



# Climate Change



## Background to initiatives

The Kirin Group was one of two companies that represented Japan when we announced our environmental measures to the world at the third session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Kyoto in 1997. The Kirin Group has long been working to reduce GHG emissions. We have achieved significant reductions, having set an ambitious target of “reducing GHG emissions across the entire value chain by half from the 1990 level by 2050” in 2009. Since the adoption of the Paris Agreement in 2015, we have been leading the way in creating a decarbonized society, having gained a renewed understanding of our impact on natural capital such as agricultural raw materials and water through scenario analysis based on the TCFD recommendations, set science-based targets for the reduction of greenhouse gas emissions, and pledged our aim to switch to 100% renewable energy for electric power used by 2040 and achieve net zero GHG emissions by 2050.

## We will create together

### A society that has overcome climate change



Realize net zero GHG emissions across the entire value chain



Lead to build a decarbonized society

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## Points

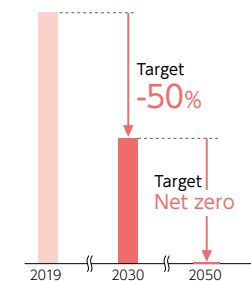
- Having obtained approval for the science-based 1.5°C target, raised our target for reducing GHG emissions to 50% across Scope 1 + 2, and 30% for Scope 3 (both by 2030, compared with 2019).
- Our long-term target to achieve net zero GHG emissions across the entire value chain by 2050 received certification as a science-based net zero target (the first in the global food and beverage industry).
- Joined RE100 and set a target for the proportion of renewable energy in electric power used (100% by 2040).
- Expanded the introduction of heat pump systems from wastewater treatment plants to production processes to further promote energy conservation.
- Moved to renewable energy for 100% of electric power purchased at two Kirin Brewery plants. Installed large-scale solar power generation facilities at all nine breweries and plants in Japan (of these, eight breweries and plants introduced the PPA model).

## Overview of initiatives

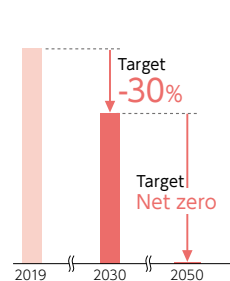
Initiative	Issue	Progress
Initiatives to achieve our vision	Reduction of GHG emissions	Acquired approval for science-based 1.5°C target. We raised our targets for reducing GHG emissions to 50% across Scope 1 + 2, and 30% for Scope 3 (by 2030, compared with 2019). Also acquired approval as a science-based net zero target.
	Renewable energy	Joined RE100 and declared our aim of using renewable energy for 100% of electric power by 2040.
	Energy conservation	Began introducing heat pump systems at wastewater treatment facilities in 2019, and expanded their introduction to production processes.
Realize net zero GHG emissions across the entire value chain	Hydro-electric power	Began using hydro-electric power at the Kyowa Kirin Takasaki Plant in 2020, as the first pharmaceuticals production business in Japan. Completed installation at the Kirin Brewery's Toride Plant and the Kirin Beverage Shonan Plant in 2017.
	Solar power generation	Utilized large-scale solar power generation at nine breweries and plants in Japan.
	Renewable energy certificates	After previously doing the same at Kirin Brewery's Nagoya Plant, we utilized electric power with environmental value (non-fossil fuel energy certificates with tracking information) and moved 100% of electric power purchased to renewable energy at Kirin Brewery's Sendai Plant. From 2022, all "Château Mercian" wineries have achieved 100% renewable energy by combining green power certificates with purchased electricity. Introduced renewable energy certificates (I-REC) at Kyowa Hakko Bio's Thai site, with the aim of reducing GHG emissions from electricity. We plan to reduce annual emissions by 10,200 tonnes.
Lead to build a decarbonized society	Reinforcing resilience in the upstream portion of the value chain	Prevented soil outflows from torrential rain by supporting the acquisition of Rainforest Alliance Certification by Sri Lankan tea farms.
	Green recovery declaration	Signed the "Business Ambition for 1.5° C" and "Uniting Business and Governments to Recover Better." Consented to "Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action."
	Engagement with the next generation	Supported the Decarbonization Challenge Cup. Rolled out an environmental mark program.

## Target

Total emissions targets for Scope 1 and Scope 2\*



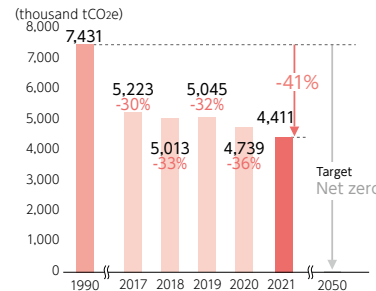
Scope 3 emissions target\*



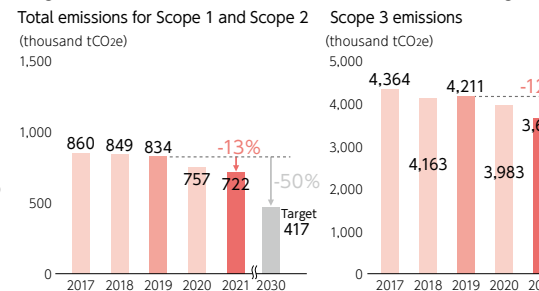
\* In December 2020, we upgraded our previous "SBT for 2°C" target, and received approval for our "SBT for 1.5°C" target.

## Progress

GHG emissions across the whole value chain

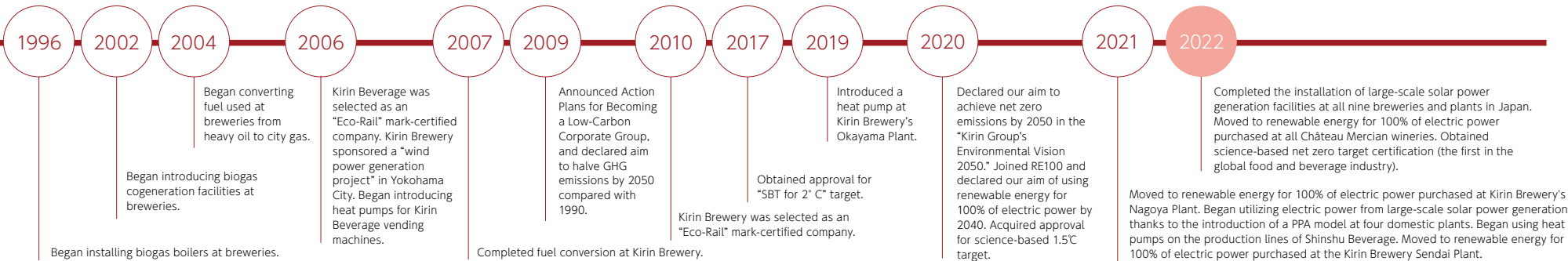
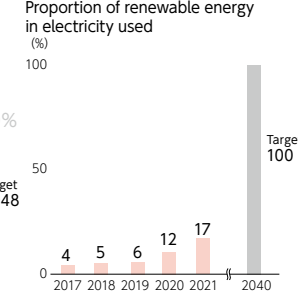


Progress towards medium-term GHG emissions reduction targets



\* Since 2019, we have excluded Lion's non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

Progress toward the target for increased use of renewable energy



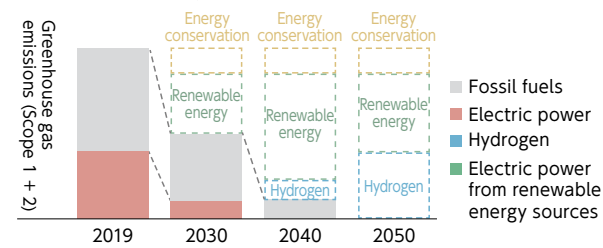


# Achieving our science-based 1.5°C target: Aiming for the world's most advanced energy system

## Development of roadmap to achieve our science-based 1.5°C target and certification of our science-based net zero target

As a mid-term target for the reduction of GHG emissions, the Kirin Group obtained approval from the international SBT initiative (SBTi) for our science-based 2°C target in 2017, and subsequently obtained approval for a target under the new standards for an science-based 1.5°C target in November 2020. In 2021, we formulated a roadmap to 2030 aimed at achieving our science-based 1.5°C target, and began implementing related initiatives. In July 2022, we obtained science-based net zero target certification, making us the first company in the global food and beverage industry to do so. We intend to take three approaches to reducing Scope 1 and Scope 2 emissions: "promotion of energy conservation," "expansion of renewable energy," and "conversion of energy." We will work to reduce GHG emissions focusing mainly on the promotion of energy conservation and the expansion of renewable energy until 2030. We believe that, from 2030 onward, in order to achieve our net zero emissions target in 2050, we must also promote energy conversion for combustion fuels used in steam production processes from fossil fuels to hydrogen and other fuels that do not emit GHG. Although large-scale investment will be required to achieve this goal, through 2030, the fiscal year of our SBT, the Kirin Group aims to implement measures to combat climate change that will be profit and loss neutral by introducing renewable energy, using the energy cost reduction benefits of energy conservation investments throughout the Group as funds. We

Method of reducing GHG emissions



have formulated this roadmap to enable us to achieve profit and loss neutrality even without taking ICP (Internal Carbon Pricing) into consideration, but we plan to accelerate the reduction of GHG emissions by taking ICP into consideration. In terms of the reduction of Scope 3 emissions, of the 15 categories defined in the "GHG Protocol," Category 1 emissions, i.e., those from the manufacture of ingredients and materials, make up the largest proportion of the total, at approximately 60%. As a key category for the reduction, we will pursue two parallel approaches as we work to achieve our target: "reducing emissions through our own initiatives" and "encouragement of reduction at business partners."

## Use of heat pumps in production processes

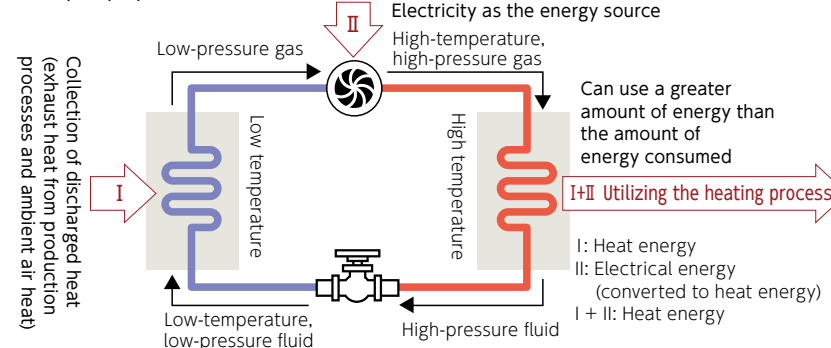
The Kirin Group is aiming to shift our energy sources from fossil fuels to electric power. We currently use both electric power and fossil fuels as energy sources at our breweries and plants. Of these, fossil fuels, which we use to generate heat, are the largest source of GHG emissions. Therefore, in order to reduce GHG emissions, we need to improve energy efficiency and reduce the amount of energy consumption. At the same time, we believe that shifting the energy mix from fossil fuels to electric power, and, furthermore, using electricity generated by renewable energy sources are the most effective ways of reducing GHG emissions. Kirin Brewery has successfully reduced its GHG emissions by approximately 70% over the 25 years from 1990 to 2015. We are now taking on the challenge of applying even more

technological innovations to achieve our target of reducing Scope 1 and Scope 2 emissions by 50% by 2030 (compared with 2019). Heat pump systems are a key technology in this regard. In 2019, we introduced heat pump systems at the wastewater treatment facilities of five Kirin Brewery plants, thereby reducing GHG emissions by 2% (approximately 3,400 tonnes) from the previous year across Kirin Brewery as a whole. Advanced engineering techniques are essential to both save energy and shift to electric power, including analyzing the entire heat flow of the production process and optimizing it through advanced designs before installation. We will deploy the knowledge that we have accumulated across Kirin Group companies as soon as possible to maximize the benefits. In 2020, we expanded the use of heat pumps to the production lines of Shinshu Beverage, followed by production processes at the Kirin Brewery Okayama Plant in March 2022. At Shinshu Beverage, we reuse waste heat, which is difficult to use directly in rinsing processes for bottles and caps, through a heat pump unit, enabling us to reduce GHG emissions by approximately 970 tonnes per year. The Kirin Brewery Okayama Plant has reduced annual GHG emissions by approximately 180 tonnes by reusing waste heat in hot water sterilization equipment for cans and heat in the air. The Kirin Group will continue leveraging its technological strengths to take on the challenge of creating the world's best energy system.

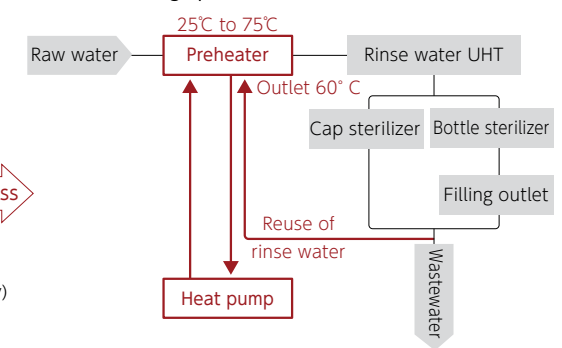


Heat pump at Shinshu Beverage

Heat pump system



Shinshu Beverage production line





# RE100: Aiming for 100% of electric power used to come from renewable energy

## Joining RE100 and 100% of electric power used to come from renewable energy that prioritizes “additionality”

In November 2020, Kirin Holdings joined “RE100,” an international environmental initiative consisting of companies aiming to use renewable energy for 100% of their electric power. At the same time, we announced that we would aim to increase the proportion of renewable energy in electric power used to 100% by 2040. We are actively promoting specific initiatives such as moving to 100% renewable energy for all purchased electric power at two Kirin Brewery plants, our utmost prioritization of “additionality,” and the use of power generated from large-scale solar power at all breweries in Japan.

## 100% renewable energy for all electric power purchased at Kirin Brewery's Sendai and Nagoya plants, and all Château Mercian wineries

Since April 2022, 100% of the electric power purchased at Kirin Brewery Sendai Plant has been generated from renewable energy. In August 2021, Kirin Brewery's Nagoya Plant became our first brewery in Japan to use 100% renewable energy. By changing all electric power used at two plants in Japan to renewable energy, we expect to reduce GHG emissions by 11,900 tonnes per year.

Since January 2022, all “Château Mercian” wineries producing Japan Wine (Château Mercian Katsunuma Winery, Château Mercian Mariko Winery, and Château Mercian Kikyogahara



Katsunuma Winery



Mariko Winery



Kikyogahara Winery



Hokkaido Chitose Brewery



Toride Brewery



Okayama Brewery



Fukuoka Brewery



Sendai Brewery



Kobe Brewery



Shiga Brewery



Nagoya Brewery

Winery) have achieved 100% renewable energy by combining green power certificates with purchased electricity. With these efforts, we expect to be able to reduce annual GHG emissions by approximately 300 tonnes.

## Use of large-scale solar power generation at all breweries in Japan

At the Kirin Group, we are prioritizing “additionality,” which refers to creating new sources of renewable energy in the world. Following the introduction of large-scale solar power generation facilities at the Yokohama Brewery in 2016, Kirin Brewery introduced these facilities at the Sendai, Nagoya, Shiga, and Kobe Breweries in 2021, and at the Hokkaido Chitose, Toride, Okayama, and Fukuoka Breweries in March 2022. The introduction of these facilities at all nine breweries (eight breweries, excluding the Yokohama Brewery, use the PPA model\*) will increase the proportion of renewable energy in electric power used by Kirin Brewery as a whole from approximately 18% to approximately 34%.

## Use of solar power in Australia

In Australia, we installed solar power generation facilities at Castlemaine Perkins Brewery in 2019 and at Little Creatures Geelong in Victoria in 2020. In 2021, Lion focused on developing a brewery network that will support measures to respond to climate change. We continued to invest in energy efficient equipment and review options for expanding the PPA model for renewable energy to other areas outside of our PPA in New South Wales, Australia. In 2021, we focused on building a network of production sites to support our response to climate change, considering expanding the renewable energy PPA model we are implementing in New South Wales, Australia, to other regions, and investing in energy-efficient facilities. Lion is also helping small-scale energy users procure renewable electricity at low prices. New South Wales' largest brewery, Tooheys Brewery, has signed a PPA agreement with a renewable energy distributor in partnership with the Australian Hotels Association (AHA), which consumes a low amount of energy. By jointly signing a large power contract, the AHA is able to introduce renewable energy at a lower cost, successfully reducing the cost of power for hotels from 11.5c/kWh to 6.9c/kWh. The agreement will reduce Lion's GHG emissions by approximately 20%.



Lion Little Creatures Geelong Brewery

\* 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.

## Other solar power generation

Production breweries and plants, including those of Kirin Brewery and Kirin Beverage, have installed solar-power generation equipment in their plant tour facilities and other locations. KIRIN GROUP LOGISTICS, Kyowa Hakko Bio, and Shinshu Beverage have leased parts of their premises and building roofs to companies that build large-scale solar power generation facilities, contributing both to effective use of company assets and to the dissemination of natural energy.



Yokohama Brewery



Kyowa Hakko Bio

## Wastewater biogas

At breweries, we use CO<sub>2</sub>-free biogas generated from anaerobic treatment facilities to purify wastewater at gas boilers, cogeneration systems, and other equipment.

[More information on wastewater biogas in Japan→P.42](#)

Breweries in Australia and New Zealand are also working toward the stable use of biogas from wastewater treatment. At Tooheys Brewery in Australia, the Utility Team focused on improving biomass population loss in anaerobic wastewater treatment plant bioreactors and discrepancies in the quality and quantity of biogas production. At the Castlemaine Perkins Brewery anaerobic treatment plant, we use healthy microorganism collected from the plant at Tooheys Brewery to replenish the bioreactor, optimized pH levels, and stabilized treatment volumes, resulting in an improvement of more than 30% in biogas generation per unit of effluent discharge volume in 2022 compared with the previous year. We have also added a cogeneration plant and are working to make effective use of biogas.

## Hydro-electric power generation

Since April 2017, Kirin Brewery's Toride Plant and Kirin Beverage's Shonan Plant started using GHG-free hydro-electric power in a portion of purchased power. The plants are taking advantage of Aqua Premium, the Japan-first option offered by TEPCO Energy Partner to supply only hydro-electric power. By using hydro-electric power, which does not emit GHG at the time of power generation, they will contribute to global warming countermeasures. This is the first example of the use of this option by any plant in Japan, not just in the food and beverages industry.

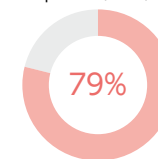
In January 2020, Kyowa Kirin's Takasaki Plant began using the same system, followed by the Fuji Research Park and CMC Research Center in January 2022. As a result, of the approximately 72.4 million kWh annual electric power consumption of the Kyowa Kirin Group, we expect that approximately 45.4 million kWh will be converted to hydro-electric power, reducing the Kyowa Kirin Group's GHG emissions by approximately 39%.

This is the first case of using electric power generated from hydro-electric power in the Japanese pharmaceutical manufacturing industry.



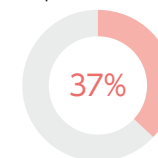
Kyowa Kirin Takasaki Plant

Percentage of purchased electric power generated from hydro-electric power (2021)



Kirin Beverage Shonan Plant

Percentage of purchased electric power generated from hydro-electric power (2021)



## Wind power

Through a consortium represented by Mitsubishi Corporation Energy Solutions, Ltd., Venti Japan Inc., C-Tech Corporation, and Mitsubishi Corporation (the "Consortium"), we have been selected as a power generation business operator 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. Kirin Holdings is a partner of the Consortium. These projects are Japan's first fixed-bottom offshore wind power generation projects in general sea areas. They will be among the largest sources of power 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.

In the future, through the activities of the Consortium, we will create a positive impact toward the decarbonization of society through the creation of new renewable energy, and achieve cooperation and symbiosis with local communities.

The Kirin Group has been sponsoring the Yokohama City Wind Power Generation Project, which Yokohama City promotes using the Green Power Certification System since 2007 as part of our support for the promotion of the use of natural energy as a Hama Wing Supporter. So far, the power generated by this project has been used by SPRING VALLEY BREWERY TOKYO, the Earth Hour hosted by WWF, etc.



Yokohama City Wind Power Plant (Hama Wing)

## Renewable energy certificates

Since 2021, Kyowa Hakko Bio has introduced "Renewable Energy Certificates (I-REC)" at Thai Kyowa Biotechnologies in Thailand. This marks the first adoption of these certificates in the pharmaceutical and food industries in Thailand, and we expect it will enable us to reduce annual GHG emissions by 10,200 tonnes, thanks to the use of renewable energy sources for some of the electricity used in the plant. In anticipation of growing global demand for Human Milk Oligosaccharide (HMO) for powdered milk, we are building a new production facility at the Rayong Plant, which we plan to bring online in the summer of 2022. By introducing this renewable energy certificate, we are aiming to achieve business growth while reducing the environmental impact. In 2022, Shanghai Kyowa Amino Acid began introducing renewable energy certificates.

At Kyowa Kirin's Tokyo Research Park, as a "Designated Global Warming Prevention Facility" based on the Tokyo Metropolitan Ordinance on Environmental Preservation, we achieved significant additional reductions in emissions (equivalent to 3,736 tonnes of CO<sub>2</sub>) by exceeding the mandatory reductions for the first and second plan periods, and provided these reductions as credits under the "Tokyo 2020 Carbon Offset Programme," as part of our support for the achievement of "Tokyo zero carbon four days in 2020."



Thai Kyowa Biotechnologies

## Carbon neutrality in Australia and New Zealand

In May 2020, Lion became Australia's first large-scale carbon neutral certified brewer.

In order to obtain Climate Active\*1 certification in Australia, Lion must disclose carbon credits used to offset total emissions for the year in its annual report, and Lion has been complying with this requirement. This certification standard is a new standard for carbon neutral certification in Australia.

In New Zealand, Lion also obtained Toitū\*2 carbon zero certification in 2021.

\*1 A third-party certification body established by the government of Australia  
\*2 A third-party certification body established by the government of New Zealand



## Raw materials

### Measures for adapting to climate change at tea farms

The Kirin Group contributes to measures for adapting to climate change through training programs for Rainforest Alliance Certification at Sri Lankan tea farms. Specifically, we direct people to plant grasses whose roots sink deep into the soil and that crawl the ground on slopes, and thus prevent the runoff of soil from erosion by torrential rain and falls in tea leaf production volumes.

The results of scenario analysis show that the effects of climate change increase water risks and water stress in many countries and regions producing agricultural products. In Sri Lanka, in recent years, unusual heavy rainfall in the rainy season has become more frequently, likely owing to the effects of climate change, and in the key black tea production region of Uva Province, many human lives were lost as a result of landslides some years ago. This initiative also contributes to the prevention of landslides and other disasters caused by heavy rainfall.



Prevention of soil runoff from rain

## Containers

### In-house production of PET bottles

Kirin Beverage introduced Japan's first in-line PET blowing aseptic filling machine at Nagano Tomato (currently Shinshu Beverage) in 1997, and subsequently installed a high speed in-line PET blowing aseptic filling machine at the Shonan Plant in 2000. In the past, we purchased empty PET bottles from container manufacturers and shipped them to plants where we filled them with beverages, to make final products. With an in-line blow aseptic filling machine, we mold PET bottle containers from a material called preform in the production process of the plant and fill them under aseptic conditions. Installation consequently contributes greatly to reducing GHG emissions as using preforms allows us to process greater loads on trucks compared to transporting empty PET bottles. In 2003, we installed preform molding equipment on the beverage production line at Kirin Distillery ahead of other players in the industry, thereby saving the transportation of preforms.

### Reducing the weight of containers

Between 1990 and 2021, Kirin Brewery and Kirin Beverage reduced GHG emissions from container manufacturing by a total of 4.8 million tonnes\* by reducing the weight of containers and packaging. Making containers lighter leads to reducing GHG emissions in the manufacturing process of containers and packaging and improving loading efficiency, which leads to the reduction of GHG emissions.

\* Calculated based on the Carbon Footprint Product Category Rule (Certified CFP-PCR Number: PA-BV-02) applied to the actual container usage of Kirin Brewery and Kirin Beverage from 1990 to 2021.



### Ocean transportation in large bags and bottling in Japan

Mercian ships some of the wine it imports via ocean transportation in specially designed, large 24kl bags (equivalent to about 32,000 of 750ml bottles) with low oxygen permeability, and bottles the wine in plants in Japan. Compared to importing bottled wine, this method lets Mercian reduce GHG emissions during ocean transport by roughly 60% because it eliminates the need to transport heavy bottles by sea, although it increases the amount of GHG emissions from the company's plants owing to bottling in Japan. We are able to use Ecology Bottles (made with at least 90% recycled glass), lightweight bottles, and PET bottles as containers, which contributes to making effective use of resources and reducing GHG emissions significantly across the entire value chain.



Specially designed large bags

Annual GHG emissions from recycled PET bottles and no label products

Approximately  
1,300t  
reduction

\* The information and product images above are as of the end of June 2022.

# Production

## Fuel shift and cogeneration

The majority of the fuel we use at breweries is consumed in the boilers that generate steam. At all Kirin Brewery and Kirin Beverage plants, we have completed the shift to natural gas, which generates less GHG emissions than heavy oil.

We have achieved more efficient boiler operations through the installation of highly efficient small boilers in line with the fuel shift. We have introduced cogeneration systems to provide some of the plants' heat and electricity.

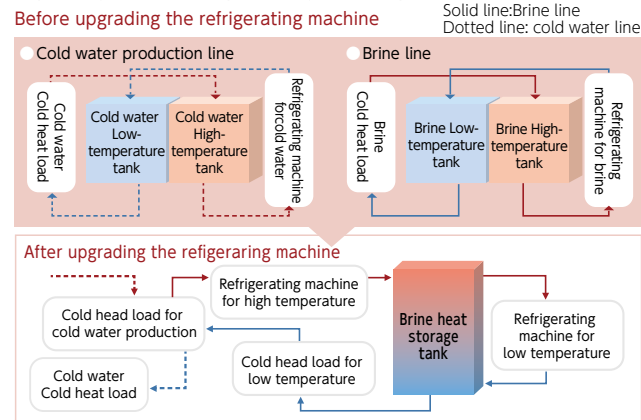


Cogeneration

## Refrigeration systems

At Kirin Brewery, we reduce energy consumption through improving the efficiency of refrigerating systems. We are introducing a cascade refrigeration system, which cools in phases, for processes that involve a considerable temperature difference, and we are also making operational improvements to refrigeration systems.

### Improving the efficiency of refrigeration systems



## Upgrades to high-pressure compressors for PET bottle molding

At the Kirin Beverage Shonan Plant, as part of our production processes, we mold PET bottles from a material called preform and fill them under aseptic conditions. In 2021, we switched our high-pressure compressors for PET bottle molding from V-type reciprocating compressors to inverter-controlled pneumatic machinery in the form of screw compressors and horizontally opposed reciprocating compressors, thereby reducing annual power usage by around 8%. This machinery can also recover and reuse waste heat from compressors.



Inverter-controlled pneumatic machinery

## Introduction of high-efficiency boilers

Biokyowa, which produces amino acids in the United States, uses natural gas as a heat source during production. In order to reduce the use of natural gas, in 2020, we replaced all boilers with high-efficiency package boilers that control the number of operating units. This has made it possible to reduce annual natural gas consumption by approximately 8%.



High-efficiency package boilers



Plant staff involved in the boiler project



# Distribution

## Modal shift

The Kirin Group is actively pursuing a modal shift of switching from truck transport to rail and ocean transport, which has lower GHG emissions, for long-distance shipments (400 to 500 km or more). Although truck transport is efficient when transporting various types of beverages over a relatively short distance to the warehouses of our business partners, rail transport enables further reduction of GHG emissions over long-distance shipments. We have developed special cartons (registered as a utility model) that are less likely to rub together during long-distance rail transport. These are just some of the initiatives we are continuing to take in pursuing a modal shift as we work to reduce GHG emissions and maintain and improve quality during shipping at the same time.

## Joint delivery

The Kirin Group has positioned the logistics area as a non-competitive sector and is actively engaging in initiatives together with other companies in the same industry. In 2017, together with other companies in the industry, we established a joint delivery center in Kanazawa City, Ishikawa Prefecture, and launched joint transport by rail container from plants in the Kansai area. Neither of the companies has plants on the Japan Sea side, so products previously had to be transported by truck over long distances—of 200 km—from their plants on the Pacific Ocean side. This was inefficient and placed a great burden on the truck drivers. Joint transportation using rail containers has not only significantly reduced GHG emissions but shortened distances between the plants and the terminals and between the terminals and the destinations with a significant alleviation of the burden on drivers, which is helping to solve the social issue of a shortage in truck drivers. Through these efforts, we have successfully completed a modal shift 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 tons. In September 2017, we began joint delivery in the eastern Hokkaido area. As a result of these efforts, we are effectively utilizing railway containers and have enhanced truck loading efficiency, leading to more efficient logistics. We estimate that this results in a reduction in annual

GHG emissions of approximately 330 tons.\*

The Kyowa Kirin Group also conducts joint transportation of products between distribution centers. Since 2020, the Ube Plant has been transporting raw materials in railway containers.

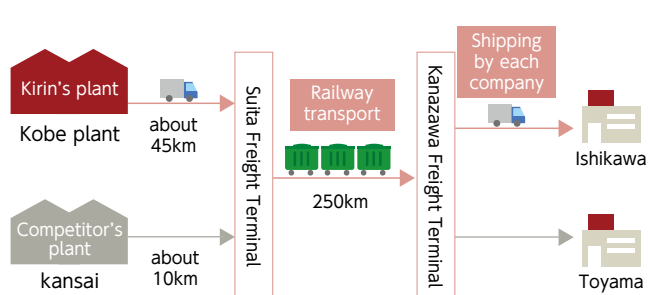
\* Contribution to Avoided Emissions through the Global Value Chain, Third Edition, Keidanren (Japan Business Foundation)

## Joint collection of beer pallets

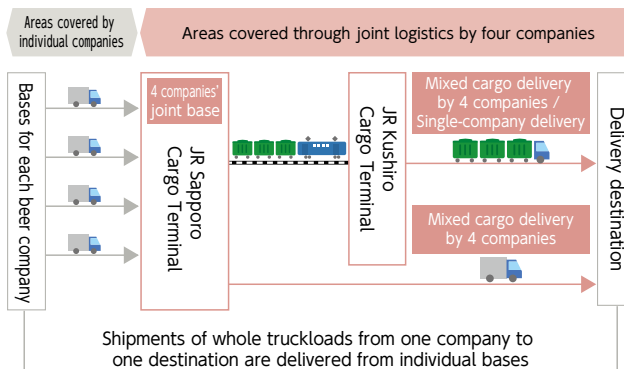
In a joint initiative by the Japan's four major breweries, we are expanding the joint collection of beer pallets. We began the joint collection of beer pallets in the Tohoku area in November 2018. From July 2019, we expanded the initiative to the Tokyo metropolitan, Tokai, and Kyushu areas, before deploying it nationwide from November 2019. Thanks to these efforts, it is estimated that in total, the four brewers have reduced annual GHG emissions by 5,158 tons (a reduction of approximately 37% compared with former methods),\* by improving the loading ratio of collection vehicles and shortening distances to collection.

\* Contribution to Avoided Emissions through the Global Value Chain, Third Edition, Keidanren (Japan Business Foundation)

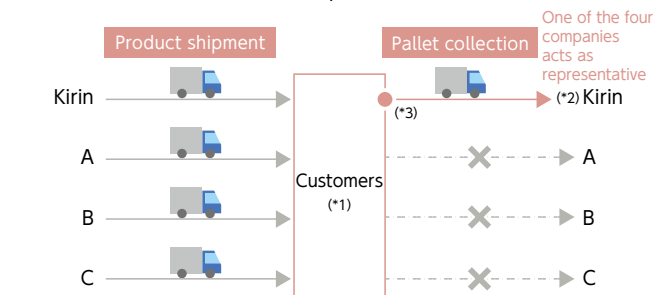
Joint delivery from Pacific Ocean side to Japan Sea side



Joint delivery in Hokkaido



Joint collection scheme for beer pallets



\*1 Restricted to customers that have dealings with multiple companies and a transaction scale of at least a certain level (total of around 10,000 beer pallets a year from members of the Association for Joint Use of Beer Pallets)  
 \*2 One company will represent the four beer companies and collect the pallets. None of the other companies will collect them.  
 \*3 The representative will tally up the pallets of the four beer companies and manage the collection with the customer.

## Improving loading efficiency

Using a truck allocation system that has master data for the precise loading capacities of each truck, the Kirin Group is working to transport our products with the most efficient combinations of trucks and cargo. Kirin Beverage has adopted a bottle shape that enhances loading efficiency, enabling us to increase the number of bottles per pallet. Kirin Beverage compensated for reduction in capacity for large carbonated drink containers (1.5L) by changing the shape of the “shoulders” of bottles and changing the diameter of PET bottles bodies from 92.5mm to 89.5mm. This means that the number of cases loaded on one pallet has been increased from 40 (10 cases x 4 stacks) to 60 (15 cases x 4 stacks), improving the loading efficiency by a factor of 1.5.

Since April 2022, we have been using square PET bottles for *Kirin Nama-cha* and *Kirin Nama-cha Hoji Sencha* (525ml and 600ml), as part of the expansion of our activities to medium-sized PET bottles. By adopting a square shape, we have increased the number of boxes loaded per pallet for 525ml bottles from 48 cases (8 cases x 6 stacks) to 60 cases (10 cases x 6 stacks), improving loading efficiency by a factor of 1.25, and for 600ml bottles, from 48 cases (8 cases x 6 stacks) to 50 cases (10 cases x 5 stacks), improving loading efficiency by a factor of 1.04.

\* Calculated based on the results of shipments of large carbonated drink containers in 2016.

## Adjustments to brewing and production sites

KIRIN GROUP LOGISTICS and Kirin Brewery are making adjustments to brewing and production sites as a key measure to reduce GHG emissions from transportation. Kirin Brewery's Sendai Plant began producing RTD products in 2022, and we expect to be able to reduce GHG emissions by approximately 3,000 tonnes per year by reducing transport distances. We will promote the optimization of our network across production and distribution as a whole at other brewing and production sites.

## Vendor-managed warehouse

The soft drinks sold by Kirin Beverage are produced at plants throughout Japan, and they cover a wide range of beverages, including tea, coffee, carbonated drinks, and sports drinks. Because raw ingredient production plants and warehouses are extremely limited in number in contrast to product manufacturing plants, long distance shipments are increasing. Since we transport raw ingredients when necessary, and in the amounts necessary, in accordance with

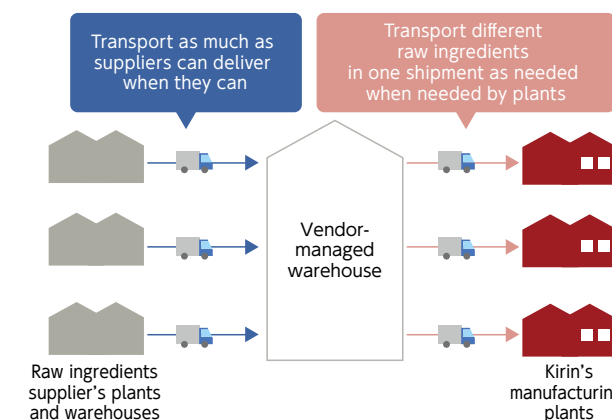
the production plans of product manufacturing plants, even small amounts of raw ingredients are transported over a long distance, which was becoming an inefficient practice.

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 a raw materials procurement and distribution system using a raw materials warehouse (vendor-managed warehouse) adjacent to Kirin Beverage's in-house plants, the Shonan Plant and Shiga Plant, from October 2019. By establishing this facility as a vendor-managed warehouse, raw ingredient suppliers can transport the desired amount of raw ingredients when they need to, thereby maximizing efficiency. This has made it easier to cope with sudden changes in production plans, and contributed greatly to improving the responsiveness of plants.

Based on the results of this trial, in April 2020, we increased the number of applicable raw ingredients to more than 200 types at 20 plants nationwide, including subcontracted plants, and the system is in full operation. Given full-scale operation, we have estimated that we are able to reduce GHG emissions by at least 1,000 tonnes per year (reduction rate of approximately 80%) and cut the number of long-distance\*<sup>1</sup> transport trucks by at least 4,000 vehicles (reduction rate of approximately 63%)\*<sup>2</sup>.

\*1 Defined as 100 km or more

\*2 Estimated based on the raw ingredient transportation results in 2017, only for raw ingredients that are assumed to make use of vendor-managed warehouses.



\* The information and product images above are as of the end of June 2022.

# Sale

## Carbon zero certified beer

*Steinlager*, which Lion sells in New Zealand, has obtained certification as a carbon zero beer under the Toitu program by a body of the New Zealand government. In 2021, we featured the Toitu carbon zero mark in our marketing campaigns to highlight to consumers the commitment Lion has made to reducing GHG emissions through Steinlager and other products.

In Australia, Lion is preparing to acquire carbon neutral certification through Climate Active for many key products. In order to obtain certification, Lion is working to comply with the requirement that it must offset all GHG emissions from the complete life cycle of the product, including emissions from raw materials and packaging, distribution and product waste.

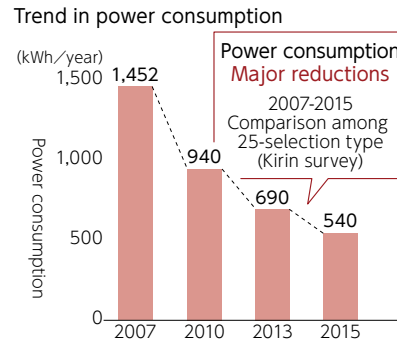


## Vending machines

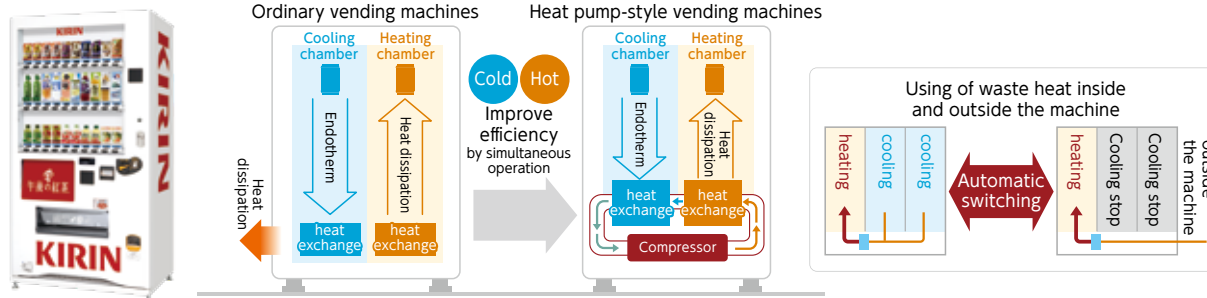
Kirin Beverage was the first in the industry to introduce heat pump-style vending machines in 2006, and from 2012, almost all newly installed vending machines for cans and PET bottles are of this type. As of April 2021, we have switched more than 85% of installed vending machines to this type.

Heat pump-style vending machines pump up the waste heat generated when cooling products and use it for heating to warm up the products. This allows reduction in power consumption compared to conventional vending machines by cutting down the power used by the heaters.

The latest heat pump-style vending machines are equipped with a compressor that uses an inverter to delicately control the operation (variable speed of rotation) according to the atmospheric temperature and the temperature of the products in the machine. Some types offer higher energy-saving performance, such as with heating functions not only by using the waste heat released by the cooling chamber as previous models did, but by capturing the heat from outside the machine, and by improving hot and cold insulation performance with the heavy use of vacuum insulation materials. These vending machines have evolved to the point where power consumption can be reduced by about 40% compared to 2013. Installation of the new models began in 2015, and we are aiming for 80% of the new machines we



### About heat pump



install in 2022 to be new models. With regard to lighting, we are replacing conventional fluorescent lighting with LED lighting, which conserves more energy.

## Change to the best-before labeling

Since 2013, Kirin Beverage has been working to shift to labeling the "year and month" as the best before date on soft drinks. Kirin Brewery has changed its labeling of production dates on cans and bottles of beer, low-malt beer, no-malt beer products, and non-alcoholic beer-taste beverage from the former "year, month and early/middle/late month" to "year and month" for products from October 1, 2020 onwards.

We expect that this change in labeling will contribute to alleviating the need for managing products based on periods of "one-third of a month," streamlining store display operations at distributors, and reducing operational loads associated with in-house inventory management and shipping operations, thereby increasing efficiency across the supply chain and significantly reducing product waste losses.

More information on measures to reduce food waste → P.34



## SPRING VALLEY BREWERY TOKYO

SPRING VALLEY BREWERY TOKYO is an all-day dining establishment with a brewery that we opened in Log Road Daikanyama in April 2015, where patrons can enjoy craft beer made on premises. 100% of the restaurant's electricity needs are met by green power using Green Power Certificates issued by the Yokohama City Wind Power Generation Project.



SPRING VALLEY BREWERY TOKYO, where patrons can enjoy craft beer

## Policy recommendations

### **Kirin Holdings signs the “Business Ambition for 1.5°C ” and “Uniting Business and Governments to Recover Better”**

On June 24, 2020, the Kirin Group signed the “Business Ambition for 1.5° C” commitment letter jointly issued by three parties - United Nations Global Compact (UNGC), Science Based Targets initiative (SBTi) and We Mean Business—requesting companies to set targets that will limit the rise in global temperature to 1.5° C.

On the same day, we signed the “Uniting Business and Governments to Recover Better” statement, which makes requests of companies that have set SBT or declared their intention to set SBT.

### **Kirin Holdings consents to “Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action”**

On July 30, 2020, Kirin Holdings became a supporter of “Making Japan a Nation where Renewable Energy is Easily Accessed: Three Strategies and Nine Policies Sought By Corporations Engaged in Climate Action,” a recommendation by the RE-Users (Renewable Energy Users Network), which promotes the use of renewable energy mainly by companies. This recommendation was developed in January 2020 in cooperation with CDP Japan and WWF Japan based on the opinions of 20 large companies participating in the RE-Users. The RE-Users will communicate with the Japanese government and electric power companies to take measures to ensure that the country as a whole is able to promote the implementation and use of renewable energy, even in the face of the spread of COVID-19.

### **Participation in the “consortium for promoting the use of electric vehicles”**

On May 1, 2020, the Kirin Group became a member company of “the consortium for promoting the use of electric vehicles” (hereinafter, the Consortium), which aims to promote the penetration of electric vehicles for business use. The Consortium aims to promote the introduction and use of electric vehicles, solve social issues, and realize a sustainable society by having companies and organizations share issues and work together to solve them. By participating in the Consortium, the Kirin Group will study highly practical electric vehicles suitable for our business operations, share insights across industries, and promote initiatives to realize a sustainable society.

### **Participation in the Climate Leaders Coalition**

Lion continues to participate in the Australian Climate Leaders Coalition (CLC), which has the mission of having company CEOs jointly lead the response to climate change through transparent and meaningful action related to mitigation and adaptation. By participating in the CLC, we are calling for policies and investments that will enable New Zealand to transition to a zero-carbon economy, and as a participating company, we are committed to addressing climate change, including measuring and publicly reporting emissions, setting public emissions reduction targets, and working with suppliers to reduce emissions.

### **Interview in TCFD Guidance on Scenario Analysis**

In the “Guidance on Scenario Analysis for Non-Financial Companies” published by the TCFD in October 2020, we expressed our opinions in an interview as one of 15 companies from around the world.

[https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD\\_Guidance-Scenario-Analysis-Guidance.pdf](https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Guidance-Scenario-Analysis-Guidance.pdf)

### **Participation in study group related to non-financial disclosure**

Since 2021, in response to a request from the Ministry of Economy, Trade and Industry, the senior executive officer responsible for CSV strategy in the Kirin Group has participated in the Study Group on Disclosure Policies for Non-financial Information. This study group will consider approaches to disclosure and disclosure media that contribute to high-quality dialogue with users of non-financial information. The study group also aims to accurately communicate Japan's position on non-financial information disclosure and guidelines, and to enhance international recognition of this issue. The senior executive officer responsible for CSV also participated in a panel discussion at the TCFD Summit held on October 9, 2020 (organized by the Ministry of Economy, Trade and Industry and cosponsored by the WBCSD and the TCFD Consortium). In 2020, a representative of the Kirin Group served as a member of the Review Committee of Sector-Specific Disclosure Guidance (food sector), the results of which were made public in the “Guidance on Climate-related Financial Disclosures 2.0 (TCFD Guidance 2.0)” by TCFD consortium published on July 31, 2020.

# Key data related to Climate Change

## Value chain greenhouse gas emissions

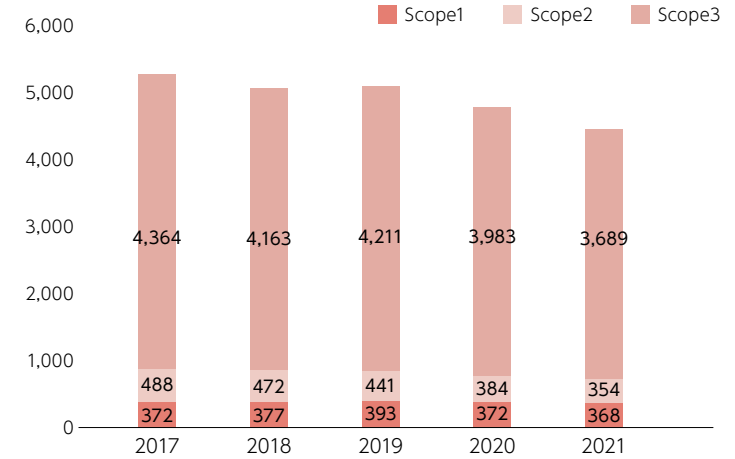
(Unit: tCO<sub>2</sub>e)

	2017	2018	2019	2020	2021
<b>Direct emissions from corporate activities (Scope 1 + Scope 2)</b>	<b>859,751</b>	<b>849,247</b>	<b>833,691</b>	<b>756,596</b>	<b>721,553</b>
Scope 1 (Emissions from use of fuel)	371,897	377,216	392,647	372,456	367,742
Scope 2 (Emissions related to purchase of power and steam)	487,853	472,032	441,044	384,140	353,811
<b>Indirect emissions (Scope 3)</b>	<b>4,363,666</b>	<b>4,163,408</b>	<b>4,211,284</b>	<b>3,982,547</b>	<b>3,688,961</b>
Raw materials (Category 1)	2,628,183	2,444,176	2,517,658	2,394,770	2,230,657
Transport - Upstream (Category 4)	376,266	379,998	521,214	492,272	433,015
Transport - Downstream (Category 9)	995,389	981,069	890,607	847,648	765,018
Product use/disposal (Category 11, 12)	158,309	150,569	47,573	45,242	43,103
Other (Category 2, 3, 5, 6, 7, 8, 10, 13, 14, 15)	205,519	207,595	234,232	202,614	217,169
<b>Emissions from entire value chain (Scope 1 + Scope 2 + Scope 3)</b>	<b>5,223,417</b>	<b>5,012,655</b>	<b>5,044,975</b>	<b>4,739,143</b>	<b>4,410,514</b>

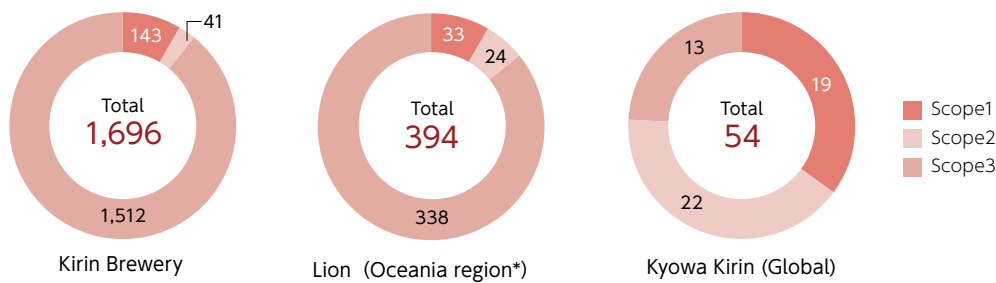
Calculation boundaries→P.121

## Trend in value chain greenhouse gas emissions

(thousand tCO<sub>2</sub>e)

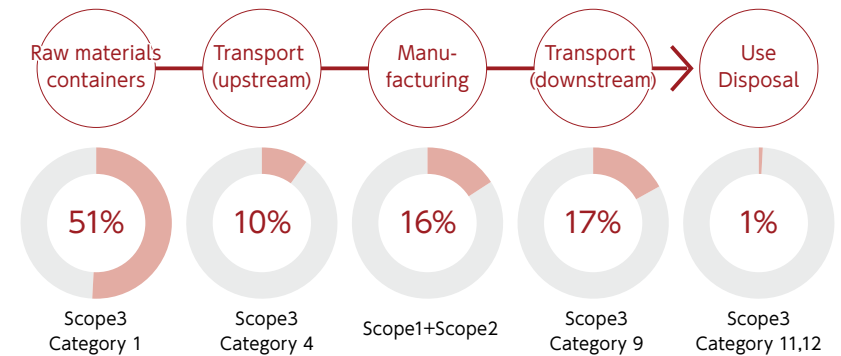


## Greenhouse emissions by business (2021) (thousand tCO<sub>2</sub>e)



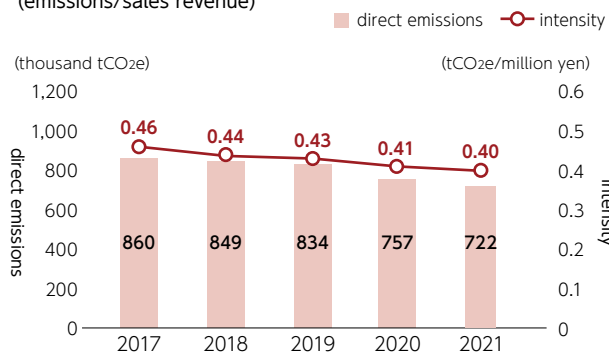
\* This region covers the Oceania region where Lion conducts business activities, excluding New Belgium Brewing.

## Ratios of greenhouse gas emissions in value chain (2021)

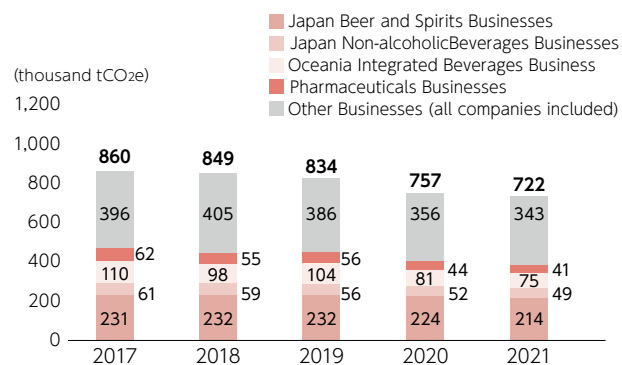


\* Since 2019, we have excluded Lion's non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

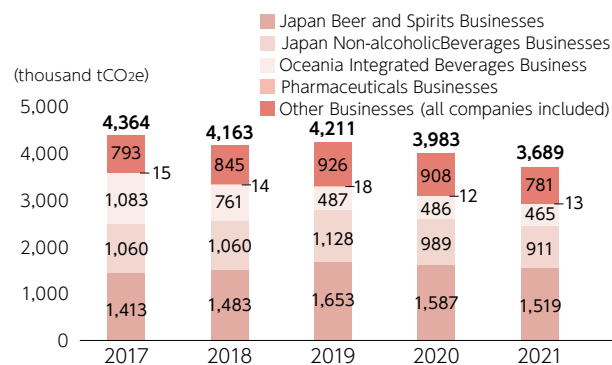
Total direct emissions (Scope 1+2) and intensity (emissions/sales revenue)



Kirin Group total direct emissions by business segment (Scope 1 + 2)



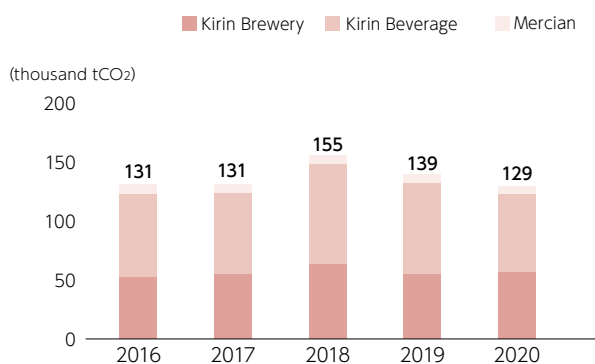
Kirin Group total Scope 3 emissions by business segment



\* Since 2019, we have excluded Lion's non-alcoholic beverages business from Scope 3 emissions, and we have changed to the LCA database (IDEA) offered by the National Institute of Advanced Industrial Science and Technology (AIST) for emissions per unit of production.

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CO<sub>2</sub> emissions associated with domestic transportation



Ratio of renewable energy to total electric power used in the Kirin Group as a whole

