be about 5% in Scenario 1 and over 30% in Scenario 3. However, if global warming continues, it will be difficult to recover the condition.

We believe that our mass plant propagation technology in addition to our accomplishments and brewing technologies that do not rely on barley and use alternative sugars in categories such as happo-shu (low-malt beer) and new genres will be a major strength for the Kirin Group. This technology has the potential to contribute to the expansion of cropping areas in a short period of time if agricultural breeds resistant to global warming are developed. Moreover, our support for farms to obtain sustainability certification, which we have been promoting in Sri Lanka since 2013, is characterized by the fact that it aims to improve the sustainability of agricultural production areas from where we procure raw materials on the whole through support for farms to acquire the certification. Considering that the impact of global warming will lead to a decrease in agricultural yields in the entire production area, we can say that this is an initiative that enhances the resilience of society and the company, compared with activities that merely procure certified products.

9 Social impact of supporting the acquisition of Rainforest Alliance certification



This farm began training in 2013 and acquired the certification in 2014.

Figure 9 shows the social impact estimated for a certain farm that acquired the Rainforest Alliance certification in Sri Lanka. This farm began training in 2013 and acquired the certification in 2014. We can see from the graph that, along with the acquisition of certification, the profit per unit of tea leaf weight and the salaries of farm workers increase, while the morbidity rate of farm workers decreases. While this is data from the specific farm, it shows that support for acquiring the certification has positive financial and social impacts on the farms and their workers, making raw material production areas more sustainable.

As a result, it was confirmed that the initiatives under our Long-Term Environmental Vision demonstrate a certain level of resilience. At the same time, we have determined that in order to further enhance resilience and bring about a positive impact on society, we need to strategically work on our initiatives by also incorporating into our vision such activities as contributions by leveraging our strength in mass plant propagation technologies, efforts to reduce food waste, which is our KPI added after the announcement of the Long-Term Environmental Vision, and our support for farms to obtain sustainability certification that contributes not only to enabling the Kirin Group to secure sustainable procurement but also to giving a positive social impact to agricultural production regions. These activities are reflected in our targets: "Cultivate, expand and procure sustainable agricultural raw materials" and "Stand by the side of farmers to make raw material production areas sustainable" under the Environmental Vision 2050.

For FSC→P.29, P.47
Information on RSPO→P.29
Information on Sri Lankan tea farms→P.32
Information on mass plant propagation technologies→P.28

Water resources

In the Kirin Group's Long-Term Environmental Vision announced in 2013, we set our goal for 2050 as "We make sustainable use of water together with our communities," and have implemented various examinations and initiatives toward achieving this goal.

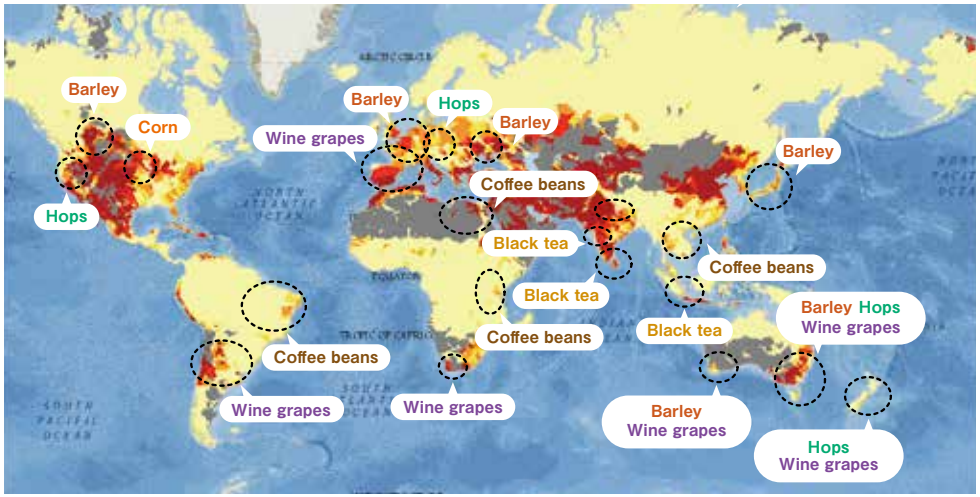
In an effort to identify the water risk to production sites, we conducted detailed surveys on three elements - water stress, water risk, and water pollution - based on WRI Aqueduct and other tools and information released by the government twice in 2014 and 2017.

The results of these surveys showed that while there was no significant water stress in Japan and Myanmar, serious water shortages would continue into the future in Australia. Furthermore, in the scenario analysis performed in 2019, assessments were made around 2040 based on Group Scenario 3. As a result, we found that water stress and water risk would rise in many ingredient agricultural production regions.

In Japan, we have been pioneering the initiative and leading the industry in carrying out Water Source Forestation Activities in the basin regions of our production sites since 1999. At the same time, our breweries have managed to reduce water consumption rates by nearly 50% (compared to 1990 levels). Also, in Australia, we have been reducing water consumption by a remarkably high rate.

Furthermore, as a measure to deal with water resources in agricultural production areas,

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



source : World Resources Institute

we launched an initiative in Sri Lanka in 2018 with the aim of protecting water sources on tea farms in five locations. We have also been running an education program to teach the approximately 15,000 residents living in the vicinity of these water sources about the importance of water and why we need to protect them.

On the other hand, Australia faced serious water shortages in various parts of the country in 2018 and 2019. In Japan, the country's logistics networks were significantly affected by the 2018 West Japan Torrential Rain Disaster. Also in Sri Lanka, which is a production region for tea leaves, record rainfall in 2017 caused landslides and massive flooding in urban areas, killing a number of people. Some tea farms from which we procure tea leaves also suffered serious damage. Natural disasters such as drought and heavy rain, which are considered to be caused by climate change, are becoming more common all over the country.

Given these circumstances, we have determined that, in order to further increase resilience, we must work on our initiatives in a strategic manner by also incorporating more concrete initiatives, such as our measures to reduce the impact of natural disasters on the logistics networks and our efforts to conserve water resources in raw material production regions, in our vision. These efforts are reflected in our goals of "Bring water, used as a raw material, to a sustainable state" and "Solve problems with water in a way that suits the characteristics of basin regions where our business bases are located" under the Environmental Vision 2050.

Information on assessment of water risks→P.41
Information on Water Source Forestation Activities→P.38
Information on water source conservation activities in Sri Lankan tea farms→P.42

Climate change

In the Kirin Group's Long-Term Environmental Vision announced in 2013, we stated, "We keep the CO_2 emissions of the value chain within the Earth's natural CO_2 absorption ability in cooperation with all the people associated with our value chain," and set our KPI to reduce the GHG emissions from the entire value chain by half from the 1990 level by 2050. In the CSV Commitment, the Kirin Group set reduction targets (GHG emission reduction of 30% compared to 2015 levels for combined Scope 1 and Scope 2 emissions and the same 30% reduction for Scope 3 emissions by 2030) that were the first targets by a Japanese food producer to be approved by the Science Based Targets initiative (SBTi), and our operating companies have been steadily reducing GHG emissions to achieve the targets.

Scenario analyses in 2018 and 2019 have revealed that climate change has a significant impact on biological and water resources and a negative financial impact on the Kirin Group. As global warming progresses it will be difficult to restore temperatures and the impact will continue. It is necessary not only to reduce the financial impact through "adaptation" measures for biological and water resources, but also to actively contribute to "mitigation."

On the other hand, findings from the scenario analysis in 2020 have indicated that we can anticipate future cost reductions by investing in renewable energy and expansion of businesses related to health foods that can help to prevent infectious diseases and heat stroke caused by climate change.

Based on the above, we have concluded that in order to contribute to mitigating global warming, it is necessary to set even more raised targets and implement measures to reduce GHG emissions, and that we need to lead to build a decarbonized society in order to expand the potential of business opportunities in response to climate change and to ensure the trust of society and customers in the Kirin Group.

These initiatives are reflected in our goals of "Realize Net-Zero GHG emission from the entire value chain" and "Lead to build a decarbonized society" in the Environmental Vision 2050.

In the scenario analysis conducted last year, we confirmed that our goals, targets, and directions for initiatives set under the conventional Long-Term Environmental Vision are effective and have a certain level of resilience. However, the circumstances surrounding the environment, such as climate change and the marine plastic problem, have changed significantly since the time we established the Long-Term Environmental Vision and the areas in which we must exercise corporate responsibility have also expanded significantly. The results of the scenario analysis also show that issues faced by society and businesses are interrelated in a complex manner, and that it is necessary to aim for the sustainability of both society and businesses by transcending the simple dichotomy between the environment and economy.

Against this backdrop, in 2020 we formulated the Environmental Vision 2050 in a way that considerably raises our targets from our previous long-term strategy. We believe that our efforts to realize our Environmental Vision 2050 will enable us to minimize the risks and financial impacts identified in the scenario analysis, enhance resilience by having a positive impact on society and businesses, and develop our businesses in a sustainable manner. Specific performance metrics will be set in the CSV Commitment going forward.

Identification of risks and opportunities

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. 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.

Theme	Scenario	Major risks	Time period			Negative impact on society	Negative impact on businesses	Possibility of difficulty in recovery	Major opportunities	Time period			Resilience of society	Positive impact on businesses	Positive impact on customers and society	Strategies for addressing risks and opportunities
			S	M	L					S	M	L				
Biological resources	Decrease in yields of main ingredient agricultural products in the 2℃/4℃ scenarios	Agricultural products: price hike, quality deterioration, concerns about stable supply, and transferring optimal production regions	●	●	●	↓↓↓	↓↓	↓↓↓	Securing of stable supply / Differentiation / Improvement of reputation through Kirin's original mass plant propagation technologies	●	●	●	↑↑↑	↑↑↑	↑↑↑	Cultivate, expand and procure sustainable agricultural raw materials Stand by the side of farmers to make raw material production areas sustainable
									Brewing technology using alternative sugars that does not rely on barley	●	●	●	↑↑↑	↑↑↑	↑↑	
									Stable supply / Strengthening relationships with agricultural production regions by supporting the acquisition of sustainable farm certification / Improvement of reputation through Kirin's original mass plant propagation technologies	●	●	●	↑↑	↑↑	↑	
	Regulations on the use of petroleum-based fertilizers/chemical pesticides	Agricultural products: poor growth, quality deterioration, pest spread, and price hike, concerns about stable supply, and transferring optimal production regions		●	●	↓↓↓	↓↓	↓↓↓	Stable supply / Cost reduction by providing appropriate guidance on the use of fertilizers and pesticides through the support for acquiring sustainable farm certification / Strengthening relationships with agricultural production regions by supporting the acquisition of sustainable farm certification / Quality improvement	●	●	●	↑↑	↑↑	↓↓	
	Decrease in domestic farmers/ expansion of idle lands	Difficulty in supplying unique agricultural ingredients (hops, grapes for Japan Wine)	●	●		↓	↓↓	↓↓↓	Community revitalization by promoting environmentally-friendly agriculture in agricultural production regions / Stable supply	●	●		↑↑↑	↑	↑↑↑	
	Interest in ecosystems/human rights	Reputation risk against procuring agricultural products inconsiderate to ecosystems/human rights	●	●		↓↓↓	↓↓	↓↓↓	Anticipation for ethical consumption	●	●	●	↑↑↑	↑↑↑	↑↑↑	
Water Resources	Water stress at production sites	Suspension of manufacture due to water shortage/decline in water quality	●	●	●	↓↓↓	↓↓↓	↓↓↓	Cost reduction through water conservation	●	●		↑↑↑	↑	↑↑↑	Bring water, used as a raw material, to a sustainable state Solve problems with water in a way that suits the characteristics of basin regions where our business bases are located
		Reputation risk against water use during droughts	●	●	●	↓↓↓	↓↓↓	↓↓	Improvement of reputation for water conservation considerate to local communities	●	●	●	↑↑↑	↑↑↑	↑↑↑	
	Water risk in domestic production sites/logistics sites/logistics channels	Suspension of manufacture and transport due to floods, etc.	●	●	●	↓↓↓	↓↓↓	↓↓↓	Continually improved BCP and execution capabilities	●	●		↑↑↑	↑	↑↑↑	
									Increase in trust / Stable operation in the community through continuing Water Source Forestation Activities and clean-up activities in basins	●	●		↑↑	↑↑	↑↑	
	Water intake/drainage restrictions at production sites	Suspension of manufacture due to water shortage/wastewater restriction	●	●	●	↓↓↓	↓↓↓	↓↓↓	Cost reduction through water conservation	●	●		↑↑↑	↓	↑↑↑	
	Water risk/water stress in ingredient agricultural production regions	Rise in prices of agricultural products/concern about stable supply	●	●	●	↓↓↓	↓↓↓	↓↓↓	Stable supply through measures to conserve water resources in ingredient production regions / Strengthening relationships with agricultural production regions by supporting the acquisition of sustainable farm certification / Improvement of reputation through Kirin's original mass plant propagation technologies		●	●	↑↑↑	↑↑	↑↑	
									Stable supply through measures to conserve water resources in raw material production areas / Strengthening relationships with agricultural production regions by supporting the acquisition of sustainable farm certification / Improvement of reputation through Kirin's original mass plant propagation technologies	●	●	●	↑↑↑	↑↑	↑↑	
	Water intake restrictions in agricultural production regions	Poor growth/decline in quality of agricultural products/rise in prices/ concern about stable supply	●	●	●	↓↓↓	↓↓↓	↓↓↓	Stable supply through provision of water-saving agricultural technology in raw material production areas/strengthening relationships with agricultural production regions by supporting the acquisition of sustainable farm certification / Improvement of reputation through Kirin's original mass plant propagation technologies	●	●	●	↑↑↑	↑↑	↑↑	
Containers and Packaging	Large price fluctuations in the oil market under the 2℃/4℃ scenarios	Concerns about supply of raw materials for PET bottles		●	●	↓↓↓	↓↓↓	↓↓↓	Stable procurement of plastic containers that are not affected by the oil market by increasing the use of recycled resin		●	●	↑↑↑	↑↑↑	↑↑↑	Develop and disseminate sustainable containers and packaging Build a resource-recycling system to make containers and packaging sustainable
	Deforestation in the 2℃/4℃ scenarios and inconsiderate agriculture, forestry, and livestock industries	Reputation risk/concerns about stable supply of raw materials for paper containers and packaging	●	●	●	↓↓↓	↓↓↓	↓↓	Stable supply of paper products with FSC certification / Anticipation for ethical consumption	●	●	●	↑↑↑	↑↑↑	↑↑↑	
	Expansion of the marine plastic problem/lack of resource circulation system	Reputation risk against PET bottles/ concerns about stable supply of recycled resin	●	●	●	↓↓↓	↓↓↓	↓↓	Stable procurement of plastic containers by increasing the use of recycled resin and inedible resin	●	●	●	↑↑↑	↑↑↑	↑↑	
									Reduced use of container materials through our original light-weight packaging technology / Cost reduction	●	●	●	↑↑↑	↑↑↑	↑	
									Improvement of reputation for seriously addressing the marine plastic problem	●	●	●	↑↑↑	↑↑↑	↑↑↑	
Climate change	Widening of regulations on carbon pricing under the 2℃/ 4℃ scenarios	Rise in fuel procurement costs		●	●	↓↓	↓↓	↓↓	Cost reduction through early achievement of GHG reduction targets		●	●	↑↑↑	↑↑↑	↑↑	Realize Net-Zero GHG emission from the entire value chain Lead to build a decarbonized society
									Elimination of the impact of carbon pricing through energy transition from natural gas and heavy oil to electricity or renewable energy		●	●	↑↑↑	↑↑↑	↑↑	
	Targets under the Paris Agreement not achieved	Various effects under the 4℃ scenario or beyond		●	●	↓↓↓	↓↓↓	↓↓↓	Market expansion and sales expansion of non-alcoholic beverages, tablets, and lactic acid bacteria products that help prevent infectious diseases and heat stroke		●	●	↑↑↑	↑↑↑	↑↑	
	Increase in renewable energy facilities	Reputation risk against energy use resulting from environmentally-inconsiderate construction/operation of renewable energy facilities		●	●	↓↓	↓↓	↓↓	Improvement of reputation through ethical use of renewable energy	●	●	●	↑↑↑	↑↑↑	↑↑↑	

↓ : Negative impact ↑ : Positive impact The number of arrows shows the magnitude of impact.

Strategies for addressing material environmental issue

We believe that we will be able to reduce climate-related and other risks, enhance resilience, and capture business opportunities by raising our target level from our previous Long-Term Environmental Vision to the new Environmental Vision 2050 and implementing concrete measures that take advantage of the Kirin Group's strengths, such as research and development capabilities, engineering capabilities, and the partnerships we have built with international NGOs and in raw material production areas.

Reinforced points in the Kirin Group's Environmental Vision 2050

Commitment and scope

From activities completed in-house to those extended to the whole of society
From domestic focus to global
From minimizing negative impacts
To getting the next generation involved, working together with the whole of society

Biological Resources	●Cultivate, expand and procure sustainable agricultural raw materials ●Stand by the side of farmers to make raw material production areas sustainable
Water Resources	●Continue to reduce the volume of water use in group operational bases ●Solving water issues in the value chain
Containers and Packaging	●Build a resource-recycling system ●Develop new containers and services
Climate Change	●Realize Net-Zero GHG emission by 2050 ●Achieve 100% renewable energy at an early stage by joining RE100 ●Lead to build a decarbonized society

The Kirin Group's Strengths

Financial impact

Positive
- Energy cost reduction
- Infectious disease control market
- Heat stroke prevention market
- Ethical consumption

Negative
- Hikes in agricultural product prices
- Drought damage
- Flood damage
- Investment in energy conservation
- Renewable energy price
- Infectious disease
- Measures against marine plastic pollution

Scenario

Physical risk
- Reduction in major agricultural yields
- Water risks in production sites/logistics sites/logistics channels
- Water stress at production sites
- Water risk in agricultural production regions
- Water stress in agricultural production regions

Migration risk
- Regulations on the use of petroleum-based fertilizers/chemical pesticides
- Decrease in domestic farmers/expansion of idle lands
- Major fluctuations in the market for oil used as material for plastic
- Deforestation due to inconsiderate agriculture, forestry, and livestock industries
- Expansion of the marine plastic problems /lack of resource circulation system
- Expanded regulations on carbon pricing, etc.
- Target under the Paris Agreement not achieved
- Increase in demand for renewable energy

Research and development capabilities

Package development technology capabilities (Institute for Packaging Innovation)

	Social value	Economic value
Smart-cut cartons	17% reduction in paper usage (compared to 2014) GHG 2,000 tonnes reduction	170 million yen reduction per year
Lighter PET bottle for the 2.0-liter	20% lighter(compared to 2014) GHG 3,850 tonnes reduction	160 million yen reduction per year
Lighter medium-size bottles	20% lighter GHG 1,000 tonnes reduction	30 million yen reduction per year

Mass plant propagation technology (Kirin Central Research Institute)

Basic technology → Technology for practical applications


Culture bag

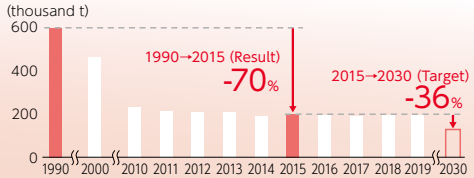

Culture vessel system


Cultured soybeans

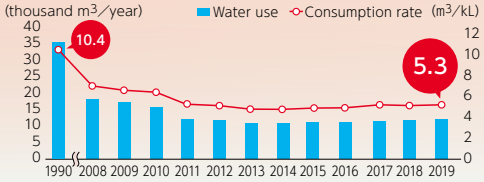

Soybean field

Engineering capability

GHG reduction



Reduction of water consumption rate



Partnerships

Sri Lankan tea farms

FSC


Sample

Next generation