

**Kikkoman Group
Environmental Preservation Activities Case Book
FY2019**



Thank you very much for accessing this site.

The Environmental Preservation Activities Case Book presents, categorized by theme, the environmental preservation activities carried out by affiliate companies of the Kikkoman Group.

As Kikkoman makes use of the work of microorganisms as the base of its operations, Kikkoman has been valuing harmony with nature since its inception. In particular, since the 1970s when social concerns over the relations between corporations and nature became apparent, Kikkoman has placed healthy environmental preservation as one of its management goals, and the group as a whole, has been taking various measures.

This Case Book gives more detailed relevant data which can be disclosed and specialized information which is requested frequently on selected environmental preservation activities in the Kikkoman Group:

- Major environmental preservation activities that are included in the Corporate Citizenship Report (or Data Book) published annually since 2006 (formerly Sustainability Report for 2004-2005, and Environmental Report for 2003 and before).
- Information on activities which should be recorded for reference.
- Unique examples of the Kikkoman Group which are related to activities by respective companies.

*For the cases which were not dealt with in the reports, the fiscal year when the cases were actively operated or the records of the cases were made, is indicated at the beginning of the respective articles.

**Some of the activities contained in this report have been terminated or suspended, but are included for the sake of record keeping.

I. Environmental Preservation System

| | |
|---|----|
| 1. Kikkoman Group Environmental Principles | |
| 1) Environmental Philosophy | 6 |
| 2) Action Guidelines | 6 |
| 3) Priority Action Assignments | 6 |
| 2. Voluntary Action Plan for Environmental Preservation (Voluntary Plan) | 7 |
| 3. Environmental Management Promotion System | |
| 1) History of the Environmental Management Promotion System | 11 |
| 2) Re-organization of the Environmental Management Promotion System to acquire ISO14001 certification for all domestic Kikkoman Group facilities as a whole | 12 |
| 3) Environmental Management Promotion System after Acquiring ISO14001 Certification for all major domestic Group facilities | 13 |
| 4. Environment Department | |
| 1) Before September 2009 | 17 |
| 2) October 2009 and Afterwards | 17 |

II. Preventing Global Warming

| | |
|--|----|
| 1. Transition of the CO₂ Emissions | |
| 1) FY2001-FY2005 | 18 |
| 2) FY2006-FY2010 | 18 |
| 3) FY2011-FY2012 | 19 |
| 4) FY2013-FY2015 | 19 |
| 5) FY2016-FY2018 | 20 |
| 2. Transition of the CO₂ Emissions per Unit of Production | |
| 1) Soy Sauce | 23 |
| 2) Soy Sauce, Noodle Soup and Barbecue Sauce | 23 |
| 3) Refining the CO ₂ Emissions per Unit of Production, a Group Goal was set | 24 |
| 4) New Goals for FY2016-FY2018 | 26 |
| 3. Approaches Taken by Plants | 29 |
| 4. Approaches in the Distribution System | 33 |
| 5. Approaches for Office Buildings | |
| 1) Kikkoman Noda Head Office Building (Noda City, Chiba) | 34 |
| 2) Kikkoman Tokyo Head Office Building (Minato-ku, Tokyo) | 36 |
| 3) Kikkoman General Hospital (Noda City, Chiba) | 36 |
| 6. Carbon Footprint of Products | |
| 1) Carbon Footprint of Products | 37 |
| 2) CFP of Soy Milk (1000ml) | 37 |
| 3) CFP of Soy Sauce (1 liter Bottle) | 38 |

III. Reducing and Recycling Waste and Byproducts

| | |
|---|----|
| 1. Transition of Recycling Rates According to the Food Recycling Law | |
| 1) Progress of Recycling Rates | 39 |
| 2) Recycling Rates by Major Domestic and Overseas Manufacturing Companies | 39 |
| 2. Transition of the Waste Generation per Unit of Production | 41 |
| 3. Use of Soy Sauce Cake | 43 |
| 4. Use of Soy Sauce Oil | 44 |
| 5. Use of Okara | 44 |
| 6. Use of Seaweed Residue | 45 |
| 7. Use of Wastewater Sludge Residue | 45 |
| 8. Research & Development to Make Use of High-Quality Byproducts | 46 |

IV. Improving Containers and Packaging

| | |
|---|----|
| 1. Kikkoman's Guidelines for Containers and Packaging, and the Containers and Packaging Committee | 48 |
| 2. Containers and Packaging for Soy Sauce | |
| 1) Glass | 49 |
| 2) Plastics (PET containers, etc.) | 50 |
| 3. Efforts by Nippon Del Monte Corp. for its Product Containers and Packaging | 53 |
| 4. Efforts by Manns Wine Co., Ltd. for its Product Containers and Packaging | 55 |
| 5. Partnership and Collaboration with Related Organizations | 56 |

V. Preserving the Water Environment

| | |
|---|----|
| 1. Transition of the Amount of Water Consumption and Water Consumption per Unit of Production | |
| 1) FY2012-FY2015 | 57 |
| 2) FY2016-FY2018 | 57 |
| 2. Approaches Taken by Plants | 59 |
| 3. Approaches to Preserve the Water Environment | 60 |
| 4. Supporting Activities to Mitigate Water Stress | 61 |
| 5. Dialogues with Suppliers | 62 |
| 6. Participation in the CEO Water Mandate | 62 |

VI. Promoting Environmental Management System

| | |
|---|----|
| 1. Environmental Management | |
| 1) Obtaining ISO14001 Certification | 63 |
| 2) Implementation of Environmental Audit | 64 |
| 3) "Cross Internal Audit" and "Environmental Close-Call Report" | 69 |
| 2. Employee Environmental Education | |
| 1) General Education | 70 |
| 2) Specialized Education | 73 |

VII. Promoting Environmental Communication

| | |
|--|----|
| 1. Communication with Local Communities | |
| 1) Environmental Management Internship | 78 |
| 2) University Internship | 79 |
| 3) Ecological Learning | 80 |
| 4) Summer Vacation Program for Environmental Learning | 82 |
| 5) Cooperation with Related Organizations | 82 |
| 2. Communication with the General Public | |
| 1) Participation in the exhibitions | 84 |
| 2) Exhibiting Kikkoman's Environmental Preservation Activities at the Kikkoman Soy Sauce Museum | 85 |
| 3) Publishing Corporate Citizenship Report (Data Book) and Environmental Preservation Activities Case Book | 85 |

VIII. Preserving Natural Environment

| | |
|---|----|
| 1. Approaches Taken by Domestic | |
| 1) Efforts at Chitose Factory | 86 |
| 2) Cooperation with the Wildlife Preservation Bureau of Hokkaido Corp. | 86 |
| 3) Participation in the Japan Business and Biodiversity Partnership | 86 |
| 4) Release Salmon Project | 86 |
| 2. Approaches Taken by Overseas | |
| 1) United States of America | 87 |
| (1) Environmental Preservation Activities at the California Plant | 87 |
| (2) Donation through the Kikkoman Foods Foundation Inc. | 89 |

| | |
|---|----|
| 2) Netherlands | 89 |
| (1) Cooperation with Environmental Purification | 89 |
| (2) Support to a Forestation Project | 92 |
| 3) Singapore | 92 |
| (1) Supporting the Development of a Man-made Lake | 92 |
| (2) “Nature Heritage Tree” was awarded to KSP | 93 |
| (3) Support to Mangrove Plantation | 93 |

IX. Environmental Consideration to Products

| | |
|---|----|
| 1. Use of Non-GMO (Genetically Modified Organism) Materials | 95 |
| 2. Residual Agricultural Chemical Inspection According to the Positive Listing System | 96 |

X. History of Environmental Preservation Activities

| | |
|---|----|
| 1. Awards Received (1995-) | 97 |
| 2. History of Environmental Preservation Activities | 99 |

1. Kikkoman Group Environmental Principles

Kikkoman Corporation formulated and published its Environmental Philosophy (Principles and Action Guidelines) in 1992. This was subsequently adopted as that of the Kikkoman Group as a whole in 2007.

1) Environmental Philosophy

The Kikkoman Group will respect the working of nature, and contribute to the realization of a society comfortable to live in through our corporate activities keeping harmony with the environment.

Commentary of Environmental Philosophy

“Respect for the working of nature” means:

Kikkoman Group looks to create an atmosphere where human life fits harmoniously within the nature world.

“Our corporate activities keeping harmony with the environment” means:

We will improve and develop our means of production and distribution to minimize our impact on the environment.

“A society comfortable to live in” means:

A society in which individuals are respected and emotional richness is valued within a healthy natural environment.

Under the “Environmental Principles,” the Kikkoman Group strives to ensure that its corporate activities are compatible with the natural environment while working to preserve the global environment and build a recycling-based society.

2) Action Guidelines

The Kikkoman Group acts on the following guidelines with enthusiasm and creativity to achieve the goals of our Environmental Philosophy.

1. Every one of us will aim to remain in harmony with the environment when performing our duties across all sectors (development, procurement, production, sales and support).
2. In addition to observing standard laws, we will formulate and observe our own company rules and regulations related to environmental protection.
3. As responsible members of society, we will actively participate in efforts to preserve the environment in our local communities.
4. We will study and deepen our understanding of the environment.
5. We will think and act from a global point of view.

3) Priority Action Assignments

Priority Action Assignments are set for the Kikkoman Group to achieve the Environmental Philosophy.

<For the Group as a whole>

To achieve the medium- and long-term environmental goals of the Kikkoman Group

<By Sectors>

<Research and Development Sector>

- R&D of environmentally friendly manufacturing technologies, materials and products
- R&D in technological application of byproducts and waste

<Procurement and manufacturing Sector>

- Promotion of green purchasing
- Promotion of resources and energy saving measures
- Conducting Environmental Preservation Activities in and around sites

<Sales and Distribution Sector>

- Reduction and appropriate disposal of waste and returned unsold products
- Streamlining logistics

<Other Sectors>

- Provision of environmental information
- Implementation of environmental preservation activities of all kinds, and the provision of support to and cooperation with such activities

2. Voluntary Action Plan for Environmental Preservation (Voluntary Plan)

<Medium- and Long-term Environmental Preservation Policies and Goals>

To achieve the "Medium- and Long-term Environmental Goals of the Kikkoman Group," a priority action assignment of the Group as a whole, the General Environment Preservation Committee, established in FY2000 (see I-3-1), announced the following "Medium- and Long-term Environmental Preservation Policy and Goals" formulated as the Voluntary Action Plan for all Group companies in August 2000.

| Policy | Goals |
|---|--|
| Policy 1: Prevention of Global Warming | Reduction of CO ₂ emissions by FY2011 Domestic major manufacturing sector of the Kikkoman Group 92% of FY1991 level (-8%) Distribution sector of the Kikkoman Group 92% of FY1991 level (-8%) |
| Policy 2: Reduction of waste | Reuse and recycle of waste and byproducts by FY2006 Domestic major manufacturing sector of the Kikkoman Group 99% (excl. construction waste) Other sectors of the Kikkoman Group 95% |
| Policy 3: Establishment of the Environmental Management System | Implementation of internal environmental audit Domestic manufacturing sector and Technological sector from FY1996 Overseas plants and related companies from FY1998 Obtaining ISO14001 certification Domestic major manufacturing sector by FY2006 Introduction of Environmental Accounting Publication of the Environmental Accounting of domestic and overseas manufacturing companies for FY2000 by the end of June 2000 Introduction of the Consolidated Environmental Accounting by the end of 2001 |

In the following years, the contents of the "Medium- and Long-term Environmental Preservation Policies and Goals" have been revised along with the progress of environmental preservation activities and the achievement of goals.

| | |
|---------------|--|
| February 2001 | Change |
| | Addition to the basic policy "Promotion of the Global Compact" To promote three principles related to the environment among the nine principles |
| | Reason for addition In January 2001 Kikkoman became the first corporation from Japan to join the UN Global Compact. |
| May 2005 | Changes |
| | Change in the goal of "Prevention of Global Warming" |
| | Goals Reduce the total amount of CO ₂ emissions of the Kikkoman Group (domestic major manufacturing sector) to 90 percent (-10%) of the FY1991 level by FY2011. |
| | Reason for revisions The goal was raised because the previously set goal "Reduce CO ₂ emissions to 92% of the FY1991 level" had been achieved for 2 consecutive years. The goal is based on the document "Sector-wise goals to reduce CO ₂ emissions: 8.6% for the Industrial Sector" decided upon by the Cabinet in April 2005. |
| | Change |
| | Addition to the basic policy: "Promotion of Environmental Education" To promote environmental education to employees, neighboring communities and schools, and the public at large |
| | Reason for addition To respond to the enforcement of the Act on Environmental Preservation Activities and Environmental Education Promotion in October 2003. |
| | Change |
| | Deletion from the Environment Sector: Promotion of the Global Compact |
| | Reason for deletion To spread the goal to all Group companies |

Environmental Preservation System

| | |
|--|--|
| May 2006 | Change |
| | Change in the goals of Reduction of Reduction of waste |
| | Goals |
| | (1) Improve the methods of recycling use of waste and byproducts (2) Promote the use of environmentally considerate containers and packaging materials |
| | Reason for revisions |
| | The goal "to raise the ratio of recycling use of waste and byproducts to 99% and higher by FY2006" was achieved. Therefore, it was decided that the quality of recycling use will be enhanced instead of setting a target. Efforts to upgrade containers and packages were added as an important task. |
| | Change |
| | Revise the "Establishment of the Environmental Management System" to the "Promotion of Environmental Management" |
| | Goals |
| | (1) Promote the PDCA Cycle. (2) Disseminate environmental information positively. (3) Disclose Environmental Accounting. |
| May 2009 | Reason for revisions |
| | (1) The goal "that major Group companies and offices acquire ISO14001 certification by FY2006" had been achieved, and a new goal was set forth to make effective use of the system. (2) The website-version of "Kikkoman Group Sustainability Report" was developed into the printed version of "Kikkoman Group Corporate Citizenship Report" with an aim to positively publicize the environmental preservation efforts by Kikkoman. (3) As the "introduction" of Environmental Accounting was finished, only the term "disclosure" was used. |
| | Change |
| | Addition of a goal to the Prevention of Global Warming: |
| | Goals |
| | Reduce CO ₂ emissions per unit of the Kikkoman Group (major manufacturing companies) to 99% and lower than that of the previous fiscal year. |
| | Reason for addition |
| | In order to make concerted efforts across the Group including overseas companies to reduce CO ₂ emissions, the range of targets was expanded. As the targets to reduce the total emissions vary from country to country, a per-unit-of-production goal was set forth. |
| | Change |
| | Addition of a goal to the Promotion of Environmental Management: |
| Goals | |
| Acquire ISO14001 for the domestic major manufacturing companies as a whole by FY2012. | |
| Reason for addition | |
| The holding company system was introduced in October 2010. By acquiring group certification, it is aimed to promote highly sustainable environmental management in the Group by building an efficient environmental management system to fit the holding company system, and to continuously improve the system. | |

Environmental Preservation System

| | |
|---------------|--|
| June 2010 | Change |
| | Revision of the goals of the "Reduction of Waste" |
| | Goals |
| | Increase the reuse rates of waste and byproducts to 99% and higher at domestic and major overseas manufacturing companies by FY2015. |
| | Reason |
| | New numerical goal was set forth. |
| December 2010 | Change |
| | Revision of the goal of the "Prevention of Global Warming" |
| | Goals |
| | (1) To reduce CO ₂ emissions by 15% and more by FY2013 compared to the FY2006 levels at major domestic companies. |
| | (2) To reduce CO ₂ emissions per unit of production by 1% and more from the previous year at major domestic companies and overseas major manufacturing companies. |
| | Reason for revisions |
| May 2012 | Change |
| | Revision of the goal of the "Prevention of Global Warming" |
| | Goals |
| | (1) To reduce the total CO ₂ emissions of major domestic companies by 17% or more from the FY2006 levels by FY2015. |
| | Reason |
| | The numerical goal amount was raised following to efforts made to reduce CO ₂ emissions. |
| April 2015 | Change |
| | Revision of the goal of the "Promotion of Environmental Management." |
| | Goals |
| | (1) To promote certain and continued improvements in the Group as the whole. |
| | Reason |
| | Upon the Group acquisition of ISO14001 in June 2011, the promotion of environmental management covering Group companies became necessary. |
| April 2015 | Change |
| | "Medium-term Environmental Policy" and "Goals" |
| | Policy&Goals |
| | "Medium-term Environmental Policy FY2016-FY2018" and "Goals" (table in the following page) |
| April 2015 | Reason |
| | "Medium-term Environmental Policy FY2013-FY2015" were achieved. |

Environmental Preservation System

“Medium-term Environmental Policy FY2016-FY2018”

| Goal | Objective |
|--|---|
| Goal 1: Low-Carbon Society | To reduce CO₂ emissions in procurement of raw material To conduct environmental impact assessment for raw material production processes To study methods of energy reduction for procurement processes |
| | To reduce CO₂ emissions in manufacturing Goal to reduce CO ₂ emissions Domestic manufacturing divisions (per unit of production): 80% (-20%) of the FY2006 level by FY2018 Major overseas manufacturing divisions (per unit of production): 97% (-3%) of the FY2015 level by FY2018 Domestic sales and back-office divisions (emissions): 99%(-1%) of the previous fiscal year |
| | To reduce CO₂ emissions in distribution To study and determine methods of distribution that most efficiently lead to the reduction of CO ₂ emissions such as improving the ratio of loading trips to total trips and controlling ecological driving |
| | To reduce waste from products and work-in-progress To promote reduction in waste resulting from problems with products, work-in-process and raw materials |
| | To reduce waste in general Numerical goal of waste reduction (except for byproducts) Domestic manufacturing divisions and major overseas manufacturing divisions (per unit of production): keep the level of the previous fiscal year or below Domestic sales and back-office divisions (emissions): keep the level of the previous fiscal year or below |
| Goal 2: Recycling-Based Society | To reduce environmental load in containers and packaging To conduct technological R&D for environmentally considerate containers and packaging To promote reduction in materials for containers and packaging |
| | To enhance environmental assessment in raw material procurement To promote the introduction of environmental assessment into the purchasing criteria |
| | To preserve water environment Numerical goals of drainage (water discharged into rivers) Domestic manufacturing divisions (<i>river discharge area</i>): BOD ≤ 10mg/l or COD ≤ 8mg/l |
| Goal 3: Symbiotic Society | To reduce water consumption Numerical goal of water consumption Domestic manufacturing divisions and major overseas manufacturing divisions (per unit of production): keep the level of the previous fiscal year or below |
| | To cooperate with local communities To support and cooperate with efforts to preserve local environments |
| Goal 4: Environmental Management Activity | To respond against environmental risks To strengthen compliance with relevant laws and regulations |
| | To keep improving the environmental management system To expand environmental education and communication To accommodate to the revision of standards |

3. Environmental Management Promotion System

1) History of the Environmental Management Promotion System

<Refer "Environmental Management Promotion System," Corporate Citizenship Report 2006>

<Start of Environment Management Organization>

Kikkoman's forerunners who had been engaged in brewing soy sauce since the Edo era have been concerned about maintaining a healthy environment in order to maximize the activity of brewing microorganisms, such as *koji*, and have taken care of the water of the Edo River for the sake of people downstream including Edo (now Tokyo) using the water for their daily life. In other words, they have been concerned with what is termed environmental management today as the principle of business.

After the impoverished postwar days, Japan's economy enjoyed rapid growth but at the same time, it began to be faced with the pollution issue. To cope with this issue, Kikkoman established the Environmental Measurement Committee in August 1970, conducted air, water and noise surveys around its factories, and presented the basic report on measures to prevent pollution. In February 1972, the Environmental Preservation Group was formed with responsibilities to plan and execute comprehensive pollution prevention measures, and to conduct measurements, analyses, and research. In October in the same year, the Environmental Analysis Office was established. Further, in December, the Environmental Management Department combining the functions of both groups was established as part of the re-organization of the company. This marked the birth of a division specializing in pollution prevention.

Later, the Environmental Management Department has expanded its functions while undergoing changes in the name from "Environmental Protection Division" (1992), "Environmental Protection Promotion Division" (1995), "Environment Management Division" (1999), to "Environment Department" (2002).

<Formulation of the Environmental Charter>

In 1992, a year before the promulgation of the Environment Basic Law, the concept on the environmental issue greatly changed within Kikkoman. The traditional concept was rather passive to carry out business activities that do not cause environmental pollution, while the new concept was a proactive one to seek "business activities to harmonize with the environment" to protect the earth as the treasure of all humans. Based on this concept, the General Environment Protection Committee was established directly under the president, and the present Environmental Principle was formulated and published.

<Formulation of the Voluntary Plan>

In 1993, the "Voluntary Action Plan for Environmental Preservation (Voluntary Plan)" was formulated by the General Environment Protection Committee, aiming at energy conservation and maintaining harmony with the environment. Efforts to achieve its goals were initiated involving all sectors of the Group.

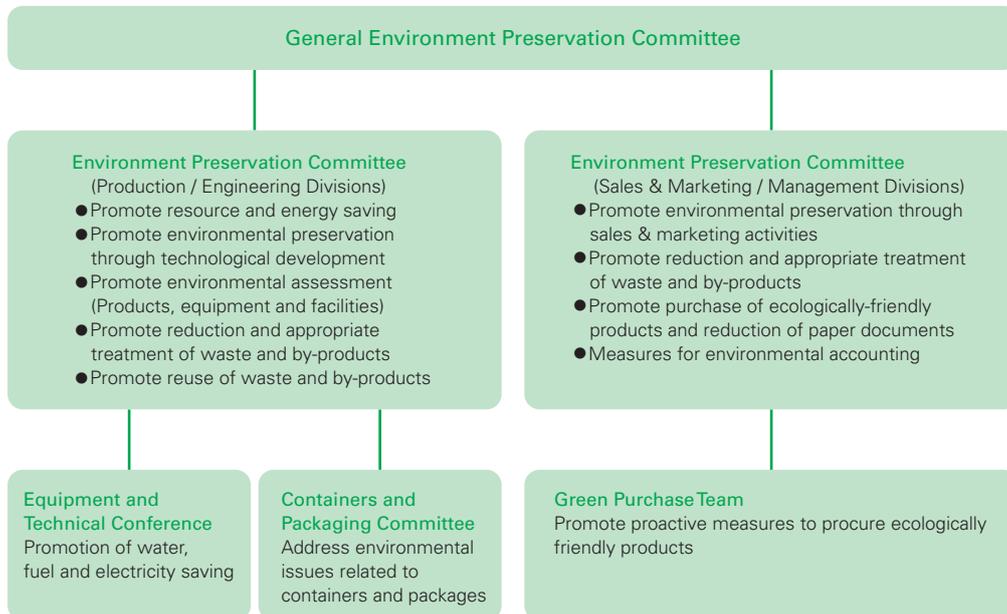
<Introduction of the Environmental Management System>

In 1996, the Internal Environmental Auditing System was introduced to monitor whether environmental protection and management activities were adequately implemented, and whether the management level was maintained and further enhanced. On the extension line of this, efforts to acquire ISO14001 certification were taken at major branches and factories in Japan. The first step for acquiring ISO14001 certification was completed in February 2006 with the Kinki Branch.

In 1999, the General Environment Protection Committee was renamed the General Environment Preservation Committee and it is responsible to formulate the "Medium- and Long-term Environmental Preservation Goals" as the guidelines to direct the environmental preservation activities of the Kikkoman Group, and to promote and manage the implementation of the guidelines.

Environmental Preservation System

● Environmental Management Promotion System (FY2000-FY2010)



2) Re-organization of the Environmental Management Promotion System to acquire ISO14001 certification for all domestic Kikkoman Group facilities as a whole

<Refer "Environmental Preservation System" in Corporate Citizenship Report 2010, website>

<Re-organization of the Environmental Management Promotion System>

The Kikkoman Group reorganized its Environmental Management Promotion System in October 2009 to adapt to the newly introduced holding company system.

Previously overseen by the General Environmental Preservation Committee, the Production/Engineering Division and Sales & Marketing/Management Division were united under the Environmental Preservation Promotion Committee. The members of the Committee are the representatives of major affiliated companies and offices in the Kikkoman Group which have acquired ISO certification.

The "Equipment and Technology Conference" and "Containers and Packaging Committee" which were substructures of the Environmental Preservation Committees before the reorganization will continue their activities as independent committees under the directors in charge of production, the environment and purchasing. The "Green Purchase Team" which was established to concretely promote the procurement of green products will be dissolved and its activities will be absorbed in respective entities which have acquired ISO certification.

Further, the Noda and Nagareyama Environmental Preservation Round Table and Takasago Factory Environmental Preservation Committee were terminated. The target of the participants in the Workshop for Environmental Administrators of the Kikkoman Group has been expanded to include all group companies in the newly named "Kikkoman Group Environmental Manager Information Exchange Meeting."

As a result, the system (refer p.13) has been established.

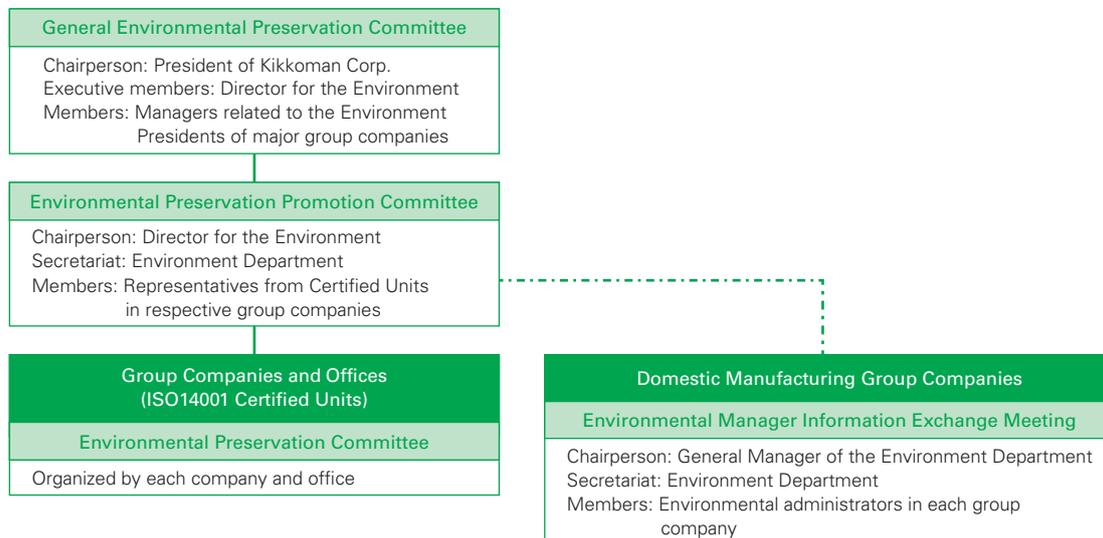
<Environmental Management Promotion System aimed for all major domestic Kikkoman Group facilities to acquire ISO14001 as a whole>

Under the new Environmental Preservation Management Promotion System of the Kikkoman Group, the General Environmental Preservation Committee has been established as the supreme decision-making organ for the environmental activities of all member companies. The Committee, chaired by the president of Kikkoman Corporation, and consisting of directors for the environment of Kikkoman Corporation and the presidents of major member companies of the Kikkoman Group, will formulate, promote and

Environmental Preservation System

supervise, among others, the Medium- and Long- term Environmental Preservation Goals.

● Environmental Preservation Management Promotion System (FY2010-)



Under this General Environmental Preservation Committee, the Environmental Preservation Promotion Committee, consisting of the managerial people and environmental administrators of member companies of the Group, is set up to promote environmental preservation activities from a Group-wise perspective. Further, concrete environmental preservation activities conducted under the directorship of this Promotion Committee are planned and supervised by the Environmental Preservation Committee established in each of the companies and offices which have acquired ISO14001 certification. In addition, the Kikkoman Group Environmental Manager Information Exchange Meeting is set up for people responsible for the environmental preservation at major manufacturing group companies in Japan through which information is shared, to accumulate environment-related knowhow and technologies, and to enhance the Group's capacity to respond to changes.

In order to improve the environmental management system, the Kikkoman Group puts forward the policies and goals of environmental preservation activities on the whole Group level, periodically review the outcomes of activities, and provides the system to help those in charge of environmental preservation to exchange information and interact among themselves.

3) Environmental Management Promotion System after Acquiring ISO14001 Certification for all major domestic Group facilities

<Reported in 2011>

In June 2011, all major domestic facilities of the Kikkoman Group which had acquired ISO14001 certification were united to acquire group certification. At this occasion, the Environmental Preservation Promotion Committee comprising environmental managers of respective facilities was established to administer ISO14001.

The framework of the Environmental Preservation Promotion System (refer p.14 "Environmental Management Framework") is as follows:

Environmental Preservation System

<Top Management>

Head of the system who supervises the entire Kikkoman Group: President of Kikkoman Corporation

<General Environmental Preservation Manager>

Environmental manager appointed by the Top Management to supervise environmental management: Officer in charge of the Environment of Kikkoman Corporation

<Secretary General>

Head of the Secretariat supporting the work of General Environmental Preservation Manager: General Manager of the Environmental Department

<Secretariat>

Staff to promote the General Environmental System under the General Environmental Preservation Manager

<Areas>

Regions, corporations and branches to implement the Environmental Management System: Refer to “Names of Area” in the chart of the Environmental Management Structure

<Area Management>

Managers of organizations supervising areas

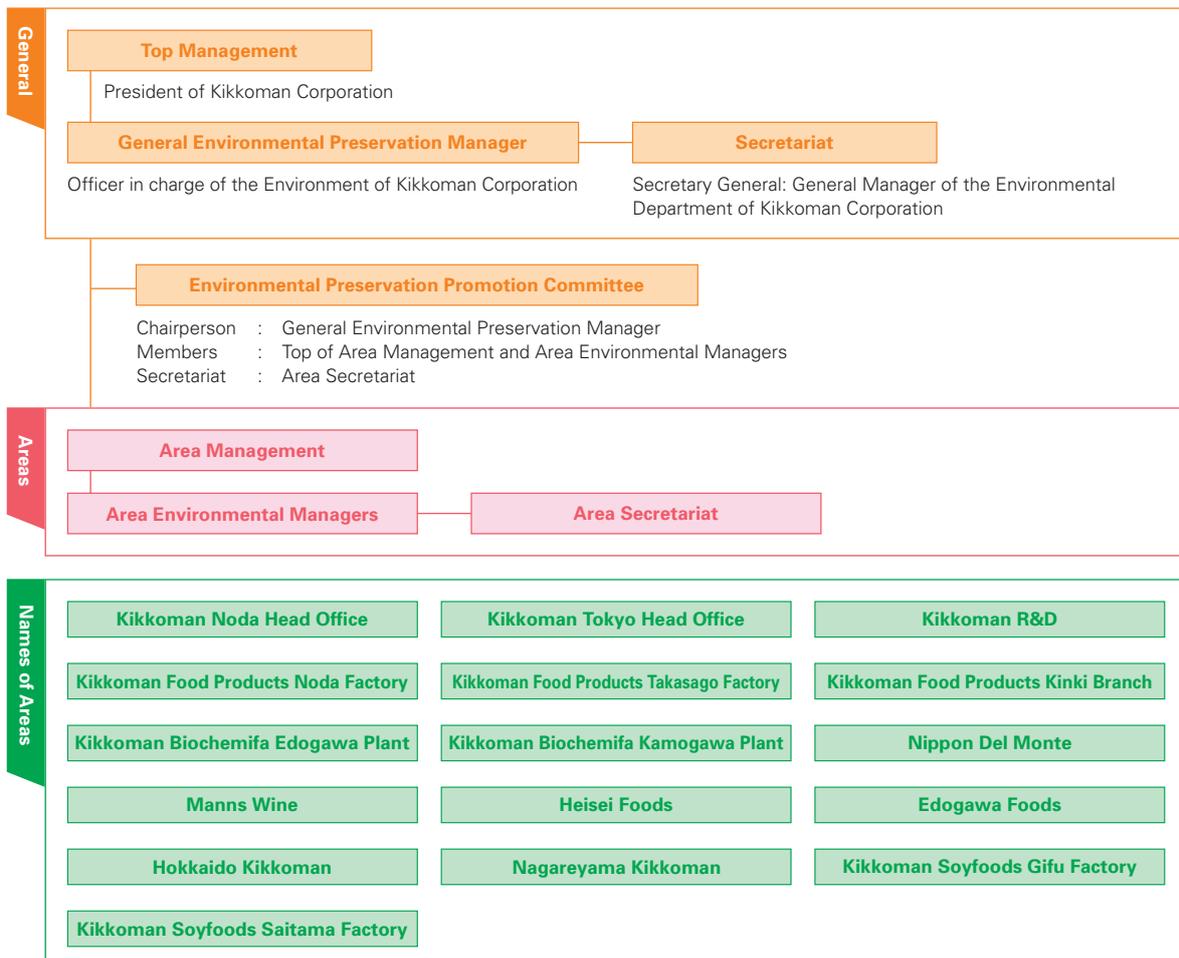
<Area Environmental Managers>

Environmental managers appointed by the Area Management to administer the areas

<Area Secretariats>

Office to promote the Area Environmental Management System under the Area Environmental Managers

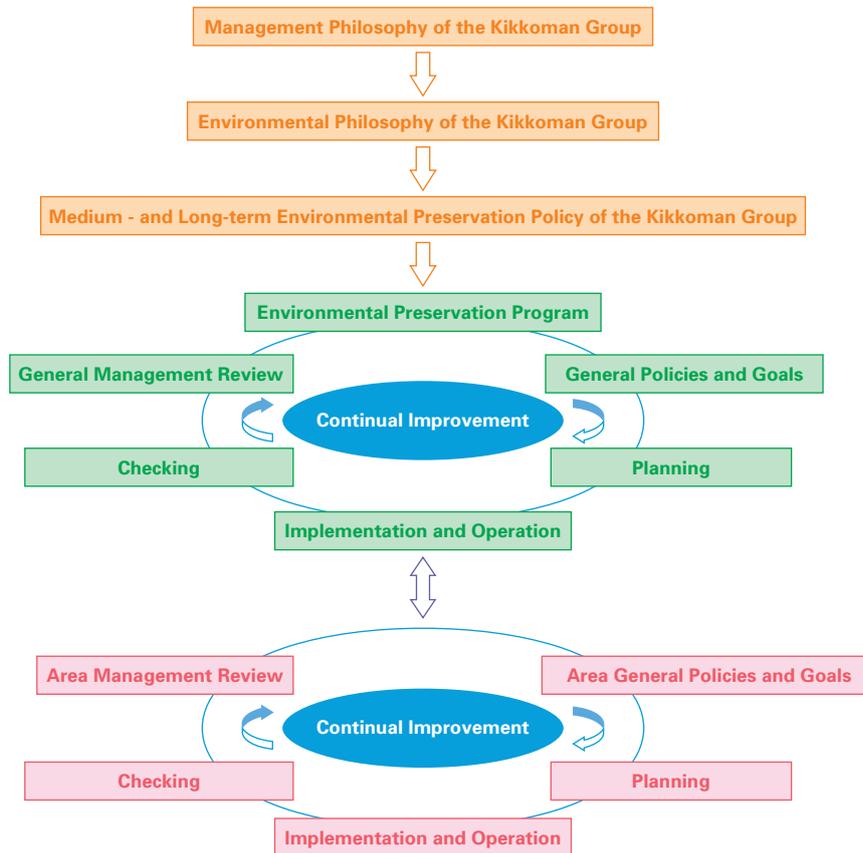
Environmental Management Framework



Environmental Preservation System

Based on its Management Philosophy, Environmental Philosophy and Medium- and Long-term Preservation Goals, the Environmental Management System of the Kikkoman Group is administered in the following framework. It aims for a high level of environmental management as a whole Group under one holding company.

Environmental Management System of the Kikkoman Group



Under the Management System, the following activities are conducted:

- To determine appropriate environmental preservation program
- To identify aspects that can influence the environment
- To identify and have access to the applicable legal requirements and other requirements
- To establish environmental preservation policies and goals
- To establish, implement and maintain plans for achieving its policies and goals
- To facilitate and review planning, managing and checking preventive actions in order to put the environmental management system into practice effectively
- To accommodate to changing circumstances

Environmental Preservation System

<Reported in FY2014>

In FY2013, Takara Shoyu Co., Ltd. began operating the Environmental Management System. With this addition, the total number of the Environmental Management Framework was 17 units. In the following fiscal year, FY2014, the company became one of the ISO14001 certified Kikkoman Group member companies.

<Reported in FY2017>

In FY2016, the Ibaraki Plant of Kikkoman Soyfoods Co. began operating the Environmental Management System. With this addition, the total number of the Environmental Management Framework was 18 units. In FY2016, the plant became one of the ISO14001 certified Kikkoman Group members.

<Reported in FY2019>

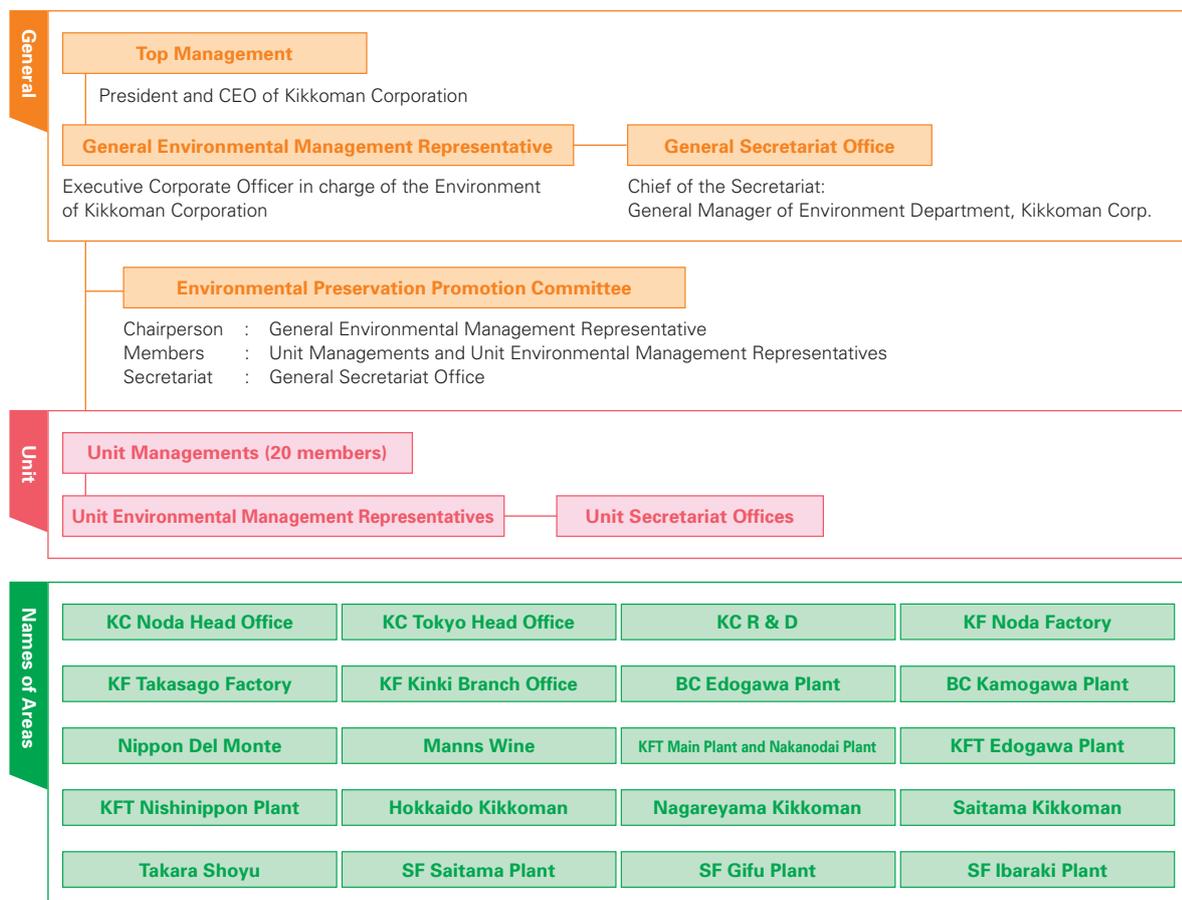
In FY2018, Saitama Kikkoman Co. began operating the Environmental Management System, and became one of the ISO14001 certified Kikkoman Group member companies.

The Nishinippon Plant of Kikkoman Foodtech Co. began operating the Environmental Management System, too. And, in the following fiscal year, FY2019, the plant became one of the ISO14001 certified Kikkoman Group members.

With these addition, the total number of the Environmental Management Framework was 20 units.

* Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

Environmental Management Framework (FY2018)



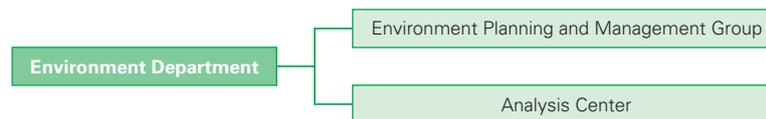
KC=Kikkoman Corp. KF=Kikkoman Food Products BC=Kikkoman Biochemifa KFT=Kikkoman Foodtech SF=Kikkoman Soyfoods

4. Environment Department

1) Before September 2009

<Refer "Activities of the Environment Department," Sustainability Report 2005>

With the aim of maintaining and conveying beautiful nature and a rich living environment for future generations, the Environment Department plans and promotes environment preservation activities of the Group, and guides and supports environmental activities by all branches and factories.



(1) Environment Planning and Managing Group

In an effort to realize the Environmental Philosophy, and with the purposes of "supporting the corporate activities keeping harmony with the environment," "supporting the development of eco-friendly products and technologies," and "living in harmony with the environment and local communities including making social contribution," the Group,

- plans, promotes and supports the environment preservation activities of the Kikkoman Group,
- plans and implements internal environmental audits, and supports branches and factories to acquire ISO14001 certification (environmental management system), and
- plans educational activities on environmental preservation, and supports Group companies to carry out social contribution activities.

(2) Analysis Center

As a professional group of analysts and measuring technicians, the Analysis Center supports and promotes Kikkoman Group's environmental preservation activities. At the same time, as a registered company authorized to certify environmental measurements, the Center aims to contribute to the environmental preservation of local communities through its activities to analyze the air, water, soil, industrial waste, noise, vibration, odor, drinking water and agricultural chemicals. In practice, the Analysis Center:

- conducts surveys and analyses on samples brought in by corporations and organizations from inside and outside the Kikkoman Group, and
- reports the results to clients

2) October 2009 and Afterwards

<Refer "Risk management backed by research and development activities" in Corporate Citizenship Report 2010, website>

The Analysis Center was re-organized at the time of the organizational reform in October 2009 as the "Environment and Food Safety Analysis Center" to "support researches on food safety and analyzing activities," and to "support environmental analyses and environmental preservation activities." It was moved from the Environment Department to the Research and Development Division. By integrating R&D and environmental analysis functions, it is expected that techniques and knowledge for analysis will be enhanced, that more efficient analysis work will be achieved and that new analysis methods will be developed.

The Environment Department will be engaged in the following activities which have been carried out so far by the Environmental Planning and Management Group.

- Planning, promoting and supporting the environmental preservation activities of the Kikkoman Group,
- Planning educational activities on environmental preservation, and supporting corporate social contribution activities, and
- Planning and implementing internal environmental audits.

In addition, the department will

- Promote acquiring ISO14001 certification of all major domestic Kikkoman Group facilities.

1. Transition of the CO₂ Emissions

<based on the level of CO₂ Emission in FY1991>

1) FY2001-FY2005

<Refer "Preventing Global Warming" in Corporate Citizenship Report 2010, website>

The Kikkoman Group, since its announcement of its medium- and long-term environmental preservation goals in August 2000, has considered the prevention of global warming as a priority. The goal set for major manufacturing group companies in Japan was to reduce CO₂ emissions to 92% (minus 8%) of the level in FY1991 by FY2011.

The target companies in FY1991 included Kikkoman Corp., Nippon Del Monte Corp. and Manns Wine Co., Ltd.

2) FY2006-FY2010

<Reported in FY2007>

In May 2005, the goal was further reduced to 90% of that of FY1991 level.

The target companies: 3 major domestic manufacturing companies (Kikkoman Corp., Nippon Del Monte Corp. and Manns Wine Co., Ltd.)

<Reported in FY2009>

Along with the reorganization of the companies within the Kikkoman Group, Kikkoman Corp. and Nippon Del Monte Corp. were separated and new names were given to the respective companies. (The target companies themselves were not changed.)

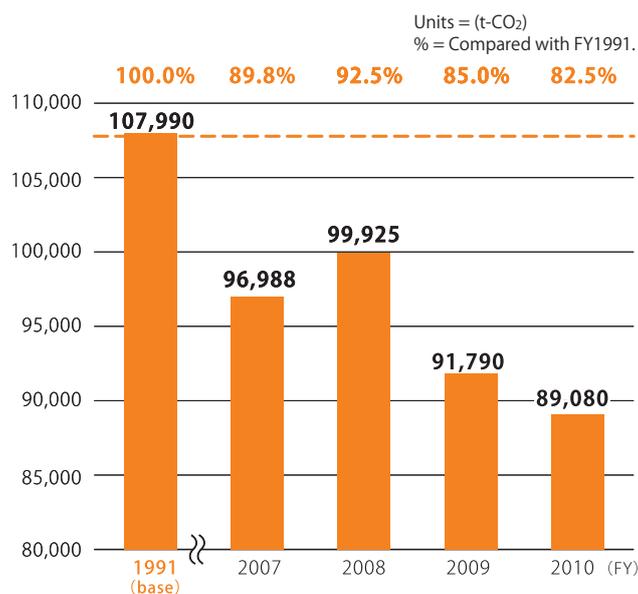
The target companies: 8 major domestic manufacturing companies (Kikkoman Corp., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Tohoku Del Monte Corp., and Manns Wine Co., Ltd.)

【FY2007-FY2010】

<Reported in FY2011>

Total CO₂ emissions from FY2007-FY2010 are shown in the following chart.

● Transition of the CO₂ emissions (Major manufacturing companies in Japan)



3) FY2011-FY2012

[FY2011]

<Refer "Preventing Global Warming" in Corporate Citizenship Report 2011, website>

In FY2011, the Kikkoman Group decided to lower the target of "global warming prevention" by FY2013 by 15% or more from the FY2006 level by reducing the total CO₂ emissions of major domestic companies. Further, target companies increased to 11 including Foodchemifa Co., Ltd., and Takara Shoyu Co., Ltd.

The target companies: 11 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Tohoku Del Monte Corp., Manns Wine Co., Ltd., Foodchemifa Co., Ltd., and Takara Shoyu Co., Ltd.)

In FY2011, the total CO₂ emissions of the 11 major domestic companies of the Kikkoman Group amounted to 126,057t-CO₂, which was 87.0% of the FY2006 level or the reduction of CO₂ emissions by 18,919t-CO₂. This reduction is attributed to the improvements of the Noda Factory, and the use of natural gas as boiler fuel by respective companies.

[FY2012]

<Refer "Preventing Global Warming," Corporate Citizenship Report 2012 detailed edition>

In FY2012, the Fukushima Factory of Nippon Del Monte Corp. and Tohoku Del Monte Corp. consolidated their business, and Foodchemifa Co., Ltd. was separated into Kikkoman Biochemifa Co. and Kikkoman Soyfoods Co., as a result, the number of target companies remained 11.

The target companies: 11 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp. (except for Fukushima Factory), Tohoku Del Monte Corp., Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.)

In FY2012, the total CO₂ emissions of the major domestic companies of the Kikkoman Group amounted to 114,030t-CO₂. It was 78.7% of the FY2006 level indicating the reduction of 30,946t-CO₂. The improvements made by consolidation in Nippon Del Monte Corp., and the use of natural gas as boiler fuel by respective companies contributed to this reduction.

4) FY2013-FY2015

[FY2013]

<Refer "Preventing Global Warming" in Corporate Citizenship Report 2013, website>

In FY2013, as part of our domestic "Global warming prevention" efforts, a more severe numerical goal for reduction of CO₂ emissions by major domestic companies was set. Emissions must be reduced by 17% or more of the FY2006 CO₂ emissions by FY2015. Saitama Kikkoman Co. which began its full operations in FY2013 was added to the list of target companies.

The target companies: 12 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (except for Fukushima Factory), Tohoku Del Monte Corp., Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.)

The total CO₂ emissions by major companies in the Kikkoman Group amounted to 115,523t-CO₂ in FY2013, which was 79.7% of the FY2006 level, or a reduction of 29,453t-CO₂. Comparing to that of FY2012, however, CO₂ emissions increased by 1,493t-CO₂ as the production increased in volume in the fiscal year.

[FY2014]

<Refer "Preventing Global Warming," Corporate Citizenship Report 2014 detailed edition>

In FY2014, the total CO₂ emissions by major domestic companies of the Kikkoman Group was 117,503t-CO₂, which was 81.0% of that of FY2006, indicating a reduction by 27,473t-CO₂. However, in comparison with FY2013, there was an increase of 1,980t-CO₂ in total emissions related to increases in the total amount of manufacturing.



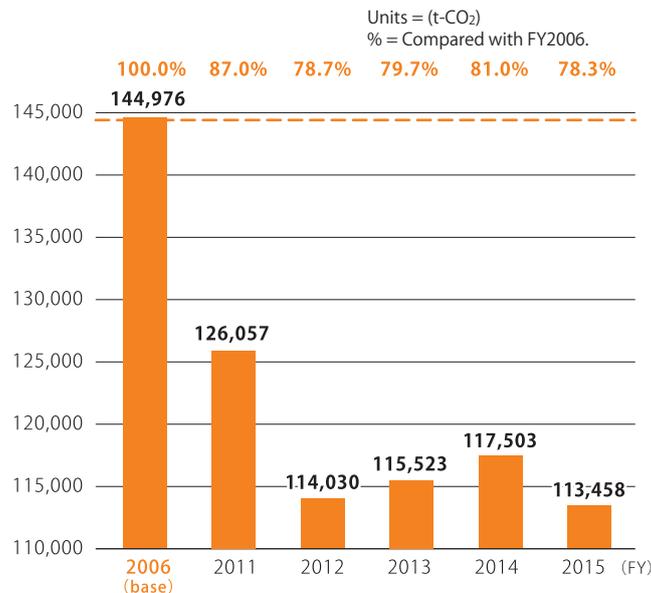
Preventing Global Warming

[FY2015]

<Refer “Preventing Global Warming,” Corporate Citizenship Report 2015 detailed edition>

In FY2015, the total CO₂ emissions by major domestic companies of the Kikkoman Group amounted to 113,458t-CO₂, which was 78.3% of that of FY2006, which was a reduction of 31,518t-CO₂. Comparing with FY2014, emissions decreased by 4,045t-CO₂.

● Transition of the CO₂ emissions (Major domestic companies)



5) FY2016-FY2018

[FY2016]

<Reported in FY2017>

In the Medium- and Long-term Environmental Preservation Goals FY2013-2015, the Kikkoman Group set forth two objectives concerning CO₂ emissions in its activities: First, to reduce the total CO₂ emissions at the major domestic companies by 17% or more from the FY 2006 levels by FY 2015, and second, to reduce the CO₂ emissions per unit of production at the major domestic companies and overseas manufacturing companies by 1% or more from that of the previous fiscal year (FY).

As a result, total CO₂ emissions by major domestic companies amounted to 113,458t-CO₂ in FY2015 which was less than the FY2006 level (144,976t-CO₂) by 31,518t-CO₂ or 21.7%. At the same time, CO₂ emissions per unit of production by major domestic companies as well as major overseas manufacturing companies was 0.156t-CO₂/t, a decrease by 0.005t-CO₂/t, or 3.1% from the level of FY2014 (0.161t-CO₂/t). Thus, both objectives were achieved.

In formulating the Medium-term Environmental Preservation Goals FY2016-2018, the Kikkoman Group designated the following new objectives.

[Objectives in the Medium-term Environmental Preservation Goals FY2016-2018]

(1) To reduce the CO₂ emissions per unit of production at the domestic manufacturing divisions by 20% or more from the FY 2006 levels by FY 2018.

The target divisions: 19 plants of domestic manufacturing companies: Kikkoman Food Products Co. (Noda and Takasago Factories), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co. (Main, Nakanodai, and Nishinippon Plants), Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma and Nagano Plants), Tohoku Del Monte Corp., Manns Wine Co., Ltd. (Katsunuma and Komoro Wineries), Kikkoman Biochemifa Co. (Edogawa and Kamogawa Plants), Kikkoman Soyfoods Co. (Saitama, Gifu and Ibaraki Plants) and Takara Shoyu Co., Ltd. (Choshi Plant)

(2) To reduce the CO₂ emissions per unit of production at the major overseas manufacturing divisions by 3% or more from the FY 2015 levels by FY 2018.

The target divisions: 4 plants of major overseas manufacturing companies: Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V.(KFE)

(3) To reduce the CO₂ emissions at the domestic sales and back-office divisions annually by 1% or more from that of the previous fiscal year (FY).

The target divisions: Domestic sales and back-office divisions: Kikkoman Corp., Kikkoman Food Products Co., Kikkoman Beverage Co., Kikkoman Business Service Co., Nippon Del Monte Agri Co. and Kikkoman Daily Co.

The CO₂ emissions at Kikkoman Group domestic manufacturing divisions (19 plants) in FY2016 were 108,000t-CO₂, which were decreased by 22.3% and 0.9% as compared with FY2006 (139,000t-CO₂) and FY2015 (109,000t-CO₂), respectively.

The CO₂ emissions at Kikkoman Group major overseas manufacturing divisions (4 plants) in FY2016 were 37,000t-CO₂, which were increased by 2.8% as compared with FY2015 (36,000t-CO₂).

The CO₂ emissions at Kikkoman Group domestic sales and back-office divisions in FY2016 were 4,100t-CO₂, which were decreased by 2.4% as compared with FY2015 (4,200t-CO₂). The objective was achieved in these divisions.

【FY2017】

<Reported in FY2019>

The CO₂ emissions at Kikkoman Group domestic manufacturing divisions (19 plants) in FY2017 were 107,000t-CO₂, which were decreased by 23.0% and 0.9% as compared with FY2006 (139,000t-CO₂) and FY2016 (108,000t-CO₂), respectively.

The CO₂ emissions at Kikkoman Group major overseas manufacturing divisions (4 plants) in FY2017 were 38,000t-CO₂, which were increased by 2.7% as compared with FY2016 (37,000t-CO₂).

The CO₂ emissions at Kikkoman Group domestic sales and back-office divisions in FY2017 were 4,100t-CO₂, equal to FY2016 (4,100t-CO₂). We could not achieve the objective.

*Kikkoman Beverage Co. merged Kikkoman Daily Co. on April 1, 2016.

The target divisions: Domestic sales and back-office divisions: Kikkoman Corp., Kikkoman Food Products Co., Kikkoman Beverage Co., Kikkoman Business Service Co. and Nippon Del Monte Agri Co.

【FY2018】

<Reported in FY2019>

The CO₂ emissions released by Kikkoman Group domestic manufacturing divisions (19 plants*) in FY2018 were 108,000t-CO₂, which were decreased by 22.3% and increased by 0.9% as compared with FY2006 (139,000t-CO₂) and FY2015 (107,000t-CO₂), respectively.

*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

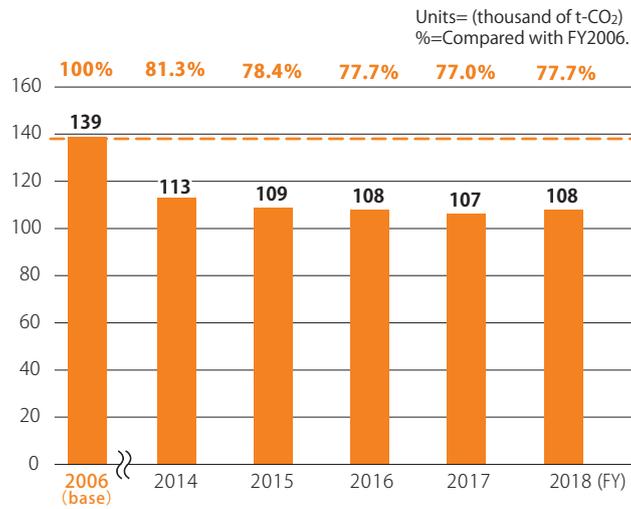
The target divisions: 19 plants of domestic manufacturing companies: Kikkoman Food Products Co. (Noda Factory and Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Kikkoman Foodtech Co. (Main Plant, Nakanodai Plant, Edogawa Plant and Nishinippon Plant), Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)

The CO₂ emissions at Kikkoman Group major overseas manufacturing divisions (4 plants) in FY2018 were 42,000t-CO₂, which were increased by 10.5% as compared with FY2017 (38,000t-CO₂).

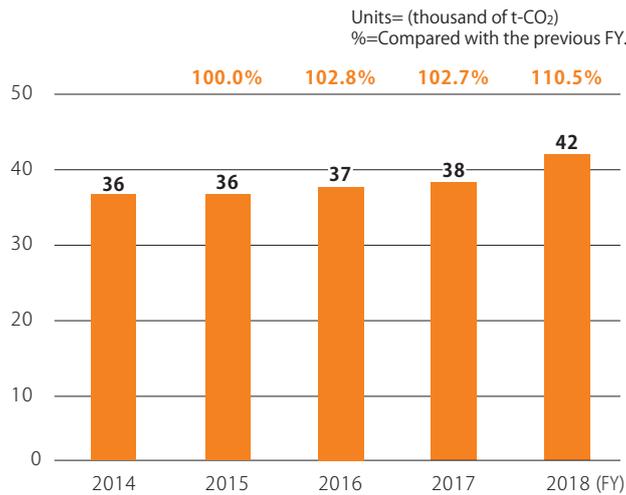
The CO₂ emissions at Kikkoman Group domestic sales and back-office divisions in FY2018 were 3,900t-CO₂, which were decreased by 4.9% as compared with FY2017 (4,100t-CO₂). The objective was achieved in these divisions.

Preventing Global Warming

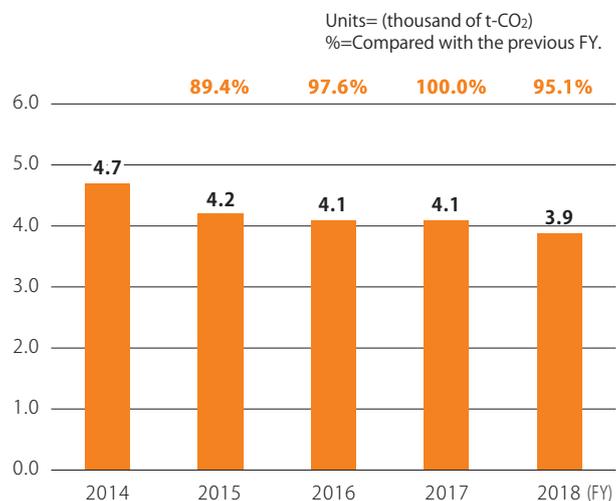
● Transition of the CO₂ emissions (Domestic manufacturing divisions)



● Transition of the CO₂ emissions (Major overseas manufacturing divisions)



● Transition of the CO₂ emissions (Domestic sales and back-office divisions)



2. Transition of the CO₂ Emissions per Unit of Production

1) Soy Sauce

<Refer "CO₂ Emissions per Unit of Production of Soy Sauce," Corporate Citizenship Report 2007>

CO₂ emissions per unit of production of soy sauce implies the total quantity of CO₂ discharged through the process of soy sauce production divided by the total quantity of produced soy sauce. The total amount of CO₂ emissions is affected by the quantity of production, however, CO₂ emissions per unit of production of soy sauce is not influenced by changes in the amount of production directly. Therefore, by comparing CO₂ emissions per the unit yearly, the outcomes of CO₂ reduction efforts as a result of the improvement of energy sources, processes and others can be observed. The Kikkoman Group is using the measurement of CO₂ emissions per unit of production of soy sauce as one of its management indicators to measure achievements of efforts. Until FY2007, the use of carbon neutral soy sauce cake as an alternative fuel to fossil fuels contributed to a reduction of CO₂ emissions in total as well as per unit of production of soy sauce.

2) Soy Sauce, Noodle Soup and Barbecue Sauce

[FY2008]

<Refer "CO₂ Emissions per Unit of Production of Soy Sauce, Noodle Sauce and Barbecue Sauce," Corporate Citizenship Report 2008>

In FY2008, the Kikkoman Group began to further add the amount of CO₂ emissions per unit of production of noodle sauce and barbecue sauce to its management indicators of CO₂ emissions per unit of production of soy sauce. It was intended to better manage CO₂ emissions within the factories by more accurately reflecting the actual situation of CO₂ emissions, as the share of producing noodle sauce and barbecue sauce is increasing.

Unfortunately in FY2008, the amount of CO₂ emissions per the unit corresponding to the amount of steam purchased from outside (0.024t-CO₂/kl) was added due to the revision of the Act on Promotion of Global Warming Countermeasures. Because of this, the total figure for this fiscal year was worsened by 15% over the previous fiscal year (0.161t-CO₂/kl in FY2007 to 0.185t-CO₂/kl in FY2008). Other than this, the amount of CO₂ emissions per unit of production of soy sauce, noodle sauce and barbecue sauce remained at the same level of FY2007 in FY2008 at 0.161t-CO₂/kl, which is 83.8% of the emissions level of FY1991.

[FY2009]

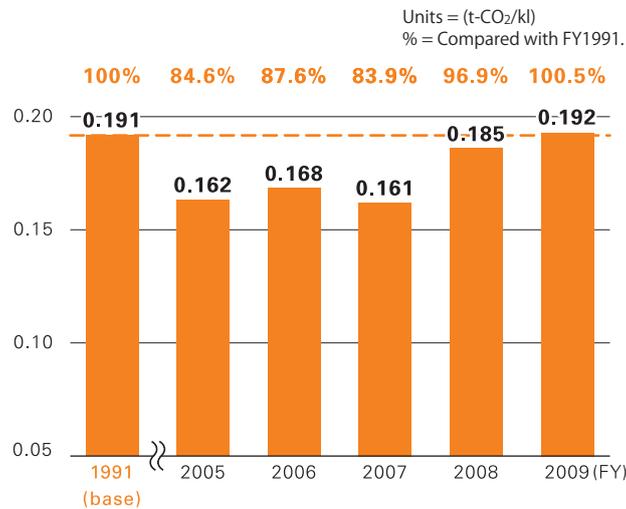
<Refer "CO₂ Emissions per Unit of Production of Soy Sauce, Noodle Soup and Barbeque Sauce," Corporate Citizenship Report 2009>

The CO₂ emissions per unit of production of soy sauce, noodle soup and barbeque sauce were reduced in total in FY2009 to 97% of the previous fiscal year. However, due to the decline in soy sauce production, which occupies the great majority of production, CO₂ emissions per unit of production rose by 3.7% over FY2008. This figure is 100.5% of the baseline year of FY1991. When the amount of CO₂ emissions related to steam purchase of FY2008 is deducted according to the revised law, CO₂ emissions per unit of production is 0.166t-CO₂/kl which is 87% of the amount in the previous fiscal year.

The transition of total CO₂ emissions per unit of production from FY2005 to FY2009 is as shown in the chart below.

Preventing Global Warming

Transition of the CO₂ emissions per unit of production of Soy Sauce, Noodle Soup and Barbeque Sauce



3) Refining the CO₂ Emissions per Unit of Production, a Group Goal was set

[FY2010]

<Refer "Reducing emissions per unit of production" in Corporate Citizenship Report 2010, website>

In FY2010, the Kikkoman Group made the following changes to the "CO₂ Emissions per Unit of Production of Soy Sauce, Noodle Soup and Barbeque Sauce" which had been used as one of the indicators to control global warming:

- In addition to the "soy sauce, noodle soup and barbeque sauce produced in Japan," "soy sauce, noodle soup and barbeque sauce produced in overseas plants," "soy milk produced by Foodchemifa Co., Ltd." "tomato products by Nippon Del Monte Corp," and "wine by Manns Wine Co., Ltd." were included as targets.
- The unit of production was changed from the weight of the contents of soy sauce, noodle soup and barbeque sauce (per kilo liter) to the total weight including the package (per ton).
- Further, the goal of emissions per unit of production was set at 99% of the previous fiscal year.

With this, the Kikkoman Group established the system to control CO₂ emissions both from the aspects of total emissions and emissions per unit of production, in other words, from both quantitative and qualitative aspects. The emissions per unit of production in FY2010 were 97.8% of that of the previous fiscal year, thus, achieving the goal.

[FY2011]

<Reported in FY2012>

Furthermore, target companies were changed in FY2011 as below:

- The target companies required to control CO₂ emissions per unit of production were increased from major domestic manufacturing companies to major domestic companies and overseas manufacturing companies including Kikkoman Corp. with no manufacturing bases, and KFI (U.S.A.), KSP (Singapore) and KFE (Netherlands)

The target companies: 11 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Tohoku Del Monte Corp., Manns Wine Co., Ltd., Foodchemifa Co., Ltd., and Takara Shoyu Co., Ltd. and 3 major overseas manufacturing companies (KFI, KSP and KFE)

The amount of emissions per unit of production in FY2011 was 0.175t-CO₂/t, which was 100.6% of FY2010 or an increase by 0.001t-CO₂/t. The target to reduce emissions per unit of production to 99% and below could not be reached. This was affected by the review of the product lines conducted by Manns Wine Co., Ltd. and Nippon Del Monte Corp. The Kikkoman Group will strive for reducing CO₂ emissions per unit of production both in Japan and overseas.

*The amount of CO₂ emissions per unit of production in the previous fiscal year (FY2010) 0.174t-CO₂/t was re-evaluated by new target companies including Kikkoman Corp.

【FY2012】

<Refer “Preventing Global Warming” in Corporate Citizenship Report 2012, website>

In FY2012, the CO₂ emissions per unit of production of the major domestic and overseas companies of the Kikkoman Group was 0.170t-CO₂/t, 97.1% of that of the previous fiscal year or a reduction by 0.005t-CO₂/t. With this, our goal was achieved, thanks to the reduction of CO₂ emissions by Nippon Del Monte Corp.

*The amount of CO₂ emissions per unit of production was calculated, excluding Nippon Del Monte Corp. Fukushima Factory and Tohoku Del Monte Corp., the operations of which were terminated in FY2012.

The target companies: 11 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.) and 3 major overseas manufacturing companies (KFI, KSP and KFE)

【FY2013】

<Refer “Preventing Global Warming” in Corporate Citizenship Report 2013, website>

In FY2013, the CO₂ emissions per unit of production of major domestic companies and major overseas manufacturing companies in the Kikkoman Group was 0.165t-CO₂/t, which stood at 97.1% of the emissions of the previous fiscal year, or a reduction by 0.005t-CO₂/t. Even though the amount of total production increased, CO₂ emissions did not increase so much. The Kikkoman Group will make every effort to reduce CO₂ emissions per production unit.

*The amount of CO₂ emissions per unit of production was calculated adding Saitama Kikkoman Co., which began its full operations in FY2013.

The target companies: 11 major domestic companies (Kikkoman Corp., Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.) and 3 major overseas manufacturing companies (KFI, KSP and KFE)

【FY2014】

<Refer “Preventing Global Warming,” Corporate Citizenship Report 2014 detailed edition>

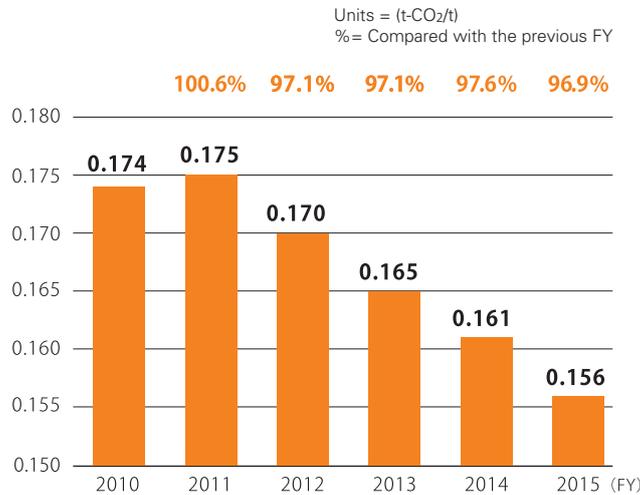
In FY2014, the CO₂ emissions per unit of production of major domestic companies and major overseas manufacturing companies in the Kikkoman Group totaled 0.161t-CO₂/t, which was a decrease by 0.004t-CO₂/t or 2.4% from that of FY2013. The goal to reduce more than 1% from the previous fiscal year level was achieved. This suggests that CO₂ emissions did not increase so much although the amount of manufacturing increased. In the future, we will continue our efforts to lower CO₂ emissions per unit of production in the Kikkoman Group as a whole including overseas manufacturers.

【FY2015】

<Refer “Preventing Global Warming,” Corporate Citizenship Report 2015 detailed edition>

In FY2015, the CO₂ emissions per unit of production of major domestic companies and major overseas manufacturing companies in the Kikkoman Group totaled 0.156t-CO₂/t, which was a decrease by 0.005t-CO₂/t or 3.1% from the level of FY2014. The goal to reduce more than 1% from the level of the previous fiscal year was achieved. We will continue our efforts to reduce CO₂ emissions per unit of production.

● Transition of the CO₂ emissions per unit of production (Major domestic companies and major overseas manufacturing companies)



4) New Goals for FY2016-FY2018

[FY2016]

<Reported in FY2017>

In the Medium- and Long-term Environmental Preservation Goals FY2013-2015, the Kikkoman Group set forth two objectives concerning CO₂ emissions in its activities: First, to reduce the total CO₂ emissions at the major domestic companies by 17% or more from the FY2006 levels by FY2015, and second, to reduce the CO₂ emissions per unit of production at the major domestic companies and major overseas manufacturing companies by 1% or more from that of the previous fiscal year (FY).

As a result, total CO₂ emissions by major domestic companies amounted to 113,458t-CO₂ in FY2015 which was less than the FY2006 level (144,976t-CO₂) by 31,518t-CO₂ or 21.7%. At the same time, CO₂ emissions per unit of production by major domestic companies as well as major overseas manufacturing companies was 0.156t-CO₂/t, a decrease by 0.005t-CO₂/t, or 3.1% from the level of FY2014 (0.161t-CO₂/t). Thus, both objectives were achieved.

In formulating the Medium-term Environmental Preservation Goals FY2016-2018, the Kikkoman Group designated the following new objectives in terms of preventing global warming (reducing CO₂ emissions) separately for Japan and overseas.

[Objectives in the Medium-term Environmental Preservation Goals FY2016-2018]

(1) To reduce the CO₂ emissions per unit of production at the domestic manufacturing divisions by 20% or more from the FY2006 levels by FY2018.

The target divisions: 19 plants of domestic manufacturing companies: Kikkoman Food Products Co. (Noda and Takasago Factories), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co. (Main, Nakanodai, and Nishinippon Plants), Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma and Nagano Plants), Tohoku Del Monte Corp., Manns Wine Co., Ltd. (Katsunuma and Komoro Wineries), Kikkoman Biochemifa Co. (Edogawa and Kamogawa Plants), Kikkoman Soyfoods Co. (Saitama, Gifu and Ibaraki Plants) and Takara Shoyu Co., Ltd. (Choshi Plants)

(2) To reduce the CO₂ emissions per unit of production at the major overseas manufacturing divisions by 3% or more from the FY2015 levels by FY2018.

The target divisions: 4 plants of major overseas manufacturing companies: Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V.(KFE)

(3) To reduce the CO₂ emissions at the domestic sales and back-office divisions annually by 1% or more from that of the previous fiscal year (FY).

The target divisions: Domestic sales and back-office divisions: Kikkoman Corp., Kikkoman Food Products Co., Kikkoman Beverage Co., Kikkoman Business Service Co., Nippon Del Monte Agri Co. and Kikkoman Daily Co.

*Change in the calculation formula of CO₂ emissions per unit of production:

In calculating CO₂ emissions per unit of production, the weights of containers and packaging had been included until the previous fiscal year (FY2015). From FY2016, the weights of containers and packaging have been excluded from the calculation. With this, the relation between manufacturing activities and CO₂ emissions became more accurately understood, which helped promote CO₂ emissions reduction activities more efficiently.

The CO₂ emissions per unit of production at Kikkoman Group domestic manufacturing divisions in FY2016 was 0.154t-CO₂/t, which was decreased by 17.6% and 3.1% as compared with FY2006 (0.187t-CO₂/t) and FY2015 (0.159t-CO₂/t), respectively.

The CO₂ emissions per unit of production by major overseas manufacturing divisions in FY2016 was 0.173t-CO₂/t, which was decreased by 1.1% as compared with FY2015 (0.175t-CO₂/t).

【FY2017】

<Reported in FY2019>

The CO₂ emissions per unit of production at Kikkoman Group domestic manufacturing divisions in FY2017 was 0.151t-CO₂/t, which was decreased by 19.3% and 1.9% as compared with FY2006 (0.187t-CO₂/t) and FY2016 (0.154t-CO₂/t), respectively.

The CO₂ emissions per unit of production at Kikkoman Group major overseas manufacturing divisions in FY2017 was 0.171t-CO₂/t, which was decreased by 2.3% and 1.2% as compared with FY2015 (0.175t-CO₂/t) and FY2016 (0.173t-CO₂/t), respectively.

【FY2018】

<Reported in FY2019>

The CO₂ emissions per unit of production at Kikkoman Group domestic manufacturing divisions* in FY2018 was 0.151t-CO₂/t, which was decreased by 19.3% as compared with FY2006 (0.187t-CO₂/t) and was equal to FY2017 (0.151t-CO₂/t). We could not achieve the objective.

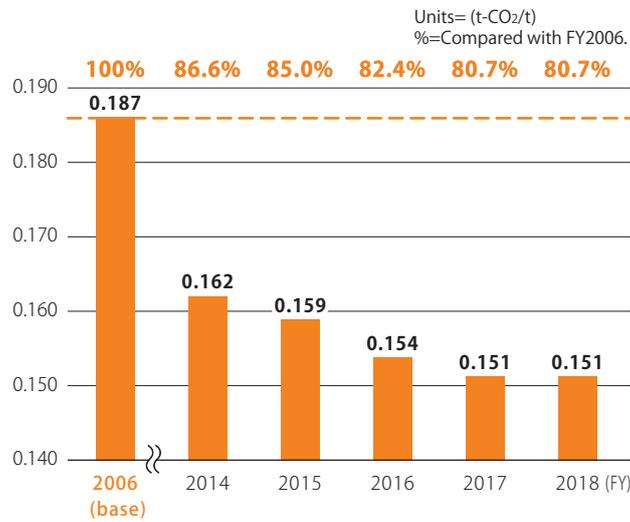
*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

The target divisions: 19 plants of domestic manufacturing companies: Kikkoman Food Products Co. (Noda Factory and Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Kikkoman Foodtech Co. (Main Plant, Nakanodai Plant, Edogawa Plant and Nishinippon Plant), Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)

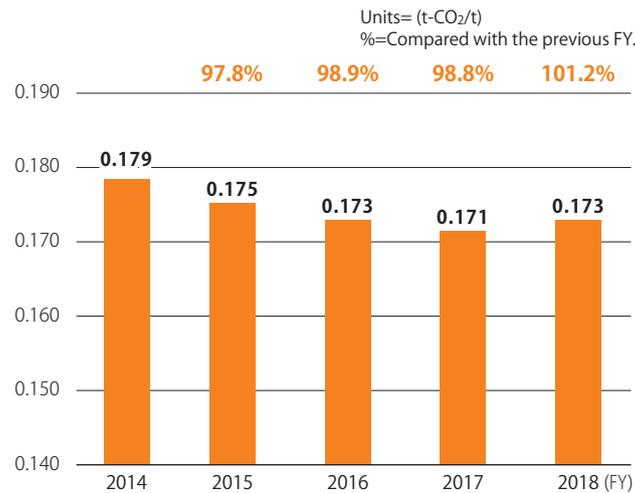
The CO₂ emissions per unit of production at Kikkoman Group major overseas manufacturing divisions in FY2018 was 0.173t-CO₂/t, which was decreased by 1.1% as compared with FY2015 (0.175t-CO₂/t). We could not achieve the objective.

Preventing Global Warming

● Transition of the CO₂ emissions per unit of production (Domestic manufacturing divisions)



● Transition of the CO₂ emissions per unit of production (Major overseas manufacturing divisions)



3. Approaches Taken by Plants

<Reported in FY2017>

The manufacturing divisions of the Kikkoman Group are making efforts to reduce CO₂ emissions through reviewing and updating their manufacturing methods as well as reviewing and replacing their equipment and energy sources (replacing with energy-saving equipment, changing fuel from heavy oil to gas, using solar power generation, and so forth).

Heavy oil boilers were replaced with gas boilers at the Edogawa Plant of Kikkoman Biochemifa Co. and the Second Production Department of the Noda Factory of Kikkoman Food Products Co., in FY2013, followed by the Research & Development Division and Nakanodai Plant of Heisei Foods Co.* in FY2014.

● Compact gas boilers (Edogawa Plant, Kikkoman Biochemifa Co.)



● Compact gas boilers (Second Production Department, Noda Factory, Kikkoman Food Products Co.)



● Compact gas boilers (R&D Division)



● Compact gas boilers (Nakanodai plant, Heisei Foods Co.*)



For work efficiency, the Nakanodai Plant of Heisei Foods Co.* had been using steam transported through a pipe from the heavy oil boiler at the Noda Factory nearby. However, considering that large amounts of heat were lost during transportation through the steam pipe between the two factories, it was an inefficient method of energy supply. As the boiler became too old, the supply of steam from the Noda Factory was terminated in August 2013, and new compact gas boilers were installed at the Nakanodai Plant to enhance energy efficiency. The compact gas boilers emit less CO₂ than a heavy oil boiler, and produces steam efficiently. As a result, yearly CO₂ emissions could be reduced by about 2,000t-CO₂.

Preventing Global Warming

- Compact gas boilers
(Main Plant, Heisei Foods Co.*)



- Compact gas boilers
(Nagareyama Kikkoman Co., Ltd.)



- Compact gas boilers
(First Production Department, Noda Factory, Kikkoman Food Products Co.)



In FY2015, heavy oil boilers were replaced with gas boilers at the Main Plant of Heisei Foods Co.,* and Nagareyama Kikkoman Co., Ltd. which produces *mirin* and other food items. Heavy oil boilers were then replaced at the First Production Department of Noda Factory of Kikkoman Food Products Co., in FY2016.

*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

Preventing Global Warming

<Reported in FY2019>

- Compact gas boilers
(Katsunuma Winery, Manns Wine Co., Ltd.)



In FY2018, heavy oil boilers were replaced to gas boilers at the Katsunuma Winery of Manns Wine Co., Ltd.

<Reported in FY2017>

- Turbo refrigerator
(Saitama Plant, Kikkoman Soyfoods Co.)



- Air handling unit to use remaining power for air conditioning



The Saitama Plant of Kikkoman Soyfoods Co. which manufactures soymilk products introduced two turbo refrigerators to cool heat-sterilized soymilk in FY2014 replacing the conventional flash chiller. With the stronger cooling power of the turbo refrigerators, the factory successfully reduced its CO₂ emissions by 1,300t-CO₂ per year.

As the new refrigerators had surplus cooling capacity, construction to enable use of the capability for air conditioning as well was undertaken, resulting in the further reduction of CO₂ emissions by 200t-CO₂ per year.

Preventing Global Warming

<Reported in FY2019>

● Noda Factory, Kikkoman Food Products Company



● Solar panels installed on the roof of the factory



● Saitama Kikkoman Company



● Solar panels installed on the roof of the company



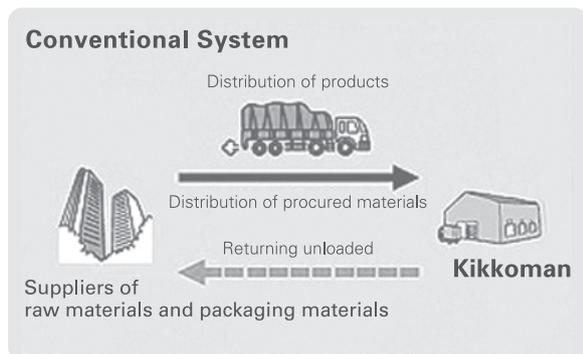
Solar panels (Solar power generation equipment) were installed on the roof of the Noda Factory of Kikkoman Food Products Co. and California Plant of Kikkoman Foods, Inc. (KFI) in FY2011, followed by the Saitama Kikkoman Co. in FY2013.

4. Approaches in the Distribution System

<Reported in FY2017>

The Kikkoman Group pays consideration to CO₂ emissions in the Distribution Divisions (consolidated subsidiary, Sobu Logistics Co., Ltd., etc.) and tries to reduce these emissions.

Conventional procurement distribution



Unified procurement and product distribution



In May 2004, distribution centers and storage facilities were rearranged to facilitate better flow lines of trucks and eliminating wasteful truck traffic. Further, the procurement and distribution of raw materials (beans, wheat, etc.) and packaging materials (plastic bottles, etc.) and the product distribution (shipping products) were integrated. The loading rate per round trip was heightened (travelling without decreasing loads), a great amount of CO₂ emissions was successfully reduced.

Trucks for product transportation



Fuel-Efficient, Low Exhaust Gas Emissions Mark



In addition, further reduction of CO₂ emissions will be sought by using fuel-efficient trucks with low gas emissions, and encouraging truck drivers to thoroughly practice ecological driving behind the wheel.

Sobu Logistics Co., Ltd. has obtained the Green Management Certificate (by the Foundation for Promoting Personal Mobility and Ecological Transportation) which is gaining interest among the transportation industry and business customers.

Preventing Global Warming

● Rail freight transportation of products



● Eco-Rail Mark



As a means to further reduce CO₂ emissions per unit of transportation, railway freight is positively used. In FY2006, Sobu Logistics Co., Ltd. received the certification of “Eco-Rail Mark Corporation” by the Railway Freight Association.

5. Approaches for Office Buildings

<Reported in FY2017>

The Office Divisions of the Kikkoman Group are strongly promoting a wide range of efforts to prevent global warming. They include controlling room temperatures for summer (28°C) and winter (20°C), encouraging staff to wear lightweight clothes in summer, reducing the use of lighting, turning lights off when not in use, strictly controlling the use of OA equipments, encouraging in-house conferences through TV, practicing ecological driving of company motorcars, and purchasing fuel-efficient motorcars and hybrid motorcars.

1) Kikkoman Noda Head Office Building (Noda City, Chiba)

The Kikkoman Noda Head Office building, completed in 1999, was designed to be an environmentally sustainable office. In keeping with the goal of maintaining harmony with the natural environment and lowering environmental loads, various advanced technological devices are employed.

The building, with its use of advanced devices, was highly evaluated by specialists, and it received the New Office Promotion Award of the Nikkei New Office Award and the 7th Architectural Culture Award of Chiba Prefecture in 2001, the Examination Committee Encouragement Prize of the 9th Environmental and Energy Saving Architecture Award by the Institute of Building Environment and Energy Conservation in 2002, the 4th Sustainable Architecture Award by the Japan Institute of Architects (JIA) in 2003 and the Special Award “Ten-Year Award” of the Society of Heating, Air-conditioning and Sanitary Engineers of Japan (SHASE) in 2011.

Preventing Global Warming

● Kikkoman Noda Head Office Building (offices)



The Noda Head Office compound has two buildings. The North Building is for offices and the South Building for conference rooms. In the rectangular-shaped Office Building stretching from east to west, office rooms are arranged on the north side to ensure stable luminance. On the south side is the entrance hall built in a wellhole style. Large windows allow the maximum use of sunshine and winds. In addition, other devices are installed to help reduce energy consumption for lighting and air-conditioning. They include the luminance control system controlled by the daylight sensor, the horizontal external louvers to control the flow of sun light into the rooms, double-glass air flow to enhance insulation, and the warm-water thermal storage (summer) and the ice thermal storage system (winter) using energy from the heat-recovery type of pump.

With these measures, the total electricity used for lighting per fine day (lighting time from 6:00 to 20:30 hours) was reduced by 42% and the perimeter annual load (PAL) was reduced by 29% as well.

Further, lamps at the lounge, entrance hall and, toilets have been replaced with LED lamps for the sake of saving electricity.

● Office Building (Open ceiling space on the south side)



● Conference room building and “Water Garden”



In the open yard between the Office Building and Conference Room Building is the “Water Garden” which has a pond for storing rain water as a way to maintain a secure water resource in case of need and to create a pleasing landscape.

Preventing Global Warming

2) Kikkoman Tokyo Head Office Building (Minato-ku, Tokyo)

● Kikkoman Tokyo Head Office Building



● “Reducing Stand-by Power Consumption” Operation



At the Kikkoman Tokyo Head Office in Minato city, Tokyo the practice of unplugging all 900 office-use computers to reduce stand-by power consumption began in FY2015. On the day before holidays, employees are reminded to be sure to unplug their computers through the in-house announcement system as a greater energy saving effect is expected on holidays. Activities by respective companies are shared at Environment Preservation Promotion Committee meetings and spread to other office divisions.

3) Kikkoman General Hospital (Noda City, Chiba)

As part of community service activities, the Kikkoman Group has been managing Kikkoman General Hospital in Noda city in Chiba prefecture, the place of foundation of the company.

The origin is that one of the founding families established a health care institution in 1862 for workers in the soy sauce brewing house and their families. Later, the founding families of Kikkoman which gathered to form the Noda Soy Sauce Brewing Union decided upon the establishment of a hospital to commemorate the enthronement of Emperor Taisho, and Noda Hospital was opened in 1914. In later years, it has been expanded as Kikkoman General Hospital to serve people in the local community.

Considering the advent of an aged society, Kikkoman General Hospital was renewed in 2012 to provide more comprehensive medical services.

● Noda Hospital when opened in 1914



● Kikkoman General Hospital (Solar panels in front)



With an earthquake resistant structure, the new hospital is designed to maintain its functional integrity even in times of disaster. Additionally, due consideration has been given to the environment through enabling full use of natural lighting, placement of solar panels at the entrance to enable power generation, efficient use of well water and implementation of energy saving equipment and instruments.

6. Carbon Footprint of Products

1) Carbon Footprint of Products

<Reported in FY2010>

Carbon Footprint of Products (CFP) is a yardstick to measure greenhouse gases (carbon dioxide CO₂, dinitrogen monoxide N₂O, perfluorocarbons PFCs, sulfur hexafluoride SF₆, methane CH₄, hydrofluorocarbons HFCs) discharged at every stage of the lifecycle of products and services including manufacturing and transporting packages and raw materials, product manufacturing, distribution, using products, and disposal and recycling. The measured figures are presented at various sales tools, such as packages, shelves at stores, catalogues and so on, to help customers choose environmentally friendly merchandise and services.

The CFP assessment is promoted in countries in Europe and North America, but International CFP Standards have not yet been formulated. In Japan, the Ministry of the Environment, the Ministry of Economy, Trade and Industry and the Ministry of Agriculture, Forestry and Fisheries have each established a Committee respectively to discuss the issue, but they are still in the stage of research.

Major developments in Japan include:

- Ministry of the Environment: Conference to Promote the Visualization of Greenhouse Gases
- Ministry of Economy, Trade and Industry: Study Group on Practical Application and Spread of the Carbon Footprint of Product Scheme (participation by Foodchemifa Co., Ltd.)
- Ministry of Agriculture, Forestry and Fisheries: Study Group on Visualizing CO₂ in the Food Industry (participation by Kikkoman Corp.)
- Society of Non-Traditional Technology: Food Study Group, the Institute of Life Cycle Assessment, Japan (commissioned by the Ministry of Economy, Trade and Industry) (participation by Kikkoman Corp.)

In these groups, the members are exchanging views, and discussing the environment for introducing the CFP scheme, and the assessment standards independently.

In the Kikkoman Group, Foodchemifa (currently Kikkoman Soyfoods) calculated the CFP of the soy milk "Oishii Muchosei Tonyu (1000ml)" using the method by the Study Group on Practical Application and Spread of the Carbon Footprint of Product Scheme and published the outcome in the "Eco Products 2008" fair. In Kikkoman, the Carbon Footprint of Product Study Group was established and assessed the CFP of the soy sauce "Kikkoman Tokusen Marudaizu Shoyu" (1 liter (L) bottle).

2) CFP of Soy Milk (1000ml)

<Refer "CFP value and display on the Soy Milk (1000 ml)," Corporate Citizenship Report 2009>

The CFP of the soy milk "Oishii Muchosei Tonyu (1000ml)" was measured according to the formula laid by the Study Group on Practical Application and Spread of the Carbon Foot Print Scheme. As a result, the total amount of CO₂ emissions was 447grams throughout the life of the soymilk from the raw materials to disposal and recycling. The breakdown by stage showed 42% from the raw materials, 33% from production process, 23% from distribution and sales, and 2% from disposal and recycling. The figure includes 110grams of total CO₂ emissions in manufacturing the paper pack (by Japan Tetra Pack).

Preventing Global Warming

● CFP of the soy milk “Oishii Muchosei Tonyu (1000ml)”



3) CFP of Soy Sauce (1 liter Bottle)

<Refer "CFP value for the Soy Sauce (1L bottle) ," Corporate Citizenship Report 2009>

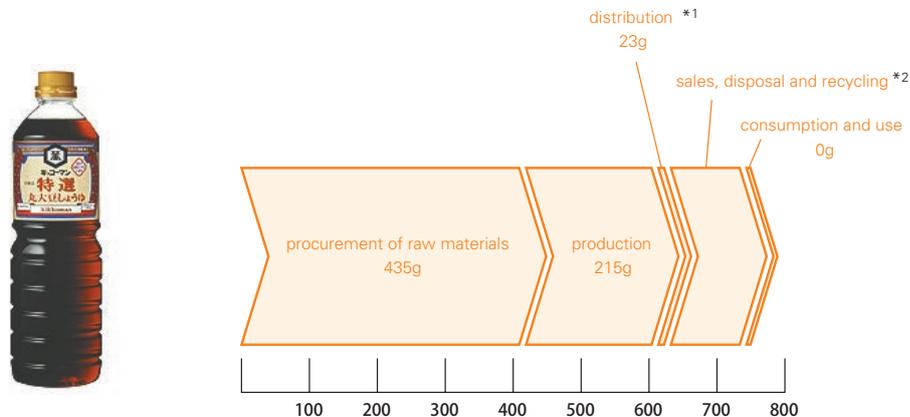
The CFP of the soy sauce “Kikkoman Tokusen Marudaizu Shoyu (1L bottle)” was calculated based on the standard designated by the Carbon Footprint of Product Study Group set up within Kikkoman.

Principles for CFP measurement at Kikkoman Corp.

- For the distribution stage, the amount of CO₂ emissions of the primary distribution stage right from the factory will be used.
- For the use stage by households, CO₂ emissions will be counted as zero, as no energy is required to use soy sauce.
- For the sales and disposal and recycling stages, CO₂ emissions will not be counted, as we must depend only on estimated amounts.

The resultant CFP figure was 673 grams for the soy sauce, “Kikkoman Tokusen Marudaizu Shoyu (1L bottle)”, 435 grams at the stage of raw material procurement, 215 grams at production, and 23 grams for distribution.

● CFP figure for the soy sauce “Kikkoman Tokusen Marudaizu Shoyu (1L bottle)”



*1 Distribution is limited to the primary distribution stage.

*2 The estimated volume for the Sales, Disposal and Recycling stage.

<Reported in FY2011>

The results were presented at the Food Research workshop by the Institute of Life Cycle Assessment, Japan held in September 2009.

<Reported in FY2012>

The results were presented at the 70th Research Presentation meeting of the Japan Soy Sauce Technology Center held in Shodo Island in June 2010, which drew attention as the first soy sauce-related CFP research.



1. Transition of Recycling Rates According to the Food Recycling Law

1) Progress of Recycling Rates

<Refer "Reducing and Recycling Waste and Byproducts," Corporate Citizenship Report 2010, website>

The Kikkoman Group adapts the priority order for recycling and recycling rates set forth in the Food Recycling Law as the criteria to determine the enhancement of recycling wastes and byproducts.

<Priority Order for Recycling>

- Suppress the generation of food waste and byproducts at each manufacturing, distribution and consumption stage.
- Reuse waste and byproducts which can be used as resources for feed and fertilizer.
- Put waste to heat recovery (burning waste and using the heat) only when they are not recyclable.
- Dehydrate and dry waste in case either reuse or heat recovery is not possible, in order to reduce the volume for proper processing.

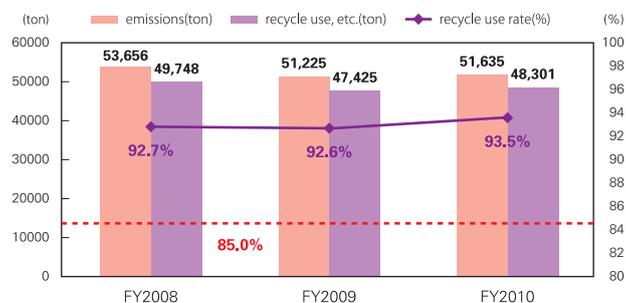
The Kikkoman Group makes effective use of food-related waste and byproducts (soy sauce cake, soy sauce oil, *okara* (soy pulp), *mirin* cake, apple residue, grape residue, seaweed extraction residue and bonito and kelp soup stock extraction residues), in particular, it is strengthening the use of wastes as feed which is given a high priority. As a result, soy sauce cake is reused almost 100% as feed, and overseas manufacturing group companies also attained 95.5% reuse of byproducts as feed.

<Recycling Rates>

A recycling rate is obtained by dividing the total volume of "controlled generation of waste and byproducts," "reuse," "heat recovery x 0.95" and "reduced waste volume" in the fiscal year by the total of "controlled generation of waste and byproducts" and "actual generation of waste and byproducts" of the fiscal year.

The recycling rates of nine manufacturing companies, Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Manns Wine Co., Ltd., Foodchemifa Co., Ltd., and Takara Shoyu Co., Ltd. are shown in the chart below. The rates are well over the target of 85% as designated for the food manufacturing industry in the Food Recycling Law.

● Transition of recycling rates according to the Food Recycling Law



2) Recycling Rates by Major Domestic and Overseas Manufacturing Companies

【FY2011】

<Refer "Reducing and Recycling Waste and Byproducts" in Corporate Citizenship Report 2012, website>

The Kikkoman Group added a new goal for the reuse and recycle of waste and byproducts in the Medium- and Long-term Environmental Preservation Goals set forth in FY2011. The goal is "to increase the recycling rate at manufacturing companies in Japan and major overseas manufacturing companies by at least 99% by FY2015."

The target companies: 10 domestic manufacturing companies (Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp., Tohoku Del Monte Corp., Manns Wine Co., Ltd., Foodchemifa Co., Ltd., and Takara Shoyu Co., Ltd.) and 3 major overseas manufacturing companies (KFI, KSP, KFE).

The recycling rate in FY2011 was 95.6%.



Reducing and Recycling Waste and Byproducts

【FY2012】

<Refer “Reducing and Recycling Waste and Byproducts” in Corporate Citizenship Report 2012, website>

In FY2012, the recycling rate of domestic and major overseas manufacturing companies reached 97.9%.

*In FY2012, the Fukushima Factory of Nippon Del Monte Corp. and Tohoku Del Monte Corp. consolidated their business, therefore, these two companies were excluded from the target companies. Foodchemifa Co., Ltd. was separated into Kikkoman Biochemifa and Kikkoman Soyfoods. As a result, the number of target companies remained 13.

The target companies: 10 domestic manufacturing companies (Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Nippon Del Monte Corp. (except for Fukushima Factory), Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.) and 3 major overseas manufacturing companies (KFI, KSP, KFE).

In the Kikkoman Group, effective use of food-related waste, sludge, post-cleaning residue, waste plastics and other waste and byproducts is sought. In FY2012 high priority was placed on the recycle/reuse of food-related waste and byproducts (soy sauce cake, soy sauce oil, *okara* (soy pulp), *mirin* cake, apple residue, grape residue, seaweed extraction residue, and bonito and kelp soup stock extraction residues). These were effectively used to manufacture animal feed. The quality of recycling was enhanced in accordance to the Food Recycling Law.

【FY2013】

<Refer “Reducing and Recycling Waste and Byproducts” in Corporate Citizenship Report 2013, website>

In FY2013, the recycling rate of domestic and major overseas manufacturing companies reached 98.9%, which was enhanced by an increase of 1.0% from 97.9% of the previous year. A significant contribution for this improvement was made by the recycling of sludge at the Kamogawa Plant of Kikkoman Biochemifa Co. In order to achieve the goal of 99% in FY2015, we will make further efforts to increase recycling of waste and byproducts.

*Saitama Kikkoman Co., which began full operation in FY2013, was added as a target company.

The target companies: 11 domestic manufacturing companies (Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (except for Fukushima Factory), Manns Wine Co., Ltd., Kikkoman Biochemifa Co., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.) and 3 major overseas manufacturing companies (KFI, KSP and KFE).

【FY2014】

<Refer “Improve the recycling rate,” and “Improve methods of recycling waste and byproducts,” Corporate Citizenship Report 2014, detailed edition (web edition)>

In FY2014, the overall recycling rate by manufacturing companies in Japan and major overseas manufacturing companies was 99.3%, an increase by 0.4% over that of FY2013 at 98.9%. The goal “to recycle more than 99% by FY2015,” set in the “Medium- and Long-term Environmental Preservation Goals,” was achieved. In FY2014, efforts to make effective use of food-related wastes (soy sauce cake, soy sauce oil, *okara*, *mirin* cake, apple residue, grape residue and bonito and kelp soup stock extraction residues) continued.

【FY2015】

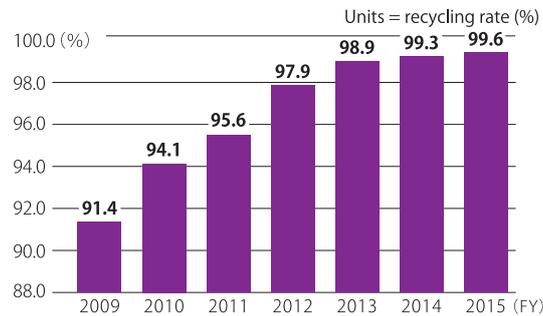
<Refer “Improve the recycling rate,” and “Improve methods of recycling waste and byproducts,” Corporate Citizenship Report 2015, detailed edition (web edition)>

In FY2015, the overall recycling rate by manufacturing companies in Japan and major overseas manufacturing companies was 99.6%, an increase by 0.3% over that of the previous fiscal year with 99.3%. The goal “to recycle more than 99% by FY2015,” set in the “Medium- and Long-term Environmental Preservation Goals,” was achieved. In FY2015, continuous efforts to make effective use of food-related wastes (soy sauce cake, soy sauce oil, *okara*, *mirin* cake, apple residue, grape residue and bonito and kelp soup stock extraction residues) were made.



Reducing and Recycling Waste and Byproducts

● Transition of recycling rate of waste and byproducts (Manufacturing companies in Japan and major overseas manufacturing companies)



(note) Recycling rates for FY2009-2010 are recalculated based on the calculation formula and the data by the target companies (domestic and major overseas manufacturing companies) used to evaluate the level of achieving the goal as set in the Medium- and Long-term Environmental Preservation Goals designated in FY2011.

2. Transition of the Waste Generation per Unit of Production

[FY2016]

<Reported in FY2017>

The Kikkoman Group set forth a objective "Increase the recycling rate at domestic and major overseas manufacturing companies by at least 99% by FY2015" in line with the reuse and recycle of waste and byproducts in the Medium- and Long-term Environmental Preservation Goals FY2013-2015.

In FY2015, the recycling rate by domestic and major overseas manufacturing companies reached 99.6%, and the goal was achieved. Upon its success, the Kikkoman Group decided upon a new objective regarding the reduction of waste generation per unit of production in its Medium-term Environmental Preservation Goals FY2016-2018, and efforts to achieve the objective were started.

[Objectives in the Medium-term Environmental Preservation Goals FY2016-2018]

(1) To keep the waste generation per unit of production at the domestic and major overseas manufacturing divisions comparing with the level of the previous fiscal year or below.

The target divisions: 19 plants of domestic manufacturing companies (Kikkoman Food Products Co., (Noda Factory, Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co. (Main Plant, Nakanodai Plant and Nishinippon Plant), Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)) and 4 plants of major overseas manufacturing companies (Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V. (KFE))

(2) To keep the waste generation at the domestic sales and back-office division comparing with the level of the previous fiscal year or below.

The target divisions: Domestic sales and back-office divisions: Kikkoman Corp., Kikkoman Food Products Co., Kikkoman Beverage Co., Kikkoman Business Service Co., Nippon Del Monte Agri Co. and Kikkoman Daily Co.

*Definition of waste: Waste and byproducts which are collected, transported and disposed of by outside companies for compensation. The following items are not included in waste;

- 1) Processed as a product within the Group (ex. soy sauce cake for feed)
- 2) Consumed within the Group (ex. soy sauce oil as fuel)
- 3) Sold to treatment companies outside the Group (ex. scrap metal)
- 4) Collected for free of charge (ex. waste paper)



Reducing and Recycling Waste and Byproducts

*Calculation of waste generation per unit of production: In order to accurately understand the relations between manufacturing activities and waste generation, and to promote waste reduction, the weights of containers and packaging are excluded when calculating waste per unit of production.

The waste generation per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2016 was 0.0335t/t, which was increased by 4.4% as compared with FY2015 (0.0321t/t). We could not achieve the objective.

The waste generation at Kikkoman Group domestic sales and back-office divisions in FY2016 were 330 tons, which was increased by 3.1% as compared with FY2015 (320 tons). We could not achieve the objective.

【FY2017】

<Reported in FY2019>

The waste generation per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2017 was 0.0366t/t, which was increased by 9.3% as compared with FY2016 (0.0335t/t). We could not achieve the objective.

The waste generation at Kikkoman Group domestic sales and back-office divisions in FY2017 were 350 tons, which was increased by 6.1% as compared with FY2016 (330 tons). We could not achieve the objective.

*Kikkoman Beverage Co. merged Kikkoman Daily Co. on April 1, 2016.

The target divisions: Domestic sales and back-office divisions: Kikkoman Corp., Kikkoman Food Products Co., Kikkoman Beverage Co., Kikkoman Business Service Co. and Nippon Del Monte Agri Co.

【FY2018】

<Reported in FY2019>

The waste generation per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2018 was 0.0375t/t, which was increased by 2.5% as compared with FY2017 (0.0366t/t). We could not achieve the objective.

*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

The target divisions: 19 plants of domestic manufacturing companies (Kikkoman Food Products Co. (Noda Factory and Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Kikkoman Foodtech Co. (Main Plant, Nakanodai Plant, Edogawa Plant and Nishinippon Plant), Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)) and 4 plants of major overseas manufacturing companies (Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V. (KFE))

The waste generation at Kikkoman Group domestic sales and back-office divisions in FY2018 were 330 tons, which was decreased by 5.7% as compared with FY2017 (350 tons). The objective was achieved in these divisions.

3. Use of Soy Sauce Cake

<Reported in FY2017>

“Soy sauce cake” is the byproduct remaining after pressing out raw soy sauce from *moromi*.

Soy sauce cake has been used as fuel, fertilizer, and animal feed. At Kikkoman Corp., Soy sauce cake was used as fuel for boilers at the factory. However, beginning in 2004, research on its usefulness as feed began and the dryer for Soy sauce cake was installed in the factory in 2006 followed by the introduction of packaging equipment in 2007. In the meanwhile, the sales channels for animal feed were explored and expanded. Soy sauce cake contains fat from soybeans, Vitamin E, Vitamin K1, isoflavones (genistein, daidzein, glycitein) and other functional ingredients which are good to feed cattle, pigs and poultry. Kikkoman Food Products Co. offers almost all of soy sauce cake produced from the soy sauce manufacturing process to livestock farmers through feed manufacturing companies.

- “Kikkoman Fresh Meal” livestock feed made of soy sauce cake



- Cows eating feed made of soy sauce cake



In 2000, Kikkoman collaborated with a paper manufacturing company to develop technology to mix Soy sauce cake with non-wood paper pulp to produce paper products (writing paper, business cards, letter pads, envelopes, etc.). Now, these paper products are used as office supplies.

- Paper mixed with soy sauce cake (writing pad, envelopes, etc.)



4. Use of Soy Sauce Oil

<Reported in FY2017>

A great amount of oil from soybeans (soy sauce oil) is contained in raw soy sauce immediately after pressing. When it is stored in a clean tank, the oil comes floating to the upper part of the soy sauce tank forming an oil layer. This soy sauce oil had been used as fuel (lamp oil in the Edo era), a material for soap, and machine oil.

● Boiler driven specifically by soy sauce oil



Kikkoman Food Products Co. has reduced its consumption of fossil fuel since 1994 by using most of the soy sauce oil generated in the soy sauce manufacturing process as carbon-neutral fuel, leading to the reduction of fossil fuel consumption.

5. Use of Okara

<Reported in FY2017>

Kikkoman Soyfoods Co. manufactures and sells soymilk products such as "Chosei Tonyu" and "Oishii Muchosei Tonyu." Soymilk is produced by steaming, crushing and pressing soybeans. The residue that remains after pressing is "Okara."

● Raw food material "Okara Powder"



Kikkoman Soyfoods Co., dries the byproduct of *okara* to make "Okara Powder", and sells the product as raw materials for processed food, feed and fertilizer.

III Reducing and Recycling Waste and Byproducts

6. Use of Seaweed Residue

<Reported in FY2015>

The Kamogawa Plant of Kikkoman Biochemifa Co. manufactures alginic acid from seaweed. Seaweed extractive residue is a byproduct from the manufacturing process of alginic acid and contains a filter aid (diatomaceous earth) which is used in the process.

● Extracted seaweed residue being fermented



● Organic fertilizer and soil improvement agents made from extracted seaweed residue



Making use of its properties, rice bran, soybean dregs and wood ash are mixed with the extracted seaweed residue and then the mix is fermented to merchandise as organic fertilizer and a soil improvement agent.

7. Use of Wastewater Sludge Residue

<Reported in FY2017>

The Kikkoman Group pays full attention to the prevention of the pollution of rivers by purifying and processing wastewater discharged from factories in the wastewater treatment facilities within the factories before the wastewater is released into them. A muddy sediment and supernatant generated in the wastewater processing facilities are "sludge."

● Fermented fertilizer made from sludge.



Noda Factory of Kikkoman Food Products Co., and Nagareyama Kikkoman Co., Ltd. put all the sludge (100%) from their wastewater treatment facilities into the hands of treatment contractors to process it as fermented fertilizer. The fertilizer is offered to farmers growing Japanese mustard spinach and strawberries.

III Reducing and Recycling Waste and Byproducts

- Japanese mustard spinach (left) and strawberries (right) grown with fertilizer from fermented sludge (2015, Ibaraki prefecture).



Fertilizer made from fermented sludge and other ingredients contains great amounts of nitrogen and phosphorus which are helpful in growing these produce.

Some part of wastewater sludge from the Kamogawa Plant of Kikkoman Biochemifa Co. is heat-compressed into slag to be processed for a base course material and other road maintenance agents.

8. Research & Development to Make Use of High-Quality Byproducts

<Reported in FY2017>

The Kikkoman Group considers it important to upgrade the quality of reusing byproducts, and conducts R&D activities to that end. One example is an R&D study on the use of soy sauce oil as fish feed. The Kikkoman R&D Division discovered the effectiveness of Soy sauce oil consisting of fatty acid ethyl ester (appx. 59%) with linoleic acid and oleic acid from soybeans and free fatty acids (15%) as a substitute for conventional fish feed made of sardine oil. The R&D Division also found other functions such as antioxidant activity and antibacterial activity against fish disease bacteria. This study on the development of new uses of the byproducts was evaluated by specialists, and the Kikkoman R&D Division received the Award by the Director of the Industrial Science and Technology and Environment Bureau, the Ministry of Economy, Trade and Industry for FY2004.

- Use of feed at a fish pond

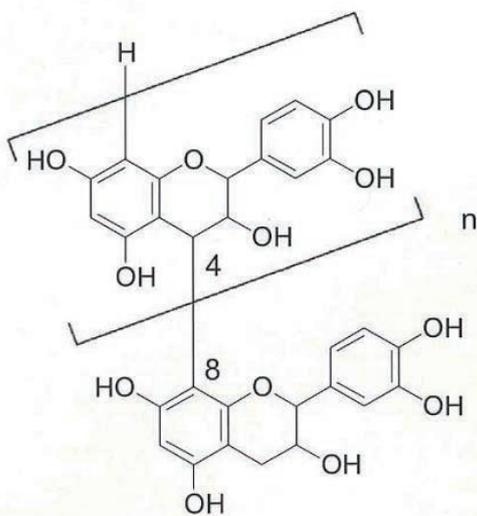


Reducing and Recycling Waste and Byproducts

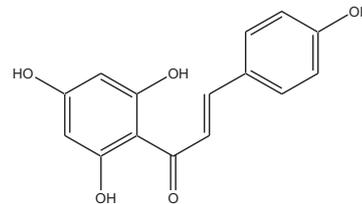
Grape seeds discharged from the winery at Manns Wine Co., Ltd. had been used as fertilizer. But the joint research group of Kikkoman and Manns Wine found that the polyphenols (proanthocyanidins) contained in grape seeds had strong antioxidant action, and developed a unique method to efficiently extract this ingredient. The result was highly evaluated among specialists, and was given the Award for Achievement in Technological Research by the Japan Society for Bioscience, Biotechnology and Agrochemistry in FY2000.

Tomato peel removed in the process of making tomato juice at the Nagano Plant of Nippon Del Monte Corp. had been reused by treatment contractors as animal feed. Kikkoman found through an R&D study with the Mibyo Medical Research Center that the tomato peel containing polyphenol (naringenin chalcone) had a strong anti-allergy action helpful to mitigate the symptoms of pollen allergy.

● proanthocyanidins (grape seed polyphenols)



● naringenin chalcone (tomato peel polyphenol)



IV Improving Containers and Packaging

1. Kikkoman's Guidelines for Containers and Packaging, and the Containers and Packaging Committee

<Reported in FY2017>

In March 2008, the Kikkoman Group stipulated the "Kikkoman's Guidelines for Containers and Packaging" to clarify the Group's attitude toward enhancing convenience and safety for customers, and reducing impact on the environment by reducing container and package weight, and recycling.

Kikkoman's Guidelines for Containers and Packaging

The Kikkoman Group will procure, develop, and merchandise containers and packaging with low environmental impact that are suitable for production, transportation, storage, and sales, and which are also safe and easy for consumers to use.

1. Reduce weight of containers and packaging.
2. Introduce and use returnable containers and packaging for our products.
3. Consider applying shapes, designs, and materials to containers and packaging that facilitate sorted collection and reuse. Promote repackaging current products in new containers and packaging in compliance with the relevant laws and regulations of each country.
4. Make greater use of sustainable resources.
5. Increase procurement from environmentally conscious suppliers and vendors.
6. Use materials with chemical compositions and shapes that have been verified as safe for humans.
7. Collect customer feedback and information regarding where and how they purchase and use our products and incorporate it into the development of new containers and packaging. Strive to develop new containers and packaging.
8. Develop containers and packaging with universal designs to make them easy to use for a diverse range of customers.

The Containers and Packaging Committee chaired by the Corporate Executive Officer, and consisting of members from related divisions such as production, equipment, distribution, development, procurement and environment, solves various problems relevant to containers and packaging from the environmental aspect.

2. Containers and Packaging for Soy Sauce

<Reported in FY2017>

Soy sauce is a seasoning which has been used from olden times. It is not known exactly when it began to be used, but in the Taiho Code (701), the law in the Asuka period (550-710), there is a description that there was a division in the Imperial Palace responsible for the production and management of *hishio*, which is considered as a predecessor of soy sauce. Looking back upon the long history of the containers and packaging of soy sauce, we can learn that a great deal of inventiveness and various environmental considerations have been involved in their development.

IV Improving Containers and Packaging

- Ceramic bottles called “comprador bottles” (owned by the Kikkoman Institute for International Food Culture)



- Wooden barrel (owned by the Kikkoman Institute for International Food Culture)



Pottery and ceramic containers such as wide-mouth jars, small-mouth pots, and bottles had been used from the long past, and cedar wooden barrels began to be used in the early Edo period (1603-1868) when soy sauce was mass produced at major production sites and transported to many places across the country. These containers were returnable and cleaned for reuse.

In those days, there were relevant occupations such as brokers and rental traders of vacant containers (earthenware and barrels). In addition, there were craftsmen who mended broken earthenware using rice flour and clay, and who dismantled large barrels to reshape them as smaller barrels. They played a due role to promote the recycling of containers.

1) Glass

In the Meiji period (1868-1912), glass bottles were imported from Europe, and in the middle of Taisho period (1912-1926), they came to be used normally as soy sauce containers.

Glass bottles made of silica sand, lime and soda ash, like earthenware and wooden barrels, were returnable containers which could be cleaned and reused. Cullet can be melted for recycling. Therefore, glass containers are favorable for the sake of the environment. In addition, glass bottles are superior in keeping the contents as they are chemically stable and able to shut off the external air completely. However, they have the disadvantages of being heavy and breakable.

- Glass bottles in the past



- 1.8 liter(L) glass bottles of Kikkoman soy sauces at present



IV Improving Containers and Packaging

Since introducing glass bottles in 1918, Kikkoman still uses glass bottles partially for business use and processing use while improving the strength and lightening the weight.

2) Plastics (PET containers, etc.)

Today, polyethylene terephthalate (PET) bottles are used as the mainstream containers for soy sauce and other products. PET has advantageous properties including strong oxygen insulation, resistance to physical shock (hard to break), and transparency. Kikkoman Corp. adopted PET for soy sauce bottles in February 1977. It was the first time for PET bottles to be used in the food industry in Japan.

After the adoption of PET bottles, Kikkoman Corp. has been improving PET containers in cooperation with the plastic molding company to make thinner sheet (to reduce material use and weight), to enhance the strength and quality sustaining capability, and recyclability.

● Soy sauce PET bottle “500ml Man Pack” developed in 1977



● 1L and 750 ml PET bottles for Kikkoman Soy Sauces at present



The 1.8L Handy PET bottles are used for “Kikkoman Soy Sauce” manufactured by Kikkoman Food Products Co. In 2000, the material used for the handle was changed to the same PET as the body for the convenience of recycling. In 2009, the weight of the handle was reduced by 4g (from 14g to 10g). Further in FY2015, the weight of one whole bottle was reduced by 4g (from 72g to 68g) by thinning its thickness without affecting the strength.

● 1.8L Handy PET bottles for Kikkoman Soy Sauces



IV Improving Containers and Packaging

<Reported in FY2019>

In FY2016-2017, the weight of the 500ml PET bottles used for “Kikkoman Less Sodium Soy Sauce” was reduced by 3g (from 24g to 21g) by thinning its thickness.

● 500ml PET bottles for Kikkoman Less Sodium Soy Sauce



<Reported in FY2017>

Used PET bottles from households are collected, in principle, by the local governments to be sold to recycling contractors. They are treated as pellets and flakes which are to be reused for containers (egg packs), clothes, stationery and other products. Kikkoman Group devotes effort to making non-PET caps and labels easily removable to facilitate recycling and reuse.

● Previous Eco-Cap®



● Current Eco-Cap®



For example, in 1999, the Eco-Cap® (registered trademark No. 4319133) was developed and put into use. The inner stop of the Eco-Cap was improved to make it easily removable. Later, functionality has been pursued to make “easier to use” containers and “easier to remove” container parts. In 2002 and 2008, the forms and specifications of caps were changed. In 2000, the glue for the product label was changed to help consumers remove it more easily.

IV Improving Containers and Packaging

<Reported in FY2019>

The soft plastic tabletop bottle, named "Ywaraka Mippu Bottle," is considered as a next-generation container. The bottle has the special function to keep the color, taste, scent of the soy sauce fresh at room temperature for 90 days after opening and to be able to pour soy sauce freely from one drop to necessary amounts. The weight of the bottle is 33g, which is much lighter than the conventional glass tabletop bottle (159g). In August 2011, the Kikkoman Group has released a raw soy sauce product named "Itsudemo-Shinsen Shiboritae Nama-shoyu" using this bottle in Japan.

In addition, the following improvements were added to the bottle in FY2018.

(1)The main material of the new bottle was changed from polyethylene to polyethylene terephthalate.

(2)A product label and a cap which can be removed easily were adopted in the new bottle, for recycling purpose.

(3)The weight of the new bottle became 10% lighter.

With these improvements, the new bottle that was named "Mippu Eco Bottle" also has a high recycling function. From February 2018, the new products using this bottle were introduced.

- The product bottled in a plastic tabletop bottle, named "Ywaraka Mippu Bottle"



- The products bottled in a new bottle, named "Mippu Eco Bottle"



3. Efforts by Nippon Del Monte Corp. for its Product Containers and Packaging

<Reported in FY2017>

Nippon Del Monte Corp. has been making efforts to lighten the containers, reduce the use of materials, and enhance recyclability for its products such as seasoning, drinks, and canned cooking ingredients. For this purpose, the company has attempted, in cooperation with container manufacturers, to thin the thickness of PET bottles and glass bottles to lower material use and weights, and to use Tetra Recart boxes (2007) in place of cans for cooking ingredients.

● Cooking ingredients in paper containers (Tetra Recart) : Tomato (left) and Corn (right)



In FY2014, Nippon Del Monte Corp. reduced the use of glass for its 800ml apple juice bottles by 58g per bottle by thinning the thickness of glass without sacrificing its strength. As a result, the weight of a bottle was reduced from 410g to 352g. In FY2015, the weight of a 900g PET bottle for tomato juice and vegetable juice was lightened by about 16%.

● Assorted apple juice set (glass bottles)



● Tomato juice and vegetable juice (900g PET bottles)



IV Improving Containers and Packaging

<Reported in FY2019>

In FY2017, the weight of the 1kg and 800g bottles used for “Del Monte Tomato Ketchup” was reduced by 1g (1kg bottles: from 34.5g to 33.5g, 800g bottles: from 28.4g to 27.4g) by thinning its thickness, and the weight of the hinge caps was reduced by 2.2g (from 6.5g to 4.3g).

● Del Monte Tomato Ketchup (1kg and 800g bottles)



4. Efforts by Manns Wine Co., Ltd. for its Product Containers and Packaging

<Reported in FY2017>

Manns Wine Co., Ltd. has continued their efforts to reduce the weights of containers and the volume of materials used for containers, and to enhance recyclability. For example, in cooperation with container manufacturers, the company thinned the thickness of the standard glass bottle (720ml) (2003), developed and used aluminum cans only for wine (2012) and PET bottles (2012).

● Wines in aluminum cans (300ml)



● Wines in PET bottles (720ml)



In FY2014, Manns Wine Co., Ltd. launched a new style of package for wine, a product that is brewed all year round. The launch was specifically for two kinds of “Japanese Wine” (brewed only with grapes grown in Japan) using PET bottles produced without antioxidants for the first time in the industry in Japan. The PET is specially made with elements to maintain the quality of the wine which is carefully brewed using only “Muscat Bailey A” and “Koshu,” grapes grown in Yamanashi prefecture which are registered with the International Organization of Vine and Wine (OIV).

In August 2014, sparkling wine (280ml) in a specially prepared can was launched nationally, the first of its kind in the Japanese wine industry. When the specially formulated can was filled with gorgeous tasting Chilean sparkling wine containing more than 3 barometric-pressure carbonic acid gas, the can retained its original shape and was not damaged.

While ensuring that both PET-bottled wine and canned sparkling wine are of equal quality to conventional glass-bottled products, they are lighter in weight, and can reduce CO₂ emissions during transportation. There are added benefits such as being more durable and not as easily breakable as glass bottles, light and easy to carry, making them good for picnics, and easy to recycle.

● Japanese Wines in PET bottles (720ml)



● Sparkling wines in cans (280ml)



5. Partnership and Collaboration with Related Organizations

<Reported in FY2017>

The Kikkoman Corp. is a corporate member of the Council for PET Bottle Recycling, Glass Bottle 3R Promotion Association, PET Bottle Committee of the Japan Containers and Packaging Recycling Association, and Liaison Council for Liquor PET Bottle Recycling. Through membership in these organizations, Kikkoman Corp. is promoting the recycling of containers and packaging.

In 2005, eight local governments in the Kanto area, namely, Saitama prefecture, Chiba prefecture, Tokyo Metropolitan, Kanagawa prefecture, Yokohama city, Kawasaki city, Chiba city, and Saitama city (later, Sagami-hara city joined) announced the "Slim down Container and Package Declaration" to simplify containers and packaging to reduce the amount of waste. Kikkoman Corp. participated in the movement from the beginning, and has continued activities under the mottoes "to use environmentally friendly packaging materials," "to examine ways to lighten the weights of containers and packaging, and to use materials to make waste sorting easier." Currently, the results of these efforts are reported every year on its website (only in Japanese).



1. Transition of the Amount of Water Consumption and Water Consumption per Unit of Production

1) FY2012-FY2015

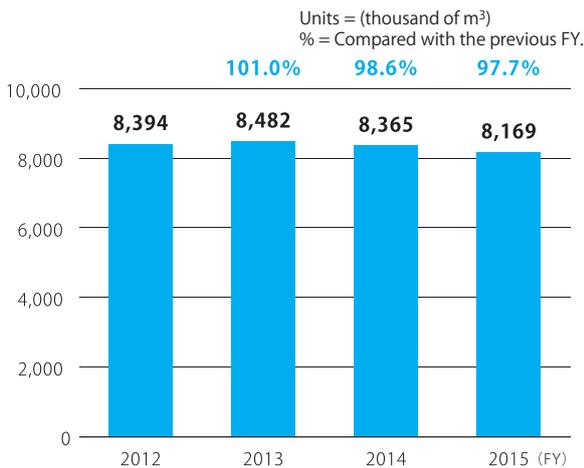
<Refer “Reduce Water Consumption” in Corporate Citizenship Report, detailed (web) edition>

At the manufacturing sectors (plants) of the Kikkoman Group, the amounts of water consumption for manufacturing are measured to control the water consumption and water consumption per unit of production. In addition, the Group is making efforts for efficient reduction of water consumption by reviewing the current manufacturing processes and adopting efficient water consumption measures.

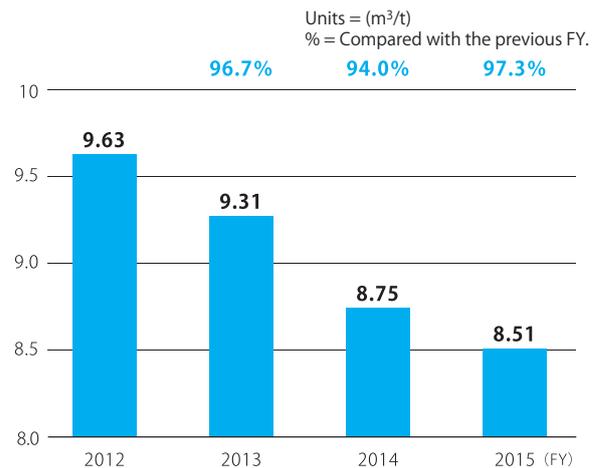
The target companies: 11 domestic manufacturing companies (Kikkoman Food Products Co., Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co., Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp., Manns Wine Co., Ltd., Foodchemifa Co., Ltd., Kikkoman Soyfoods Co. and Takara Shoyu Co., Ltd.), and 3 major overseas manufacturing companies (KFI, KSP, KFE)

In FY2015, the water consumption was reduced by 2.3% from the level of the previous fiscal year. A reduction of 2.7% in water consumption per unit of production from the previous fiscal year was also achieved.

● Transition of water consumption (Domestic and major overseas manufacturing companies)



● Transition of water consumption per unit of production (Domestic and major overseas manufacturing companies)



2) FY2016-FY2018

[FY2016]

<Reported in FY2017>

The Kikkoman Group set forth a new objective to reduce water consumption in the Medium-term Environmental Preservation Goals FY2016-2018, and began activities to reduce water consumption.

[Objective in the Medium-term Environmental Preservation Goals FY2016-2018]

(1) To keep the water consumption per unit of production at the domestic and major overseas manufacturing with the level of the previous fiscal year or below.

*The targets were changed from “domestic and major overseas manufacturing companies” to “domestic and major overseas manufacturing divisions (plants)”.

The target divisions: 19 plants of domestic manufacturing companies (Kikkoman Food Products Co. (Noda Factory, Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Heisei Foods Co.(Main Plant, Nakanodai Plant and Nishinippon Plant), Edogawa Foods Co., Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods

V Preserving the Water Environment

Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)) and 4 factories of major overseas manufacturing companies (Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V. (KFE))

*Change in calculating water consumption per unit of production

The weights of containers and packaging had been included in the amounts of production (tons) until FY2015. From FY2016, the weights of containers and packaging were excluded. With this, the relations between production activities and water consumption became clear, and efficiency in water consumption was enhanced.

The water consumption per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2016 was 8.22m³/t, which was decreased by 9.0% as compared with FY2015 (9.03m³/t), calculated with the new definition, by reviewing the current manufacturing processes and adopting new measures and the objective was achieved.

[FY2017]

<Reported in FY2019>

The water consumption per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2017 was 8.24m³/t, which was increased by 0.2% as compared with FY2016 (8.22m³/t). We could not achieve the objective.

[FY2018]

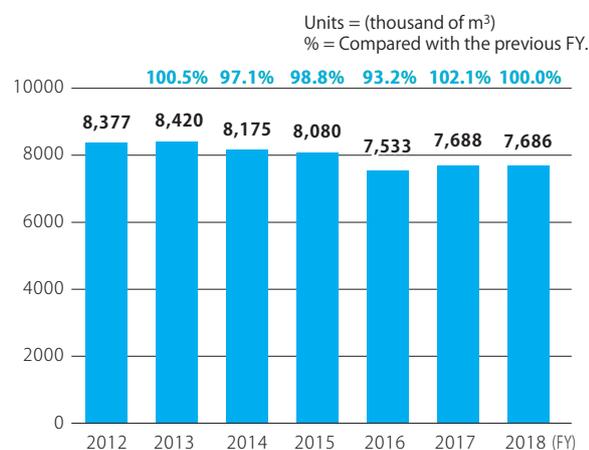
<Reported in FY2019>

The water consumption per unit of production at Kikkoman Group domestic and major overseas manufacturing divisions in FY2018 was 8.00m³/t, which was decreased by 2.9% as compared with FY2017 (8.24m³/t). The objective was achieved in these divisions.

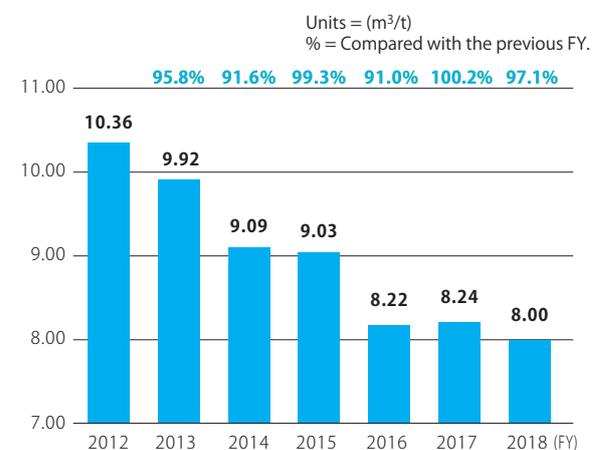
*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

The target divisions: 19 plants of domestic manufacturing companies (Kikkoman Food Products Co. (Noda Factory and Takasago Factory), Hokkaido Kikkoman Co., Nagareyama Kikkoman Co., Ltd., Kikkoman Foodtech Co. (Main Plant, Nakanodai Plant, Edogawa Plant and Nishinippon Plant), Saitama Kikkoman Co., Nippon Del Monte Corp. (Gunma Plant and Nagano Plant), Manns Wine Co., Ltd. (Katsunuma Winery and Komoro Winery), Kikkoman Biochemifa Co. (Edogawa Plant and Kamogawa Plant), Kikkoman Soyfoods Co. (Saitama Plant, Gifu Plant and Ibaraki Plant) and Takara Shoyu Co., Ltd. (Choshi Plant)) and 4 plants of major overseas manufacturing companies (Wisconsin and California Plants of Kikkoman Foods, Inc. (KFI), Plant of Kikkoman (S) Pte. Ltd. (KSP) and Plant of Kikkoman Foods Europe B.V. (KFE))

● Transition of water consumption (Domestic and major overseas manufacturing divisions)



● Transition of water consumption per unit of production (Domestic and major overseas manufacturing divisions)



2. Approaches Taken by Plants

<Reported in FY2017>

Hokkaido Kikkoman Co. (Chitose city, Hokkaido) has fully reused the clean water used for cooling in the manufacturing process of soy sauce and other products to cleanse equipment and others in the plant as a means to reduce water consumption per unit of production.

● Wines for cooking and food processing: 1.8L PET Bottles (left) and 10L Bag-in-Box (BIB) (right)



Katsunuma Winery of Manns Wine Co., Ltd. (Koshu city, Yamanashi prefecture) stopped using centrifugal separation to remove any dregs (yeast and tartar) remaining after brewing wine. This resulted in controlling the deterioration of wine through oxidation and at the same time in reducing water consumption (appx. 3,000kl) for centrifugal separation as well as CO₂ emissions (appx. 10t-CO₂) by ending electricity consumption for separation.

<Reported in FY2019>

● Brewery equipment (Katsunuma Winery, Manns Wine Co.,Ltd.)



● Wine filling equipment (Katsunuma Winery, Manns Wine Co., Ltd.)



In FY2017, Katsunuma Winery of Manns Wine Co., Ltd. succeeded in reducing water consumption (appx. 57m³) by improving the method of cleaning wine filling equipment. Gunma Plant of Nippon Del Monte Corp. succeeded in reducing water consumption (appx. 2,500m³) by improving the method of cleaning the containers for shipping ketchup. As a result, the amount of fuel (heavy fuel oil A) used to heat the wash water was reduced.

● Wastewater treatment facility (Edogawa Plant, Kikkoman Biochemifa Co.)



● Sludge dewatering equipment (Edogawa Plant, Kikkoman Biochemifa Co.)



The Edogawa Plant of Kikkoman Biochemifa Co. pays full attention to preserve the water environment by processing wastewater discharged from its plant in the wastewater treatment facility. Because the quality of the processed water became very high, the Edogawa Plant began using the water for washing sludge dewatering equipment in FY2017. The water consumption of the plant was reduced by appx. 850m³ per year.

3. Approaches to Preserve the Water Environment

<Reported in FY2017>

Being fully aware of the importance of preserving the water environment, the Kikkoman Group has established new water quality standards that are more stringent than the current legal standards to apply to the water discharged from manufacturing activities such as Biochemical oxygen demand (BOD). Through reviewing the manufacturing processes and equipment being used, and applying efficient measures, the Group makes efforts to preserve the water environment of manufacturing sectors (factories and plants) and their vicinities.

The Kikkoman Group set forth a goal in the Medium-term Environmental Preservation Goals FY2016-2018, to improve the quality of water discharged and began activities in FY2016 to achieve the goal.

【Objective in the Medium-term Environmental Preservation Goals FY2016-2018】

(1) To reduce wastewater BOD to less than 10mg/L, or COD to less than 8mg/L at domestic river discharge areas.

【FY2016】

In FY2016, among 14 domestic manufacturing divisions (plants) in the Kikkoman Group, 10 plants which discharge wastewater to river discharge areas after treating the water at their wastewater treatment facilities, their purifying capabilities were upgraded. In total, 8 plants succeeded in lowering BOD to 10mg/L or COD to 8mg/L. In the 2 plants which failed to achieve the objective, the quality of discharged water was lower than the legal standards (restriction values).

【FY2017】

<Reported in FY2019>

In total, 8 plants succeeded in lowering BOD to 10mg/L or COD to 8mg/L. In the other 2 plants which failed to achieve the objective, the quality of discharged water was lower than the legal standards (restriction values).

[FY2018]

<Reported in FY2019>

In total, 9 plants succeeded in lowering BOD to 10mg/L or COD to 8mg/L. In another plant which failed to achieve the objective, the quality of discharged water was lower than the legal standards (restriction values).

The wastewater treatment facility in the Second Production Department of Noda Factory of Kikkoman Food Products Co. improved its wastewater processing by installing an ozone reactor in October 2013 to further purify the treated water before discharging into the river.

● Ozone Generator (Second Production Department, Noda Factory, Kikkoman Food Products Co.)



● Ozone wastewater treatment equipment (Second Production Department, Noda Factory, Kikkoman Food Products Co.)



In March 2015, a pressure floatation separation apparatus was installed at the First Production Department of Noda Factory of Kikkoman Food Products Co.

Since soy sauce is manufactured in the First Production Department, the wastewater from the manufacturing process contains oil from soybeans causing a great burden on the wastewater treatment facility. By reducing the inflow of oil to the wastewater treatment facility through the pressure floatation separation apparatus, the load on the treatment facility was lightened. At the same time, the aeration blower of the wastewater treatment facility was renovated to promote energy-saving in wastewater treatment.

4. Supporting Activities to Mitigate Water Stress

<Reported in FY2017>

The Kikkoman Group has manufacturing bases in regions where water stress* has become a significant social issue, such as the US, the Netherlands and Singapore. At these manufacturing bases, we support water environment preservation activities that are conducted by local governments and NGOs in order to contribute to solving issues.

*Water stress: Situation when water demand exceeds the amount of water available at certain periods of time or when use of water is limited as a result of water quality.

For example, KSP in Singapore supports the Kingfisher Lake construction project, and KFE in the Netherlands supports the water quality improvement project of Zuidlaardermeer Lake in Groningen state. (refer VIII. Preserving Natural Environment).

5. Dialogues with Suppliers

<Reported in FY2017>

In North America where water stress is observed, the Kikkoman Group procures great amounts of soybeans and wheat, the raw materials for soy sauce, and the Kikkoman Group has dialogues with the big suppliers on the protection and improvement of the water environment.

6. Participation in the CEO Water Mandate

<Reported in FY2017>

The Kikkoman Group signed the CEO Water Mandate, an initiative under the United Nations Global Compact.

This CEO Water Mandate is a framework for signatory corporations to work together to promote efforts to reduce climate risk and to solve various issues, aimed at alleviating problems in sustainable water use caused by climate change.

The Kikkoman Group will put the Group's environmental philosophy into practice through being involved in the initiatives working to preserve water resources indispensable for the earth and reflecting that involvement to our corporate activities.

VI Promoting Environmental Management System

1. Environmental Management

1) Obtaining ISO14001 Certification

<Reported in FY2017>

Considering international standard ISO14001 as an effective tool to promote environmental management, Kikkoman obtained ISO14001 certification for the Noda Plant (currently Noda Factory, Kikkoman Food Products Company) in May 1997, as the first case in the Japanese food industry.

These efforts were followed by the Kikkoman Group's goal of "acquiring ISO14001 certification for the major offices by FY2006," which was successfully achieved in February 2006 when the Kinki Branch Office acquired ISO14001 certification.

● Closing Meeting of judging multi-site ISO14001 certification(May 2011, Kikkoman Tokyo Head Office)



● Kikkoman Group multi-site ISO14001 certification



In June 2011, the Kikkoman Group obtained the multi-site ISO14001 certification for major domestic companies and further strengthened the environmental management promotion system.

Chronology of ISO14001 certifications of Kikkoman Group Companies

| Year | companies |
|------|--|
| 1997 | Noda Plant Kikkoman Corp. (currently Noda Factory, Kikkoman Food Products Company) |
| 1998 | Takasago Factory, Kikkoman Corp. (currently Takasago Factory, Kikkoman Food Products Company) |
| 1999 | Fukushima Factory, Nippon Del Monte Corporation Chitose Factory, Kikkoman Corp. (currently Hokkaido Kikkoman Company) Noda Factory, Kikkoman Corp. (Noda and Nakane areas) (currently Noda Factory, Kikkoman Food Products Company) |
| 2000 | Gunma Factory, Nippon Del Monte Corporation Manns Wine Co., Ltd. |
| 2001 | Nagano Factory, Nippon Del Monte Corporation Noda Factory, Kikkoman Corp. (Nakanodai area) (currently Nakanodai Plant, Heisei Foods Company*) |
| 2002 | Gifu Factory, Kibun Food Chemifa Co., Ltd. (currently Gifu Plant, Kikkoman Soyfoods Company) Wisconsin Plant, Kikkoman Foods, Inc. (KFI) (U.S.) Kikkoman Foods Europe B.V. (KFE), Netherlands Kikkoman (S) Pte., Ltd. (KSP), Singapore Kamogawa Plant, Kibun Food Chemifa, Co., Ltd. (currently Kamogawa Plant, Kikkoman Biochemifa Company) Edogawa Plant, Kikkoman Corp. (currently Edogawa Plant, Kikkoman Biochemifa Company) |
| 2003 | Brewing Factory, Kikkoman Corp. (currently Nagareyama Kikkoman Co., Ltd.) California Plant, Kikkoman Foods, Inc. (KFI) (U.S.) Saitama Factory, Kibun Food Chemifa Co., Ltd. (currently Saitama Plant, Kikkoman Soyfoods Company) |

VI Promoting Environmental Management System

| | |
|------|---|
| 2004 | R&D Division, Kikkoman Corp. (currently R&D Division, Kikkoman Group) Noda Head Office, Kikkoman Corp. (currently Noda Head Office, Kikkoman Group) |
| 2005 | Nippon Del Monte Corp. received certification again as one corporate entity Tokyo Head Office, Kikkoman Corp. (currently Tokyo Head Office, Kikkoman Group) |
| 2006 | Kinki Branch Office, Kikkoman Corp. (currently Kinki Branch Office, Kikkoman Food Products Company) |
| 2011 | Multi-site certification of the Kikkoman Group for Japan Edogawa Foods Company* joined a target company under the multi-site certification. |
| 2013 | Takara Shoyu Co., Ltd. joined a target company under the multi-site certification. |
| 2015 | Ibaraki Plant, Kikkoman Soyfoods Co. joined a target company under the multi-site certification. |

*Heisei Foods Co. merged Edogawa Foods Co. and changed its name to Kikkoman Foodtech Co. on April 1, 2017.

<Reported in FY2019>

Since the international standard of ISO14001 was revised in September 2015, the Kikkoman Group reviewed and rebuild its environmental management system (EMS) and re-acquired the multi-site ISO14001 following the new standard in June 2017.

*Saitama Kikkoman Company joined the multi-site certification at this time.

2) Implementation of Environmental Audit

<Reported in FY2017>

For those companies having obtained ISO14001 certification both in Japan and abroad, regular internal environmental audits are conducted by a team of qualified employees. In addition, the evaluation of ISO14001 certification maintenance and renewal is conducted by accredited outside certification bodies. The results of the audit and judgment are shared with all concerned companies in order to upgrade their environmental management levels

● Komoro Winery, Manns Wine Co., Ltd.



● ISO14001 certification maintenance evaluation at Komoro Winery (April, 2013)



The Environmental Department of Kikkoman Corp. conducts "Company Visits" to member companies (factories, etc.) one or more times yearly to exchange information with managers and employees responsible for environment-related facilities and to inspect environment-related facilities in the respective companies.

During "company visits" in FY2015, the Department staff heard explanations on current operation conditions, progress in implementing the plan to save energy and reduce CO₂ emissions at the factory, measures to observe environmental-related laws and regulations, and measures to prevent "environmental close-call incidents" (mentioned later) at each place. Upon analyzing the information provided, problems were identified, and preventive measures were suggested. The staff helped member companies formulate plans for more efficient energy saving processes and methods for reduction of CO₂ emissions.

VI Promoting Environmental Management System

- Information exchange session of Company Visit (November 2014, Edogawa Plant, Kikkoman Biochemifa Co.)



- The wastewater treatment facility inspection (November 2015, Gunma Plant, Nippon Del Monte Corp.)



- Information exchange session of Company Visit (July 2015, Nagano Plant, Nippon Del Monte Corp.)



- The wastewater treatment facility inspection (July 2015, Main Plant, Heisei Foods, Co.)



<Reported in FY2019>

- Information exchange session of Company Visit (December 2016, Gunma Plant, Nippon Del Monte Corp.)



- The plant inspection (November 2016, Third Production Department, Noda Factory, Kikkoman Food Products Co.)



VI Promoting Environmental Management System

- Information exchange session of Company Visit (December 2017, Saitama Kikkoman Co.)



- The wastewater treatment facility inspection (January 2017, Nagareyama Kikkoman Co., Ltd.)



<Reported in FY2017>

Further, the Environmental Department conducts internal environmental audits and inspections of environment-related facilities at major overseas manufacturing companies every three years, and provides environmental education to employees on those occasions.

- President Kikkoman Zhenji Foods Co., Ltd.



- Internal environmental audit of PKZ (FY2014)



VI Promoting Environmental Management System

● Kikkoman Foods Europe B.V. (KFE)



● Information exchange session at a wholesale company in France (FY2015)



● Wisconsin Plant, Kikkoman Foods, Inc. (KFI)



● Environment education to Wisconsin Plant employees (FY2016)



In FY2014, the Kikkoman Environmental Department staff visited three manufacturing companies in Asia, namely, President Kikkoman Inc. (PKI, Taiwan), Kunshan President Kikkoman Biotechnology Co., Ltd. (KPKI, China), and President Kikkoman Zhenji Foods Co., Ltd. (PKZ, China). In FY2015, Europe was chosen and the team visited its manufacturing company, Kikkoman Foods Europe B.V. (KFE, Netherlands) and the wholesale companies in Europe, and in FY2016, the staff visited the Wisconsin Plant of Kikkoman Foods, Inc. (KFI) and the wholesale companies in the United States. At each visit, the staff surveyed environmental preservation activities, and conducted environmental education programs for employees to enhance their awareness, sharing information on environmental preservation efforts.

VI Promoting Environmental Management System

<Reported in FY2019>

- Information exchange session in Kikkoman Sales USA, Inc. (FY2017)



- Information exchange session in KMS Service Inc. (FY2017)



- The lecture to the employees of Kikkoman (S) Pte. Ltd. (FY2017)



- Information exchange session in KTA and DMA (FY2017)



In the first half of FY2017 (in September, 2016), the Environmental department visited the California Plant of Kikkoman Foods, Inc. (KFI: U.S.), one of the manufacturing bases in the U.S., and wholesalers (JFC International Inc. (JFC: U.S.) and Kikkoman Sales USA, Inc. (KSU: U.S.), etc.), IT service management company (KMS Service Inc. (KMS: U.S.)). And, in the second half of FY2017 (in February, 2017), the department visited Kikkoman (S) Pte Ltd. (KSP: Singapore), Siam Del Monte Company Ltd (SDM: Thailand) and Del Monte Asia Pte Ltd (DMA: Singapore), etc.

VI Promoting Environmental Management System

● The lecture to the employees of President Kikkoman Inc. (FY2018)



In FY2018 (in February, 2018), the department selected the Asia region and visited President Kikkoman Inc. (PKI: Taiwan), one of the manufacturing bases in the region.

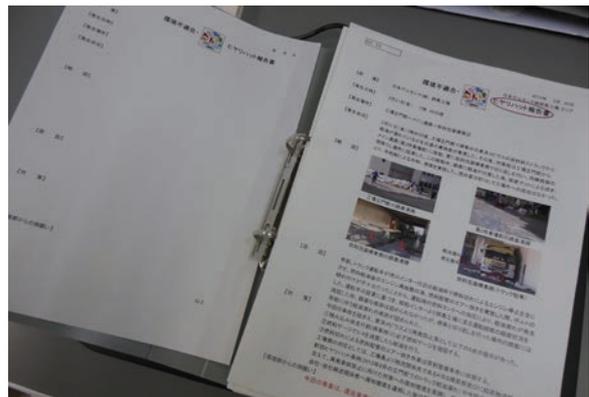
3) "Cross Internal Audit" and "Environmental Close-Call Report" <Reported in FY2017>

The Kikkoman Group holds regular information exchange meetings for the managers and office workers in charge of ISO14001 at all companies, offices, environmental facilities (wastewater treatment, waste storage facilities) to facilitate interaction among them. At the meetings, participants share all kinds of environment-related information including the enforcement and revision of laws and regulations, ISO14001 operation activities and problems in other companies, expertise and new technological advancements for pollution prevention and environmental preservation.

● Cross Internal Auditing (FY2013)



● Environmental Close-Call Report



VI Promoting Environmental Management System

On the occasion of the Kikkoman Group obtaining multi-site ISO14001 certification for the entire group in FY2012, “Cross Internal Audit” and the “Environmental Close-Call Incident Report” were initiated in FY2013.

The “Cross Internal Audit” is an auditing system whereby an internal auditor of another company takes part in the internal environmental audit conducted in one company according to the ISO14001 standard. The aims of this system are to standardize the levels of auditing systems of different companies, build the capacity of internal auditors, enhance the quality of audits, and deepen the communication among people responsible for environmental auditing.

The “Environmental Close-Call Report” system obliges employees to report incidents they come across in their daily work activities which may lead to environmental pollution and which cause them emotional distress (Close-Call cases). At companies where “Close-Call incidents” occur, the causes should be investigated, and preventive measures should be examined and recorded in the “Environmental Close-Call Report.” The report is distributed among member companies for the purposes of sharing the information, and strengthening environmental pollution precautions.

2. Employee Environmental Education

1) General Education

<Reported in FY2017>

Group-wide consciousness for environment preservation is being enhanced by actively introducing lectures on environmental preservation in the employee training curricula of “new employee orientation,” “mid-level employee training,” and “training for employees posted overseas” which are conducted regularly by the Kikkoman Business Service Personnel Department. In addition, open lecture meetings on environmental preservation are held for employees for the same purpose.

● New employee orientation (April 2011)



● New employee orientation (April 2015)



[FY2016]

<Reported in FY2017>

In September 2015, lecture meetings for employees were held at the Noda Head Office (Noda city, Chiba prefecture) and Tokyo Head Office (Minato-ku, Tokyo) of the Kikkoman Group with lecturer, C.W. Nicol who has been engaged in environmental preservation activities for many years.

VI Promoting Environmental Management System

● Lecture Meetings with C. W. Nicol (September 2015, Noda Head Office and Tokyo Head Office of the Kikkoman Group)



Born in Wales, Great Britain, C. W. Nicol has been living in Nagano prefecture since 1980 and obtained Japanese nationality in 1995. He established The C.W. Nicol Afan Woodland Trust and began efforts to revive a devastated forest and is bringing the natural environment of Kurohime back from destruction. He is engaged in supporting the rehabilitation work in the affected areas of the Great East Japan Earthquake.

He related his experiences with humor, and encouraged the audiences to be aware of the importance of nature such as forests, water, animals and plants, and to have an attitude to be more involved in nature.

Employees who joined his lecture commented, "I understood the importance of interacting with nature," "I realized the goodness of how fortunate Japan is to be so rich in nature," "He gave me a good chance to review the nature in my neighborhood."

【FY2017】

<Reported in FY2019>

In September 2016, lecture meetings for employees were held at Noda Head Office and Tokyo Head Office of the Kikkoman Group with lecturer, Dr. Takeshi Yoro.

● Lecture Meetings with Dr. Takeshi Yoro (September 2016, Noda Head Office and Tokyo Head Office of the Kikkoman Group)



Dr. Takeshi Yoro is an emeritus professor (anatomy) of University of Tokyo, and a famous social critic of wide range of issues including the natural environmental preservation. Especially, saying that bug-hunting is his hobby, he is pointing out a lot of dangerous changes in natural field where insects are living, and which have had strong impacts on human beings.

In the lecture, he laid stress on, "We have to realize that human beings are a part of nature. For example, we, Japanese whose staple food is rice, are so closely related to rice fields that the rice fields' changes will have immediate effects on our lives,"

VI Promoting Environmental Management System

“Urbanization, which we are moving forward all over the world today, has been weakening the tie between nature and human beings. With the lapse of urbanization, we will lose natural powers which are important for us to live as a part of nature. Decline in birthrate is one of the representative examples,” “We have to come back to the natural fields more often,” and “We do not have any reasons to destroy the nature where insects live happily.”

Some of the representative responses of the audiences are, “I understand the natural preservation is one of my own problems,” and “I saw coming back to my native land, full of nature, in a new light.”

【FY2018】

<Reported in FY2019>

In September 2017, lecture meetings for employees were held at Noda Head Office and Tokyo Head Office of the Kikkoman Group with lecturer, Dr. Yuji Kishi.

● Lecture Meetings with Dr. Yuji Kishi (September 2017, Noda Head Office and Tokyo Head Office of the Kikkoman Group)



Dr. Yuji Kishi is an emeritus professor (ecology) of Keio University, and has been appealing to the public the importance of understanding “water flow” as “water system” and engaged in many practical activities to control flood and landslide, and to preserve water system from a headwater to an estuary as a total.

In the lecture, showing a lot of scenes of watershed, he laid stress on, “In order to control flood and landslide, it is important to grasp a river from the view points of not only stream or amount of water but also water system as a whole,” “A natural environment preservation plan has to be made based on distinctive features which each natural environment has concerning its own existence and changing direction,” and “Human beings have been co-existing with natural environment from the beginning of history. There is no natural environment which does not have any ties with human beings. Therefore, for preserving natural environments, it is better to take care of natural environments in search of the ideal relationship between human beings and nature than to try to protect nature from artificial changes.”

Some of the representative responses of the audiences are, “I could understand the importance of the idea of Water System concretely,” and “Under the unordinary weather conditions, we have to observe rivers more carefully from the view point of Water System.”

VI Promoting Environmental Management System

2) Specialized Education

<Reported in FY2017>

Various capacity building training sessions are held regularly in the Kikkoman Group to upgrade the capabilities of managers and responsible employees in respective specialized engagements. They include "Training of ISO14001 Internal Environmental Auditors," "Skill Up Training of ISO14001 Internal Environmental Auditors," "Skill Up Training for Environmental Managers," "Training for Industrial Waste Managers," and "Training for Wastewater Treatment Facility Managers."

The "Training of ISO14001 Internal Environmental Auditors" is held in July every year with lecturers invited from various consulting companies specializing in environmental management. In FY2016, the seminar was attended by 24 internal auditors-to-be each time and they studied the environmental management system (EMS), ISO14001 requirements, and tasks required for conducting internal environmental audits.

● Training of ISO14001 Internal Environmental Auditors (July 2013)



● Training of ISO14001 Internal Environmental Auditors (July 2015)



In FY2014, the "Skill Up Training of ISO14001 Internal Environmental Auditors" started for active internal auditors who had participated in an internal auditor training seminar. In this seminar, practical points and viewpoints for auditing have been raised to skill up auditors' capabilities.

<Reported in FY2019>

Since the international standard of ISO14001 was revised in September 2015, the Kikkoman Group reviewed and rebuild its environmental management system (EMS).

Therefore, the Kikkoman Group promoted the training for internal environmental auditors to carry out their jobs pursuant to the new international standard (ISO14001: 2015) in FY2017 and FY2018.

● Skill Up Training of ISO14001 Internal Environmental Auditors (September 2016, Tokyo Head Office of the Kikkoman Group)



VI Promoting Environmental Management System

In FY2017, the seminars “Skill Up Training of ISO14001 Internal Environmental Auditors” by an external specialist were held six times, and 200 employees (licensees of internal environmental audit) joined in total. Also, in FY2018, the seminars by the Environment Division of the Kikkoman Corp. were held nine times, and 128 employees, including internal environmental auditors, joined in total.

- Skill Up Training of ISO14001 Internal Environmental Auditors
(left: September 2017, Nagareyama Kikkoman Co., Ltd.)
(right: April 2018, Takasago Factory of Kikkoman Food Products Co.)



The Kikkoman Group re-acquired the multi-site ISO14001 following the new standard in June 2017.

<Reported in FY2017>

The “Training for Industrial Waste Manager” is organized for industrial waste managers in major affiliated companies in Japan. During the seminars conducted in March 2014 and March 2015, basic matters of industrial waste management were confirmed which included the classification of waste, the selection and outsourcing contracts for collection and transportation and disposal of waste, handling (application, operation, and confirmation) of industrial waste management sheets (“manifests”) and electronic manifests. After that, representatives from a waste collection and transportation contractor and a waste disposal contractor were invited as lecturers to explain current technologies for waste treatment. In the seminar in March 2016, a consultant specializing in waste was invited as a lecturer to explain waste-related laws and discharger responsibilities, to help environmental managers gain legal knowledge and to enhance their capacity.

Other than these, regional seminars were held at different places. In the Noda and Nagareyama district, an information exchange meeting on handling general waste was held for waste managers in member companies in June 2015, an explanation meeting on the handling of an electronic manifest was held in January 2016. In November 2015, a study meeting was organized for waste managers and others at Katsunuma Winery (Yamanashi prefecture) of Manns Wine Co., Ltd. to study the flow of writing the manifest at the time of collecting, transporting, and disposing waste, principles in signing contracts with contractors of waste collection, transportation and disposal, and actual breach of contract cases. At the end of the study meetings, tests were given to measure the proficiency level and capabilities of the participants.

VI Promoting Environmental Management System

● Training for Industrial Waste Managers (March 2014)



● Training for Industrial Waste Managers (March 2016)



<Reported in FY2019>

● Training for Industrial Waste Managers (March 2017)



● Training for Industrial Waste Managers (March 2018)



In FY2017, two seminars for industrial waste managers were held.

In December 2016, consultants specializing in waste were invited as lecturers to explain the “Kikkoman Group Guideline for Industrial Waste Treatment,” used when to handle industrial waste. And in March 2017, consultants specializing in waste were invited as lecturers to explain the handling of industrial waste management sheets “manifests.”

As for FY2018 in December 2017, consultants specializing in waste were invited as lecturers to explain the “Kikkoman Group Guideline for Industrial Waste Treatment.” And in March 2018, consultants specializing in waste were invited as lectures to explain the classification of industrial waste, the contracts with companies on transportation and disposal of waste, and handling of industrial waste management sheets and electronic manifests.

VI Promoting Environmental Management System

<Reported in FY2017>

The “Training for Wastewater Treatment Facility Managers” is held for the managers of wastewater treatment facilities in major manufacturing companies of the Kikkoman Group. In the seminar held in July 2013, after listening to a lecture by a specialist from a wastewater treatment agency on the latest wastewater treatment technology, participants reported on the current situation of wastewater treatment facilities in their respective workplaces and discussed how to improve the situations. In the seminar in August 2014, specialists working at a wastewater treatment company were invited as lecturers at the wastewater treatment facility in Noda Factory, Kikkoman Food Products, Co., and participants reviewed their practical work of wastewater treatment under instruction by the specialists. This practical training was highly evaluated as “useful and practical” by participants. In July 2015, another seminar was held at the wastewater treatment facility of Nagareyama Kikkoman Co., Ltd. Here, the results of “wastewater diagnosis” were reported, and participants studied more efficient and stable methods of facility management through practical training and lectures.

● Training for Wastewater Treatment Facility Managers (August 2014, Noda Factory, Kikkoman Food Products Co.)



● Training for Wastewater Treatment Facility Managers (July 2015, Nagareyama Kikkoman Co., Ltd.)



VI Promoting Environmental Management System

<Reported in FY2019>

In July 2016, the seminar titled “Training for Wastewater Treatment Facility Managers” was held at the research and development facility of the wastewater treatment company. The specialists of the company reported the diagnosis results of the wastewater treatment facilities of two plants in the Kikkoman Group, and proposed more efficient and stable methods of facilities management. After the lecture, the participants took a tour of this facility, and studied the latest facilities, equipment and chemicals used for wastewater treatment.

In July 2017, a seminar was held at the Tokyo Head Office of the Kikkoman Group. In the seminar, the specialists working at the wastewater treatment company were invited as lecturers to explain the roles and efficient management of microorganisms on the activated sludge process of the wastewater treatment.

● Training for Wastewater Treatment Facility Managers (July 2017, Tokyo Head Office of the Kikkoman Group)



VII Promoting Environmental Communication

The Kikkoman Group has been striving to share information with its stakeholders through the publication of the Kikkoman Group Corporate Citizenship Report, Data Book, Environmental Accounting, and the Kikkoman Group Environmental Preservation Activities Case Book. It also widely utilizes information, technology, and experience within the Group for environmental preservation activities for the global society, in cooperation and collaboration with national/local administrative organizations, educational institutions, industries, and related organizations.

1. Communication with Local Communities

<Reported in FY2017>

The Kikkoman Group has been striving to make the best use of the information, technology, and experience that it has acquired through many years of the Group's corporate activity regarding environmental preservation activities for the local communities, in cooperation and collaboration with national/local administrative organizations, educational institutions, industries, and related organizations.

1) Environmental Management Internship

Since FY2007, Kikkoman Corp. has conducted an annual Environmental Management Internship program consisting of about 30 hours of lectures and training classes as a credit, and has accepted students from Chiba University and Tokyo Kasei University.

● Environmental management internship "Visiting factory" (FY2017)



● Environmental management internship "Visiting wastewater treatment facility" (FY2014)



● Environmental management internship "Practical training in environmental analysis" (FY2015)



● Environmental management internship "Olfaction test practice" (FY2016)



VII Promoting Environmental Communication

The students who participated in the program made the following comments:

“By having attended this program, I came to have a greater awareness of the serious condition of the present global environment, and to realize the importance of environmental preservation by companies;” and “this program has made me interested in jobs related to the environment of parks and green areas.”

● Joint internship debriefing (FY2014 at the Tokyo Metropolitan Government)



In November 2013, a joint internship debriefing by students who participated in the internship programs at various companies was held at the Tokyo Metropolitan Government, where the Kikkoman program participants also presented their results and engaged in active discussions with other students.

2) University Internship <Reported in FY2019>

Since 2016, Kikkoman Group has conducted the internship program based on the “University Internship project” promoted by the Education Reform Committee of Japan Association of Corporate Executives, and has accepted students studying mechanical engineering and production engineering at universities and colleges.

● University Internship “Wastewater treatment facility tour” (August 2016)



● University Internship “Practical training in environmental analysis” (August 2017)



3) Ecological Learning

Kikkoman Corp. has organized Ecological Learning twice a year (in spring and autumn) since FY2009 at Shimizu Park (Noda city, Chiba prefecture), targeting elementary school students in the neighborhood of the Noda Head Office.

● Ecological Learning (March 2013 at Shimizu Park)

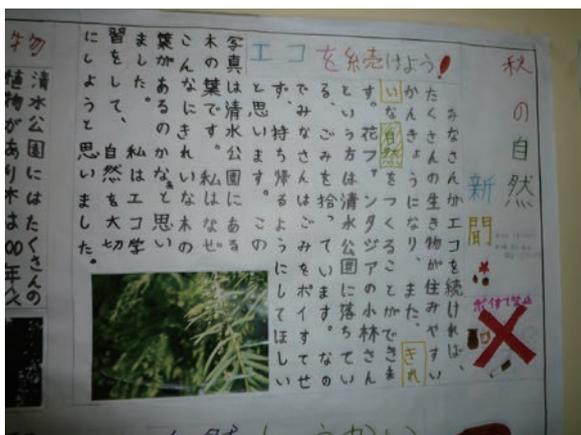


● Ecological Learning (October 2014 at Shimizu Park)



Students who participate in the program, divided into several groups, learn the importance of nature by observing how various animals, plants, and insects live, and by touching and collecting them during a tour of the park with the staff and nature instructors. After the learning, the students discuss or compile into wall newspapers or leaflets what they have learned.

● Wall newspaper of a summary of Ecological Learning by elementary school students (Autumn in 2011)



● Leaflet of a summary of Ecological Learning by elementary school students (Spring in 2015)



4) Summer Vacation Program for Environmental Learning

Kikkoman Corp. has organized a workshop program called Summer Vacation Program for Environmental Learning for elementary school students during their summer vacation (July-August) since FY2015.

● Summer Vacation Program for Environmental Learning (held in July and August 2015 at the Kikkoman Soy Sauce Museum)



This workshop provides elementary school students with explanations, contrived to make them enjoy learning as much as possible, about the Kikkoman Group's environmental preservation activities in the soy sauce production process and environmentally friendly efforts in life that even the students can undertake. The students who participated in the program made the following comments: "I had a good opportunity for learning a lot about soy sauce;" "I learned that there is no waste in soy sauce manufacturing;" and "I will do my best to keep good nature with my friends."

5) Cooperation with Related Organizations

Kikkoman Corp. has been promoting various environmental preservation activities as a member of the following organizations: Kanto Region, Agriculture, Forestry and Fisheries Relevant Company Environmental Policy Association, Environment Committee of Japan Food Industry Association (JFIA), Environmental Conservation Association of Chiba Prefecture, the Council for PET Bottle Recycling, Glass Bottle 3R Promotion Association, PET Bottle Committee of the Japan Containers and Packaging Recycling Association, and Liaison Council for Liquor PET Bottle Recycling.

In April 2013, Chiba Prefecture launched the "Chiba Corporate Network for Biodiversity" in cooperation with the public and private sectors, in order to support and strengthen efforts toward preserving and sustainably utilizing biodiversity, aiming to achieve the "Aichi Targets", which the Convention on Biological Diversity (CBD) is committed to meet by 2020 for saving biodiversity and enhancing its benefits for people. Kikkoman Corp. has actively worked in the network through periodically held information exchange meetings among companies since its participation at the launch.

VII Promoting Environmental Communication

● Biodiversity Satellite Station (Kikkoman Soy Sauce Museum)



In FY2014, a new section for transmitting the importance of biodiversity called Biodiversity Satellite Station was open in the Kikkoman Soy Sauce Museum.

The Kikkoman Group is actively expanding its environmental preservation activities in society by publicly showing the environment-related facilities of its factories and plants, as well as transmitting and providing the Group's information, technology, and experience on environmental preservation in response to requests by industry, administrative or educational organizations, and NPOs.

● Environmental preservation lecture for teachers (August 2015 at Noda Head Office, Kikkoman Group)



● Environmental preservation lecture at a university (October 2015 at the Kanagawa Institute of Technology)



VII Promoting Environmental Communication

2. Communication with the General Public

<Reported in FY2017>

The Kikkoman Group has been keen on building relationships with wide-ranging people in society for environmental preservation by widely publishing its environmental preservation activities for dissemination to society.

1) Participation in the exhibitions

<Reported in FY2017>

Since 2005, Kikkoman Group has been participating in the Eco-Product Exhibition, which is the largest exhibition for environmentally-friendly products and environment-related technology in Japan, held annually at Tokyo Big Sight.

● Exhibition booth (December 2013)



● Demonstration (December 2015)



Under the theme of "Healthy nature creates rich and well food cultures," the Kikkoman Group introduced the environmental preservation activities promoted in the Group, giving examples of saving energy in the manufacturing process and effectively using byproducts, through the display panels and demonstrations at the booth.

<Reported in FY2019>

In 2016, Kikkoman has participated in the exhibition at the 12th convention of the Alliance for Healthy Cities, Japan, held at the Kikkoman Arena.

● The 12th convention of the Alliance for Healthy Cities, Japan (July 2016, Kikkoman Arena)



● Kikkoman Booth



VII Promoting Environmental Communication

2) Exhibiting Kikkoman's Environmental Preservation Activities at the Kikkoman Soy Sauce Museum

● Display panel for "Soy Sauce Manufacturing Process and Environmental Preservation Activities"



The Kikkoman Soy Sauce Museum permanently exhibits an easy-to-understand display panel that briefly introduces the company's environmental preservation efforts in the soy sauce manufacturing process.

3) Publishing Corporate Citizenship Report (Data Book) and Environmental Preservation Activities Case Book

The environmental preservation activities by the Kikkoman Group are published on its website.

1. Approaches Taken by Domestic

1) Efforts at Chitose Factory

<Refer "Greening of Chitose Factory received the Minister of Economy, Trade and Industry Award as a good model of the greening of factory," Sustainability Report 2005>

Chitose Factory of Kikkoman Corp. is situated near to the center of the Chitose-Rinku Industrial Park. Under the Kikkoman Environmental Philosophy "keeping harmony with the environment," greenery was carefully laid and maintained in its premises taking natural settings into consideration, including leaving the natural forest as it is. The green area has been opened to the public for their comfort.

Total area of the premises: 88,822 sq. m.

Green occupation: 51%

- natural wood: 35%

- trimmed trees: 14%

- plantation: 18%

- plant cover: 32%



At the 23rd national assembly of the Promotion of the Greening of Factories on October 1, 2004, the Chitose Factory (then) received the Minister of Economy, Trade and Industry Award for its merit in promoting greening of its premises.

The landscaping of the premises with consideration to the nature of Hokkaido incorporating the existing natural forest, and offering a place of comfort to local people such as "visiting factory" and offering the green areas for organizing an "insect photo exhibition" were highly recognized. The policy and practices of the Chitose Factory were in line with the policy of the Chitose city government to build a city where "people who are environmentally considerate and who are filled with happy feelings interact."

2) Cooperation with the Wildlife Preservation Bureau of Hokkaido Corp.

<Refer "Cooperation in the protection of endangered wild life," Sustainability Report 2004>

Since 1999, Chitose Factory of Kikkoman Corp. has been cooperating with the Wildlife Preservation Bureau of Hokkaido Corp. that conducts activities to protect, survey and research endangered animals and to educate the public about them. The organization is now placing an emphasis on the protection of shima owls. The owls have been cherished by indigenous Ainu people in Hokkaido as the "guardian deity of forests," but its population has decreased and it is now estimated to be around 120.

● Symbol Mark of the Wildlife Preservation Bureau of Hokkaido Corp.



3) Participation in the Japan Business and Biodiversity Partnership

<Reported in FY2013>

The Kikkoman Group joined the Japan Business and Biodiversity Partnership in May 2011. To promote the activities of biodiversity by business corporations, the Partnership invites many businesses to join and encourages them to share and exchange information and experiences among themselves, and with economic associations, environmental NGOs, academia and public organizations. Business corporations which agree to the prospectus of the Partnership, and which take action in line with its action guidelines are eligible as members.



4) Release Salmon Project

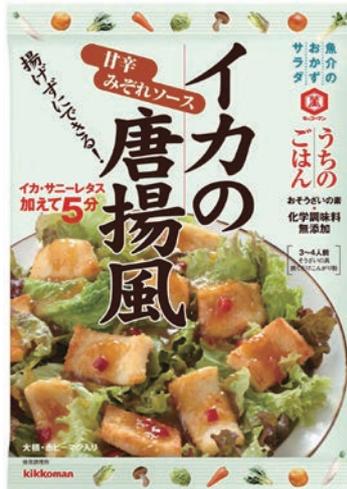
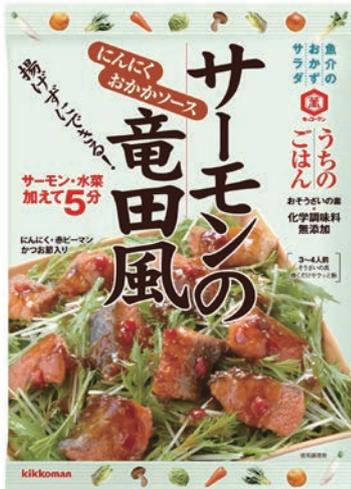
<Reported in FY2016>

The volume of salmon catches in Iwate prefecture peaked in 1996 with over 70,000 tons after which the volume has continued to

decline, falling to less than 10,000 tons in 2011 and 2012 consecutively.

Kikkoman Food Products Co. supported research on raising salmon homing rates by Iwate University, using a portion of sales of the three food items launched between September and November 2014, namely "Gyokai-no-Okazu Salada (Seafood salad)" in "Kikkoman Uchi-no-Gohan (our home meal)" series.

● "Gyokai-no-Okazu Salada (Seafood salad)" in "Kikkoman Uchi-no-Gohan (our home meal)" series.



Eggs collected in December 2014 were raised carefully, and in April 2015, about 152,000 juvenile salmon were released into the river Katagishi in Kamaishi city and went into the ocean.

● Collecting salmon eggs



● Releasing juvenile salmon into Katagishi river



2. Approaches Taken by Overseas

1) United States of America

(1) Environmental Preservation Activities at the California Plant

<Refer "topics - KFI's California Plant Wins WRAP Award for Sixth Consecutive Year," Corporate Citizenship Report 2007>

In FY2007, KFI California Plant received a Waste Reduction Awards Program (WRAP) award for the 7th time and sixth consecutive year from California State. This award is given to organizations for their energy saving, waste reduction and other environmental

preservation efforts. KFI California Plant's continuous efforts for improvement have led to its consecutive receipt of the award. The plant also received the Business Environmental Resource Center Award for three consecutive years from the government of Sacramento county in which the plant is located. This is an unprecedented case, and in particular, in this year, the highest rank of the award was given.

The winning of these awards has been warmly praised from neighboring communities, and has led to the KFI California Plant's enjoyment of a high reputation. It is the result of the everyday plant-wide environmental preservation efforts made by the cooperation of the environmental manager and the whole employee.

KFI's California Plant's major achievements in environmental preservation

- Making soy sauce cake into livestock feed
- Reducing waste by recycling cartons and plastic packages
- Replacing old mercury lamps with more energy-efficient fluorescent lights
- Closing down boilers on weekends during the summer
- Installing an ambient temperature sensor on a refrigerator to automatically shut it off during the winter
- Installing equipments to recover drained residual steam in order to re-use the energy
- Preventing a water leak through proper handling of flushing hoses

● California Plant, Kikkoman Foods, Inc. (KFI) (U.S.)



<Reported in FY2013>

The KFI California Plant has been recognized by the community for its praiseworthy efforts in such areas as energy and water conservation, pollution prevention, and waste reduction.

The plant received the Waste Reduction Award Program (WRAP) Award from the State of California in 1999, 2001-2006, and 2008-2011; the Pollution Prevention Award (PPA) and Sacramento Sustainable Business (SSB) Award from Sacramento County (where it is located) in 2004-2006, 2007-2009, and 2011; the Sacramento Environmental Commission (SEC) Award from the Sacramento Environmental Commission, an environmental conservation organization in the county, in 2007 and 2009; and the Green Leadership Award from the county's trade paper, The Business Journals, in 2012.

● KFI employees awarded with WRAP Award, SSB Award, and SEC Award (2008-09)



(2) Donation through the Kikkoman Foods Foundation Inc.

<Refer "Kikkoman Foods Foundation Inc." in Corporate Citizenship Report 2014, detailed edition (web edition)>

Kikkoman Foods Inc. (KFI), a soy sauce manufacturer in the United States, established the charitable foundation, Kikkoman Foods Foundation Inc. in 1993. Through this foundation, KFI has been donating to educational institutions and to people affected by disaster there.

In 2013, Kikkoman Foods Foundation, as part of the 40th anniversary of the initial shipping of the product from KFI, donated one million dollars to the University of Wisconsin- Milwaukee (UWM). This donation was used as part of the funds to help its School of Freshwater Sciences (SFS) to establish the Kikkoman Healthy Waters Environmental Health Laboratories to study water resources.

2) Netherlands

(1) Cooperation with Environmental Purification

<Refer "Cooperating with natural preservation," Sustainability Report 2004>

Kikkoman Foods Europe B.V. (KFE) has been cooperating with the water quality improvement project of Lake Zuidlaardermeer in Groningen state in the Netherlands since 1997. The background for KFE to be involved in this project is as follows.



The history of the Netherlands is that of struggles against water. The people have built dykes on the swampy land and installed pump units at many places to pump out water to reclaim the land for living. In the 1990s, however, frequent floods troubled the people. The main reason for floods is said to be the rise of sea surface due to global warming added by the deterioration of pump units. Furthermore, in Groningen state, the ground sinkage due to natural gas extraction worsened the disaster.

Lake Zuidlaardermeer is the second largest freshwater lake in the state and is an important water source for local people. However, water pollution worsened to a critical level as to damage the ecology, and the populations of fish, small animals and wild birds that used to abound in the lake decreased. The solutions to the problem required the management of the amount of water, the purification of water, and the recovery of its ecology. Het Groninger Landschap, an NGO aiming for environmental preservation, initiated a project to improve its water quality. Currently, the European Union, Netherlands government, Groningen state, Hoogezand-Sappameer city, WNF (related organization of the World Wide Fund for Nature) and other organizations support this project.

In 1997, the above NGO requested KFE to cooperate with the project. KFE agreed to become a major donor. It was because the project fitted the company's policies "to keep harmony with nature," and "to become a company whose existence is meaningful to the society." KFE considered this was a good opportunity to express appreciation to nature and the local community. The windmill to pump water to the lake purchased by the KFE fund was named "Kikkoman Windmill."



The mechanism of water purification of this project is "to purify water by the healing capacity and power of nature." A large water-purifying pond is constructed adjacent to the lake, to which lake water is pumped little by little by the windmill. While the water flows in the pond, water is purified by the work of hydric plants and microorganisms in the pond, and then flows back into the lake. Since this is a long-term project, and no remarkable result has been witnessed as yet. However, it has been reported that the water quality and ecology are beginning to show a sign for betterment. The project has been widely covered by the media and is reputed as a water management system with little burden on nature. It is hoped that such natural preservation efforts will spread to other areas.

KFE has agreed to continue its donation until at least 2012. The maintenance and improvement of the system and the purifying pond are the major activities now and in the future. The system is still on the experimental level, and if successful with Lake Zuidlaardermeer, the system could be applied to any place. There may be a day when a windmill can be seen anywhere in the world. The participation of the EU may prove the great interest shown by other countries.

<Reported in FY2012>

The results of the 10-year observation have been published concerning the water quality improvement project in Groningen state to which KFE continues to offer its donations.

Improvements found are as follows:

- 54 species of birds have been identified.
Within these, 8 species have been identified as endangered species.
- 129 kinds in flora have been identified.
Within these, 6 kinds have been identified as being endangered .
- 8 kinds of fish have been identified.
- Over 25 types of butterflies have been identified.

In the future, KFE will continue to not only help preserve the biodiversity of wildlife inhabiting the lake but also improve people's living, educational and recreational environments.

<Refer “Winning EDEN award 2013” in Corporate Citizenship Report 2014, detailed edition (web edition)>

- Kikkoman Foods Europe B.V.
(KFE, Netherlands)



- “EDEN award 2013”
commemorative shield



The ongoing environmental protection activities by Kikkoman Foods Europe B.V. (KFE, Netherlands) were given high regards by the government of the Netherlands, and in FY2014, KFE was selected as a winner of EDEN award 2013. KFE determined to provide this water quality improvement project with 20,000 Euro every year until FY2018 when KFE celebrates the 20th anniversary of its foundation.

<Reported in FY2019>

In FY2018, KFE determined to donate 20,000 Euro to the water quality improvement project every year until FY2023 in commemoration of KFE 20th anniversary of its establishment.

- “Kikkoman Windmill”



(2) Support to a Forestation Project

<Refer "Support to a forestation project," Sustainability Report 2005>

As part of its contribution to the community environment, KFE supported the Greening Funds (Het National Groenfonds) of the Netherlands in 2002 in commemoration of the 5th anniversary of its founding. The Funds are promoting forestation projects in the country to improve the environment as well as to slow global warming. Kikkoman's donation was allocated to plant 30,000 seedlings in wide Het Hikerveld Natural Park located 60km southwest from the plant. When these seedlings grow, there will be wild birds and wild animals visiting them. In this park, there are cultural facilities including the Local Cultural Museum, and the demonstration of the traditional sheep breeding using sheepdogs as partners. Traditionally, support to the Funds has been given mainly by public organizations. The KFE donation is highly appreciated as "it may draw attention to the Funds from the private corporation."



3) Singapore

(1) Supporting the Development of a Man-made Lake

<Reported in FY2012>

Expressing Kikkoman's awareness of the importance of water and biodiversity, KSP made a donation in 2010 to support a part of the construction expenses of a man-made lake project in the national park in Marina Bay at the center of Singapore.

The man-made lake (Kingfisher Lake) is expected to serve as a place of relief for citizens. In addition, by growing aquatic plants, it is expected that the following will occur:

- The aquatic plants act as a filter, improve murky water, and remove sediment.
- Bundles of aquatic plants and reeds will be planted in the lake to absorb nutrients such as nitrogen and phosphorus, controlling the growth of algae and creating good quality water.
- Maintaining aquatic plant diversity, good water circulation and aeration will allow fish and dragonflies to grow.

As such, the lake aims to maintain a favorable aquatic environment where a variety of fish and insects can live.

● The Man-Made Lake “Kingfisher Lake”



(2) “Nature Heritage Tree” was awarded to KSP

<Refer “Contribution to Preservation of Singapore’s Natural Environment,” in Corporate Citizenship Report, 2012>

As part of its 25th anniversary, Kikkoman (S) Pte Limited (KSP) made a donation of SGD \$1,000,000 to a project called Kingfisher Lake. The man-made lake was created in a section of Singapore’s Gardens by the Bay, a national park being developed by the Singaporean government. The theme of the project is the ability of aquatic plants to purify water. The lake project provides residents and travelers with a green space, and is designed to showcase Singapore’s concept of striving to coexist with nature. It has been designed with special biotope features such as functions for cleaning of the water by aquatic plants, nutrient enrichment of the water, and nurturing of aquatic creatures.

The Singaporean government awarded KSP with a “Nature Heritage Tree”* at a ceremony for promoting beautification and greenery, in recognition of the company’s contribution to the greening of Singapore.

*Nature Heritage Tree ...The 80-year old Rain Tree is planted close to the top of Fort Canning Hill. At the base of the tree a plaque reads, “The heritage tree is dedicated to Kikkoman in appreciation of their support for the Garden City Fund.”



(3) Support to Mangrove Plantation

<Reported in FY2017>

Singapore has seen a growing decline in mangrove forests that has resulted in a situation which threatens tropical species of flora and fauna. The Singapore government has seriously addressed the problem to improve the situation. One of its efforts can be seen in mangrove planting along the coastline of the Sungei Buloh Wetland Reserve, the natural heritage in northern Singapore that opened in FY2016. Commemorating its 30th anniversary, KSP has donated SGD \$500,000 to natural conservation activities (including the tree planting mentioned above) and environmental education.

● Tree-planting activity in the Sungei Buloh Wetland Reserve



● Commemoration of tree planting



1. Use of Non-GMO (Genetically Modified Organism) Materials

<Refer "Use of Non-GMO (Genetically Modified Organism) Materials," Corporate Citizenship Report 2006>

Genetically modified (GMO) produce were introduced to Japan in November 1996, and have awakened controversies about their safety and environmental influence. As soon as GMO soybeans began to be imported to Japan, Kikkoman became concerned about the question of GMO produce, as the soybeans used for its products were to be imported from the United States where GMO soybeans were produced.

The Ministry of Agriculture, Forestry and Fisheries published the "standards for indicating the use of GMO produce on product labels" in March 2000, and the labeling of their use on each product was enforced in April 2001. This duty was not applied to soy sauce for the reason that soybean protein and DNA were assumed to be decomposed in the long brewing process. Even so, the Soy Sauce Industry decided to formulate the guidelines for labeling the use of GMO materials on the precondition that it would be left with each company to do so. In the meanwhile, Kikkoman has prepared conditions for implementing voluntary labeling.

Even though soy sauce was exempted from labeling, it was the desires of consumers that prompted soy sauce manufacturers to declare the use of non-GMO produce. The five major companies out of 1500 soy sauce manufacturers in the country have up to a 50-percent market share altogether and the rest is shared by medium and small size manufacturers. A move to use non-GMO materials was initiated by these medium and small size manufacturers. Soon, requests for non-GMO materials were made from many interested parties, particularly from people working on school lunch, coop and major food processing companies.

Kikkoman began addressing this issue earnestly. In June 2003, Kikkoman declared that the company would switch all the soybeans for soy sauce to non-GMO soybeans in Japan. Today, the users of soy sauce for business and food processing purposes are concerned about the use of non-GMO soybeans. Many business talks begin on the assumption that Kikkoman's products are using non-GMO soybeans. At present, the statement on the use of non-GMO materials is a requirement when submitting a document on material standards to these companies along with the information on allergens.

Currently, Kikkoman voluntarily conducts regular sampling inspections on marudaizu (soybeans) and defatted soybeans used to produce soy sauce to be sold in Japan, and confirms that they are non-GMO materials. Further, at production and distribution sites, an IP-handled method is adopted whereby non-GMO and GMO products are managed separately, which is certified with a document describing the details of management in order to prevent them from being mixed. As a result, the use of a non-GMO material is clearly expressed on the label of the soy sauce "Kikkoman Tokusen Marudaizu Shoyu," for example, Ingredients: Soybean (non-genetically modified), wheat, salt.

● Label stating "non-genetically modified soy beans are used."



2. Residual Agricultural Chemical Inspection According to the Positive Listing System

<Refer "Screening for Residual Agricultural Chemicals," Corporate Citizenship Report 2006>

Kikkoman received the "Technical Award for FY2006" by the Japan Soy Sauce Technology Center for the development of a "simultaneous analysis method on residual agricultural chemicals in soy sauce production." The following is a research outline prepared by a person in charge of the development of the award winning method.

The Food Hygiene Law was revised in May 2003 and the decision was made that the Positive Listing System of Residual Agricultural Chemicals would be enforced in May 2006. Accordingly, the levels of residual agricultural chemicals were restricted for all food products, and the standard values or tentative standard values for 801 kinds of agricultural chemicals and other substances were designated. For other agricultural chemicals for which the standard levels were not set, a uniformly strict level was laid at 0.01 ppm. Considering the implications of residual agriculture chemicals as a food processing company, we began developing a method to analyze agricultural chemical residues as a means to offer safe products.

The basic policies to develop a method to analyze different agricultural chemicals at one time were to satisfy the needs for: (1) stable qualitative analyses of agricultural chemicals, (2) accurate quantitative analyses, (3) qualitative analysis at a sensitivity level of 0.01 ppm, and (4) prompt and simple handling.

To realize these policies, we developed a preparation method using solid phase extraction to refine sample extract liquid, as this method allowed speedy and simple handling with a wide range of application. As a measuring device, we, first, studied the use of GC/MS recommended by the Ministry of Health, Labor and Welfare. But it was found difficult to attain highly accurate analyses with this device as its measurement was greatly affected by miscellaneous matters in samples. Then we tested a quadruple-type GC/MS/MS, which proved to have excellent qualitative and quantitative analyzing capabilities, and is hardly affected by miscellaneous matters. Using this device, we established a method to analyze 97 kinds of residual agricultural chemicals in raw materials (soybeans and wheat), as well as those remaining in soy sauce and byproducts simultaneously with accuracy up to 0.01 ppm density. ¹⁻³⁾

We inspected about 200 samples of ingredients and finished products, and detected no agricultural chemicals in them.

For the purpose of experiment, we added agricultural chemical mixtures in matured soy sauce moromi (unrefined soy sauce), compressed the samples, and examined the kinds, and quantities of agricultural chemicals distributed in the soy sauce liquid, soy sauce oil and soy sauce cake. The result showed that the greatest number of types of agricultural chemicals remained in soy sauce cake. ³⁾

To respond to the enforcement of the Positive Listing System, we studied and developed the simultaneous analysis method of residual agricultural chemicals in soy sauce production with excellent performance in accuracy, speed, and cost. We presented the results at the Convention of the Japan Soy Sauce Technology Center, and published an article in its magazine "Study and Technologies on Soy Sauce." We will further continue this study, upgrade our analyzing technologies, and disseminate scientifically evidenced information on the safety assurance of food, thereby contributing to the development of the soy sauce industry.

References

- 1) Tatsuya Sakakibara, Takashi Ishiyama, Noriko Kimura, and Masaoki Sasaki, Summary of Lecturers 4 at the 62nd Research and Study Convention by the Japan Soy Sauce Information Center (2005)
- 2) Tatsuya Sakakibara, Takashi Ishiyama, Noriko Kimura, Hiroki Tatsumi and Masaoki Sasaki, Study and Technologies of Soy Sauce 32(2), 93 (2006)
- 3) Tatsuya Sakakibara, Noriko Kimura, Tatsuo Horiuchi, Hiroki Tatsumi and Masaoki Sasaki, Summary of Lecturers 4 at the 63rd Research and Study Convention by the Japan Soy Sauce Information Center (2006)



History of Environmental Preservation Activities

1. Awards Received (1995-)

| | |
|------|---|
| 1995 | <p>The 15th Kinoshita Award (Grand Prix of the Package Industry) by the Japan Packaging Institute To Kikkoman Corp. for developing the back-in-box octo-post made with resource saving cardboard.</p> |
| 1997 | <p>Excellent Factory in Resource Reuse by Clean Waste Chiba To the Noda Plant of Kikkoman Corp. at the convention to promote proper disposal of industrial waste.</p> <p>Excellent Greening of a Factory Award by the Hokkaido Regional Office of the Ministry of International Trade and Industry To the Chitose Factory of Kikkoman Corp. as a model factory promoting greening.</p> |
| 1998 | <p>The 7th Environment Saving and Resource Saving Award by the Nippon Shokuryo Shimbun (a food industry newspaper) To Kikkoman Corp. for its active efforts to preserve the environment and protect resources.</p> |
| 1999 | <p>JSBBA Award for Achievement in Technological Research by the Japan Society for Bioscience, Biotechnology and Agrochemistry (JSBBA) To Kikkoman Corp. for developing a method of extracting high-purity polyphenol from grape seeds (the byproducts of wine production), and assessing its functionality.</p> <p>Waste Reduction Award Program (WRAP) Award by CalRecycle (California, US) To the California Plant of Kikkoman Foods, Inc. for its waste reducing and recycling efforts. [The same award was also given in 2001-2006, 2008-2011.]</p> <p>The 9th Distribution System Grand Prize by Nikkan Kogyo Shimbun Co., Ltd. (an industrial paper) To Kikkoman Corp. for its development of distribution support software programs as a good model in promoting computerization of the distribution service industry.</p> |
| 2001 | <p>The 7th Architectural Culture Award of Chiba Prefecture by the Chiba Prefectural government To the Noda Head Office of Kikkoman Group for the functionality and cultural traits of its architecture, including energy efficiency by using the latest and more innovative technology, aiming to become an office with reduced environmental impact.</p> <p>Nikkei New Office Promotion Award by Nippon Keizai Shimbun Co., Ltd. (a nationwide economic paper) To the Noda Head office of Kikkoman Group for its energy-saving design and effective use of rainwater in an effort to promote new comfortable and functional offices.</p> <p>The 23rd Minister of Agriculture, Forestry and Fisheries Award (for the Food Industry sector of the Environmental Conservation Category) by the Ministry To Kikkoman Corp. for its efforts to sustain and improve the environment through energy saving and resource reuse, and the environmental management system, etc.</p> |
| 2002 | <p>The Examination Committee Encouragement Prize of the Environmental and Energy Saving Architecture Award by the Institute of Building Environment and Energy Conservation To the Noda Head office of Kikkoman Group for its energy-saving design, adopting louvers for lighting, and effective air-conditioning system and rainwater utilization.</p> |
| 2003 | <p>Special Award for Production under the Nikkei Advanced Business Operation Award by Nippon Keizai Shimbun Co., Ltd. To Kikkoman Foods, Inc. (KFI) for its enhanced productivity, environmental measures, international competitiveness and expansion of soy sauce consumption.</p> <p>The 4th Sustainable Architecture Award by the Japan Institute of Architects To the Noda Head office of Kikkoman Group for its excellent ideas and techniques that will open up a new horizon as a model for the age of environmental concern.</p> |
| 2004 | <p>Award for 2003 by the Director of the Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry To the R&D Division of Kikkoman Corp. for using soy sauce oil as fish feed as an excellent example of resource recycle technology.</p> <p>JSBBA Award for Achievement in Technological Research by the Japan Society for Bioscience, Biotechnology and Agrochemistry (JSBBA) To the R&D Division of Kikkoman Corp. for its technology to apply firefly Luciferase to produce various stain measuring devices.</p> |

X History of Environmental Preservation Activities

| | |
|------|---|
| | <p>Excellent Corporation Award by the Sustainable Management Rating Institute To Kikkoman Corp. for its excellent practice of corporate social responsibility (CSR) management that serves as a model for other companies.</p> |
| 2004 | <p>Pollution Prevention Award (PPA)/Sacramento Sustainable Business (SSB) Award by Sacramento County To the California Plant of Kikkoman Foods, Inc. (KFI) for its efforts to save energy and water, prevent pollution, and reduce waste. [PPA was also granted in 2005 and 2006; SSB was granted in 2007-09 and 2011.]</p> <p>The 23rd Ministry of Economy, Trade and Industry Award for the Greening of a Factory by the Japan Greenery Research and Development Center To the Chitose Factory of Kikkoman Corp. for its efforts to maintain the natural forests and to offer a place of comfort to local people.</p> |
| 2006 | <p>Technical Award for FY2006 by the Japan Soy Sauce Technology Center for devising a general agricultural chemical residue analysis method. To Environmental Analysis Center of Kikkoman Corp. for devising a general agricultural chemical residue analysis method.</p> |
| 2007 | <p>Sacramento Environmental Commission (SEC) Award by the Sacramento Environmental Commission, an environment conservation organization in Sacramento county To Kikkoman Foods, Inc. for active environmental preservation effort [The same award was also granted in 2009.]</p> |
| 2009 | <p>Food Packaging Award of the Japan Packaging Contest 2009 organized by the Japan Packaging Institute To Kikkoman Food Products Co. for Kikkoman soy sauce 750ml and 500ml bottles.</p> |
| 2010 | <p>Honored by the Singapore Government To KSP as a corporation which has contributed to the promotion of beautification and greening in Singapore. As a token, the natural heritage "Rain Tree" was awarded to KSP.</p> |
| 2011 | <p>Special Award "Ten Year Award," (11th Awarding) by the Society of Heating, Air-Conditioning and Sanitary Engineers To Kikkoman Noda Head Office Building for its provision of comfort in the interior environment, and management to maintain and improve energy-saving qualities.</p> |
| 2012 | <p>Green Leadership Award by the Business Journals (industrial magazine) To the California Plant of Kikkoman Foods, Inc. as a corporation taking a leading role in building a beautiful future among corporations in Sacramento county.</p> |
| 2013 | <p>EDEN Award (2013) by the Dutch Government and other institution To Kikkoman Foods Europe B.V. as a corporation making contributions to the water quality preservation project for Lake Zuldlaardermeer in Groningen state, the Netherlands.</p> |
| 2014 | <p>Honor by the Chairman of the Chubu Electricity Use Rationalization Committee (for corporations excelling in energy management) To the Gifu Plant of Kikkoman Soyfoods Co. for its efforts in efficient use of electricity and saving energy.</p> |
| 2016 | <p>Nikkei New Office Promotion Award by Nippon Keizai Shimbun Co., Ltd. (in the Kinki Area) To the Kinki Branch Office of Kikkoman Group for its good management and control of the intellectual asset and information, its high capability of intellectual production utilizing information technology (IT), its establishment of comfort and convenient working environment and its high contribution to natural environment and local society.</p> |
| 2017 | <p>2016 Award for the Excellent Energy Management Factory, by the Kanto Regional Office of Ministry of Economy, Trade and Industry To the Noda Factory of Kikkoman Food Products Co., for its reduction of energy consumption and CO₂ emissions accomplished with reviewing and improving efficiency of usage of the boilers.</p> |

2. History of Environmental Preservation Activities

| | |
|----------------------|--|
| 1970:Aug. | The Antipollution Committee was established. |
| 1971:all year | Environmental loads were surveyed among all the operations centers. |
| 1972:Dec. | The Environmental Management Department was established. (Measures Section and Investigation Section) |
| 1976:Oct. | The Environmental Analysis Center was established. (Certified Environmental Survey/Measurement Services) |
| 1989:Nov. | Boiler using soy sauce cake was installed. |
| 1992:Mar. | Division was re-organized to Environment Protection Division. |
| 1992:Apr. | The General Environment Protection Committee was established. |
| 1992:Oct. | Kikkoman Group Environmental Principles was formulated and announced. |
| 1993:Mar. | Voluntary Action Plan on Environmental Preservation (Voluntary Plan) was formulated. |
| 1995:Mar. | Division was re-organized to Environmental Protection Promotion Division (Environmental Preservation Planning Department and Environmental Analysis Center) |
| 1995:Jun. | Internal Environmental Auditing started (at 14 places including the production and research sectors and the hospital). |
| 1995:Sep. | Kikkoman joined the World Business Council for Sustainable Development (WBCSD). |
| 1997:May | Noda Plant (currently Noda Factory, Kikkoman Food Products Company) acquired ISO14001 certification. |
| 1997:Oct. | The Target of Internal Environmental Auditing expanded to related companies and overseas factories. |
| 1998:Nov. | Kikkoman Annual Environmental Report was disclosed. |
| 1999:Aug. | The General Environmental Preservation Committee was established (reorganized into the General Environment Protection Committee). Environmental Management Dept. was set up within the Environmental Protection Promotion Division. |
| 2000:Feb. | Goals for the reduction of greenhouse gas, recycling of waste and byproducts were determined and announced. |
| 2000:Jul. | Environmental Accounting was disclosed in the Kikkoman Annual Environmental Report. |
| 2001:Jan. | Participation in the United Nations Global Compact Initiative was announced. |
| 2001:Jul. | Kikkoman Group Annual Environmental Report was published. |
| 2002:Jun. | Environmental Protection Promotion Div. was reorganized as Environment Department (Environment Planning & Management Group and Analysis Center). |
| 2003:Mar. | ISO14001 certifications for major plants abroad were acquired. |
| 2004:Jun. | Kikkoman Group Annual Environmental Management Report was disclosed on the website. |
| 2005:Jun. | Kikkoman Group Environmental Preservation Activities Case Book was published. |
| 2005:Jul. | “Eco Rail Mark” was certified by the Railway Freight Association. |
| 2005:Dec. | Participation in Eco Product Exhibition was started. “Slim down Container and Package Declaration” announced by eight local governments. |
| 2006:Feb. | ISO14001 certifications for all major companies were acquired. |
| 2006:Jun. | Kikkoman Group Corporate Citizenship Report was published. |
| 2006:Aug. | Participation in “Team Minus 6%”. |
| 2008:Mar. | Kikkoman’s Guidelines for Containers and Packaging were determined and announced. |
| 2009:Feb. | Caring for Climate was signed. |
| 2009:Oct. | The Environmental Analysis Center was re-organized as the “Kikkoman Environment and Food Safety Analysis Center” of the R & D Division. |
| 2009:Nov. | Environmental Management Promotion System was organized. |
| 2011:May | Participation in the Japan Business and Biodiversity Partnership. |
| 2011:Jun. | Kikkoman Group Multi-site ISO14001 Certification was acquired in Japan. |
| 2013:Apr. | Joined the Chiba Biodiversity Corporate Network. |
| 2015:Jun. | CEO Water Mandate in the UN Global Compact and Water Project were signed. |