Global Trends and Kirin's Actions

All of the Kirin Group's businesses are directly formed from the benefits of natural capital. For example, we use agricultural products and water to make beverages, and then package them and deliver them to customers. The greenhouse gases (GHGs) generated during these processes lead to climate change and have a major impact on agricultural products and water, our raw materials. Environmental initiatives are essential to the business continuity of the Kirin Group.

Based on this understanding, the Kirin Group has always been a pioneer in its promotion of environmental measures. The Kirin Group Long-Term Environmental Vision that we announced in 2013 was a long-term strategy targeting the year 2050, which was not common at the time. We were the first Japanese food company to implement a number of initiatives, including our support for tea farms to acquire the certification for sustainable agriculture, the approval of our 2℃ reduction target by the SBT Initiative, and our expression of support for the TCFD recommendations.
Following the announcement of our new long-term strategy, the Kirin Group's Environmental Vision 2050, in February 2020, we will continue to be an industry pioneer, including using FSC®-certified paper for all paper containers of alcohol and non-alcohol beverages in Japan, upgrading our Science Based Target for reducing emissions to a 1.5℃ pathway, and switching to renewable energy for all electric power used at Kirin Brewery's Nagoya Plant.

Kyoto Protocol | COP10 Nagoya Protocol on Biological Diversity | Paris Agreement; SDGs | TCFD | IPCC Special Report on Global Warming of 1.5℃

1997

- Kirin Brewery's Kobe Plant, an advanced model brewery for low-carbon and water-saving production, completed (1997)

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

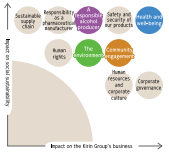
- Reduced weight for all large bottles (2003)

2010

- Action Plans for Becoming a Low-Carbon Corporate Group announced (2009)
- Kirin Group's Long-Term Environmental Vision announced (2013)
- Survey of water risks to natural capital and major global business sites (2014)
- Declaration of Support for Biodiversity Conservation announced (2010)
- Guidelines for the Procurement of Sustainable Biological Resources and an Action Plan announced (2013)
- Start of support for tea farms in Sri Lanka to acquire Rainforest Alliance certification (2013)
- Start of development and deployment of lightweight medium bottles (2014)
- Use of 100% recycled PET bottles started (2014)

2015

- Group Materiality Matrix announced (2016)



- CSV Commitment announced as SDGs Initiative (2017)
- Becomes the first food and beverage manufacturer in Japan to be approved by SBT (2017)

2017

- First Japanese company to support the TCFD recommendations (2018)
- Announcement of CSV long-term and non-financial targets "Kirin Group CSV Purpose" (2019)

- Start of water source conservation activities in Sri Lankan tea farms (2018)

- Kirin Group Plastic Policy announced (2019)

2019

- Kirin Group's Environmental Vision 2050 announced (2020)
- "Kirin Holdings Green Bonds" issued (2020)
- Achieved use of FSC-certified paper in 100% of paper containers at Kirin Brewery, Kirin Beverage, and Mercian (2020)

FSC® C137754

- Joined RE100 (2020)
- Upgraded SBT to 1.5˚C (2020)
- Expanded R100 PET bottles to cover the *Nama-cha* series (2021)
- 100% renewable energy purchased at Kirin Brewery's Nagoya Plant (2021)

2020

Find out more at ra.org https://www.rainforest-alliance.org/

Determination of Materiality

Environmental problems may pose a major business risk in the Kirin Group's businesses, but solving them can also lead to the creation of value for society and our businesses.
From this perspective, when determining the materiality of environmental issues, we make sure to fully understand various social issues and impacts, such as trends in international standards, policies, and initiatives, the results of scenario analysis, and the circumstances surrounding natural disasters, and we not only consider the impact on the Kirin Group's businesses, but also fully consider the impact on the value chain of our businesses and the communities and societies in which we operate. We determine materiality by engaging in dialogue with a variety of stakeholders, including those interested in our company's finances, as well as those affected by our business activities in social and environmental terms, both currently and in the future.
Based on environmental materiality analysis, we have determined that "biological resources," "water resources," "containers and packaging," and "climate change" are significant environmental issues for the Kirin Group. Targets and specific initiatives also reflect our environmental vision, which forms a long-term strategy.

STEP1

Identification of relevant issues

We examine the circumstances surrounding the Kirin Group to identify relevant issues. When developing the Environmental Vision 2050, we identified issues by referring to factors such as international standards and policies, domestic and international discussions, trends in international initiatives, the results of scenario analysis based on the TCFD, the seriousness of natural disasters and other environmental impacts that are actually occurring, and opinions obtained in workshops with investors and young people. Going forward, we will continue to engage in dialogue with various stakeholders, including local communities in areas where we source our agricultural raw materials and where business sites are located, as well as customers, to identify relevant issues.

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

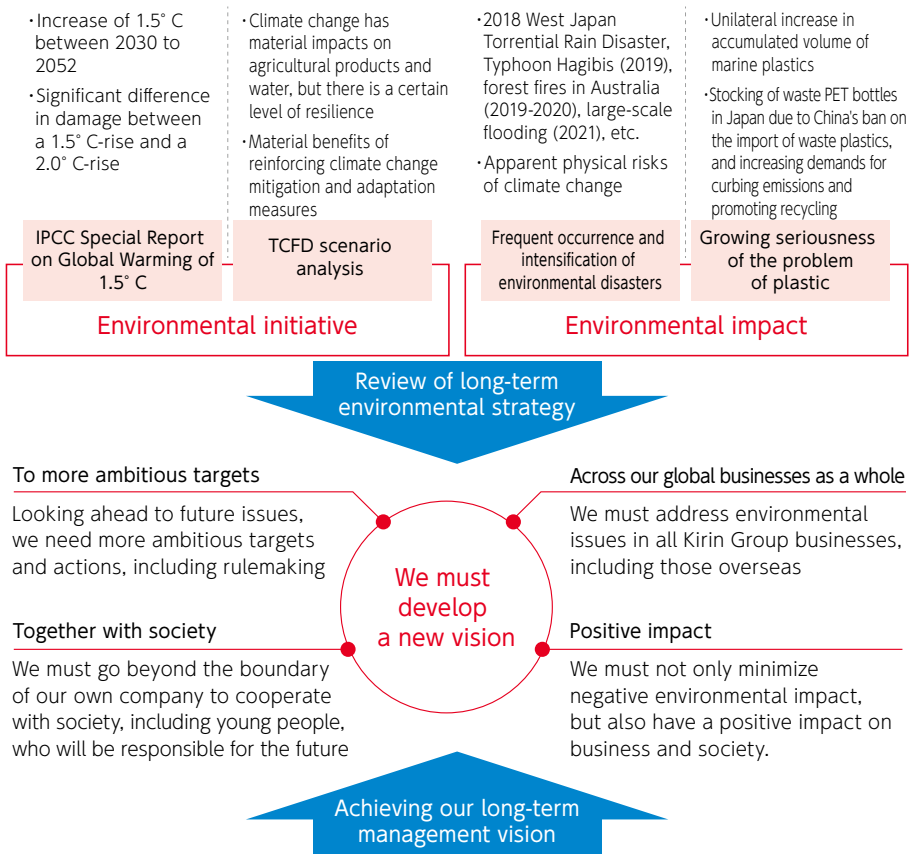
Determination of materiality

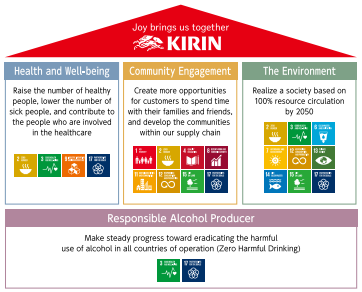
By holding discussions at the executive management level, we identify risks to and opportunities for businesses and society, assess their materiality and develop action plans that include metrics. In formulating the Environmental Vision 2050, based on the issues identified and information gathered in 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. We will perform periodic reviews to update issues and KPIs that need to be addressed on an ongoing basis.





CSV Purpose

2027 Vision

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

"One KIRIN" Values

Passion Integrity **Diversity**

Kirin Group's Environmental Vision 2050

The Kirin Group reviewed its previous environmental vision and developed the Kirin Group's Environmental Vision 2050 as a new long-term strategy to strengthen the resilience of society and the Kirin Group. We announced the vision in February 2020, and are promoting efforts to achieve it.
Since 2013, the Kirin Group has placed the concept of "CSV," in which we address social issues through our core businesses by making social and corporate value compatible, at the center of our management strategy. At the same time, in order to take the initiative in addressing global environmental issues, we developed the Kirin Group Long-Term Environmental Vision, a long-term strategy for 2050, and have been developing our businesses with the aim of achieving this vision. Starting with the adoption of the Paris Agreement, there have been significant changes, however, in global developments surrounding the environment, including a number of international initiatives such as SBTi and the TCFD being launched, and the discussion of marine pollution caused by plastics as a global issue. Furthermore, it is expected that corporate environmental initiatives will also shift from being self-contained to having a positive impact on society as a whole.
The Kirin Group has concluded that we must establish a new environmental vision to meet such social demands.
Kirin aims not only to minimize negative impact and attain environmental neutrality, but also to have a positive impact on society beyond the boundary of our own company. Based on this new vision, we will broaden our horizons and expand the scope of our activities from our value chain to cover society as a whole. Together with society, including the young people who will lead the future, we will create a prosperous world for the next generations.

Kirin Group's Environmental Vision 2050

Enrich the Earth with Positive Impact

Biological Resources
A society that values sustainable biological resources.

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

Water Resources
A society that values sustainable water resources.

Climate Change
A society that has overcome climate change.

Input to and Output from Kirin Products
Environmental Interactions

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

Efforts for Realization

Biological Resources
A society that values sustainable biological resources.

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

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

Water Resources
A society that values sustainable water resources.

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

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

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

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

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

Climate Change
A society that has overcome climate change.

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

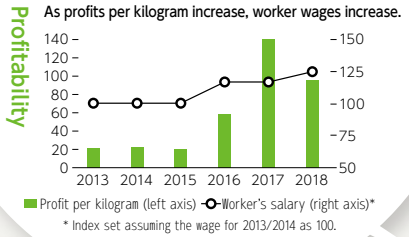
Lead to build a decarbonized society
- Build a business model that contributes to a decarbonized society with customers and other stakeholders.
- Support research to mitigate climate change and expand responsible renewable energy to society.

Aiming for a positive impact from the start

The Kirin Group will not describe the Environmental Vision 2050 as something occurring in the distant future, but will instead start at a rapid pace with products that embody our vision, thus creating outcomes that have a positive impact.

Increasing profits at Sri Lankan tea farms, leading to higher salaries for workers

Social impact of supporting for Sri Lankan tea farms to get Rainforest Alliance Certified



Realization of a society where plastics are recycled and forest conservation

Expanded the use of "R100 bottles" and no label products

Reduced resin usage by approximately 1,400 tons per year

Reduced CO_2 emissions by approximately 1,300 tons per year

100% use of FSC-certified paper

Mitigation of climate change

As a result of introducing renewable energy:

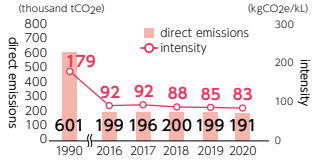
Kirin Brewery Nagoya Plant

Reduced GHG emissions by 7,400 tons per year

Kirin Brewery's Nagoya, Sendai, Kobe, and Shiga plants

Reduced GHG emissions by 4,500 tons per year

Direct emissions (Scope 1+2) and intensity (emissions/production) of Kirin Brewery



Climate change

- Kirin Brewery's Nagoya Plant began using 100% renewable energy for all purchased electricity. (August 2021)
- Kirin Brewery's Nagoya, Sendai, Kobe, and Shiga plants introduced solar power generation using a PPA model.(2021)

Declaration and participation for green recovery

- Signed joint statements"Business Ambition for 1.5℃" and "Uniting Business and Governments to Recover Better." (June 2020)
- Joined RE100. Declared our aim of using renewable energy for 100% of electric power used by 2040. (November 2020)
- Upgraded SBT "2℃ target" to "1.5℃ target" certification. (December 2020)

Container and packaging

- Expanded "R100 PET bottles" made from 100% recycled PET resin to cover *Kirin Nama-cha* (600ml) and *Kirin Nama-cha Hoji Sencha* (600ml). (March 2020)
- Released *Kirin Nama-cha No Label* and *Kirin Nama-cha Hoji Sencha No Label* as exclusive e-commerce products. (March 2020)
- Start collection of used PET bottles at convenience stores. (July 2021)
- Kirin Brewery, Kirin Beverage, and Mercian, became Japan's first companies to use 100% FSC-certified paper for all paper containers. (November 2020)

Biological resources

- Started supporting for small coffee farms in Vietnam to get Rainforest Alliance Certified (March 2020)
- 93 large tea farms in Sri Lanka obtained certification. (December 2020)
- Released of products for year-round sales using certified tea leaves. (July 2021)

Research and development

Through joint research with Bridgestone, Kirin succeeded in developing a method that utilizes "bag-type culture production technology," one of Kirin' s proprietary "mass plant propagation systems," to improve the productivity of natural rubber derived from the "guayule," which can be grown in arid regions. (January 2021)

Disclosure based on TCFD recommendations

The Kirin Group has been building the capacity to disclose information that complies with the recommendations released in 2017 by the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board (FSB). We aim to achieve this within about five years. Our disclosures include assessments of social and business risks and opportunities relating to climate change, and of the resilience of our strategies. We began to conduct and disclose scenario analysis in 2018 and also became the first Japanese food company to declare our support for the TCFD recommendations in December 2018. Since 2020, we have analyzed and disclosed opportunities for business growth brought about by climate change.

Governance

At the Kirin Group, the Board of Directors deliberates and makes resolutions on significant matters, such as basic policies related to the environment as a whole, including climate change issues, while the Group Executive Committee deliberates and makes decisions concerning the setting of targets, such as upgrading to SBT1.5 and joining RE100. The Kirin Group sets environmental targets as part of its CSV Commitment, a non-financial key performance indicator. We incorporate these targets into the management plans of each operating company, and reflect progress in achieving them in the performance evaluations of Kirin Holdings Executive Officers. The Group CSV Committee, which is chaired by the CEO of Kirin Holdings and whose members consist of the CEOs of key operating companies, discusses responses to environmental issues across the Kirin Group and submits any decisions it makes to the Board of Directors. Every year, the Board of Directors receives reports on and reviews progress in environmental management and risks and growth opportunities related to environmental issues.

More information on corporate governance→P75

Strategy

Following the adoption of the Paris Agreement in 2015, the IPCC special report on the impacts of global warming of 1.5° C in 2018, and the results of scenario analysis, the Kirin Group revised its environmental vision, which forms a long-term strategy, enhanced its targets, and incorporated them into its management strategy.
As mitigation measures, in order to achieve net zero GHG emissions across the entire value chain by 2050, we have upgraded our SBT to a 1.5° C target, and we will address transitional risks by expanding the use of renewable energy and making efforts to save energy. As adaptation measures, we will respond to physical risks with technologies for utilizing alternative sugars that do not depend on barley, mass plant propagation technologies, technologies that reduce water usage, our support for the acquisition of sustainable farming certification, etc. We will also contribute to solving social issues caused by climate change, such as the spread of heatstroke and infectious diseases, by providing products that offer solutions.

More information on our environmental vision→P10

More information on scenario analysis→P14～18

Main potential impacts

- Increase in procurement costs due to decline in yields of agricultural products
- Increase in energy costs due to carbon pricing
- Disruptions to operations due to droughts
- Disruptions to operations due to floods
- Decline in yields of agricultural raw materials due to droughts and floods
- Social issues caused by climate change (infectious diseases and heatstroke)

Measures to respond and adapt to physical risks

- Brewing technology that does not rely on barley
- Mass plant propagation technologies
- Development of advanced water usage reduction technologies and flood response manuals
- Support for farms to acquire the certification for sustainable agriculture and conservation of water sources in growing areas
- Products addressing social issues associated with climate change, etc.

Measures to respond to and mitigate transitional risks

- Net zero GHG emissions across the value chain (2050)
- Enhanced medium-term emission reduction target (obtained approval for the "SBT1.5")
- Increase use of renewable energy (joined RE100)
- Reduce GHG emissions on a medium- to long-term profit neutral basis

Risk management

The Kirin Group has established the Group Risk and Compliance Committee within Kirin Holdings to oversee risk management through activities such as quarterly monitoring of risk factors, including climate change-related risks. However, we have concluded that climate change-related risks cannot be sufficiently identified solely through the conventional approach of judging the materiality of risks based on the degree of impact and the likelihood of occurrence. For that reason, we have adopted a new approach to identify and examine significant risks based on the development, analysis, and assessment of scenarios for risk for which the probability of occurrence is unknown, but where the consequences of occurrence on our businesses would be extremely serious.

More information on risk management→P76

Metrics and targets

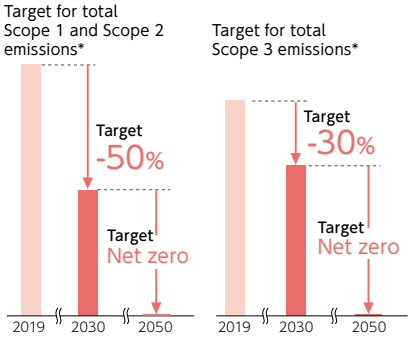
The Kirin Group has set a target of net zero GHG emissions across the entire value chain by 2050. As medium-term targets, we have revised our GHG reduction targets upward to a 50% reduction under Scope 1 + 2 and a 30% reduction under Scope 3 from the 2019 level by 2030 (obtained approval for the "SBT for 1.5° C" standard), and have set a target for renewable energy use of 100% (joined RE100) by 2040 (both targets were set in 2020).
For adaptation measures, e.g. support for obtaining sustainable farming certification and the supply of products that combat heatstroke and infectious diseases, each operating company breaks down the Group targets, sets its own targets as CSV commitments, and works on them by establishing a road map.

Key metrics and targets→P21

Results→P22

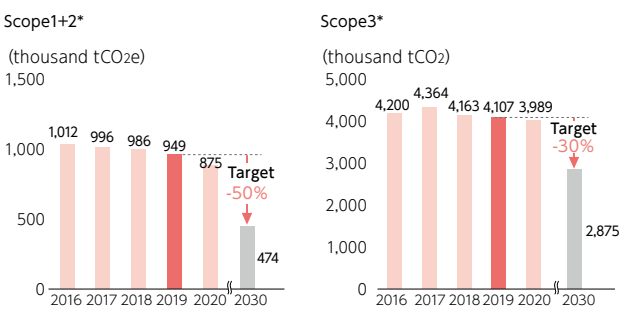
More detailed data→P99～103

Target



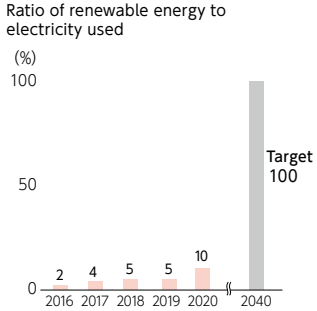
*In December 2020, we moved from the old 2° C target to a 1.5° C target, which has been approved under the Science Based Target initiative (SBTi).

Progress
Trends of GHG emissions against medium-term targets



*The above graph shows progress made toward the "SBT 1.5° C" target of a 50% reduction in Scope 1 + Scope 2 and a 30% reduction in Scope 3 GHG emissions from the 2019 level by 2030.

Progress toward the target for increased use of renewable energy



Results of scenario analysis and reflection in strategy prior to 2020

Prior to the publication of the TCFD final recommendations at the end of June 2017, the Kirin Group, as a company formed from natural capital, had been aware of issues related to biological resources and water resources, and had conducted various risk surveys. This accumulation of many years' knowledge about risk assessment in the value chain enabled us to begin scenario analysis soon after the TCFD final recommendations were published in 2017, and to disclose information in line with the TCFD recommendations in the Kirin Group Environmental Report 2018 as early as the end of June 2018.

In 2018, we investigated and evaluated the impact on agricultural yields in three scenarios combining temperature and socioeconomic scenarios, using the IPCC's Representative Concentration Pathways (RCPs) as the main pathways and the Shared Socioeconomic Pathways (SSPs) as supplementary pathways.

In 2019, under the 2℃ and 4℃ scenarios set in-house, we analyzed the impacts of climate change on agricultural raw materials per major supplier country in 2050 and 2100 . We also conducted water stress and water risk surveys at agricultural production sites, water risk surveys at production and distribution facilities, and carbon pricing impact assessments.

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

Effectiveness of scenario analysis

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

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

Kirin Beverage has actively promoted a modal shift, partly also to cope with the shortage of truck drivers, and has achieved a significant reduction in GHG emissions. This shift to railway transportation, however, happened to disrupt deliveries during peak sales periods due to the disaster, which caused a major impact. We had listed the impact of natural disasters on transportation as a major risk in conventional risk management, and we had made some efforts to mitigate this risk. However, since we regarded the probability of occurrence as low, we did not consider detailed countermeasures. Learning from this experience, in the fall of 2018, we prepared and began implementing a manual for what to do in the event of similar disasters. Through this measure, we successfully avoided any major impacts from Typhoon Faxai (2019 Boso Peninsula Typhoon) and Typhoon Hagibis (2019 East Japan Typhoon) in October 2019.

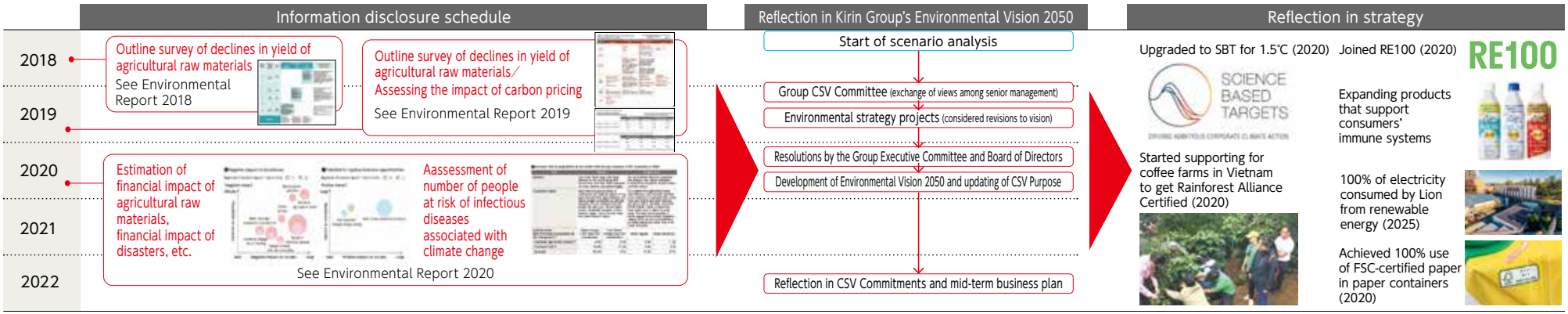
Currently, we apply scenario analysis methods to risk management other than climate change as well.

Reflection in strategy

At a meeting in June 2019, the Group CSV Committee reported and discussed the situation surrounding the rapidly changing environment following the adoption of the Paris Agreement, and senior management provided directions for the launch of the project in order to develop measures to take. Consequently, the Board of Directors adopted and revised the "environmental vision" and "GHG emissions reduction targets," which now reflect the results of scenario analysis as significant input information.

We have also reflected the results of scenario analysis in mitigation measures such as our joining of the RE100 , our revisions of specific targets such as upgrading our SBT to 1.5℃, our use of renewable energy for 100% of electricity used at the Kirin Brewery Nagoya Plant, the introduction of large-scale solar power generation based on a PPA model at four breweries, and our use of renewable energy for 100% of electricity used in our Australian business by 2025, as well as in adaptation measures such as our rollout of support for coffee farms in Vietnam to acquire the certification for sustainable agriculture as we provide such support at tea farms in Sri Lanka, and the achievement of the use of FSC-certified paper for 100% of paper containers in the Japanese beverages businesses as a means of forest conservation.

Going forward, we plan to revise our CSV Commitments to incorporate climate change and a variety of other environmental issues into the management strategies of each of our operating companies, and to incorporate them into our next mid-term business plan starting in fiscal 2022.



Scenario analysis

	Hypothetical scenario	Scenario analysis results	Scenario driver	Types of risks and business opportunities	Time frames	Financial impact	Strategies	Related pages
Kirin Group Scenario 3 4℃ scenario; SSP3, RCP8.5	Laws and regulations on climate change will become more stringent in developed countries, but less so in developing countries, resulting in insufficient reductions to GHG emissions. As a result, global temperatures continue to rise and torrential rains and other natural disasters caused by climate change occur more frequently than at present. The impact of a carbon tax on energy costs will not have a significant impact on business. An increasing number of people face concerns about health impacts as global warming leads to an increase in the number of people at risk for infectious diseases, infections spread even to areas that have not previously been affected by these diseases, and the number of people requiring emergency services for heatstroke rises significantly.	**Business risks:** ●As a result of global warming, yields of major agricultural raw materials (barley, hops, and coffee beans) decrease significantly, affecting procurement costs. Quality degradation is also expected. ●There may also be an impact on alternative sugars and agricultural products that are sources of protein, which are required for low-malt and no-malt beer product. ●Carbon taxes are introduced in major countries where the Kirin Group operates its businesses, but they are low so the impact is negligible. ●Floods due to extreme rainfall and droughts accompanying climate change cause some business sites to suspend production.	Increase in procurement costs due to decline in yields of agricultural products	Physical risk (chronic) / transitional risk (market and reputation)	Medium- to long term	Approx. 3.0 to 12.0 billion yen	●Brewing technology that does not rely on barley ●Mass plant propagation technologies ●Support for farms to acquire the certification for sustainable agriculture	**P15** **P34** **P29, P30, P33**
			Increase in energy costs due to carbon pricing	Transitional risk (policy and law, technologies, and markets)	Medium- to long term	Tax burden if GHGs are not reduced Approx. 1.3 billion yen (2030) Approx. 1.7 billion yen (2050) Tax burden if GHGs are reduced Approx. 0.6 billion yen (2030) 0 yen (2050)	●Reduce GHG emissions on a medium- to long-term profit neutral basis	**P17~P18** **P59~P69**
			Disruptions to operations due to droughts	Physical risk (chronic) / transitional risk (reputation)	Short- and long-term	Approx. 0.6 billion yen (Lion Castlemaine Perkins Brewery) Approx. 30 million yen (Thai Kyowa Biotechnologies)	●Advanced water usage reduction technologies	**P16~P17** **P37~P44**
			Disruptions to operations due to floods	Physical risk (chronic)	Short- and long-term	Approx. 1.0 billion yen (Lion Castlemaine Perkins Brewery) Approx. 5.0 billion yen (Sendai Brewery)	●Development of flood response manuals	**P16~P17** **P37~P44**
			Decline in yields of agricultural raw materials due to droughts and floods	Physical risk (chronic)	Medium- to long term	Included in procurement costs due to decline in yields of agricultural products (See above)	●Measures to address extreme rainfall and conserve water sources in areas where agricultural raw materials are produced	**P16~P17, P40**
		Social impact: ●The number of persons requiring emergency services because of heatstroke doubles owing to rising global temperatures. ●The population exposed to the risk of infectious diseases increases as a result of higher temperatures, and a market for immunity-related products expands and establishes itself.	Population requiring emergency services for heatstroke	Physical risk (chronic)/ transitional risk (market)/ products and services/ markets	Short- and long-term	In 2050, the size of the Japanese market is expected to increase by a factor of 2-4x compared with the years 1981 to 2000, growing to between 90 billion yen and 190 billion yen	●Contribute to products to counter heatstroke	**P17~P18**
			Population exposed to infectious diseases	Physical risk (chronic)/ transitional risk (market)/ products and services/ markets	Short- and long-term	The market for immune-related products in Asia as whole is expected to increase by a factor of 1.8x compared with 2020, to around 750 billion yen by 2030	●Contribute to products that support consumers' immune systems	**P17~P18**
Kirin Group Scenario 1 2℃ or 1.5℃ scenario; SSP1, RCP2.6	In addition to a carbon tax, carbon border adjustment mechanism are introduced, and stringent climate change laws and regulations are in place around the world. As a result, the increase in global temperature is suppressed, climate disasters do not increase much more than the current level, and the impact on agricultural yields is limited. On the other hand, carbon taxes and other regulations lead to increases in energy costs and affect other procurement items. Although global warming does not have a significant impact on human health, the impact of climate change becomes increasingly noticeable on a daily basis, including hot summer days and typhoon damage.	**Business risks:** ●Although yields of major agricultural raw materials decline owing to global warming, the impact on procurement costs is negligible. ●The impact is negligible on alternative sugars and agricultural products that are sources of protein, which are required for low-malt and no-malt beer product. ●Energy costs are significantly higher because of carbon taxes introduced in the major countries in which the Kirin Group operates its businesses. ●Some business sites are affected by floods caused by extreme rainfall and droughts associated with climate change, but it is within the scope of our ability to respond.	Increase in procurement costs due to decline in yields of agricultural products	Physical risk (acute)	Medium- to long term	Approx. 1.0 to 2.5 billion yen	●Brewing technology that does not rely on barley ●Mass plant propagation technologies ●Support for farms to acquire the certification for sustainable agriculture	**P15** **P34** **P29, P30, P33**
			Increase in energy costs due to carbon pricing	Transitional risk (policy and law, technologies, and markets)	Medium- to long term	Tax burden if GHGs are not reduced Approx. 7.7 billion yen (2030) Approx. 9.9 billion yen (2050) Tax burden if GHGs are reduced Approx. 3.9 billion yen (2030) 0 yen (2050)	●Reduce GHG emissions on a medium- to long-term profit neutral basis	**P17~P18** **P59~P69**
			Disruptions to operations due to droughts	Physical risk (acute)	Short- and long-term	Same as 4℃ scenario, but probability of occurrence is expected to be low	●Advanced water usage reduction technologies	**P16~P17** **P37~P44**
			Disruptions to operations due to floods	Physical risk (acute)	Short- and long-term	Same as 4℃ scenario, but probability of occurrence is expected to be low	●Development of flood response manuals	**P16~P17** **P37~P44**
			Decline in yields of agricultural raw materials due to droughts and floods	Physical risk (acute)	Medium- to long term	Same as 4℃ scenario but not significant	●Measures to address extreme rainfall and conserve water sources in areas where agricultural raw materials are produced	**P16~P17, P40**
		Social impact: ●Although the number of persons requiring emergency services for heatstroke increases owing to rising global temperatures, it is not at a level that causes significant concern. ●The population exposed to the risk of infectious diseases increases as a result of higher temperatures, leading to increased interest in enhancing immunity.	Population requiring emergency services for heatstroke	Physical risk (acute)/ transitional risk (market)/ products and services/ markets	Short- and long-term	Same as 4℃ scenario but not significant	●Contribute to products to counter heatstroke	**P17~P18**
			Population exposed to infectious diseases	Physical risk (acute)/ transitional risk (market)/ products and services/ markets	Short- and long-term	Same as 4℃ scenario but not significant	●Contribute to products that support consumers' immune systems	**P17~P18**

* Types of risks and business opportunities: Determined according to the TCFD risk and opportunity types and categories
Time frames: Determined as follows: Short-term: 2021 to 2024 (from present to period of next mid-term business plan); medium-term: 2025 to 2030 (period covered by KV2027 and the SDGs); and long-term: 2031 to 2050 (target year for the Kirin Group' s Environmental Vision 2050)

Biological resources

Assessment of impact on major agricultural raw materials

In 2021, we calculated the financial impact of a decline in the yields of agricultural raw materials on our Japan alcohol and non-alcoholic beverages businesses, as well as our beer businesses in Australia, New Zealand, and Myanmar. We found that under the 2℃ scenario, it may be possible (75th percentile) to reduce the financial impact by approximately 9.0 billion yen compared with the 4℃ scenario. In 2020, we estimated and disclosed the financial impact of a decline in the yields of agricultural raw materials for the Japan alcohol and non-alcoholic beverages businesses. In order to expand the scope to global markets and identify the scale of the risk in the event that such a decline in yields occurs, we assessed the impact based on a range that included the middle 50% of forecast data for price volatility. (Graph 2).

We conducted studies and analyses of the impacts of climate change on agricultural raw materials twice, in 2018 and 2019, and found that yields of most agricultural products would decrease significantly (Table 1). In addition, we have also identified serious drought and flood risks in surveys on water risk and stress in areas where agricultural raw materials are produced (Table 5).

Strategy

・Brewing technology that does not rely on barley

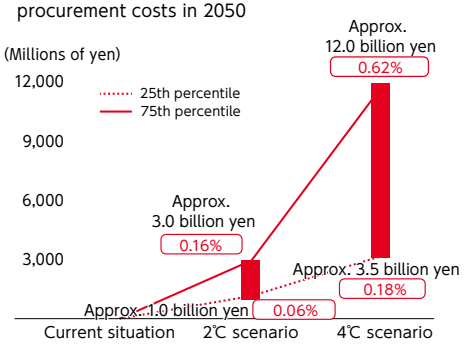
Over the past 10 years, Kirin Brewery has been a market leader in low-malt and no-malt beer, which together account for more than 40% of the Japanese market, with shares of 70% and 90% of these segments respectively (Graph 3). This accumulation of knowledge forms an advantage that will enable us to continue to win customer support and maintain profits with products that do not use barley or use it in limited quantities, even in the event that barley procurement costs increase owing to climate change.

We are also conducting a new study on the effects of climate change on yields of high-fructose corn syrup (corn) and protein sources (soybeans), which are necessary for the production of low-malt and no-malt beer products (Table 1). We learned that corn yields are unlikely to decline simultaneously in the four largest exporters at current temperatures, but are very likely to decline simultaneously across these exporters in the 2℃ and 4℃ scenarios (Table 4*). It is reported that research on corn lags behind other grains in relation to the cultivation of varieties that are tolerant to heat, but in the United States, a sustainable agriculture platform has started providing support to farmers, so we will keep a close eye on these developments. The impacts of climate change on soybeans are shown in Table 1, and we do not expect any significant decline in yields at present. The results of a survey of soybeans per country disclosed by an NPO also indicated that we are procuring soybeans from countries with low risk. Since there are significant environmental concerns related to the production of soybeans in some countries where they are produced, this year we will incorporate them into our Action Plan for the Sustainable Use of Biological Resources, as part of efforts to maintain highly sustainable procurement.

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

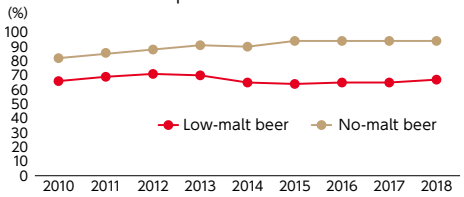
Agricultural products	Kirin Group Scenario3: 4℃, unwanted world, 2050			
	America (North and South)	Asia	Europe and Africa	Oceania
Barley	Canada -12% (2100) U.S. +9% (2100)	West Asia -5% to +10% Korea +0.5%	Finland -5.9% (spring barley) Mediterranean coast (West) -0.3%(Portugal, Spain, France, Italy) (East) +4.4% France -10% or more (Winter barley) -20% or more (Spring barley)	Western Australia -10 to -30%
Hops	U.S. (Washington) -16% (2100)		Czech Republic -8.5%	
Tea leaves		Sri Lanka Decline in yields in lowlands, low impact in highlands India (Assam region) 3.8% decline in yields per 1° C increase above average temperature of 28° C India (Darjeeling region) -40% to -80%	Kenya Change in suitable land from 1500 to 2100 meters above sea level to 2000 to 2300 meters above sea level. Drastic reduction in suitable land in the western part of Kenya, with land remaining suitable in the mountainous area of Kenya Malawi Chitipa 80% reduction in suitable land Nkhata Bay 60% reduction in suitable land Mulanje 70% increase in suitable land Thyolo 20% increase in suitable land	
Wine grapes	U.S. (California) 60% reduction in suitable land U.S. (Northwest) 231% increase in suitable land Chile 25% reduction in suitable land	Japan (Hokkaido) Increase in suitable land, Pinot Noir cultivation possible Japan (Central) Increase in suitable land while also anticipating obstacles from high temperatures	Northern Europe 99% increase in suitable land Mediterranean 68% reduction in suitable land Spain Change in overall wine production for each 1° C rise -2.1% (Spain as a whole) -4.6% (Andalusia) -4.8% (Duero River Valley) -34.6.% (northern Mediterranean)	New Zealand 168% increase in suitable land Australia (southern coast) 73% reduction in suitable land Australia (ex. southern coast) 22% reduction in suitable land
Coffee beans	Brazil 55% reduction in land suitable for arabica 60% reduction in land suitable for robusta	Southeast Asia 60% reduction in land suitable for arabica 52% reduction in land suitable for robusta	East Africa 13% reduction in land suitable for arabica 16% reduction in land suitable for robusta	
Corn	U.S. (Southwest) -27% U.S. (Midwestern Iowa) -5% to -12% U.S. -46/5% (2100) Brazil -19/4% (2100) Argentine -28.5% (2100)	China -27.4%	Ukraine -40.6% (2100)	
Soybeans	U.S. -10% (2080) Brazil -20% (2080) Argentine +40% or more	China +16% to +50% (2100) India -80%		

2 Impact of decline in yields on agricultural product procurement costs in 2050



Calculations are based on the major agricultural raw materials used in the Japan alcohol and non-alcoholic beverages businesses, as well as Australia, New Zealand and Myanmar. Figures in ( ) show the percentage of revenue.

3 Kirin Brewery's domestic market share of low-malt and no-malt beer products



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

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

* Tigchelaar et al. (2018) Future warming increases probability of globally synchronized maize production shocks. Proceedings of the National Academy of Sciences Jun 2018, 115 (26) 6644-6649; https://doi.org/10.1073/pnas.1718031115

・Mass plant propagation technologies

We expect the Kirin Central Research Institute's proprietary mass plant propagation technologies to play a major role in cultivation when agricultural breeds suited to global warming are developed. It is difficult to conceive of a business model for the Kirin Group that is completely independent of barley and hops, so we will continue measures to expand the scope of potential application of heat-tolerant agricultural breeds in the event that such breeds are developed. We will also examine opportunities to expand the application of our proprietary resin film bag-type culture vessels, which we have developed for mass plant propagation, because they can use water more effectively than soil cultivation, making them suitable for cultivation in areas with high water risks.

・Support for acquisition of certification for sustainable agriculture

In supporting for Sri Lanka's tea farms to get Rainforest Alliance Certified, which we have been providing since 2013, we will reduce the agricultural impact of climate change, such as extreme rainfall and droughts, and continuously promote agriculture that is resilient to climate change. By visiting Sri Lanka every year to exchange opinions with farm managers and to confirm the situation at tea farms, we are able identify the impact of climate change on farms and take appropriate measures in response.

New Belgium Brewing, a Kirin Group company, is funding Montana State University to support a barley cultivation program focused on climate change mitigation and adaptation.

■Water resources

Assessment of the effects of water risk and water stress

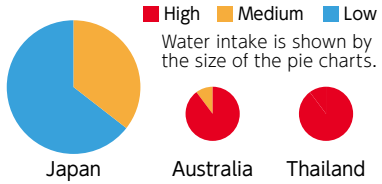
In 2021, we conducted surveys on water risk and water stress at production sites, as we had done previously in 2014 and 2017. The results showed that Myanmar and China (Zhuhai) had high levels of water risk, such as floods, while Lion's three brewerys in Australia and Thai Kyowa Biotechnologies' plant in Rayong Province had higher levels of water stress, such as droughts. Future projections also showed that the level of water stress at Lion's six brewerys in Australia will increase in future. In 2017, we conducted a detailed water risk survey of areas producing raw materials, and found that water stress was increasing in many production areas (Table 5). Table 7 shows the estimated financial impact on production from floods and droughts.

When assessing water risk, we referred to Aqueduct 3.0 and hazard maps prepared by local administrations. We estimated the financial impact of floods on production sites using a global simulation system capable of quantitatively evaluating the risk of natural disasters. However, because the results of our financial impact calculations deviated from past results, we decided to identify and manage the amount of damage caused by past brewery flooding as the better estimation of financial impact. We assessed water stress based on Aqueduct 3.0, online surveys, interviews with business sites, and estimated the financial impact for business sites with a "high" level of water stress. A graph of water use by country and level of water stress (Graph 6)

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

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

6 Total water intake by country and water stress



7 Estimation of water risk and water stress damage

Cost of damages in past factory flooding events

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

Water stress (estimated impact of reduced production due to drought)

Country	Operating companies	Plant	Cost of damage	Sales ratio
Australia	Lion	Castlemain Perkins Brewery	Approx. 600 million yen	0.03%
Thailand	Thai Kyowa Biotechnologies Co.	Thai Kyowa Biotechnologies	Approx. 30 million yen	0.001%

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

8 Lion Risk Survey (January - December 2018)

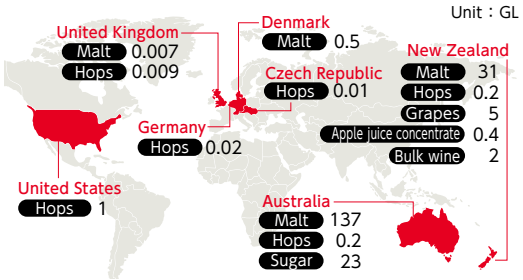
Agricultural raw materials

- The water footprint is 200 GL, 84% of which is related to malt production
- We expect water stress levels in all regions cultivating barley, sugar, and hops in Australia to increase by between 1.4 and 2.8 times

Business sites

- Total water footprint is 2.7 GL (mostly washing and brewing)
- All locations have experienced extreme drought except Tasmania
- Water prices have risen by 4% on average over the past year, with a highest regional increase of 12%

9 Lion water footprint per agricultural raw material (January - December 2018)



shows that water use in Australia and Thailand is lower than in Japan, but water stress is high at almost all sites. In Japan, on the other hand, although water consumption is high, there were no businesses with high levels of water stress.
Lion conducted its own water risk survey in 2019. The results are shown in Table 8 and Figure 9.

Response strategy

・Development of flood response manuals and advanced water usage reduction technologies

We will respond to water risks at our business sites through measures including the preparation of a manual for adapting to floods. In 2011, when Lion's Castlemaine Perkins Brewery was flooded, we cut off power sources in the brewery in advance to prevent damage to the brewery's electrical equipment from short circuits. This reduced the cost of damage and enabled the plant to quickly resume operations. A similar measure was effective in 2000, when part of Kirin Brewery's Nagoya Plant was flooded. Following our experience of the 2018 West Japan Torrential Rain Disaster, we developed a manual for responding when we expect disruptions to logistics over a wide area. As a result, we successfully avoided any major impact from the subsequent Typhoon Faxai and Typhoon Hagibis.
As a measure against water stress at business sites, Lion will implement water-saving initiatives on an ongoing basis to achieve advanced intensity targets. Thai Kyowa Biotechnologies, which faced water intake restrictions due to drought in 2020, has been able to limit water intake and avoid negative impacts by holding enough inventories and switching temporarily to products that use less water. By sharing this knowledge within the Kirin Group, we are reinforcing our ability to respond to water risks and water stress.

・Measures to address torrential rain and conserve water resources in areas where agricultural raw materials are produced

In response to water risk in areas producing agricultural raw materials, we are working to prevent sediment runoff in torrential rains by planting undergrowth with deep roots, as part of our efforts to support for Sri Lankan tea farms to obtain the certification for sustainable agriculture. In response to water stress, we started water source conservation activities at Sri Lankan tea farms in 2018, and plan to continue to expand these activities in future.
At coffee farms in Vietnam, we are also supporting the acquisition of certification, and are trialing measures to enhance the water retention capabilities of fields. We have not taken any specific measures in relation to major agricultural products in Europe and Australia, which are expected to experience severe water stress. However, we intend to accumulate knowledge through initiatives in Sri Lanka and other countries to use in future responses. We also plan to expand the scope of applications and accumulate knowledge for our proprietary resin film bag-type mass plant cultivation vessels, which enable the cultivation of agricultural products with little water.

11 Assessment of impact of carbon pricing

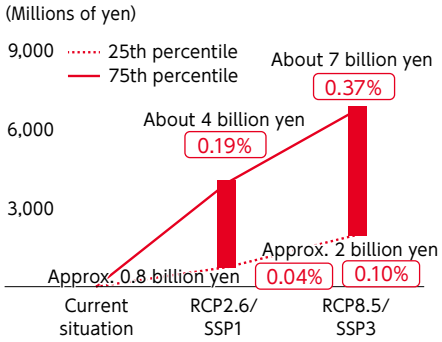
	Scenario	Group Scenario 3 (4° C Scenario)		Group Scenario 1 (2° C Scenario)		1.5° C Scenario	
	Year	2030	2050	2030	2050	2030	2050
If GHG emissions are not reduced	Carbon taxes(Billions of yen)	13	17	77	99	106~4,756	136~7,913
	Percentage of revenue	0.07%	0.09%	0.42%	0.54%	0.57%~25.72%	0.73%~42.79%
If we reduce GHG emissions in line with targets	Carbon taxes(Billions of yen)	6	0	39	0	53~2,378	0
	Percentage of revenue	0.03%	0.00%	0.21%	0.00%	0.29%~12.86%	0.00%
Tax savings	Tax savings(Billions of yen)	6	17	39	99	53~2,378	136~7,913
	Percentage of revenue	0.03%	0.09%	0.21%	0.54%	0.29%~12.86%	0.73%~42.79%

Climate Change

Assessment of impact of carbon pricing

In 2021, we further refined carbon pricing assessment that we originally conducted in 2019. As a result, we estimated that if we achieve the"SBT for 1.5℃"target, tax savings will amount to approximately 0.6 billion yen in 2030 under the 4℃ scenario, approximately 3.9 billion yen under the 2℃ scenario, and at least approximately 5.3 billion yen under the 1.5℃ scenario, compared with not reducing GHG emissions.
In our estimations, we applied the IEA scenario to the 2℃ scenario and the 4℃ scenario for the electric power emission factor and carbon tax, and newly used the IPCC Special Report on Global Warming of 1.5℃ for the 1.5℃ scenario, and as the basis of carbon price forecasts (Table 11).
The results of our estimations showed that there are significant potential tax savings in reducing GHG emissions, but the financial impact of carbon taxes in the 1.5℃ scenario is also significant.
We have also estimated the financial impact of the introduction of carbon pricing on agricultural procurement costs in Japan, Australia, New Zealand, and Myanmar (Figure 10). However,

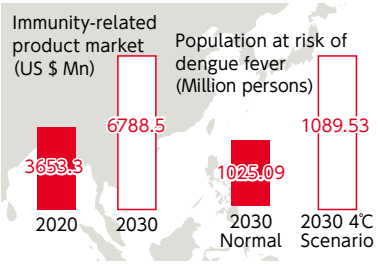
10 Impact on agricultural product procurement costs from carbon pricing in 2050 (percentage of revenue)



12 Forecast population exposed to risk of dengue fever under the 4℃ scenario(Upper: Ten thousand persons; Lower: difference from not taking GDP into consideration)

Region	2030		2050	
	Without GDP consideration	With GDP consideration	Without GDP consideration	With GDP consideration
Asia Pacific High-income countries	81	56 (▲31%)	92	69 (▲25%)
East Asia	31,093	37,559 (+21%)	28,574	21,679 (▲24%)
Southeast Asia	71,335	71,338 (0%)	75,666	75,669 (0%)

13 Market forecast for infectious disease-related products (Persistence Market Research)



*1 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
*2 S-8 Impact Assessment and Adaptation for Climate Change Research Project Team 2014 Report https://www.nies.go.jp/s8_project/scenariodata2.html#no3

because the socioeconomic systems in the paper used for the estimation differ from the Kirin Group's scenario, we are currently using it as a reference and plan to develop further, more detailed assessments in future.

Response strategy

・Reduce GHG emissions on a medium- to long-term profit neutral basis

The Kirin Group is committed to achieving medium- to long-term profit neutrality in investments addressing climate change. Specifically, we will quickly implement energy-saving measures that significantly reduce costs, then use those energy cost savings as funds to introduce renewable energy. We believe that the key to success lies in production and engineering technologies to ensure that capital investment is highly economically rational. Kirin Brewery's engineering division, which has accumulated expertise by implementing measures to address climate change, will collaborate with each group company to draw up the most effective measures based on a broad view of the Kirin Group as a whole, and thereby produce results quickly.

Assessment of the impact of global warming on health

Table 12 shows the results of an analysis of the impact of dengue virus infection based on the WHO climate change and health impact scenario.*1 In this scenario, the total number of people at risk of infection in East and Southeast Asia is approximately 1 billion. When economic growth is taken into consideration, the number of people at risk in high income countries in Asia and the Pacific, as well as East Asia, decreases by approximately 25% by 2050.

Based on observational and forecast data on climate change from the National Institute for Environmental Studies*2, under the RCP 8.5 scenario (equivalent to the 4℃ scenario in Kirin Group Scenario 3), the number of heat-related excess deaths in Japan between 2080 and 2100 will be between almost four times and over 10 times the number between 1981 and 2000. Estimating the number of persons requiring emergency services as a result of heatstroke in Japan, which is considered to be closely related to the temperature, under the RCP 8.5 scenario it is expected that in 2050 this number will be approximately two to four times that of 1981 to 2000.

Response strategy

・Contribute to products that support consumers' immune systems

The WHO's report forecasts that the number of people at risk of exposure to infectious diseases in countries and regions that achieve economic growth will not increase despite further global warming, and will instead decrease. This may suggest that economic growth will result in an expansion of the market for immunity-related products. According to another survey, the total market for immunity-related products in Asia under the 4℃ scenario is expected to be worth 750 billion yen by 2030, approximately 1.8 times the size of the market in 2020 (Figure 13).

In response to the social issue of the spread of infectious disease, the Kirin Group's Health Science business will focus on the development of the "immunity" field. With the addition of FANCL and Kyowa Hakko Bio, we will establish a vertically integrated value chain and promote the commercialization of immunity-related products at Kirin Beverage, Koiwai, etc.

・Contribute to products to counter heatstroke

In the Kirin Group Scenario 3 (4℃ scenario), assuming that the market for non-alcoholic beverages that prevent heatstroke is correlated with global warming, we estimated that the domestic market would expand by approximately 94.0 billion to 188.0 billion yen. The Japanese government takes seriously the fact that the annual number of deaths from heatstroke has exceeded 1,000 people each year since 2018. For the first time, the government has compiled a single action plan from those of each ministry and agency, in which it has set a target of no more than 1,000 deaths per year from heatstroke. In response to these trends, we will expand sales of non-alcoholic beverages that prevent heatstroke such as *SALTY LITCHI*.

Identification of risks and opportunities

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

Theme	Scenario	Scenario driver	Time frame			Types of risks and business opportunities	Potential impact			Strategy	Related pages
			S	M	L		L	M	H		
Biological resources	As a result of global warming, yields of major agricultural raw materials (barley, hops, and coffee beans) decline significantly, affecting procurement costs. Quality degradation is also expected.	Increase in procurement costs due to decline in yields of agricultural products		●	●	Physical risk (acute and chronic) / transitional risk (market and reputation)	■	■		・Brewing technology that does not rely on barley ・Mass plant propagation technologies ・Support for farms to acquire certification for sustainable agriculture	P15 P34 P29, P30, P33
	Increases in the cost of petroleum-based fertilizers and chemical pesticides due to carbon pricing, as well as competition with biofuel cultivation, affect procurement costs.	Increase in procurement costs of agricultural products due to carbon pricing		●	●	Physical risk (acute and chronic) / transitional risk (market and reputation)	■	■		・Brewing technology that does not rely on barley ・Mass plant propagation technologies ・Support for farms to acquire certification for sustainable agriculture	P15 P34 P29, P30, P33
	Domestic hop fields and other farm land becomes idle land and traditional Satochi-Satoyama landscapes are lost as a result of the decline in domestic farmers	Biodiversity / ecosystem services	●	●		Physical risk (acute and chronic) / transitional risk (reputation)	■			・Support for farms to acquire certification for sustainable agriculture ・Efforts to enrich ecosystems	P31, P32
	It is discovered that the environment and the human rights of workers in areas producing agricultural products are not being protected, resulting in a loss of trust from society as a buyer and a decline in brand value.	Biodiversity / ecosystem services Violations of human rights Brand value	●	●		Reputation	■	■		・Support for farms to acquire certification for sustainable agriculture ・Efforts to enrich ecosystems	P29, P30, P33, P35
	Supply shortages occur as a result of limits on commercial forestry out of consideration for nature and human rights, as well as a rapid increase in demand for certified agricultural products.	Increase in procurement costs of wood, paper, and agricultural products	●	●		Reputation	■	■		・Support for acquisition of sustainable forestry and farm certification systems ・Mass plant propagation technologies	P29, P30, P33, P35
Water resources	Manufacturing becomes impossible owing to droughts caused by climate change. Society criticizes the company for operating during droughts.	Disruptions to operations due to droughts	●	●	●	Physical risk (acute and chronic)/ transitional risk (reputation)	■	■		・Advanced water usage reduction technologies	P16~P17, P37~P42
	Floods caused by torrential rain accompanying climate change cause some business sites to suspend production.	Disruptions to operations due to floods	●	●	●	Physical risk (acute and chronic)	■			・Development of flood response manuals	P16~P17, P37~P40
	Floods caused by torrential rains and droughts accompanying climate change affect areas producing agricultural products, causing significant declines in yields and affecting procurement costs.	Decline in yields of agricultural raw materials due to droughts and floods		●	●	Physical risk (chronic)	■	■		・Measures to address torrential rain and conserve water resources in areas where agricultural raw materials are produced	P16~P17, P40
	Operation is suspended and brand value declines owing to the pollution of rivers and seas caused by pollutants flowing into wastewater from business sites.	Violations of laws and regulations Scale of damage to surrounding businesses and residents due to pollution	●			Reputation	■	■		・Improvements to environmental management systems	P43, P76~P79, P81
Containers and packaging	Climate change results in rapid increases in the price of crude oil, meaning raw material-based resins for PET bottles rapidly increase in price or become difficult to obtain.	Usage rate of recycled resins or plant-based resins	●	●		Physical risk (acute and chronic) / transitional risk (market and reputation)	■	■		・Expansion of mechanical recycling ・Establishment of chemical recycling manufacturing technology ・Creation of social systems for collecting used PET bottles	P47, P51, P54, P55
	A failure to address marine plastic pollution problems results in a loss of trust from society and a decline in brand value.	Usage rate of recycled resins or plant-based resins	●	●		Reputation	■	■		・Expansion of mechanical recycling ・Establishment of chemical recycling manufacturing technology ・Creation of social systems for collecting used PET bottles	P47, P51, P54, P55
	With the shift from plastic to paper containers, the use of wood and paper from forests that are not eco-friendly results in a loss of trust from society and a decline in brand value.	FSC and other certification networks and the usage rate of recycled paper	●	●		Physical risk (acute and chronic) / transitional risk (market and reputation) Reputation	■	■		・Expansion of the use of FSC and other products with sustainable forest certification	P35, P48
Climate change	Carbon taxes are introduced and stringent policy and law are enacted around the world.	Increase in energy costs due to carbon pricing		●	●	Transitional risk (policy and law, technologies, and markets)	■	■	■	・Reduction of GHG emissions on a medium- to long-term profit neutral basis	P17~P18, P59~P70
	The number of persons requiring emergency services as a result of heatstroke doubles owing to rising global temperatures.	Population requiring emergency services for heatstroke	●	●	●	Physical risk (chronic) / transitional risk (market) / products, services, and markets	■	■	■	・Contribution to products that support consumers' immune systems	P17~P18
	The population exposed to the risk of infectious diseases increases as a result of higher global temperatures, and a market for immunity-related products expands and establishes itself.	Population exposed to infectious diseases	●	●	●	Physical risk (chronic) / transitional risk (market) / products, services, and markets	■	■	■	・Contribute to products to counter heatstroke	P17~P18
	Shortages of electricity occur owing to factors such as suspensions to thermal power generation and delays to the replacement of power plants as a result of measures to address global warming, earthquakes, disasters, and LNG shortages, as well as suspensions to the supply of renewable energy as a result of natural disasters.	Power plant operating rates, power supply and demand forecasts, and power usage rates	●	●		Transitional risk (policy and law, and technologies)		■	■	・Investment in energy conservation ・Implementation of measures to conserve energy	P59~P70
	Brand value declines as it is pointed out that the renewable energy used by the company affects nature and the scenery in areas where power plants are located, biofuels are cultivated, etc., produces noise, and is not very resistant to disasters.	Violations of policy and law, and human rights, media reporting, and brand value	●	●		Transitional risk (policy and law, and reputation)		■	■	・Support for farms to acquire certification for sustainable agriculture ・Procurement of certified products	P10, P35

Strategies for addressing material environmental issue

As we aim to achieve the *Kirin Group Environmental Vision 2050,* the Kirin Group is developing a unique environmental strategy based on our strengths in R&D and engineering. When developing and implementing strategies, we listen not just to the voices of stakeholders in the value chain, but also society at large. Additionally, at the execution stage, we work with NGOs, local communities, and the next generation to develop activities with an awareness of outcomes.

Rulemaking

Science Based Targets Network

On February 27, 2021, Kirin became the first Japanese company in the pharmaceutical and food industry to participate in the Corporate Engagement Program held by the Science Based Targets Network. By 2022, we will set targets for corporate use of natural capital (freshwater, land, oceans, resource exploitation, climate change, pollution, and invasive species).

Alliance to End Plastic Waste

In March 2021, Kirin participated in the "Alliance to End Plastic Waste," an international non-profit organization that works on a global basis to resolve the issue of waste plastics. We will work with a variety of stakeholders to create a "society that continuously circulate plastic," as we engage in activities with the aim of solving problems related to plastic waste from a global perspective.

Scenarios

Physical Risk

- Increase in procurement costs due to decline in yields of agricultural products
- Suspensions of operation and delivery due to droughts and floods
- Decline in yields of agricultural raw materials due to droughts and floods
- Social issues caused by climate change (infectious diseases and heatstroke)

Transitional Risk

- Rapid increase in energy costs due to carbon pricing
- Increase in reliance on bioenergy and a shortage of farmland as a result of carbon pricing
- Increase in idle lands due to decrease in domestic farmers
- Damage to ecosystems due to farming and forestry that is not eco-friendly
- Decline in yields of agricultural products and environmental damage owing to low level of agricultural technology at small farms
- Human rights violations upstream in the value chain
- Leaking of pollutants into wastewater

Financial impact

Positive

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

Negative

- Higher procurement costs for agricultural products
- Drop in earnings due to production suspensions
- Drop in earnings due to delivery suspensions
- Increase in cost of conserving energy
- Depletion of renewable energy and increase in costs
- Brand damage from problems related to waste plastics
- Brand damage from problems related to human rights
- Violations of laws and regulations

The Kirin Group's Strengths

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

Research and development capabilities

Kirin Central Research Institute

Mass plant propagation technology

Institute for Packaging Innovation

Package development technology capabilities

Engineering capability

Engineering divisions and Kirin Engineering Company, Limited

Heat pump equipment in Okayama Brewery

Partnerships

Sri Lankan tea farms

FSC Certification

Sample

Next generation