Performance

GRI302-1
GRI302-4

Reduction of greenhouse gas emissions in the value chain

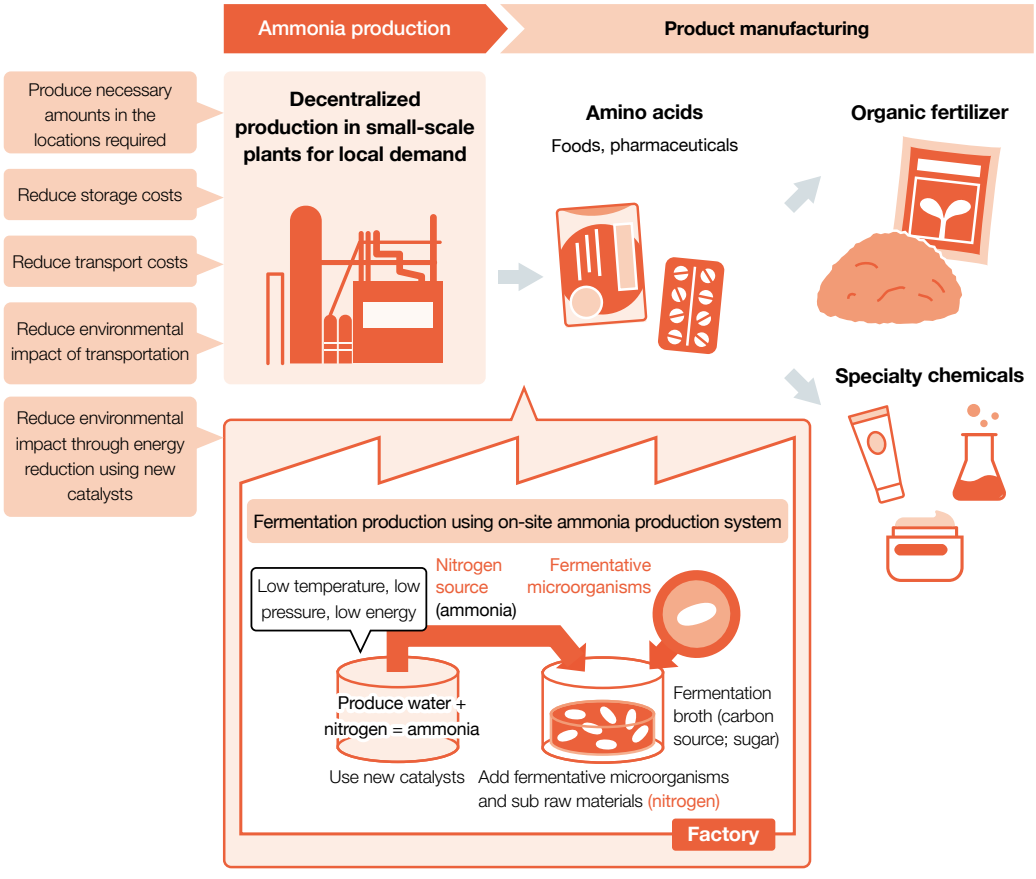
Reducing environmental impact through on-site ammonia production

The Ajinomoto Group purchases ammonia for our amino acid fermentation processes. Currently, ammonia is generally produced worldwide using the Haber-Bosch process. This is an excellent production technology that synthesizes ammonia using only hydrogen obtained from nitrogen in the air and natural gas. However, due to the need for high-temperature and high-pressure reaction conditions, production is concentrated in large-scale plants and performed at enormous scale. Capital investment related to this process is extremely costly. In addition, transport to areas of demand scattered throughout the world requires large amounts of energy.

To solve these problems, Ajinomoto Co., Inc. is working toward practical implementation of on-site production to produce the necessary amount of ammonia where it is needed. In 2017, the Company, in partnership with Professor Hideo Hosono of the Tokyo Institute of Technology and others, established Tsubame BHB Co., Ltd. Through this company, we are working toward the practical application of an innovative ammonia production technology using electride catalyst. Electride catalysts allow for highly efficient synthesis of ammonia, even under low-temperature and low-pressure conditions. This means ammonia can be produced at small-scale plants, something considered difficult to accomplish under the Haber-Bosch process.

In October 2019, we completed a pilot production facility at the Company's Kawasaki Plant, launching operations capable of small-scale production of several tens of tons per year. Moving forward, we intend to verify long-term durability and optimal operating conditions, preparing for commercialization of on-site ammonia production between 2021 and 2022.

On-site ammonia production system



Climate Change Adaptation and Mitigation

Performance

GRI302-1
GRI305-4
GRI305-5
GRI305-6

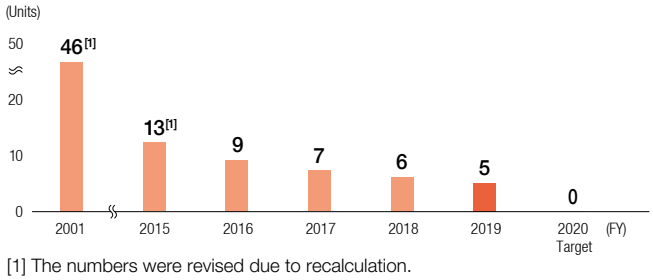
Management of fluorocarbons

The Kigali Amendment to the Montreal Protocol, which regulates ozone-depleting substances, came into force in January 2019, setting gradual reduction targets for hydrofluorocarbons (HFC). In response, we revised the Ajinomoto Group policies for reducing fluorocarbons.

We aim to eliminate all HFCs by fiscal 2030 at factories with equipment that use fluorocarbons. Our intent is to switch to natural refrigerants or refrigerants with low Global Warming Potential (GWP) of less than 150 when installing new or upgrading existing equipment.

With regard to the seven Group frozen food factories in Japan, we converted 1 unit to natural refrigerants during fiscal 2019. We plan to convert the remaining 5 units and eliminate the use of fluorocarbons by the end of fiscal 2020.

Number of freezers using fluorocarbons (frozen food factories in Japan)



[1] The numbers were revised due to recalculation.

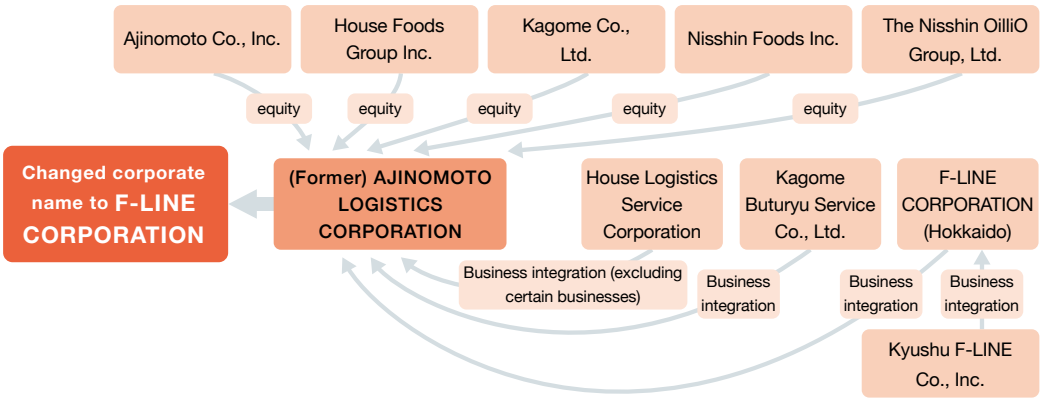
Performance

GRI302-2
GRI302-3
GRI302-4

Initiatives in transportation

Logistics is an indispensable part of the value chain for manufacturers. The Ajinomoto Group is also working to establish a sustainable logistics system. In April 2019, Ajinomoto Co., Inc. established joint logistics company F-LINE CORPORATION in partnership with four other food manufacturing companies[2]. We consider this company to be a tangible platform derived from the F-LINE (Future Logistics Intelligent Network) Project launched in 2015 by six food manufacturers[3]. In a spirit to *compete on products, but distribute in cooperation*, the goal of this entity to is provide efficient logistics throughout Japan through joint transport. The F-LINE Project provides cooperative distribution for the original six participating companies in Hokkaido and Kyushu, as well as a joint mainline trunk transport in Hokkaido.

Launch of F-LINE CORPORATION, a joint-equity logistics company

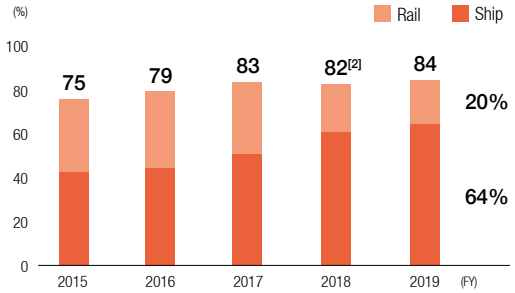


[2] House Foods Group Inc., Kagome Co., Ltd., Nisshin Foods Inc., Nisshin Oillio Group, Ltd.
[3] Consisting of the four companies listed above, Mizkan Co., Ltd., and Ajinomoto Co., Inc.

Climate Change Adaptation and Mitigation

The Ajinomoto Group has pursued modal shift[1] since 1995 in an effort to enhance transport capacity and lower environmental impact. During fiscal 2019, Ajinomoto Co., Inc. achieved an overall 84% long-distance transport modal shift by using ships for transport.

Modal shift percentage of Ajinomoto Co., Inc. 500km or more



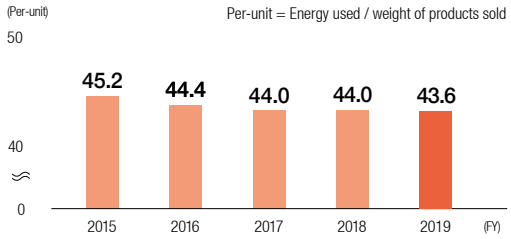
[1] Selecting rail or ship transport methods to generate a smaller environmental impact. Compared to trucking, railway container and ship transport result in CO_2 emissions at one-eleventh and one-sixth of the volume, respectively.
[2] Correction due to a description error.

Per-unit energy use in logistics

Ajinomoto Co., Inc., Ajinomoto Frozen Foods Co., Inc., and Ajinomoto AGF, Inc. are considered specified consignors under the Energy Conservation Act in Japan. Each company is legally obligated to make efforts in reducing per-unit energy use (crude oil equivalent) within their cargo logistics by at least 1% per year on average over five years, reporting results to the Japanese government.

We have worked to conserve energy through joint transport, unloading overseas products directly at major customer import terminals, and other measures. However, the impact of an increase in the number of applicable plants, increase in inventory transport volume, contraction in beverage business which deals with relatively heavy products, and other factors have produced only an average 0.9% reduction in per-unit combined energy use for the 3 companies over the five-year period by fiscal 2019.

Per-unit energy use in logistics[3]



[3] Combined results for Ajinomoto Co., Inc., Ajinomoto Frozen Foods Co., Inc., and Ajinomoto AGF, Inc.

Climate Change Adaptation and Mitigation

Performance

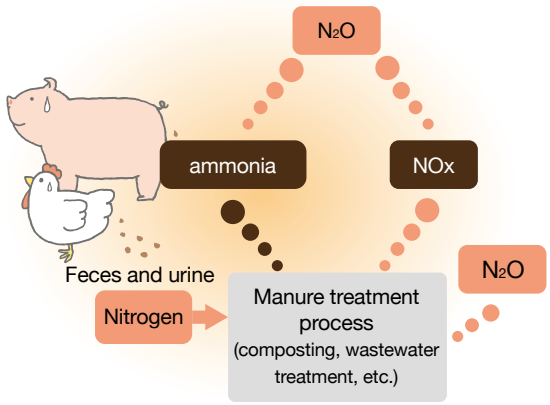
GRI302-5

▶ P89

Reducing livestock nitrogen emissions with feed-use amino acids

Feeds with poor amino acid balance lead to an oversupply of unnecessary amino acids. This oversupply is not utilized by the animals and excreted in large quantities as nitrogen compounds. During the waste treatment process, nitrogen compounds turn into nitrous oxide (N_2O), which increases environment impact at approximately 300 times the global warming potential of CO_2. Feed-use amino acids improve balance of feeds, reducing excretion and reduce excreted nitrogen compounds by approximately 30%. Amino acids thus help reduce the life-cycle CO_2 (LC-CO_2) emissions of feed while also helping diminish odor caused by ammonia derived from nitrogen compounds. Other benefits include reduced soil, surface water, and groundwater pollution.

N_2O cycle



Nitrogen emissions per pig (g/day)

Source: Takada et al., Japanese Society of Animal Science (2009)