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.

Item	Description

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.

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.

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 and loss neutral basis

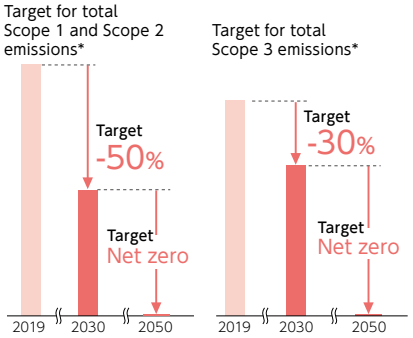
Risk management

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.

Metrics and targets

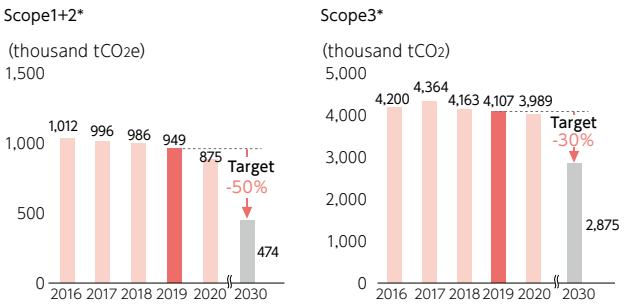
The Kirin Group has set a target of net zero GHG emissions across the entire value chain by 2050. As medium-term targets, we have revised our GHG reduction targets upward to a 50% reduction under Scope 1 + 2 and a 30% reduction under Scope 3 from the 2019 level by 2030 (obtained approval for the "SBT 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.

Target



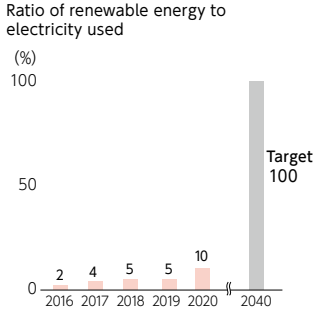
*In December 2020, we moved from the old 2° C target to a 1.5° C target, which has been approved under the Science Based Target initiative (SBTi).

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.

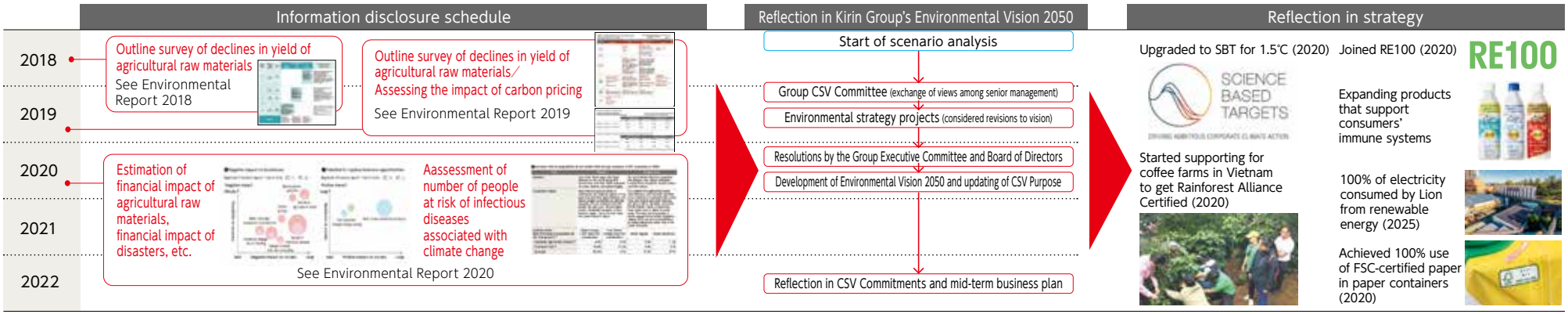
Currently, we apply scenario analysis methods to risk management other than climate change as well.

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
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
			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 and loss neutral basis
			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
			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
			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
		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
			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
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
			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 and loss neutral basis
			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
			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
			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
		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
			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

* 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

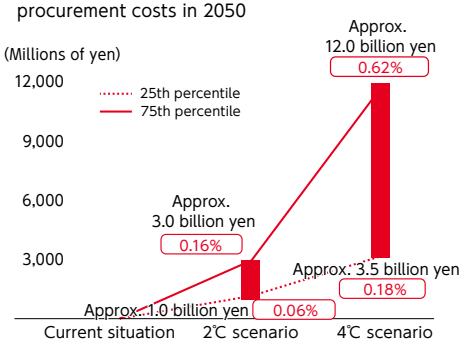
Over the past 10 years, Kirin Brewery has been a market leader in low-malt and no-malt beer, which together account for more than 40% of the Japanese market, with shares of 70% and 90% of these segments respectively (Graph 3). This accumulation of knowledge forms an advantage that will enable us to continue 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)

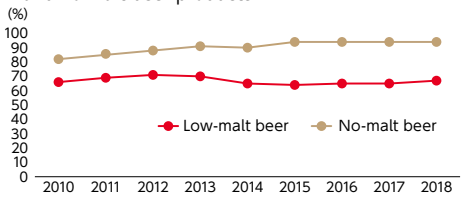
Agricultural products	Kirin Group Scenario3: 4℃, unwanted world, 2050			
	America (North and South)	Asia	Europe and Africa	Oceania
Barley	Canada -12% (2100) U.S. +9% (2100)	West Asia -5% to +10% Korea +0.5%	Finland -5.9% (spring barley) Mediterranean coast (West) -0.3%(Portugal, Spain, France, Italy) (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

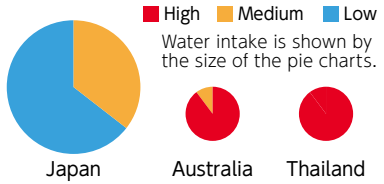
In 2021, we conducted surveys on water risk and water stress at production sites, as we had done previously in 2014 and 2017. The results showed that Myanmar and China (Zhuhai) had high levels of water risk, such as floods, while Lion's three brewerys in Australia and Thai Kyowa Biotechnologies' plant 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)

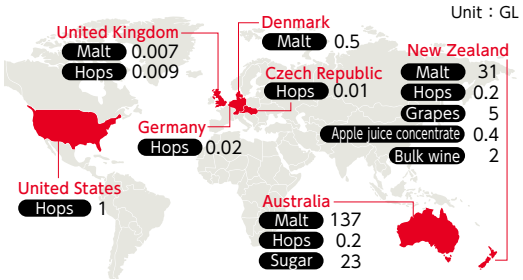
Agricultural raw materials

- 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

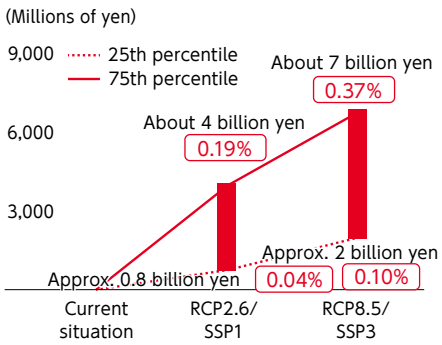
	Scenario	Group Scenario 3 (4° C Scenario)		Group Scenario 1 (2° C Scenario)		1.5° C Scenario	
	Year	2030	2050	2030	2050	2030	2050
If GHG emissions are not reduced	Carbon taxes(Billions of yen)	1.3	1.7	7.7	9.9	11~476	14~791
	Percentage of revenue	0.07%	0.09%	0.42%	0.54%	0.57%~25.72%	0.73%~42.79%
If we reduce GHG emissions in line with targets	Carbon taxes(Billions of yen)	0.6	0	3.9	0	5.3~238	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)	0.6	1.7	3.9	9.9	5.3~238	14~791
	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,

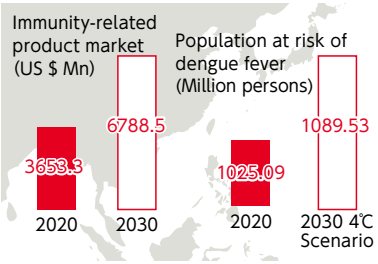
10 Impact on agricultural product procurement costs from carbon pricing in 2050 (percentage of revenue)



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)

	2030		2050	
Region	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 and loss neutral basis

The Kirin Group is committed to achieving medium- to long-term profit and loss 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*.