Activities

Value Chain Overview

The Kirin Group actively engages in various social issues to connect the desire to enjoy and pass on the rich blessings of the Earth to future generations with everyone involved in the value chain. To achieve the "Kirin Group's Environmental Vision 2050," which aims for "Enrich the Earth with positive impact," we identify risks and opportunities at each stage of the value chain and execute them strategically to ensure more reliable achievement of our goals.(Details on the "Kirin Group's Environmental Vision 2050" → P.10)

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- Impact on currently held assets P.54
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Activities

Activities in response to Significant Risks and Opportunities

Physical risk / Chronic risks

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

Biological Resources | Water Resources | Climate Change

Yields of agricultural raw materials may decline significantly owing to global warming and reductions in daily temperature ranges caused by climate change. Additionally, we identified, in surveys related to water risk and water stress, severe levels of drought risk and flood risk in areas producing agricultural raw materials.

Changes in the state of nature [medium to long term]

Biological Resources | Water Resources | Climate Change

Soil erosion and soil runoff have become problems owing to factors such as heavy rainfall caused by climate change and land development in areas surrounding the farms due to economic growth. In addition, there is soil pollution caused by the use of agricultural chemicals and other problems, and these factors may change ecosystems and reduce yields of agricultural raw materials.

Response strategy

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

We will continue to support farmers for the acquisition of sustainable farm certification in order to secure production areas for agricultural products that are resilient to climate change. Through comprehensive training on techniques that maintain crop yields while reducing the use of pesticides and fertilizers, we aim to minimize the impact of environmental changes on raw agricultural products and contribute to reducing the environmental footprint of agriculture.

▶Technology development to improve plant heat tolerance in response to global warming (adaptation measures)

To adapt to climate change, we promote research and development of breeding and cultivation technologies to stably produce hops with high tolerance to environmental stresses such as heat and drought.

▶Mass plant propagation technologies (adaptation measures)

We will continue efforts to accumulate knowledge concerning applications for “mass plant propagation technologies” developed by the Kirin Central Research Institute, to prepare for the risk of falling yields of agricultural products as a result of climate change. We expect the knowledge can be used if heat-tolerant varieties adapted to global warming are commercialized. Given the challenges for us of creating a beer business that doesn’t rely on barley and hops, we aim to contribute to the stable procurement of key agricultural products and the sustainability of agriculture through breeding technology improvements that address global warming.

▶Development of alternative raw materials and new production technologies (adaptation measures)

Barley, a vital agricultural input for our core product, faces the risk of yield declines due to climate change. Accordingly, advancing technical expertise to reproduce similar flavor characteristics without depending on barley is regarded as a key adaptation strategy to mitigate potential supply chain vulnerabilities. Additionally, we are investigating and analyzing the medium- to long-term yield impacts of climate change on the agricultural products used as raw materials for the isomerized sugar needed in beer-flavored beverages, tailored to each region.

▶Introduction of perennial grains into annual crop production systems (adaptation measures)

In many wheat-producing regions of Australia, intensive cultivation of annual crops has negatively affected water quality and soil health. By integrating perennial grains into the production system in these areas, we aim to simultaneously achieve ecosystem restoration and productivity improvement.

▶GHG emission reduction (mitigation measures)

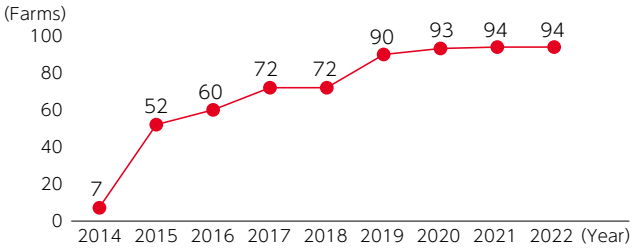
In order to minimize the risk of falling agricultural yields, we will promote initiatives aimed at achieving Net-Zero emissions by 2050, our science-based 1.5℃ target by 2030, and renewable energy targets under RE100 by 2040.

Activities

▶Support for obtaining Rainforest Alliance certification for raw agricultural product farms

Rainforest Alliance (RA) certification is an international system that verifies agricultural producers and businesses meet stringent standards for sustainable agriculture and forest management. These standards encompass environmental protection, respect for human rights, worker welfare, and community well-being. Farms and businesses that achieve these standards are awarded the RA symbol, featuring a frog logo. This logo signifies the health of ecosystems and indicates that the products have been produced sustainably.The Kirin Group supports the acquisition of RA certification for tea farms in Sri Lanka, which produce raw agricultural products for “Kirin Gogo-no-Kocha,” and for coffee farms in Vietnam, from which Kirin sources 30% of its coffee beans. To date, with the support of the Kirin Group, 94 large tea estates and as well as 659 coffee farms (including those transitioning from UTZ certification, a sustainable agriculture certification by a Dutch non-profit organization, to RA certification), have obtained certification. In August 2021, the Kirin Group also began year-round sales of “Kirin Gogo-no-Kocha Straight Tea” made with tea leaves from these certified farms.

Number of large farms obtaining certification in Sri Lanka



Activities

Activities in response to Significant Risks and Opportunities

Supporting growers to obtain Rainforest Alliance Certification

▶Activities related to technology development to improve plant heat tolerance in response to global warming

The Kirin Group's Institute for Future Beverages and the startup CULTA, originating from the University of Tokyo, are conducting joint research to enhance the heat tolerance of hops for climate change-adapted hop production. Traditionally, hop quality assessments were only conducted once a year in line with harvest frequency. However, with the establishment of indoor cultivation technology, hops can now be harvested multiple times a year regardless of the season, allowing for more frequent quality assessments. This shortens the evaluation cycle for breeding and cultivation techniques, accelerating research and development to counteract yield and quality decline, thus contributing to sustainable hop production when high-temperature-tolerant hop varieties are commercialized.

▶Plant mass propagation technology (adaptation measures)

To address the risk of reduced agricultural yields due to climate change, rapid and large-scale propagation technology is required when heat-tolerant varieties adapted to global warming are commercialized. Kirin Central Research Institute utilizes its proprietary "plastic bag-type culture vessel technology" made of plastic film, enabling the mass production of healthy seedlings and clones with identical genotypes as the parent plants, with multiplication rates ranging from tens of thousands to hundreds of thousands, depending on the plant species. Because the plants are grown in small bags with nutrient solutions circulated for growth, water resources are used more efficiently than in soil cultivation, allowing stable cultivation even in areas with high water stress. This technology is expected to significantly contribute to establishing a sustainable agricultural supply system in conjunction with the spread of heat-tolerant varieties.

▶Possession of technology for achieving beer flavor using soybeans

"Kirin Nodogoshi Nama," a beer-flavored alcoholic beverage sold by Kirin Brewery in Japan, is brewed using isomerized sugar and soybeans instead of barley. By possessing brewing technology that reproduces beer flavor with raw materials expected to have a stable supply, we can address the risk of reduced barley yields. Although climate change is expected to impact soybean yields differently across regions, the overall global yield is not expected to change significantly.

Research and analysis on isomerized sugar used to beer-flavored beverages has shown that the probability of a simultaneous 10% yield decrease in corn in the four major production regions (USA, China, Brazil, Argentina) exceeds 80% by the end of the century under a 4°C scenario, and about 10% around 2050 under a 2°C scenario. However, for other agricultural products that can be used as raw materials for isomerized sugar, such as sugarcane and potatoes, the yield is not expected to decrease globally, despite regional variations. Based on these results, we believe that combining production regions, crops, and brewing technologies will allow us to respond to medium- to long-term yield fluctuations under climate change, and that brewing technology that does not rely on barley is effective as an adaptation measure to physical risks.

▶Introduction of perennial grains into annual crop production systems

The "The Good Grain" initiative, in collaboration with Sustainable Table and Stone & Wood, explores the potential for ecosystem restoration and productivity improvement by introducing perennial grains (Mountain Rye) into annual crop production systems. Large-scale cultivation and malt production are being promoted in demonstration fields, and new uses in beer brewing are being tested. Additionally, symposiums involving the supply chain, agricultural industry, and brewing industry are held to share results and challenges.

▶GHG emission reduction (mitigation measures)

We will implement GHG emission reductions across the entire value chain, from product development to sales. (details on GHG emission reduction initiatives→P.48~52)

Activities

Activities in response to Significant Risks and Opportunities

Physical Risk / Chronic Risk

Environmental pollution from improper disposal of used containers [medium to long Term]

Biological Resources | Water Resources | Containers and Packaging | Climate Change

If used containers are not properly recycled and are released into the environment, they may have a negative impact on a wide range of ecosystems in the form of greenhouse gas emissions, damage to the natural environment, and marine plastic pollution. Furthermore, stricter future regulations on the improper disposal of plastic containers could present transition risks, potentially increasing extended producer responsibility and diminishing corporate brand value.

Response strategy

▶Building a society that recycles plastics

In accordance with the "Kirin Group Plastic Policy" that we established in 2019, the Kirin Group is progressively increasing the ratio of recycled PET resin used in its bottles to meet the targets of 50% by 2030 and of 100% sustainable container use by 2050.

Additionally, Lion has developed the "Sustainable Packaging Strategy" to enhance recycling efforts in Australia and New Zealand. In collaboration with the Australian Packaging Covenant Organization (APCO), Lion has set ambitious goals to incorporate over 50% recycled material in its packaging by 2025 and ensure that 100% of its packaging is reusable, recyclable, or compostable. Progress toward these goals has been consistent, with Lion receiving recognition from APCO in 2023 for its exemplary practices.

Activities

▶Horizontal recycling of PET bottles

We are collaborating with various companies to efficiently segregate, collect, and recycle used PET bottles through the bottle-to-bottle initiative. Our partnerships have gradually expanded, including WELCIA YAKKYOKU, Tobu Railway, and Chiba Yakuhin in 2022, Sugi Pharmacy and Tokyo Tatemono in 2023, and Yomiuri Land in 2024. Additionally, we are strengthening our collaboration by forming agreements with local governments. In 2023, for example, we signed a partnership agreement on the horizontal recycling of PET bottles with Asahi Soft Drinks Co., Ltd. and four cities (Joso City, Toride City, Moriya City, Tsukubamirai City), represented by the Joso Regional Municipal Union. All used PET bottles sorted by citizens in these cities are recycled mechanically or chemically to regenerate PET bottle material, which is then reused in PET bottle products.

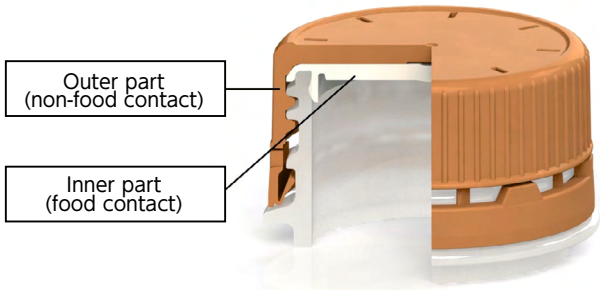
New Functional Recycling Box and Awareness Sticker

Furthermore, new functional recycling boxes with educational stickers have been installed in various locations near vending machines, and with the cooperation of consumers, PET bottles are collected in these boxes, promoting horizontal recycling throughout society.

▶Horizontal recycling of beverage caps

Starting in 2024, we are conducting Japan's first proof-of-concept trial for the practical implementation of horizontal recycling of caps used for alcoholic beverage PET bottles in collaboration with Nihon Yamamura Glass Co., Ltd. This initiative utilizes two-piece caps with 10% recycled resin in the outer part (non-food contact) to enable horizontal recycling into caps for the same purpose. The trial will use approximately 40,000 caps, with an estimated reduction in GHG emissions of about 1.7g per cap.

Two-Piece Cap Used in the Proof-of-Concept Trial



▶VicReturn initiative

In Victoria, Lion continues to play an active role as a founding member of VicReturn, the coordinator of the container deposit scheme. Launched in November 2023, this initiative successfully collected 500 million containers by June 2024.

Activities

Activities in response to Significant Risks and Opportunities

Physical Risk / Acute risk

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

Water Resources | Climate Change

Significant impacts, including disruptions to brewing and manufacturing, may occur as a result of damage from typhoons, heavy rainfall, and other disasters caused by climate change. The Kirin Group has operated businesses in Japan and Australia, where the level of water stress differs significantly. As such, we have developed an understanding rooted in experience of the fact that problems related to water differ between countries and regions, and that they largely depend on basins and specific locations. Since 2014, the Kirin Group has been conducting regular scientific surveys. In 2024, we conducted surveys and analyses of water risk at brewing and production sites using Aqueduct 4.0, hazard maps created by local governments, and other resources (Details of Manufacturing Site Water Risk/Stress → P.18). As a result, we found that water stress and water risk have worsened at many business sites. Our management benchmark for the financial impact of flooding on brewing and production sites is approximately 1.0 billion yen to 5.0 billion yen, in line with the actual amounts of flood damage in the past (Details of financial impact → P.34). We are also using wind and water damage simulation systems to forecast losses from the risk of flooding. We are also concerned about flooding at our business sites due to rising sea levels caused by global warming. Although sea levels in Japan are expected to rise by 0.46 to 0.97 meters under the 4°C scenario, we think it is still difficult to form a quantitative assessment. Going forward, we will continue paying close attention to the results of latest research.[*1]

*1 We are conducting multifaceted risk assessments for floods using multiple systems. Aqueduct can be used for risk assessments that include future predictions, not just current evaluations. It is the most widely used tool at present, providing high comparability, but it has limitations in tracing the basis of evaluations in detail and may not fully reflect complex water systems. Hazard maps, created by local governments with deep understanding of the region, provide evaluations assuming the worst-case scenario. Using them in conjunction with Aqueduct allows for more accurate risk assessments. Simulation systems can estimate damage ratios and loss amounts for different recurrence periods, aiding in exposure understanding and insurance coverage decisions.

Response strategy

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

We share the knowledge and experiences of locations that have dealt with flooding within the group to minimize damage.

▶Insurance for floods (adaptation measures)

We will consider insurance at business sites as an effective measure against natural disasters, including floods.

▶Addressing flooding at facilities (adaptation measures)

We assume that flooding would have a serious impact on the continuity of our businesses, and we will therefore promote physical countermeasures as necessary at business sites where we must continue to fulfill our responsibility to supply customers.

Activities

▶Re-evaluation and analysis of water risks across the group

New Belgium Brewing's Asheville brewery was not previously evaluated as high-risk by conventional assessment tools but suffered flood damage from Hurricane Helene in September 2024. This event has prompted a plan to re-evaluate and analyze water risks at all manufacturing sites across the group. We will conduct comprehensive water risk assessments using both the latest global tools and local information. The new evaluation and analysis results will be accumulated as knowledge, and measures to address similar future damages will be considered and shared, thereby strengthening water-related resilience across the group.

▶Decision-making on insurance coverage using wind and water damage simulation systems

In 2020, we used the natural disaster model AIR to simulate wind and water damage for our main 20 business sites in Japan, thereby estimating loss percentages and amounts of damage for each recurrence period. For 200-year disasters (a disaster occurring once every 200 years), the total exposure across the Kirin Group was approximately 1.0 billion yen. At KYOWA PHARMA CHEMICAL, however, we calculated that the annual amount of damage from a wind and water disaster of a scale occurring once every 500 years would be equivalent to 42% of the value of its property. Accordingly, in 2022, we conducted on-site surveys, and confirmed that the amount of damage would be precisely equivalent to 17%. We also conducted risk surveys at Thai Kyowa Biotechnologies, which is located in an area where flood and other water risks are expected, in 2023. Going forward, we will continue conducting on-site risk surveys and assessing the possibility of insurance for business sites that we have judged to be at high risk of future flood damage, based on our wind and flood simulation system.

▶Flood prevention measures at Kyowa Kirin

At Kyowa Kirin, we have judged that the amount of damages from recovery, production disruption, and business opportunity losses would be considerable in the event that water damage, etc., caused long-term disruptions to operations at Kyowa Kirin's own pharmaceutical plants, commissioned manufacturers of drug substances, and packaging material suppliers. At Kyowa Kirin's own sites, we have formulated policies on countermeasures against water damage, and have taken measures to prevent flooding (geographically distributed storage of important assets related to production, waterproofing of buildings, moving important facilities to high floors and locations, the installation of flood walls, etc.). In the future, we intend to continue to address these issues through investment in our facilities. We will assess and address the impact across the supply chain as a whole, and take steps to avoid production disruptions and minimize damages. At the same time, there will be a significant impact on companies commissioned to manufacture drug substances, packaging material suppliers, etc., so we will gather information about water damage countermeasures at each partner company, identify issues, and consider measures such the formulation of BCPs and disaster response drills.

Activities

Activities in response to Significant Risks and Opportunities

Physical Risk / Acute risk

Impact on transportation from floods [short to long term]

Water Resources | Climate Change

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

Response strategy

▶Sharing of knowledge on responding to floods (adaptation measures)

We utilize response manuals for widespread logistics disruptions caused by natural disasters to address similar incidents. Additionally, we continuously update these manuals and accumulate knowledge whenever new disasters occur.

▶Diversification of suppliers (adaptation measures)

We reduce risk by having multiple suppliers. We work with our suppliers as part of endeavors to sustain our supply chain, to ensure that we can stably deliver safe and secure products to customers, at the optimal price.

Activities

▶Utilizing knowledge for responding to transportation impacts from typhoon damage

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

▶Diversification of malt suppliers and long-term contracts with hop farmers

We have diversified our procurement of malt, the main ingredient of beer, across three continents: North America, Europe, and Australia. We combine procurement measures for hops, such as adopting long-term contracts with producers, as part of efforts to secure the necessary amounts, and minimize the impact of market prices.

Activities

Activities in response to Significant Risks and Opportunities

Physical risk / Acute risk

Disruption of operations owing to droughts (short to long term)

Water Resources | Climate Change

Water is essential in brewing and production processes for alcoholic beverages, soft drinks, pharmaceutical products, and biochemical products. Accordingly, there may be disruption or obstacles to brewing and production in the event of severe droughts caused by climate change. In our assessment of water stress at production and brewing sites based on Aqueduct 4.0, and other resources, water stress such as drought was elevated as high at seven plants in Australia, two in the U.S., two in China, and one in Thailand. The financial impact of the drought on the manufacturing sites was estimated assuming Aqueduct 3.0. We have identified the estimated financial impact of droughts on breweries and production sites based on the volume decline in brewing and production under certain assumptions at business sites with a "high" level of water stress. We estimated that the financial impact was between approximately 30 to 600 million yen. Based on past cases, we have judged that the impact can be minimized to a negligible level even during droughts. However, in light of the effects of climate change in recent years, which have been becoming more severe and frequent as evidenced by the flood damage at NBB Asheville, we are currently re-examining the water risk assessments of the Kirin Group's global bases.

Response strategy

▶Advanced water reduction technology (adaptation measures)

We conduct assessments of water stress and water risk to obtain scientific evidence. Based on this understanding, we implement appropriate water reduction measures tailored to the different levels of water stress in each country and region.

▶Sharing drought response knowledge (adaptation measures)

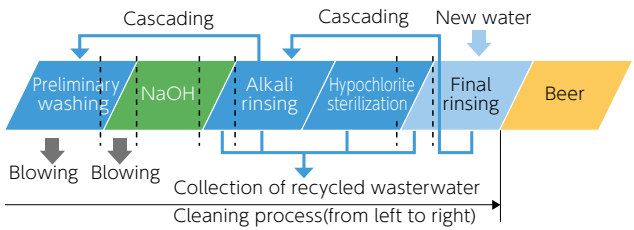
We enhance the resilience of each business by sharing the knowledge and insights gained from drought experiences across our global sites.

Activities

▶Introduction of reverse osmosis (RO) water recycling plant at Tooheys Brewery

Unlike Japan, which is rich in water resources, Australia faces chronic water shortages. For example, in Sydney, New South Wales, there is a high risk of drought, and a significant amount of water is used for industrial purposes rather than daily living, necessitating water conservation in the business sector. The Kirin Group aims to reduce water usage by constructing facilities in Australia that purify and reuse water used in breweries. In 2024, following the Castlemaine Perkins Brewery in Queensland, Tooheys Brewery became the second site to introduce a reverse osmosis (RO) water recycling plant. The recycled water is used for equipment cleaning and other purposes. This facility's introduction allows for the reuse of approximately 270 million liters of water annually, contributing to water conservation. This amount is equivalent to filling 108 Olympic swimming pools. Additionally, a $7.2 million investment will save over $700,000 in annual water bills.

The water used for cleaning is cascaded for repeated use according to water quality.



▶Strict management of flow rate and flow velocity to avoid wasting water in the production process

In our production process, we use a lot of water in cleaning and sterilizing processes. We have established management system to strictly control quality of the cleaning processes and water consumption by optimizing flow rate and other parameters. We also actively promote reuse of water, depending on purposes. For example, the rinsing water that we use in the final cleaning step of an equipment is relatively clean, so we can use it again for the initial cleaning step of other equipment. In this way, the water used for cleaning is cascaded for repeated use according to water quality. In order to ensure that equipment is appropriately cleaned, it is necessary to know how to use the equipment, such as how to balance the amount of water that can be recovered with the amount of water that is used, and how to time the process. The Kirin Group is achieving a high level of water conservation by accumulating best practices and sharing them among production sites.

▶Addressing watershed-level water stress through collaboration with local communities, global environmental organizations, and experts

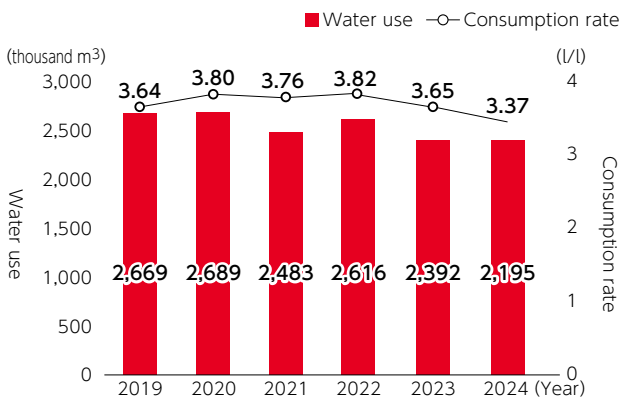
The Fort Collins Brewery, under the Kirin Group, uses water from the Colorado River Basin in the United States. In recent years, the Colorado River Basin has experienced a decrease in river flow due to reduced snowfall. Despite this, water demand has increased due to the expansion of agriculture and dairy farming upstream, and population growth downstream. Additionally, there are stringent restrictions on water usage imposed by geographical and historical contexts. This water stress cannot be resolved through our water-saving efforts alone. Therefore, the Kirin Group has begun collaborating with watershed stakeholders and the community to find solutions together. In March 2023, we held a TNFD scenario analysis workshop with TNFD stakeholders and local water experts to discuss and consider strategies for addressing water stress issues. By collaborating not only within our company but also with local communities, experts, and environmental organizations, we are strengthening our ability to approach shared challenges. We share this knowledge across the entire group to enhance our response capabilities.

Activities

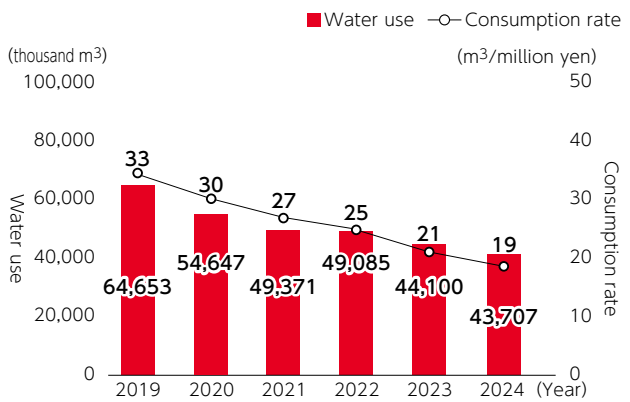
Activities in response to Significant Risks and Opportunities

Metrics and targets

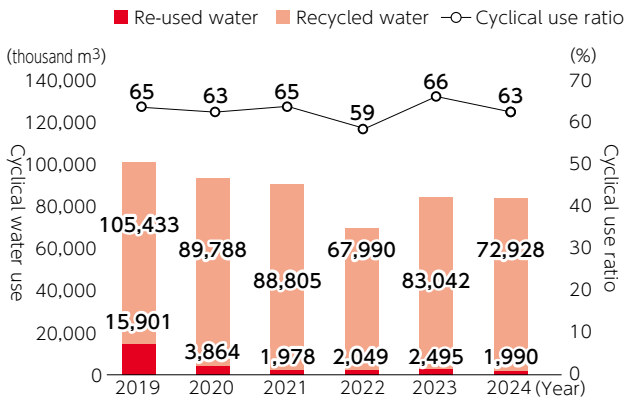
Water use and consumption rate (water use / production volume) of Lion(Oceania region)



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



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



Activities

Activities in response to Significant Risks and Opportunities

Physical Risk / Acute Risk

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

Biological Resources | Water Resources | Climate Change

There is a possibility that water risk and water stress from climate change, as well as disasters, may result in a decline in agricultural yields and an increasing financial impact related to procurement. We conducted a detailed water risk survey of raw material production areas using Aqueduct3.0 in 2019, and identified that water stress will be high in many production areas (Impacts of Climate Change on Major Agricultural Yields and Water Stress on Agricultural Land Around 2050 → P.19). In recent years, such concerns have emerged in many regions around the world.

Response strategy

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

In addition to mitigating long-term climate risks by reducing GHG emissions, it is essential to strengthen our preparedness for floods and droughts as part of our short-term strategy. For this purpose, priority sites will be narrowed down after conducting water risk analysis in production areas. Among the priority sites, action sites will be identified and water resource conservation activities and training will be promoted, as well as appropriate disaster mitigation measures and sustainable water use management. This will contribute to the risk reduction of yield declines due to extreme weather events and to ensuring a stable agricultural product supply.

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

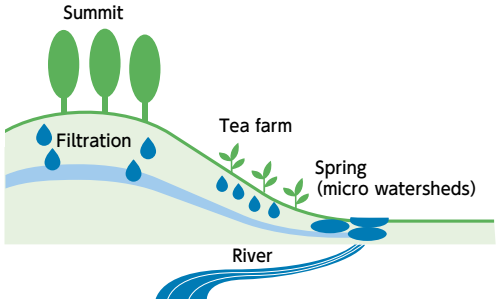
Soil runoff leads to a decline in agricultural productivity and negatively impacts the conservation of water resources. Enhancing soil conservation and water management practices is crucial for ensuring the sustainability of agricultural land, particularly as precipitation patterns become more unpredictable. Effective soil management can reduce erosion during rainfall, improve water permeability, and increase water retention during droughts. Additionally, maintaining forests and vegetation supports water source recharge and contributes to the stability of the regional water cycle. Through these measures, we aim to mitigate procurement risks.

Activities

▶Training on measures to address water stress in agricultural production areas

Many tea farms in the highlands of Sri Lanka are planted with tea trees on steep slopes. In areas with favorable geological conditions, rainwater seeps into the ground and emerges as springs in corners of the tea farms. These springs are known as micro watersheds. Located in the highlands of central Sri Lanka, these micro watersheds are the sources of most rivers flowing to coastal cities, making them small but valuable sources of water. In recognition of their importance, we initiated conservation activities in 2018, and by the end of 2024, 27 water sources had been preserved. As part of these conservation activities, we have provided training to 1,750 residents to raise awareness about the need for water source conservation. Additionally, pamphlets on the importance of water, conservation, and watershed protection have been distributed to approximately 15,000 people. Some farms have integrated water education into nursery and elementary school programs for harvest workers. In Vietnam, coffee farms began training in 2020 to acquire certification, introducing methods to prevent land from drying out during droughts and to store water for use during dry periods.

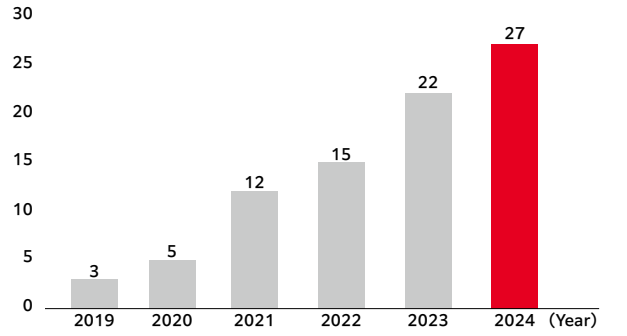
Mechanism of micro watersheds



▶Cover crop training to prevent soil runoff

In Sri Lanka, the impact of climate change has led to frequent occurrences of drought and heavy rain. Urbanization, industrialization, and inappropriate land use have exacerbated soil erosion and runoff, which are significant problems. Tea farms, often situated on steep, sunny slopes, face additional challenges. Heavy rains not only cause the runoff of fertile soil but have also led to landslides that have resulted in loss of lives. Covering the ground with grass (cover crops) is an effective soil management measure that enriches ecosystems and serves as an adaptation strategy to climate change. This approach prevents soil runoff by shielding the ground from direct rainfall during heavy rains and helps retain water during droughts. In our training activities to support the acquisition of certification for sustainable tea farms in Sri Lanka, we teach how to identify grasses that negatively impact tea cultivation. We instruct tea farms to ensure that the ground is covered with well-rooted grasses. In collaboration with neighboring universities, we have developed a method that is accessible to farm workers, providing them with science based guidance.

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



Number of residents educated on the importance of water

Group training : 1,750 people
Distribution of pamphlets : 15,000 people

Activities

Activities in response to Significant Risks and Opportunities

Physical Risk / Acute Risk

Impacts of diseases and air pollution on agricultural products [short to medium term]

Biological Resources | Climate Change

With climate change and the degradation and pollution of the natural environment, there is growing concern about the impact of diseases and air pollution on agricultural yields. In Sri Lanka, air pollutants from neighboring India are damaging tea leaves in lowland areas. Global warming is expected to exacerbate grape diseases. Additionally, Brazil, a major producer of oranges for processing, has experienced a sharp decline in production due to extreme heat, low rainfall, and disease.

Response strategy

▶Research and measures from a long-term perspective (adaptation measures)

We will leverage our strength of having fields where we are able to conduct surveys and various types of tests to solve various issues related to the environment through a scientific approach and research and development with a long-term perspective.

Activities

We believe that comprehensive pest management is an effective way to control agricultural diseases, and we have already begun trials in some vineyards and tea farms. It seems likely that ecosystems will become stable when a variety of species inhabit in the fields. We have also begun research concerning the possibility that the enrichment of ecosystems through hedgerow-style cultivation may suppress diseases, as well as focusing on the early detection of insects and mites that are vectors of diseases.

Long-term, ongoing research is necessary to solve various issues related to climate change and natural capital. In the Kirin Group, we have our own vineyards, and we have established strong relationships of trust with tea farms in Sri Lanka through long term engagement.

One of the major diseases in grape cultivation is downy mildew, with serious damage reported worldwide. To mitigate this damage, it is urgent to accurately identify the pathogens affecting grape quality and yield and to develop technologies that maximize control effectiveness. The Institute for Future Beverages has established the following two technologies:

▶Technology for year-round maintenance and management of downy mildew pathogens

The research team has developed an innovative method to stably maintain and manage downy mildew pathogens throughout the year. This technology allows for the continuous cultivation of pathogens in the laboratory without relying on conventional overwintering by oospores in leaf litter.

▶Pesticide efficacy evaluation technology

Utilizing the aforementioned maintenance technology, the team has established a drug resistance evaluation system that can be assessed year-round. This technology is expected to significantly contribute to the early detection of resistant bacteria and the verification of the effectiveness of new pesticides.

The development of these technologies will significantly advance downy mildew control strategies and enable more effective and sustainable disease management. These research results received a conference presentation award from the American Society for Enology and Viticulture (ASEV) Japan.

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Policy Risk

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

Biological Resources | Water Resources | Climate Change

It is highly likely that energy procurement and logistics costs will spike if governments introduce systems such as carbon taxes, emissions trading schemes, and carbon border adjustment mechanisms. In Japan, we anticipate initiatives such as the introduction of an emissions trading scheme by the GX League, and the introduction of systems that require generators of electric power to purchase emission allowances in the future. Such initiatives result in additional cost for energy procurement. The Kirin Group will minimize the risk of cost increase by steadily reducing emissions to meet the 1.5℃-aligned SBT and Net-Zero target.

As a result of estimating the financial impact on energy procurement and the emission reduction effect due to carbon pricing, achieving the SBT 1.5℃ target would result in tax savings of approximately 2.7 billion yen under the 4℃ scenario, 4.6 billion yen under the 2℃ scenario, and 4.9 billion yen under the 1.5℃ scenario by 2030.

Response strategy

▶Energy saving/renewable energy/switch of energy source

In order to minimize the financial impact of carbon pricing, we will first reduce GHG emissions in accordance with our roadmap, under the basic principle of profit and loss neutrality as a group, aiming for the 1.5°C-aligned SBT targeting 2030 for Scope 1 and Scope 2 emissions. Specifically, the merit from saving energy will offset depreciation and amortization from the investment and the procurement costs increase of renewable energy. Since the outlook for technological innovations in areas such as switch of energy source and trends in energy costs are currently unclear, we cannot accurately estimate costs for 2030 onward. We will, however, incorporate measures to reduce GHGs aimed at achieving our RE100 renewable energy target by 2040 and the net-zero target by 2050 into our business plan.

Metrics	target of 2030	Progress of 2024
Scope1+2 reduction rate	50%	34%
Scope3 reduction rate	30%	10%

▶GHG emission reduction through logistics optimization

In order to reduce GHG emissions in logistics departments, we will develop the various initiatives such as modal shifts, joint deliveries with industry peers, and higher loading ratios. GHG emissions from upstream transportation (category 4), including the transportation of products, account for approximately 10% of total Scope 3 emissions, and are a major target for the reduction of emissions. In recent years, reducing the impact of transportation has also been an important initiative from the perspective of reducing the risk that we will not be able to transport products owing to the shortage of truck drivers.

▶GHG emission reduction through lightweight packaging

By lightweighting containers and packaging such as bottles and labels, we will reduce GHG emissions in manufacturing and logistics.

▶Increasing the ratio of recycled materials in packaging

We will adopt can lids that increase the ratio of recycled aluminum, thereby reducing Scope 3 emissions, instead of primary aluminum ingot which requires significant electricity during manufacturing.

▶GHG emission reduction at the sales stage

By introducing high energy-efficient heat pump vending machines, we will reduce Scope 3 emissions.

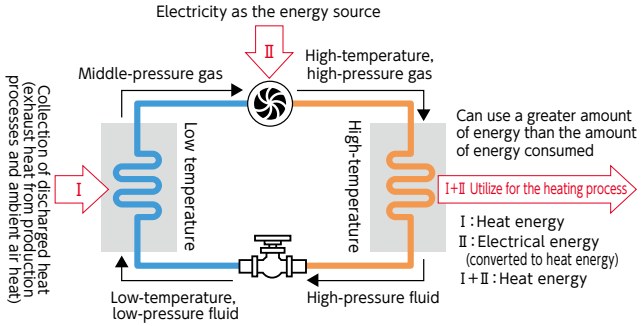
Activities

▶Energy saving/renewable energy/switch of energy source

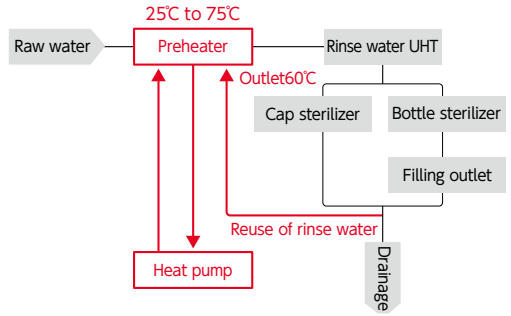
【 Utilization of heat pumps in production processes 】

The Kirin Group believes that reducing dependency on fossil fuel combustion and increase that on electricity, and, furthermore, using renewable electricity are the most effective ways of energy efficiency. Kirin Brewery has reduced GHG emissions by approximately 70% over the 25 years from 1990 to 2015. Since 2019, heat pump systems have been introduced at wastewater treatment plants in six Kirin Brewery plants, reducing GHG emissions by 3% (approximately 4,800 tonnes) compared to last year (As of November 2023). At Shinshu Beverage, about 970 tonnes of GHG emissions are reduced annually by reusing waste heat, which is difficult to use directly, in the bottle cap rinsing process. The Kirin Brewery Okayama Plant has reduced annual GHG emissions by approximately 180 tonnes by reusing waste heat and using thermal energy of atmosphere to a hot water sterilization process for cans (As of November 2023).

Heat pump system



Shinshu Beverage production line



Activities

Activities in response to Significant Risks and Opportunities

【 Improving compressor efficiency 】

At the Kirin Beverage Shonan Plant, in 2021, we switched our high-pressure compressors for PET bottle molding from V-type reciprocating compressors to screw compressors and horizontally opposed reciprocating compressors with variable frequency drives, thereby reducing annual power usage by around 8%. These machines enable us to recover waste heat from themselves and to reuse the heat to other processes.

Improving compressor efficiency

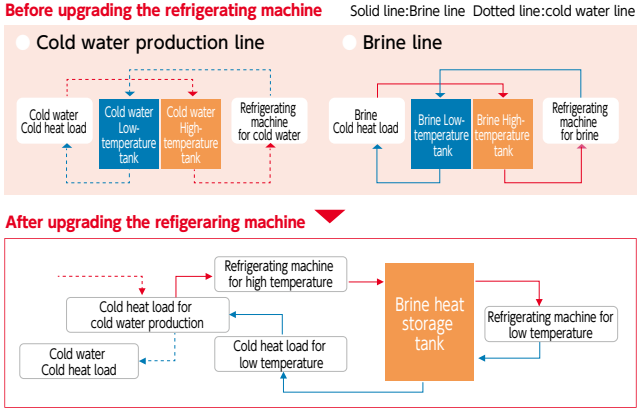
Inverter-controlled pneumatic machinery

The Information and product images above are as of the end of June 2023.

【 Improving the efficiency of refrigeration systems 】

At Kirin Brewery, we reduce energy consumption through improving the efficiency of refrigerating systems. We are implementing a phased approach to the refrigeration system, which cools cooling media in multi-steps, a methodology to maximize energy efficiency of refrigerators.

Improving the efficiency of refrigeration systems



▶Renewable energy

【 Switch purchased electricity for plants to 100% renewable 】

Kirin Brewery has achieved 100% of renewable energy for purchased electricity at Sendai and Nagoya plants since 2022, Fukuoka and Okayama plants since January 2023, Toride plant since April 2023, and Hokkaido Chitose, Yokohama, Shiga, and Kobe plants, as well as all sales sites, since January 2024. As a result, Kirin Brewery has achieved 100% renewable energy for purchased electricity at all production and sales sites, and the proportion of renewable energy in all electricity usage is 66%.

We aim to achieve RE100 target as soon as possible and replace all electricity used in our global operation to renewable energy in the future.

Kyowa Kirin completed to switch purchased electricity to renewable of its production sites and research laboratories in Japan. Kyowa Kirin expanded the initiative from Takasaki Plant, Bio Production Technology Laboratories, Fuji Research Park, and CMC Research Center, in 2020, to Ube Plant in April 2023. Through these initiatives, Kyowa Kirin Group as a whole reduced CO_2 emissions from its operation by more than 55% by the end of 2023 compared with those of 2019, and has already achieved its 2030 target.

Since January 2022, all "Château Mercian" wineries (Château Mercian Katsunuma Winery, Château Mercian Mariko Winery, and Château Mercian Kikyogahara Winery) have achieved 100% renewable energy by applying renewable energy certificates with purchased electricity. At breweries in Australia and New Zealand for Lion, 100% of purchased electricity has been sourced from renewable energy since January 2023.

Kirin Brewery Sendai Plant

Kirin Brewery Nagoya Plant

Kirin Brewery Fukuoka Plant

Kirin Brewery Okayama Plant

Kirin Brewery Toride Plant

Château Mercian Katsunuma Winery

Château Mercian Mariko Winery

Château Mercian Kikyogahara Winery

【 Use of large-scale solar power generation 】

Kirin Group values, in its renewable energy procurement, "additionality," which refers to creating new sources of renewable energy in the world, as well as "ethical procurement," which refers to considering the environmental impact and human rights in generating energy. Kirin Brewery has introduced large-scale photovoltaic system at all nine plants (eight plants, excluding Yokohama Plant, use PPA model[*1]). At Mercian Fujisawa Plant, we introduced photovoltaic electricity based on PPA model from March 2023. This initiative has reduced annual GHG emissions by approximately 124 tonnes and increased the proportion of renewable energy in electric power used by Mercian from approximately 5% before introduction to approximately 8%. At Kyowa Kirin, we have introduced large-scale photovoltaic system (1.47MW) based on PPA model at Ube Plant in 2023. This initiative reduced annual CO_2 emissions by approximately 1,029 tonnes. Vietnam Kirin Beverage introduced a large-scale solar power generation facility (369 KW) using the PPA model, which starts operation in May 2025. This is expected to reduce CO_2 emissions by approximately 340 tonnes annually. Kirin Group Logistics, Kyowa Hakko Bio, and Shinshu Beverage also rent parts of their premises and building roofs to large-scale solar power generation facility companies, contributing to the effective use of their assets and promoting the spread of natural energy.

Activities

Activities in response to Significant Risks and Opportunities


Kirin Brewery Hokkaido Chitose Plant


Kirin Brewery Kobe Brewery Plant


Kirin Brewery Shiga Brewery Plant

Mercian Fujisawa Plant

【 Use of solar power generation in Australia 】

Lion installed photovoltaic system to Castlemaine Perkins Brewery in 2019 and to Little Creatures Brewery in Victoria in 2020. Tooheys Brewery, the largest brewery in New South Wales, collaborates with Australian Hotels Association (AHA), contracting PPA with a renewable energy distributor. By leveraging a buying power of Tooheys, AHA was able to introduce renewable energy at a lower price, successfully reducing the electricity unit cost for hotels' pubs from 11.5c/kWh to 6.9c/kWh. In May 2020, Lion became Australia's first large scale carbon neutral brewer, certified by Climate Active[*2]. Lion discloses carbon credits used to offset its emissions for a year in the annual report to comply certification requirement by Climate Active. The requirement is a new standard for carbon neutral certification in Australia. In New Zealand, Lion has obtained Toitū[*3] carbon zero certification since 2021.

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


Lion's Little Creatures Geelong

【 Wind power generation 】

Mitsubishi Corporation Offshore Wind Ltd., Venti Japan Inc., C-Tech Corporation, and Mitsubishi Corporation have been selected as power generation business operators for projects off the coast of Noshiro City, Mitane Town, and Oga City in Akita Prefecture, off the coast of Yurihonjo City in Akita Prefecture, and off the coast of Choshi City in Chiba Prefecture, through a consortium (the "Consortium") represented by Mitsubishi Corporation Energy Solutions, Ltd. Kirin Holdings is a partner in the Consortium. These projects are Japan's first fixed-bottom offshore wind power generation projects in general sea areas. Both projects will be the largest power sources in Japan and will make a significant contribution to the Japanese government's commitment to achieve carbon neutrality by 2050. The maximum power output of the three projects will be approximately 1.69 million kW, which is sufficient to meet the electric power demand of approximately 1.21 million households.

【 Renewable energy certificates 】

Since 2021, Kyowa Hakko Bio has introduced "Renewable Energy Certificates (I-REC)" at Thai Kyowa Biotechnologies in Thailand. This is the first case of I-REC application in pharmaceutical and food industries in Thailand. The initiative has offset emissions from electricity and reduced annual GHG emissions by 9,050 tonnes in 2024. We have also introduced renewable energy certificates to Shanghai Kyowa Amino Acid and BioKyowa (I-REC and REC, respectively).

▶Switch of energy source

【 Switch of energy source from heavy oil to natural Gas 】

The majority of the fuel we use at breweries are consumed in boilers that generate steam. At all plants of Kirin Brewery and Kirin Beverage, At all plants of Kirin Brewery and Kirin Beverage, and Mercian Yatsushiro plant, we completely switched the fuel to natural gas, which generates less GHG emissions than heavy oil. We have achieved more efficient boiler operations through the installation of highly efficient gas boilers. To meet part of the plant's heat and electricity needs, cogeneration systems have been installed to provide both heat and electricity.

【 Introduction of electric boilers 】

Lion is planning to install an electric boiler at a brewery in New Zealand, which will begin operation in late 2025. It will save approximately 700 t-CO_2-e per year (6% of Lion Scope 1 and 2 emissions in New Zealand) by replacing the current LPG fuel.

【 Green hydrogen utilization demonstration project 】

Kirin Brewery, along with Mitsubishi Corporation, MCKB Energy Service which is sponsored by Mitsubishi Corporation Clean Energy, Takasago Thermal Engineering and Miura, will start a pilot project in June 2026 to switch part of the boiler fuel used at Kirin Brewery's Hokkaido Chitose Brewery from fossil fuels to green hydrogen and utilize green hydrogen-derived steam in the beer production process.

In the beer production process, a large amount of steam is used for wort boiling and other processes. In this project, part of the boiler fuel used to produce steam will be switched from city gas to green hydrogen, with a plan to meet up to approximately 23% of the annual heat demand with hydrogen, reducing GHG emissions by approximately 464 tonnes per year.

▶GHG emission reduction through logistics optimization

【 Joint delivery and modal shift 】

The Kirin Group regards logistics as a noncompetitive sector and is actively engaging in initiatives together with other companies. In 2017, Kirin Brewery and Asahi Breweries opened a joint delivery center in Kanazawa City, Ishikawa Prefecture, and launched joint train transportation from plants in western area of Japan. Neither of the companies has plants on the coastal side of Japan Sea, so products previously had to be transported by truck over long distances—of 200 km—from their plants on the Pacific Ocean side. This logistic was inefficient and heavy burdens for truck drivers. Joint transportation using train containers not only reduced significant GHG emissions but also shortened driving distances of trucks, significantly reducing burdens of drivers. Thus, the joint delivery contributes to solve truck driver shortages of logistic industry, one of the biggest issues in Japanese society. Through these efforts, we have successfully completed modal shifts from long distance truck transportation, equivalent to 10,000 vehicles a year, to railway containers, and we estimate that we can thus annually reduce GHG emissions by approximately 2,700 tCO_2e. In September 2017, we began joint delivery with Asahi Breweries,

Activities

Activities in response to Significant Risks and Opportunities

Suntory, and Sapporo Breweries in the eastern Hokkaido area. We estimate that the Hokkaido case results in a reduction in annual GHG emissions of approximately 330 tCO_2e.*1

*1 Japan Business Federation (Keidanren) "Contribution to Reduction through Global Value Chains, 5th Edition" (in Japanese)
https://www.keidanren.or.jp/policy/vape/gvc2018.pdf

【 Optimizing inventory and transportation volumes through AI analysis 】

Kirin Beverage and Asahi Soft Drinks have fully introduced the production, sales, and inventory management service "MOVO PSI" developed by Hacobu and JDSC from November 1, 2024, to optimize inventory and transportation volumes. "MOVO PSI" analyzes PSI (Production, Sales, Inventory) information between companies using AI (machine learning) to level daily order quantities and replenishment volumes. The demonstration experiment achieved results such as reducing transportation costs by up to about 9.1% and inventory days by up to about 13.2%, further improving logistics efficiency by increasing self-transport loading efficiency and reducing out-of-stock rates.

Additionally, Kirin Beverage and Kao jointly transport between their logistics centers starting from February 2025 and will gradually increase delivery volumes. Specifically, the empty truck sections connecting Kao's Kawasaki Logistics Center (Kanagawa Prefecture) and Koshoku Logistics Center (Nagano Prefecture), and Kirin Beverage subsidiary Shinshu Beverage Plant (Nagano Prefecture) and Kirin Beverage Kawasaki Logistics Center (Kanagawa Prefecture) will be utilized to optimize truck transportation efficiency and reduce GHG emissions (approximately 15% in the corresponding sections).

The logistics industry faces structural issues such as truck driver shortages, and this initiative was realized under three conditions:

1. Both shippers can utilize logistics data.
2. Sufficient load can be secured for return trips.
3. There are available transportation sections to connect.

Both companies aim to reduce the number of trucks by over 300 annually and will expand joint transportation sections and promote cross-industry collaboration in the future.

【 Vendor-managed warehouses 】

The use of vendor-managed warehouse can reduce long-distance transportation. As a result, GHG emissions are reduced, contributing to a more sustainable supply chain. With the aim of mitigating the risk of not being able to transport due to an unavailability of trucks and optimizing transportation efficiency, we started a trial operation of raw materials procurement and distribution system using raw materials warehouses (vendor-managed warehouses) close to Kirin Beverage's plants, Shonan Plant and Shiga Plant, in October 2019. By establishing vendor-managed warehouses, raw material and ingredient suppliers can transport desired amount of cargo with their convenient schedules, thereby maximizing efficiency. This initiative has made it easier for plants to cope with sudden changes in production plans and contributed greatly to improving production flexibility.

【 In-line blow aseptic filling machines 】

In the past, we purchased empty PET bottles from container manufacturers and shipped them to plants where we filled them with beverages. With in-line blow aseptic filling machines, we mold PET bottles from preforms, thick, compact, semi-processed bottle, in our production processes and fill them under aseptic conditions. This system reduces GHG emissions of empty bottle transportation since trucks can carry much more preforms than empty molded PET bottles. In 2003, we installed preform molding equipment to a soft drink production line at Kirin Distillery, the first case in Japanese beverage industry, reducing transportation loads of preforms.

【 Importing wine in large bags 】

Mercian imports some of its wine via marine transportation in specially designed 24kl bags (equivalent to about 32,000 of 750ml bottles) with low oxygen permeability and fills the wine into bottles in Japan. Compared to importing bottled wine, this method reduces Mercian's GHG emissions from marine transportation by roughly 60% by eliminating needs to transport heavy bottles by sea. Bottling in Japan enables us to use Ecology Bottles (made with at least 90% recycled glass), lightweight bottles, and PET bottles as containers. This production system reduces resource consumption and GHG emissions significantly throughout the value chain.

Specially designed large bags

▶GHG emission reduction through lightweight packaging

Making containers and packaging lighter leads to reducing GHG emissions from production and transportation of the containers and packaging.

▶Increasing the ratio of recycled materials in packaging

Primary aluminum ingots in the manufacturing process consume a large amount of electricity, resulting in higher GHG emissions compared to recycled materials, posing an environmental challenge. To address this, Kirin Brewery, in collaboration with three domestic beer companies, has fully adopted "EcoEnd™" beverage can lids, which produce approximately 40%*2 fewer GHG emissions during manufacturing. Starting sequentially from February 2025, some beer products sold by each company will use "EcoEnd™" lids. Developed jointly by Toyo Seikan and UACJ, "EcoEnd™" meets the required strength and other characteristics for can lids while promoting the circular use of recycled materials. As a measure to reduce Scope 3 emissions, consideration will be given to adopting it for products other than beer.

*2 Reduction amount per can lid compared to conventional products of Toyo Seikan.

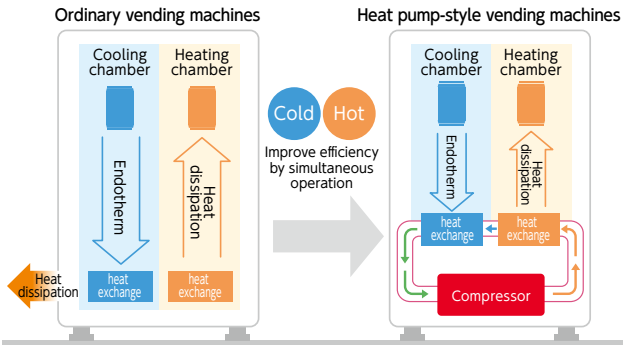
Activities

Activities in response to Significant Risks and Opportunities

▶GHG emission reduction at the sales stage

Kirin Beverage is the first in the industry to introduce heat pump-type vending machines in 2006, and from 2012, almost all newly installed vending machines for cans and PET bottles are of this type. As of March 2025, we have switched more than 93% of installed vending machines to this type. Heat pump-type vending machines pump up waste heat generated from cooling functions and use the heat to warm up the products. This system reduces electricity consumption compared to conventional vending machines. Some models offer higher energy-saving performance with heat sources not only by recovering waste heat released by the cooling function but also by capturing heat from outside the machine and with improved insulation performance by effective use of vacuum insulation materials. These vending machines have evolved to the point where electricity consumption can be reduced by about 40% compared to 2013. The "Green Power Vending Machines" that we began introducing from January 2024, achieve net-zero CO_2 emissions by obtaining Renewable Energy Certificates (REC) equivalent to the annual energy consumption required for operation, we established an application scheme for acquiring REC and will promote their further introduction.

Heat pump function



Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Policy

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

Biological Resources | Water Resources | Climate Change

The prices of agricultural products may spike if governments introduce carbon taxes and carbon border adjustment mechanisms. We estimated the financial impact of carbon pricing on agricultural product prices for barley, hops, black tea leaves, grape juice, starch, lactose, corn, and cassava handled by Kirin Brewery, Kirin Beverage, Mercian, Lion, Kyowa Kirin, and Kyowa Hakko Bio. The results show that by 2050, under the RCP2.6/SSP1 scenario, the impact would be approximately 900 million to 4 billion yen, and under the RCP8.5/SSP3 scenario, it would be approximately 2.2 billion to 8 billion yen (both estimates include the effects of biofuel demand and nitrogen fertilizer prices). The greater the temperature rise, the higher the uncertainty and the greater the risk . Due to the impact of carbon pricing, increased demand for corn for biofuels, which are renewable energy sources, and soybeans may pose a competitive risk to raw materials for alcoholic beverages and soft drinks. Additionally, carbon pricing is expected to raise natural gas prices, which will in turn affect nitrogen fertilizer prices.

Response strategy

▶Risk mitigation through mass plant propagation technologies

To address the risk of competition for raw materials with the increased demand for biofuel corn and soybeans, we can potentially mitigate raw material shortages and price hikes by utilizing mass plant propagation technologies to improve cultivation efficiency.

▶Measures against fertilizer price increases

In response to the rising prices of nitrogen fertilizers, we support the acquisition of sustainable farm certifications and provide proper fertilizer management training to farmers.

Activities

▶Risk mitigation through plant mass propagation technology

The Kirin Group's mass plant propagation technology consists of four underlying technologies: stem propagation technique (organ culture method), sprout propagation technique (PPR method), embryo propagation technique (somatic embryo method), and potato propagation technique (micro tuber method).

This original technology is globally unprecedented. Plant propagation is normally performed using seeds and cutting. These methods result in a limited cultivation period, and the growth rate can be low depending on the plant. However, The Kirin Group's mass propagation technology that we developed makes it possible to significantly increase the number of quality plants with the same characteristics as the parent plant, regardless of the season.

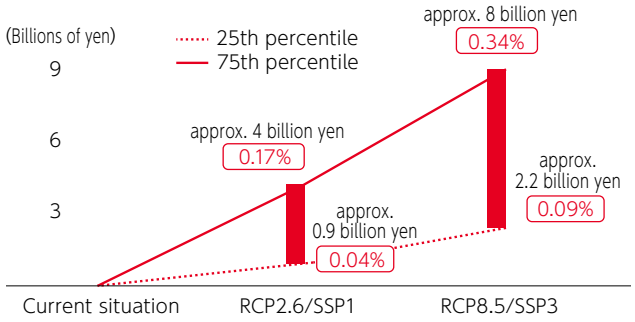
The Kirin Central Research Institute has successfully applied this technology to hops, a raw material for beer, using a world-first approach to promote the formation of axillary buds. By enabling the mass propagation of hops, this technology contributes to stabilizing the supply and improving the quality of raw materials for beer production.

Plant mass propagation technology is expected to have a positive impact on the sustainability of agriculture and ecosystems by accelerating the dissemination of varieties adapted to environmental changes, as well as the mass propagation of new varieties, endangered species, and useful plants.

▶Measures against fertilizer price increases

The Kirin Group conducts Rainforest Alliance certification support training for tea farms in Sri Lanka. The training provides scientific methods to increase yields while reducing the use of pesticides and fertilizers. (see details on certification support→P.56)

Impact on agricultural product procurement costs from carbon pricing in 2050 (percentage of revenue)*1,2



*1 The socioeconomic systems in the papers we used for our estimates differ from the Kirin Group scenarios, so we have created and disclosed our estimates under the RCP2.6/SSP1 and RCP8.5/SSP3 scenarios in these papers (sources are listed in reference documents).
*2 Recalculated with 2024 data

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Policy

Impact on currently held assets [medium to long term]

Biological Resources | Water Resources | Climate Change

If policies, regulations, and societal demands towards decarbonization become stricter, it may become difficult to continue using existing facilities that use fossil fuels for the period that we initially planned. Under the Kirin Group's roadmap, we plan to switch the fuel for boilers, which are heat sources used in manufacturing processes such as boiling, from natural gas to GHG-free energy sources such as green hydrogen in the future. In such cases, the renewal of boilers and other facilities will be required earlier than expected. In the same way, we are required to transition the trucks we use for transportation to electric vehicles sooner than initially expected, but we believe that the impact will be small even if renewal becomes necessary before assets are fully depreciated.
(Details of the roadmap → P.26)

Response strategy

▶ **Identification of trends in technology and implementation of our roadmap with adaptive updates**

We will proceed with our transition plan based on our Net Zero roadmap, which is constantly updated in light of technological trends.

Activities

The use of GHG-free energy requires technological innovation and infrastructure development. Although the full-fledged transition will not take place until 2030, we will update existing plant facilities, including boilers and trucks in accordance with regulations. If we misjudge the timing of introducing new technology, there is a risk that our existing technology and facilities may become obsolete as a result of regulatory changes or shifts in societal trends. Accordingly, we will develop a long-term roadmap for facility renewal and introduction, and constantly update it to ensure a smooth transition.

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Policy

Cost of regulatory response [medium to long term]

Biological Resources | Water Resources | Climate Change

In 2023, the International Sustainability Standards Board (ISSB) finalized the IFRS Sustainability Disclosure Standards, which will serve as the global baseline for the disclosure of information related to sustainability. Based on these standards, jurisdictions around the world are creating legislation concerning information disclosure requirements for companies. The Kirin Group has business sites in Japan, Australia, the US, and the EU, and in the future, it is likely that we will be required to report sustainability-related information in accordance with the requirements of each jurisdiction. The Kirin Group believes that natural capital and climate change are among the sustainability issues for which we should disclose information. Specifically, we must explain the impact of these issues on corporate value, and our response to risks and opportunities. To achieve this, we must establish systems that enable us to accurately and quickly collect information from across the value chain and utilize it in management.

Response strategy

▶Advancement of data collection and calculation methods

We will strengthen the organizational structure responsible for sustainability-related disclosure and enhance data collection and calculation by introducing an IT system.

▶Refinement of data calculation

When calculating Scope 3 emissions data, we will replace the conventional estimation method using emission factors based on literature values with calculations based on primary data from suppliers.

Activities

▶Advancing data collection and calculation methods

As a leading global CSV company, we have begun preparations for the establishment of the Disclosure Section, which will oversee the Group's financial and non-financial information disclosure (completed in April 2025). This office will ensure that our organizational structure supports continuous disclosure in compliance with international standards such as ISSB and SSBJ. By assigning dedicated people to appropriately manage disclosure, we will ensure that non-financial information related to the environment is disclosed in compliance with these standards. We have also decided to change the organizational structure to collect non-financial data to one that utilizes a system and have begun preparations for its launch. Previously, data to calculate Scope 3 emissions was collected individually from each company and then aggregated by the headquarters. By utilizing the new system, we will be able to reduce the burden of aggregation and calculation and promote higher quality disclosure.

▶Refinement in data calculation

In the past, Scope 3 data disclosure relied on secondary data from literature and published databases. However, we have started collecting primary data that reflects our suppliers' GHG reduction efforts, leveraging the Kirin Supply Chain Environmental Program launched in 2024. By replacing secondary data with supplier primary data, the results will better reflect the efforts of the GHG reduction measures taken by each supplier, enabling us to disclose calculation results that more accurately represent the actual situation.

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Policy

Incompatibility with rapid agricultural policy transitions [short to long term]

Biological Resources

Sri Lanka's sudden ban on the import of chemical fertilizers and agricultural chemicals in the first half of 2021 (later withdrawn) caused a decline in yields of many agricultural products and caused great damage to the Sri Lankan economy. Political and macroeconomic influences can cause indirect changes in the use of land as a result of changes to crops produced and reduced yields per unit area. This could encourage deforestation. Without sufficient preparation, the transition to organic farming may weaken agriculture itself and lead to the destruction to the natural environment in the area surrounding agricultural land.

Response strategy

▶Support for training farmers in sustainable agriculture

We recognize that proactively implementing environmental initiatives ahead of policy changes can help mitigate challenges during periods of rapid transition. Through training and support programs, we aim to equip farmers with the knowledge and resources needed to successfully adopt sustainable agricultural practices.

▶Appropriate engagement with experts and policymakers

We will strengthen our network with experts and policymakers through active participation in global environmental initiatives, collaboration with environmental organizations through supporting farmers, and joint research projects with academic societies and government institutions. By leveraging these networks, we will gain knowledge about agricultural technologies, policy trends, and business, while improving agricultural sustainability.

Activities

▶Training for obtaining Rainforest Alliance certification

The Kirin Group has supported Sri Lankan tea farms to acquire Rainforest Alliance Certification. From 2022 to 2024, a total of 9 large farms and 4,804 small farms participated in the training. In Sri Lanka, droughts and frequent heavy rains caused by climate change have become serious problems. Urbanization, industrialization, soil erosion and outflow due to the inappropriate use of land are also major concerns. Since large tea farms are often located on steep, sunny slopes, heavy rains not only wash away the fertile soil, but in the past have caused landslides, in some cases taking the lives of people living on the farms. Covering the ground with grass (cover crops) not only enriches the ecosystem but also prevents soil erosion and retains water during droughts, making it an effective adaptation measure to climate change. The training teaches how to identify grasses that negatively affect tea cultivation and ensures that the ground in the tea farms is covered with good, deep-rooted grasses. Training also teaches scientific methods to increase yields while reducing the use of pesticides and fertilizers. In addition to protecting the forests, the reduced expenditure on pesticides and fertilizers improves the farms' profitability and increase the safety of the tea leaves.

Furthermore, the Kirin Group has supported coffee farms to acquire Rainforest Alliance Certification since 2020 in Vietnam, which accounts for about 30% of the coffee beans procured by the Kirin Group. Through the training, we aim to improve coffee quality by creating a system that can flexibly respond to environmental changes such as climate change, reducing water usage, preventing river pollution, considering biodiversity, and introducing regenerative agriculture. Currently, the training is being conducted in Gia Lai Province, Vietnam, and in 2024, 12 training schools were held, with 336 farms participating.

▶Joint investment project with NPO to support regenerative agriculture

Stone & Wood Brewery, a subsidiary of Lion, has launched a joint investment project with an NPO in 2024 to promote the spread of agriculture. The project foundation supports local charitable organizations and provides sustainable agriculture projects, educational support, and community support to farmers who wish to introduce regenerative agriculture. This initiative has built valuable networks with environmental organizations, experts in regenerative agriculture, and local non-profit organizations.

Metrics and targets

Targets and results of certification support training

Metrics	Targets	Results
Number of large tea farms Assisted to obtain certification in Sri Lanka (number of farms that received training)	15 (2022-2024 cumulative)	9 (2022-2024 cumulative)
Number of small tea farms assisted to obtain certification in Sri Lanka (number of farms that received training)	5,350 (2022-2024 cumulative)	4,804 (2022-2024 cumulative)
Number of coffee farms assisted to obtain certification in Vietnam (number of farms that received training)	2,000 (2024-2026 cumulative)	336 (2024)

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Technology

Lack of research and development resources and lack of long-term perspective [short to Long Term]

Biological Resources | Water Resources | Containers and Packaging | Climate Change

Relying on suppliers for the development of technologies such as lightweight packaging and recycled PET poses a risk of losing control over the schedule for achieving Scope 3 targets and implementing the Kirin Group plastic policy.

Concepts such as "The Climate-Nature Nexus" and "NbS (Nature-based Solutions)" have emerged as adaptation measures for climate change, but since they target nature, they generally require long-term research and technological development. If we begin taking action after the risks have become clear, we risk falling behind competitors and making it difficult to recover over the long term.

Response strategy

▶In-house packaging development capability

The Kirin Group has the Institute for Package Innovation, where we develop packaging and containers in-house, as one of the few research laboratories of its scale owned by a global food and beverage, and pharmaceutical company. We think we will be able to utilize this strength to develop advanced containers and packaging with lower GHG emissions across the value chain.

Based on the technologies it has accumulated in the development of glass bottles, cans, PET bottles, cardboard cartons, and other containers and packaging, the Institute for Package Innovation utilizes AI, kansei (affective) engineering, and other technologies. Taking advantage of the strength of having this large-scale research facility, we are able to provide technical support necessary for commercialization and develop new containers. As part of the recycling of PET bottles, we are focusing on technical development related to chemical recycling. We aim to use recycled PET resin for 50% of domestic PET bottles by 2027, and we will thereby contribute to reducing social costs by transitioning to a circular economy.

▶Research and development on climate change and natural capital

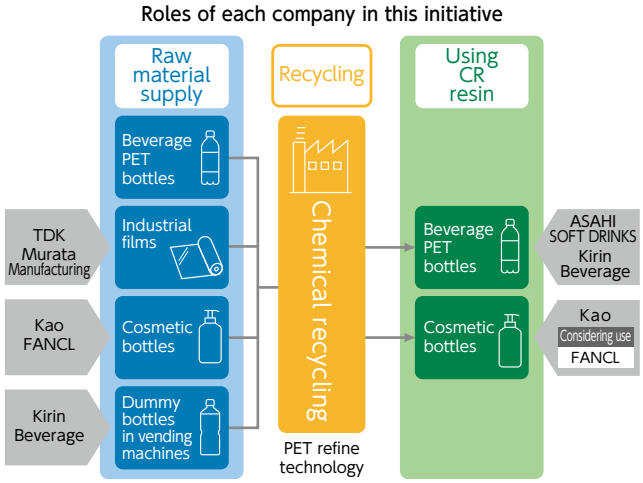
Grapes and hops are sensitive to changes in climate and cultivation conditions, and recent climate changes have already begun to affect their yields, quality, and flavors. To adapt to these climate changes, we are further promoting research and development in breeding and cultivation techniques.

Activities

▶Expansion of recycled materials through chemical recycling technology

The Institute for Package Innovation is promoting efforts to expand recycled PET resin by regenerating non-food-grade PET materials into beverage PET bottles. This initiative began trial operations in April 2025. Within a collaborative scheme involving companies from different industries, the laboratory led the safety evaluation of using chemically recycled resin, made from non-food-grade PET, in food containers. The results of this evaluation were presented at the 120th Annual Scientific Conference of the Japan Society for Food Hygiene and Safety, where it received the Young Excellence Presentation Award.

Scheme for expanding recycled materials



▶Research and development for climate change and natural capital

In 2022, the Kirin Group developed mass plant propagation technology for hops, and we intend to build a sustainable supply system for raw materials by combining improvements to breeds and mass plant propagation technology. (Details on mass propagation technology → P.53)

At Château Mercian Mariko Vineyard, we launched a joint study in cooperation with NARO in March 2024, to assess the effects of carbon storage as a climate change mitigation measure. In this research, we intend to engage in initiatives such as assessing the carbon storage effect of biochar utilizing grapevine-pruning residues from vineyards, etc.

Biochar made from grapevine-pruning residues

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Technology

Decline in ability of engineering departments to respond and lack of appropriate investment [short to long term]

Climate Change

There is a possibility that our engineering workforces to achieve decarbonization are insufficient, or the technology may not be passed on and applied appropriately.

For example, effective utilization of waste heat is essential for the efficient utilization of energy. This requires not only the introduction of modern equipment and facilities, but also engineers and technology with a deep understanding of the production process. Technological progress is rapid, and if we cannot determine the timing for introducing technology or make quick investment decisions, we may not be able to achieve reductions in GHG emissions as planned. While momentum for the decarbonized society is rapidly increasing, there is a high possibility that we will be unable to introduce renewable energy at an appropriate time and appropriate price in Japan, where the places for installing renewable energy facilities are particularly limited.

Response strategy

▶Strengthening engineering capabilities

We assign personnel with engineering skills in each group company to ensure robust support for production facilities, while continuously developing and passing on technical expertise. The engineering department of Kirin Brewery will play a pivotal role in supporting the decarbonization engineering efforts across the entire group.

▶Understand technological trends and flexibly introduce facilities and equipment

The Kirin Group will centrally monitor technological trends and social conditions through the engineering department of Kirin Brewery.

Activities

▶Strengthening engineering functions

The Kirin Group ensures that engineers who are well-versed in production processes, production technology, and maintenance skills provide robust support for production facilities. Additionally, the group owns Kirin Engineering, a general engineering company specializing in the construction of plants producing beer, non-alcoholic beverages, pharmaceuticals, and other products. Kirin Engineering has been involved in large-scale production facility expansions and modifications for both within and outside the Group in Japan and abroad for many years. By undertaking engineering for various businesses in-house, the engineers can transfer and develop expertise and technical skills in building facilities. These technical capabilities and engineers will also support the growth and expansion of businesses ranging from food to pharmaceuticals.

▶Monitoring technological trends and agile equipment introduction

Based on the understanding of technology trends and societal movements, we reflect these insights in our climate change response roadmap. We determine where and what type of facility introduction will be effective within the group and agilely implement technologies through close communication with each Group company.

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Market

Social resistance to fossil-derived raw materials [medium to long term]

Containers and Packaging | Climate Change

Concern about related to plastic is spreading to issues related to all aspects of climate change, not just ocean pollution. As a result, there is a possibility that people may have a stronger negative impression than before of containers and packaging using raw materials derived from fossils. In Japan, the "Act on Promotion of Resource Circulation for Plastics" was enacted on April 1, 2022, and Concern about related to plastics has been increasing. Plastics are a raw material derived from oil, and we expect that as Concern about related to climate change increases, people will focus on GHG emissions when they are burned, as well as problems related to the depletion of resources from raw materials derived from oil.

Response strategy

▶Plastic resource recycling

In accordance with the "Kirin Group Plastic Policy," which we formulated in 2019 with the aim of resolving problems related to plastics, the Kirin Group will promote PET bottles that use recycled PET resin. In this policy, we have set forth our target of increasing the percentage of recycled resin to 50% of PET bottles in our operations in Japan by 2027. We have also been advancing the use of recycled PET resin through mechanical recycling. We will promote technical development related to practical uses for chemical recycling to create high quality recycled PET resin by recycling dirty used PET bottles and other PET resin. In addition, we will create systems to recover used PET bottles and other PET resin.

Activities

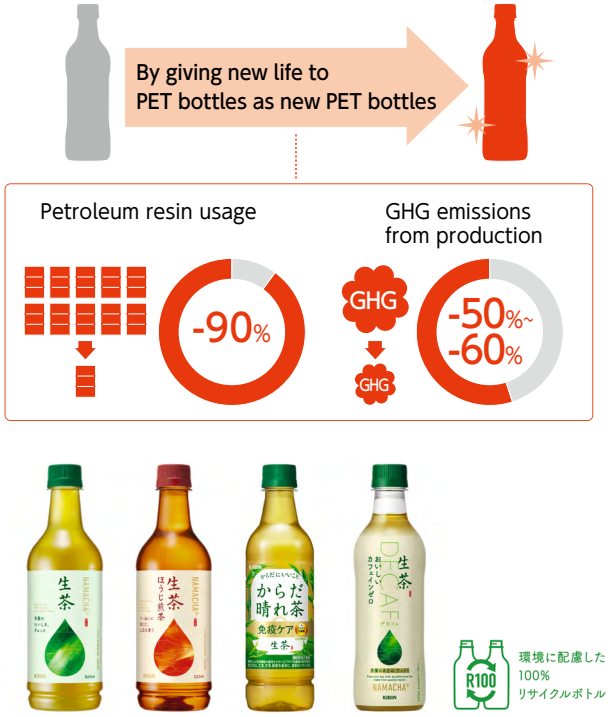
▶R100 PET bottles

In accordance with Kirin Group Plastic Policy that we established in 2019, the Kirin Group is gradually expanding the use of "R100 PET bottles" made from 100% recycled PET resin.

R100 PET bottles use mechanically recycled resin. By using this resin, we can reduce petroleum-based resin by 90% and GHG emissions by 50-60%, compared with conventional PET resin.

We began using recycled resin for some of the packaging of *Kirin Gogo-no-Kocha Oishii Muto (sugar-free)* in February 2014. Subsequently, in 2019, we began using "R100 PET bottles," which use 100% recycled PET resin, for KIRIN NAMACHA Decaf. Our use of "R100 PET bottles" as of June 2025 is shown below.

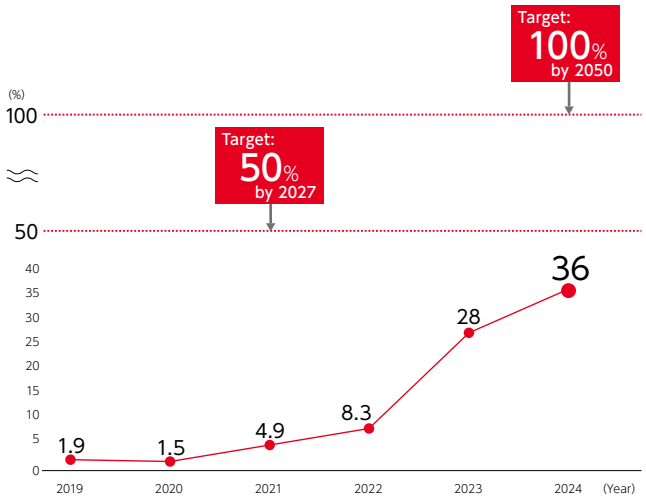
R100 PET bottles



KIRIN NAMACHA : 600ml (First photo from the left)
KIRIN NAMACHA *Hoji Sencha* : 600ml (Second photo from the left)
KIRIN NAMACHA *Karada-Hare-cha* : 525ml (Second photo from the right)
KIRIN NAMACHA *oishii caffeine Zero* : 430ml (First photo on the right)
* Product photos are as of the end of June 2025.

Metrics and targets

PET bottles: Trends in the use of recycled PET resin (Japan)



Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Market and Reputation

Concerns about deforestation [Medium to Long Term]

Biological Resources | Water Resources | Climate Change

As awareness of the importance of forests as GHG sinks grows, concerns about business activities that lead to deforestation are likely to increase more than ever, potentially leading to a stronger negative perception. The worst forest fires in Australia's history from 2019 to 2020 and the wildfires in California in 2025 have brought renewed attention to the relationship between climate change and forests.

The United Nations Food System Summit was held in 2021, the EU's "Farm to Fork" strategy and Japan's "Green Food System Strategy" have been formulated and announced, and there is a stronger focus on sustainable agricultural production than ever before. The spread of COVID-19 and geopolitical issues have also increased people's interest in food security. It is assumed that interest in sustainable agriculture due to these factors will lead to interest in forest issues.

Opportunity loss due to ethical consumption [Medium to Long Term]

Biological Resources | Water Resources | Climate Change

If we fail to provide products that respect the environment and human rights in terms of climate change, natural capital, and containers and packaging, we risk being surpassed by competitors and losing out on opportunities to generate earnings through ethical consumption. Based on scenario analysis related to climate change and natural capital, we have concluded that a rapid expansion of the market for ethical consumption is unlikely at this time. If, however, young people interested in sustainability become the main consumers, they may choose ethical products. In addition, because issues related to containers and packaging are familiar and easily recognized by consumers, we believe that if we do not respond appropriately, it is likely to lead to criticism.

Response strategy

▶Promotion of sustainable forestry and agriculture

The Kirin Group is continuing initiatives to expand sustainable forestry and agriculture, and we plan to increase the proportion of certified paper and raw materials from certified farms that we use.

▶Creation of high-quality forest-based carbon credits

We will conduct joint research aimed at creating forest-based carbon credits.

▶Environmentally friendly products

The Kirin Group will advance the production of environmentally friendly products and display the content and effects of these efforts. Additionally, through cross-industry partnerships, we are working to improve sustainability in the packaging sector.

Activities

▶Promotion of sustainable forestry and agriculture

As part of our efforts towards sustainable forestry, we are expanding the use of FSC-certified paper for paper containers. In 2020, Kirin Brewery, Kirin Beverage, and Mercian adopted 100% FSC-certified paper for all their paper containers. In 2021, we revised the Kirin Group Action Plan for the Sustainable Use of Biological Resources, and we set forth our intention to expand our use of sustainable paper to all our businesses around the world.

In terms of sustainable agriculture, we support the acquisition of Rainforest Alliance certification, which is a certification for more sustainable farming, at tea farms in Sri Lanka and coffee farms in Vietnam. Since August 2021, we have also been selling a year-round product in the Kirin Gogo-no-Kocha line that uses tea leaves from farms with Rainforest Alliance certification.

▶Creation of high-quality forest-based carbon credits

In March 2025, The Kirin Group started a joint research project with Hitachi to create forest-based carbon credits. By utilizing the Kirin Group's unique "mass plant propagation technology" and Hitachi's "natural measurement technology and digital technology related to MRV (Measurement, Reporting, and Verification)," we aim to create high-quality forest-based carbon credits while achieving both GHG reduction and biodiversity conservation in reforestation areas.

▶Environmentally friendly products

Stone & Wood has launched the "Re-In-Can-Ation" project in Australia in collaboration with suppliers such as Visy, Novelis, and Rio Tinto to aim for sustainable packaging. This initiative adopts cans made from 83% recycled aluminum and low-carbon primary aluminum, aiming to reduce CO_2 emissions by 59% compared to traditional cans. The 18-month trial expects to sell 15 million cans and reduce CO_2 emissions by 1,235 tonnes.

Cans made from recycled aluminum and low-carbon primary aluminum

Activities

Activities in response to Significant Risks and Opportunities

Transition Risk / Market Risk

High energy prices [medium to long term]

Climate Change

As initiatives targeting decarbonization accelerate around the world, it is highly possible that demand for natural gas may increase and prices may rise in the short term, owing to such factors as the transition toward sources of energy with low GHG emissions and divestment of coal.

Response strategy

▶ **Steady implementation of our roadmap to achieve our science-based 1.5˚C target**

We must surely execute our roadmap for countermeasures against climate change, which is based on our science-based 1.5℃ target, as we look to reduce our use of natural gas.

In the Kirin Group roadmap, we plan to shift our energy mix to electric power as much as possible, and use renewable energy as the source of that electric power.

Activities

We are conducting demonstration tests with the assumption of converting the heat sources in heating processes from city gas to electricity or green hydrogen.
Details on green hydrogen → P.50

Stone & Wood spearheads cross-industry alliance to transform sustainable packaging in Australia

A Collaborative Approach

Lion's Stone & Wood brand, along with its supply chain partners Visy, Novelis, and Rio Tinto, have announced a breakthrough packaging initiative that uses low carbon raw materials and recycled content to create a more sustainable beverage can.

The pilot initiative named Re-In-Can-Ation, brings together key players across the aluminium value chain to create a can that contains low carbon primary aluminium and on average, 83 per cent recycled aluminium.*

Environmental Benefits

The 18-month trial will see 15 million of these cans enter the market and is estimated to be the equivalent of reducing carbon emission by 1,235 tonnes when compared to the equivalent quantity of Stone & Wood's existing cans.**

Lion Group Sustainability Director, Justin Merrell, said "This partnership shows what's possible when industry leaders unite behind a common goal. In this project we're demonstrating the potential to reduce carbon emissions and conserve resources with the containers our consumers recycle. It's proof that when the full value chain collaborates, we see a stronger circular economy and great benefit to the environment. Only two thirds of Australia's aluminium cans are currently recycled so there is still work to do".

Each supply chain partner plays a crucial role in the initiative to ensure end-to-end environmental sustainability throughout the manufacturing process. Novelis manufactures high-recycled content aluminium coils, Rio Tinto provides low-carbon primary aluminium from its Bell Bay aluminium smelter in Tasmania, and Visy manufactures the cans locally at its Yatala site in Queensland.

With the emergence of new climate disclosure reporting around the world, this type of value chain cooperation is critical for addressing scope 3 emissions and developing a credible transition plan to a low carbon economy.

Recognition from APCO

The Australian Packaging Covenant Organisation (APCO) recognises the importance of this initiative in addressing a significant recycling challenge in Australia, where only 64 per cent of aluminium beverage cans are currently recycled.

* based on average recycled content (by mass) of an aluminium can using aluminium coils manufactured by Novelis during the period 1 June 2023 to 31 May 2024.

** reduction based on comparison with the average carbon emissions intensity of Stone & Wood's previous 2023 financial year 375mL cans. Calculation includes all carbon dioxide equivalent emissions from raw material extraction up to the manufacturing of the can (raw material extraction / smelting / recycling, transportation of materials, manufacturing of the cans). The Life Cycle Assessment (LCA) used for this calculation follows the ISO 14040/14044 (ISO, 2006b) Environmental Management—Life Cycle Assessment Standard.

Consumer communication

By offering the product, Lion intends to stimulate consumers' willingness to pay for sustainable choices. The company already started engaging with consumers on its SNS and confirmed a strong interest in practical sustainability outcomes.