Results of the 3rd Follow-up to the Keidanren Voluntary Action Plan on the Environment

(Global Warming Measures; Report by Industry)

November 2, 2000
Japan Federation of Economic Organizations (Keidanren)

*** The items in parentheses indicate the indices being used to define the goals of each industry.**

{Amount of CO_2 emissions}

Japan Gas Association ····· 1
Japan Federation of Housing Organizations ····· 4
Japan Auto Parts Industries Association ····· 6
Japan Automobile Manufacturers Association ····· 9
Japan Federation of Construction Contractors; Japan Civil Engineering Contractors' Association; Building Contractors Society ····· 12
The Japan Rubber Manufacturers Association ····· 14
Federation of Pharmaceutical Manufacturers' Association of Japan; Japan Pharmaceutical Manufacturers Association ····· 16
Brewers Association of Japan ····· 20
Japan Sugar Refiners' Association ····· 23
Japan Association of Rolling Stock Industries ····· 25
Japan Glass Bottle Association ····· 26

{CO_2 emissions per unit output}

Federation of Electric Power Companies ····· 28
Communications Industry Association of Japan; Electronic Industries Association of Japan; Japan Electronic Industry Development Association ····· 31
Japan Electrical Manufacturers' Association ····· 34
Japan Camera Industry Association ····· 38
Japan Society of Industrial Machinery Manufacturers ····· 40
Japan Bearing Industrial Association ····· 43
The Japan Soft Drinks Association ····· 46
Japan Shipowners' Association ····· 49
The Scheduled Airlines Association of Japan ····· 51

{Amount of energy consumed}

Japan Iron and Steel Federation ····· 53
Flat Glass Association of Japan ····· 56
Japan Electric Wire and Cable Makers' Association ····· 58
The Shipbuilders' Association of Japan ····· 61

{Energy input per unit output}

Petroleum Association of Japan ····· 63
Japan Chemical Industry Association ····· 66
Cement Association of Japan ····· 69
Federation of Paper Manufacturers in Japan ····· 71

Japan Mining Industry Association ····· 74
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Japan Brass Makers Association ····· 80
Limestone Association of Japan ····· 83
Japan Dairy Industry Association ····· 86
Japan Machine Tool Builder's Association ····· 89
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The Real Estate Companies Association of Japan ····· 93

{Others}

Japan Coal Energy Center ····· 95
Japan Non-Government Railways Association ····· 98

Guide to Reading the Section on Specific Industries

Name of Industry

Goals

1. Degree of progress toward goals
→ Graphic representation of the progress being made by each industry toward its declared goals. In the event of multiple goals, an industry's progress is depicted separately for each goal.

2. CO_2 emissions
→ Graphic representations of CO_2 emissions by each industry. For industries that have defined their goals in terms of CO_2 emissions, this graph appears under "Degree of progress toward goals," rather than under item 2.

Reference data
→ Prepared on the basis of data provided by the respective industries, other than that given above.

3. Other efforts to deal with global warming
(1) Contributions to the transportation, offices and households sector (effect of products and services)
→ Specific examples of efforts that are contributing toward the reduction of CO_2 from the transportation, offices and households sector.

(2) Measures to deal with greenhouse gases other than CO_2
→ Examples of measures being taken to reduce substitute chlorofluorocarbons (HFC, PFC, SF_6), methane, and nitrous oxide.

(3) Involvement in "activities jointly implemented" (AIJ) etc.
→ Examples of AIJ or other activities, when an industry is undertaking such efforts. AIJ has been defined as the pilot phase of Joint Implementation, one of the mechanisms of the Kyoto accord.

(4) Environmental management; environmental conservation in overseas business activities
→ Updates on ISO 14001 acquisition; reports on environmental conservation activities overseas.

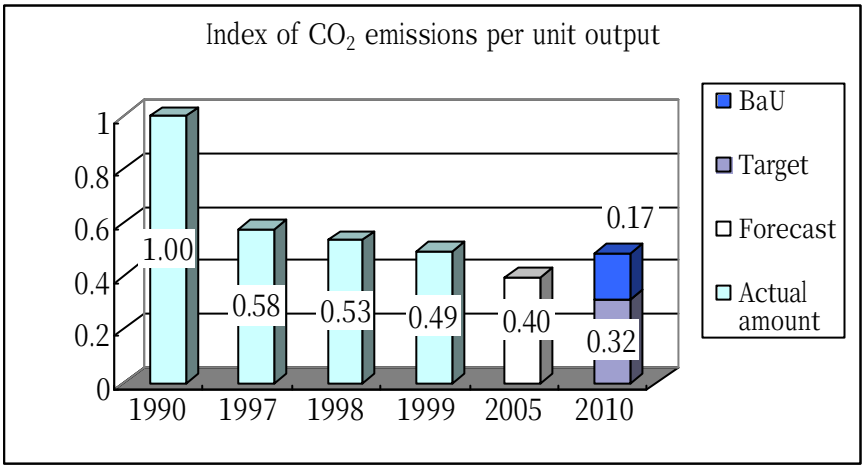
Footnotes:

→ When necessary, the following kinds of information are recorded: basic data on each industry (e.g., principal products, percentage of participating companies, etc.); assumptions underlying the calculation of forecasts for fiscal 2010; assumptions underlying estimates of CO_2 emissions by each industry (e.g., use of demand-end electricity rather than power generating-end electricity in calculations of electric power per unit of output); and so on.

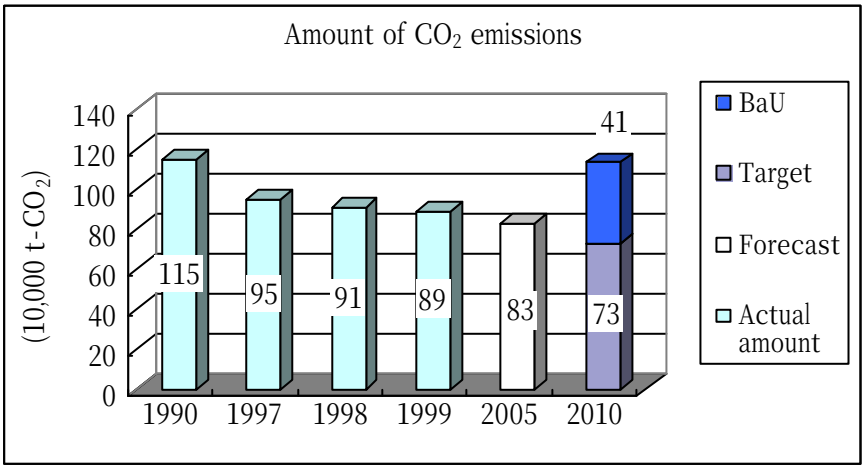
Japan Gas Association

Target: To reduce CO_2 emissions in fiscal 2010 to 730,000 t-CO_2 from 1.15 million t-CO_2 in fiscal 1990, by lowering the index of CO_2 emissions per unit output (m^3 of gas) in the manufacturing and distribution of city gas to 1/3 of the level of fiscal 1990.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Note: Emissions are amounts resulting from the production and distribution of city gas.

Assuming a value of 1 for CO_2 emissions from the manufacture and distribution of city gas in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.58 in fiscal 1997, 0.53 in fiscal 1998, and 0.49 in fiscal 1999. The industry is forecasting an index value of 0.40 for fiscal 2005, and aiming for a target value of 0.32 in fiscal 2010. It has recorded the following amount of CO_2 emissions: 1.15 million t-CO_2 in fiscal 1990; 950,000 t-CO_2 in fiscal 1997; 910,000 t-CO_2 in fiscal 1998; and 890,000 t-CO_2 in fiscal

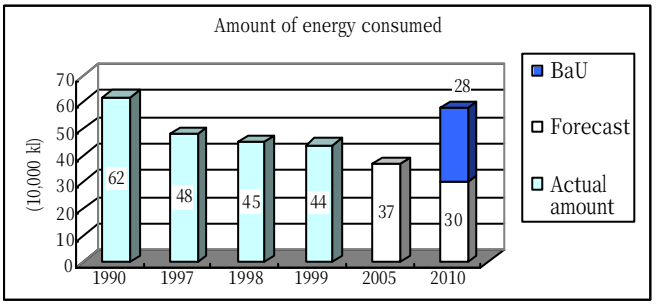
1999, which was a 23% reduction compared to fiscal 1990. As this trend indicates, it is on track toward achieving its target for fiscal 2010. The industry is forecasting emissions of 830,000 t-CO_2 in fiscal 2005, a 28% decline compared to fiscal 1990, and from there aims to reduce emissions to 730,000 t-CO_2 in fiscal 2010, 37% less than the level in fiscal 1990. Toward these ends, the industry has adopted the following measures.

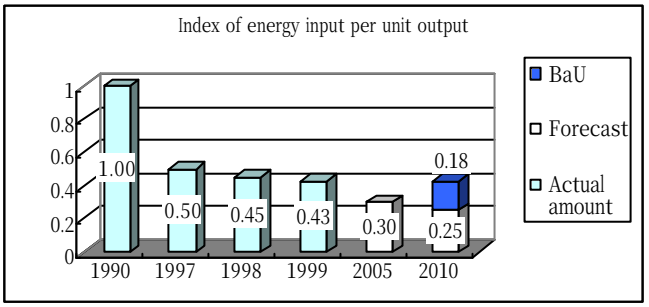
- Improving the efficiency of city gas production by converting to high calorific value gas that uses natural gas etc. as a raw material.

  Reducing heating fuel requirements by switching from a manufacturing process based primarily on reforming equipment, which heats naphtha, LPG and other raw materials and causes reactions at high temperatures, to a process based principally on highly efficient LNG gasification equipment.
- Promoting various energy conservation measures at city gas manufacturing plants.

Were a voluntary action plan not executed in fiscal 1999, the industry forecasts that CO_2 emissions would be 1.14 million t-CO_2 in fiscal 2010, 28% more than in fiscal 1999 and 1% less than in fiscal 1990.

Reference data





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

The industry has recorded the following amounts of energy consumption (in terms of crude oil equivalents): 620,000 kl in fiscal 1990; 480,000 kl in fiscal 1997; 450,000 kl in fiscal 1998; and 440,000 kl in fiscal 1999. It is forecasting consumption of 370,000 kl in fiscal 2005 and 300,000 kl in fiscal 2010, 40% and 52% reductions, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, energy consumption in 2010 would be 580,000 kl, a 6% decline compared to 1990. Finally, assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 0.50 in fiscal 1997, 0.45 in fiscal 1998, and 0.43 in fiscal 1999. The industry is forecasting index values of 0.30 and 0.25 for fiscal 2005 and 2010, respectively.

2. Environmental management; environmental conservation in overseas business activities

- 10 plants and other operational sites, accounting for approximately 80% of all gas manufactured nationwide, have obtained ISO 14001 certification.
- Focusing primarily on the developing nations, companies are involved in technology transfer of anti-global warming technologies. Examples include:
  a. The propagation and promotion of: technologies for conversion from coal to natural gas; technologies for the utilization of natural gas; energy-conservation technologies; environmental protection technologies (China et al.).
  b. Participation in the establishment of a city gas and community air conditioning joint venture, and provision of technology to the joint venture (Malaysia).
  c. Provision of independently developed afforestation technology that uses microorganisms to reestablish forests in environmentally devastated area (Indonesia).

Note 1: The principal product of this industry is city gas, and the percentage of companies participating in this follow-up survey was 100% (239 producers).

Note 2: In calculating CO_2 emissions resulting from the purchase of electricity, the industry has used figures on a power demand-end basis.

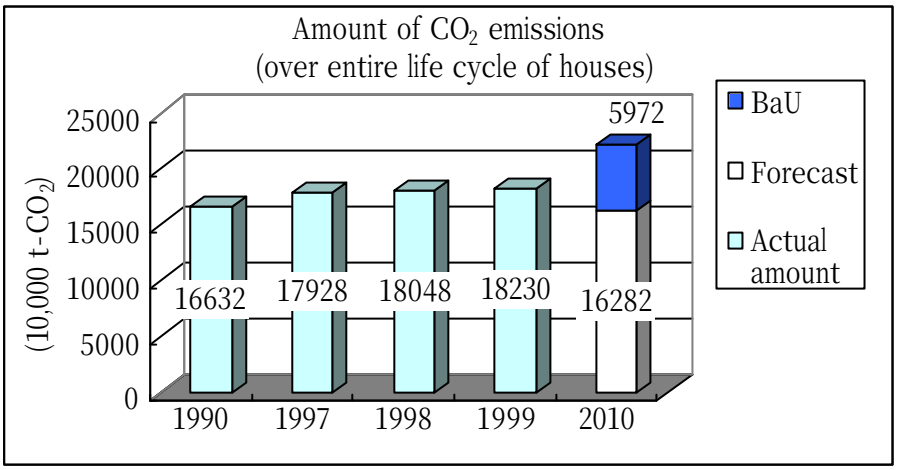
Note 3: Emissions in fiscal 2010 on a business as usual basis for the period after fiscal 1999 were calculated by multiplying the gas manufacturing ratio in 2010 by the amount of CO_2 emissions in 1999. The difference in CO_2 emissions resulting from differences in amounts of electricity purchased under the target scenario vs. the BaU scenario were calculated using standard per-unit-of-output figures for thermal electricity.

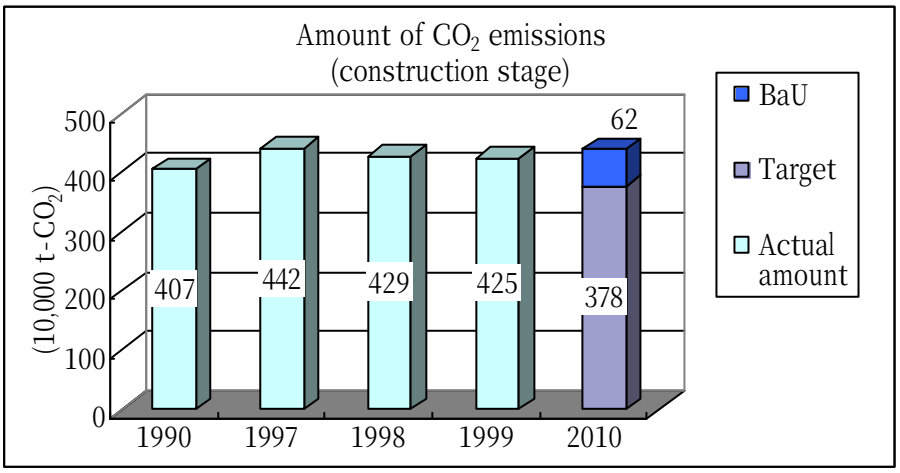
Note 4: City gas manufactured in fiscal 1999 totaled 24.4 billion m^3 (converted at 41,860 kJ/m^3), or approximately 1.6 times the amount manufactured in fiscal 1990. The industry forecasts that city gas production in fiscal 2010 will be roughly twice the amount produced in 1990.

Japan Federation of Housing Organizations

Target: To reduce the amount of CO_2 emissions at each stage of the life cycle of houses, and to stabilize emissions over the entire life cycle of houses at fiscal1990 levels in fiscal 2010 and beyond (target rate of reduction at the construction stage, 7%).

1. Degree of progress toward goal





The housing industry estimates that, over their entire life cycles, houses have emitted the following amounts of CO_2: 166.32 million t-CO_2 in fiscal 1990; 179.28 million t-CO_2 in fiscal 1997; 180.48 million t-CO_2 in fiscal 1998; and 182.30 million t-CO_2 in fiscal 1999. The industry is aiming for emissions of 162.82 million t-CO_2 in fiscal 2010, a 2% decline compared to fiscal 1990. Toward this end, it is evaluating and preparing housing construction guidelines that take into account environmental concerns, by dealing with the adoption of construction methods that are sensitive to the environment, reductions in the use of lumber from tropical regions, and so on.

Were the voluntary action plan not executed, CO_2 emissions in 2010 would reach 222.55 million t-CO_2, a 34% increase over fiscal 1990.

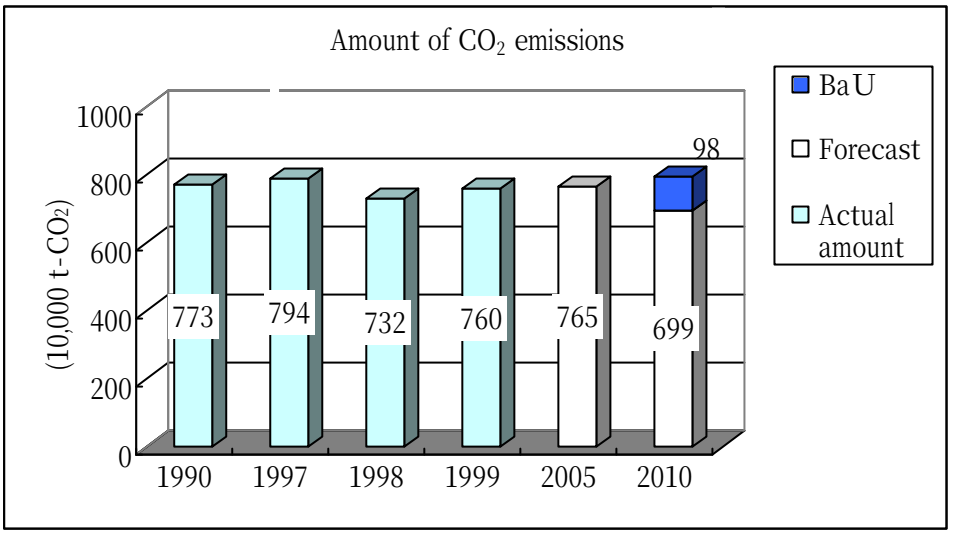
In addition, the industry estimates that it has emitted the following amounts of CO_2 during construction: 4.07 million t-CO_2 in fiscal 1990; 4.42 million t-CO_2 in fiscal 1997; 4.29 million t-CO_2 in fiscal 1998; and 4.25 million t-CO_2 in fiscal 1999. Its goal for fiscal 2010 is 3.78 million t-CO_2, a 7% reduction compared to 1990. Were a voluntary action plan not executed, emissions in 2010 would be 4.40 million t-CO_2, an 8% increase compared to fiscal 1990.

Note: The housing life cycle is divided into the following stages: materials stage; construction stage; use stage (renovations); use stage (energy consumption); demolition stage; and disposal stage. The following assumptions are built into the forecast targeted for fiscal 2010. New housing starts (average): 1.46 million/year for fiscal 1990~2000; 1.39 million/year for fiscal 2001~2005; 1.23 million/year for fiscal 2006~2010; and 860,000/year for fiscal 2011~2020.

Japan Auto Parts Industries Association

Target: To reduce CO_2 emissions by 7% of the level of fiscal 1990 by 2010.

1. Degree of progress toward goal

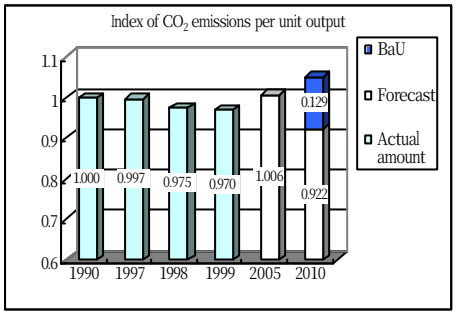


The auto parts industry has emitted the following amounts of CO_2: 7.73 million t-CO_2 in fiscal 1990; 7.94 million t-CO_2 in fiscal 1997; 7.32 million t-CO_2 in fiscal 1998; and 7.60 million t-CO_2 in fiscal 1999. It is forecasting emissions of 7.65 million t-CO_2 in fiscal 2005, a 1% decline compared to fiscal 1990. It is aiming for a 7% reduction in emissions in fiscal 2010 compared to fiscal 1990; the outlook now is for it to achieve a 10% reduction in that year vis-à-vis 1990 to 6.99 million t-CO_2. Despite a projected 4.3% year-on-year increase in production value, CO_2 emissions grew by a more moderate 3.8% in fiscal 1999. This reflected the fact that energy conservation efforts on the part of major companies are gradually bearing fruit. The industry has adopted the following principal measures to achieve its emissions targets.

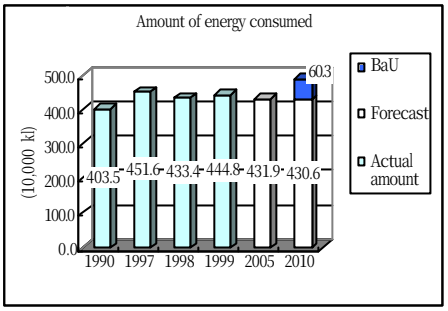
- Improving methods of operation, including ending the practice of keeping machinery on during off-production times
- Improving the efficiency of equipment and machinery
- Rationalizing processes
- Cogeneration and other methods of recovering waste energy
- Mutual awareness-raising and sharing of information on energy-saving technologies.

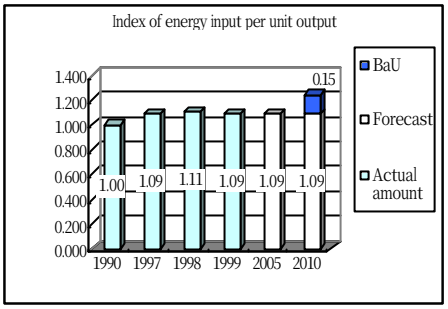
Were the voluntary action plan not executed, the forecast for CO_2 emissions in fiscal 2010 would be 7.97 million t-CO_2, 3% higher than in fiscal 1990.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

Assigning a value of 1 to amounts emitted in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.997 in fiscal 1997, 0.975 in fiscal 1998, and 0.970 in fiscal 1999. The industry is forecasting index values of 1.006 in fiscal 2005 and 0.922 in fiscal 2010.

The industry has recorded the following amounts of energy consumption: 4.035 million kl in fiscal 1990; 4.516 million kl in fiscal 1997; 4.334 million kl in fiscal 1998; and 4.448 million kl in fiscal 1999. It is forecasting consumption of 4.319 million kl in fiscal 2005 and 4.306 million kl in fiscal 2010, both levels approximately 7% higher than in fiscal 1990. Were a voluntary action plan not executed, energy consumption in fiscal 2010 would be 4.909 million kl, or a 22% increase over fiscal 1990.

Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit of output stood at 1.09 in fiscal 1997, 1.11 in fiscal 1998, and 1.09 in fiscal 1999. The industry is forecasting index values of 1.09 for both fiscal 2005 and fiscal 2010.

2. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

Because measures such as reducing the size and weight of components, and building more high-performance parts can contribute to increased fuel efficiency and lower CO_2 emissions in the final product, auto parts companies have been investing the greatest possible efforts into product development, in cooperation with automobile manufacturers.

Toward this end, efforts to conserve energy in parts production processes may become a temporary bottleneck, but the industry will make allowances that enable it to contribute to lower CO_2 emissions for the sector as a whole.

(2) Measures to deal with greenhouse gases other than CO_2

- Participate and/or cooperate in projects to collect and decompose the designated

cholorofluorcarbons (CFC 12) used as coolants in car air conditioning systems.

- Participate and/or cooperate in projects to collect and reutilize the substitute chlorofluorcarbons (HFC 134a) used as coolants in car air conditioning systems.

3. Environmental management; environmental conservation in overseas business activities

- To date, the environmental management systems of approximately 80 companies and 200 production and other operational centers have been examined and registered. Hereafter, the outlook is for another 10-plus companies and 20 or so production and operations centers to be examined each fiscal year. The industry will continue its efforts to raise awareness hereafter and to generate positively spiralling impacts.

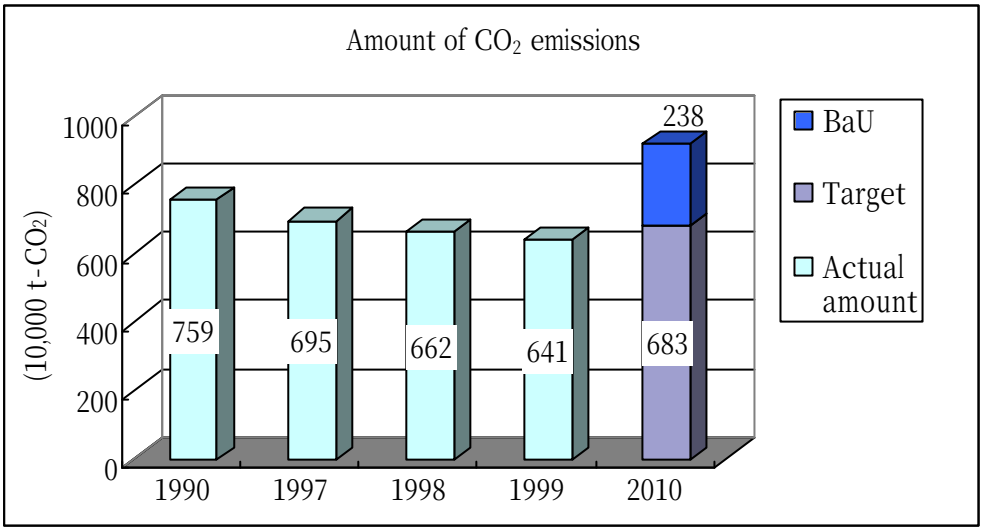
In its overseas activities as well, the industry also recognizes the need to provide adequate facilities for environmental measures similar to those adopted domestically, and we believe that this approach is having an effect.

Note: The principal products of this industry are automobile parts (excluding tires, batteries, window glass, etc.). The participation rate by companies in this follow-up survey was 27.4% (129 out of 471 companies), representing a participation rate in terms of value of shipments of approximately 54%. Based on the outlook for value of production through fiscal 2005, the industry is forecasting that the value of shipments of auto parts in fiscal 2010 (including exports and overseas production) will be flat throughout the forecast period.

Japan Automobile Manufacturers Association

Target: To reduce CO_2 emitted from production plants in the automobile industry by 10% of the level of fiscal 1990 by fiscal 2010.

1. Degree of progress toward goal



The automobile industry has emitted the following amounts of CO_2 through its manufacturing activities: 7.59 million t-CO_2 in fiscal 1990; 6.95 million t-CO_2 in fiscal 1997; 6.62 million t-CO_2 in fiscal 1998; and 6.41 million t-CO_2 in fiscal 1999. The industry's recent energy conservation measures have centered on the following.

(1) Applying energy conservation measures to all phases of production as has been done to date (measures dealing with supplies of energy, and with equipment consuming large amounts of energy)
(2) Enhancing the sophistication of operations and control technology (establishing careful controls over different forms of energy use, such that energy consumption is linked to the quantity of production)
(3) Increasing the efficiency of materials handling processes, through use of lighter materials, reductions of cost of cutting, etc.

In fiscal 1999, member companies adopted the following principal energy-conservation measures.

- Reduced the air pressure of compressed air and prevented leakage of compressed air.
- Improved boiler combustion; reduced boiler size; and utilized extra steam for cogeneration purposes.

- Improved insulation in drying furnaces used on painting lines; enabled burners to be turned off through the collection of waste heat; adjusted air flows in booths to appropriate levels; adopted inverter technology in fans.
- Reduced number of tasks in casting and metalworking processes.
- Combined and eliminated production lines; concentrated production on lines that placed minimal loads on the environment.
- Limited production to number of units capable of being supported by compressed air and boilers.
- Reduced amounts of molten metal produced by changing the shape of the lip of the bucket used in the casting process.

In fiscal 1999, the industry reduced CO_2 emissions to 6.41 million t-CO_2 by continuing to implement measures that had been adopted in the past and by moving vigorously to promote energy conservation measures (mainly integrating and eliminating facilities) in the face of declining production trends. Although the decline in production value as a result of the slumping domestic economy also played a part, the industry's rate of CO_2 emissions fell at a faster rate than the decline in production, indicating that emissions-reduction measures are making an undeniable impact.

The industry is aiming to achieve CO_2 emissions of 6.83 million t-CO_2 in fiscal 2010, 10% lower than in fiscal 1990. Were a voluntary action plan not executed, emissions in 2010 would be 9.21 million t-CO_2, 21% higher than in 1990.

2. Other efforts to deal with greenhouse gases

(1) Contributions to the transportation, offices and households sector (effort of products and services)

The industry is promoting measures to increase fuel efficiency in automobiles and to develop and propagate clean-energy vehicles. It is also participating actively in Intelligent Transportation Systems in order to improve traffic flows. It has been moving vigorously to achieve the targets for fuel consumption set under the revised energy consumption law. As automobile fuel efficiency continues to improve hereafter, enabling the industry to achieve its planned targets, it appears set to succesfully reduce CO_2 emissions by the government's target of 3.2 million t-CO_2 in 2010.

(2) Measures to deal with greenhouse gases other than CO_2

- Recovering designated chlorofluorocarbons (CFC 12) and employing technologies to decompose such gases.

From the standpoint of protecting the ozone layer and slowing the progress of global warming, the industry took action to rapidly convert from use of CFC 12 to

HFC 134a as the coolant used in car air conditioning systems.

In 1998, in cooperation with the auto parts, sales and servicing industries, the industry also began using an integrated system that enables it to collect and decompose CFC 12 from scrapped automobiles. Through June 2000, it had decomposed approximately 244 tons of CFC 12.

- Curbing emissions of HFC 134a

  HFC 134a, the coolant now used in car air conditioners, has one-sixth the impact on global warming as CFC 12. Moreover, the industry believes that, through its efforts to reduce the amounts of coolants used, to prevent leakage, and to improve methods of refilling, it has been able to reduce HFC 134a's global warming effects over its life span to around one-fifteenth that of CFC 12.

(3) Involvement in AIJ etc.

The industry has carried out a project to ameliorate traffic congestion at designated intersections in the suburbs of Bangkok, Thailand. This project has succeeded in reducing CO_2 emissions by an estimated 1,700 t-C per year.

3. Environmental management; environmental conservation in overseas business activities

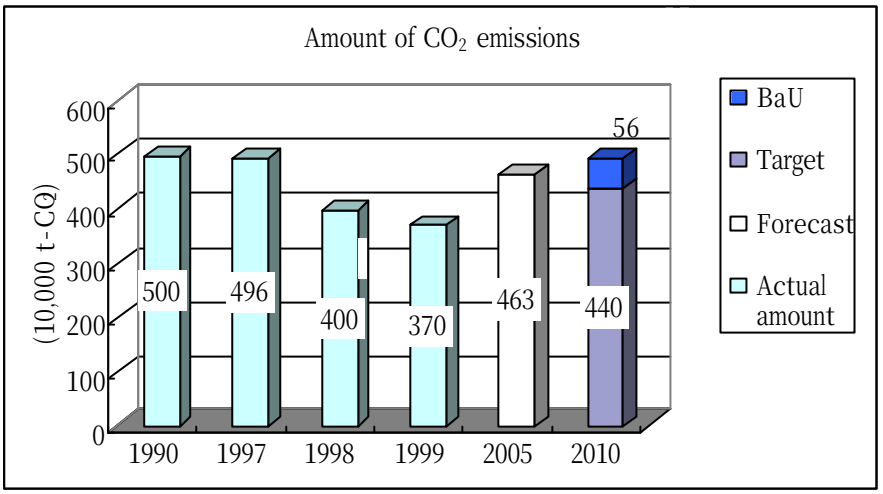
By obtaining ISO 14001 certification, the country's automobile manufacturers have been establishing systems that provide them with more effective means of dealing with the environment. As of September 2000, the number of production and other operational sites that have been examined and registered stood at 58. In addition, the industry is carrying out surveys aimed at improving city environments in a number of Asian countries.

Note: The principal products of the industry are passenger cars and trucks, motorcycles, and KD components. The percentage of companies participating in this follow-up survey was 100% (13 companies), representing a coverage ratio for energy used of 100%. In its forecast for fiscal 2010, the industry assumes that production value in the target year would be the same as in fiscal 1990. To calculate the target for CO_2 reduction in fiscal 2010, the industry uses a CO_2 conversion coefficient for electricity of 0.104 kg-C/kWh, which was the coefficient for fiscal 1990.

Japan Federation of Construction Contractors;
Japan Civil Engineering Contractors' Association; Building Contractors Society

Target: With fiscal 1990 as the base year, to endeavor to reduce the CO_2 generated during construction work (on-site work) by 12% by 2010.

1. Degree of progress toward goal



The construction industry has emitted the following amounts of CO_2: 5.0 million t-CO_2 in fiscal 1990; 4.96 million tons t-CO_2 in fiscal 1997; 4.0 million t-CO_2 in fiscal 1998; and 3.70 million t-CO_2 in fiscal 1999. It attributes the decline in emissions in 1999 to a reduction of construction activity in the industry resulting from lower private capital investment, cutbacks in public works spending and other factors. It is forecasting emissions of 4.63 million t-CO_2 in fiscal 2005, 7% less than in fiscal 1990. Its target for fiscal 2010 is 4.4 million t-$C0_2$, a 12% reduction compared to 1990. Toward this end, the industry will adopt the following principal measures.

- Turning engines off during idling.
- Reducing the amount of rock and soil transported from construction sites.
- Recycling rock and soil dug up at construction sites.
- Reducing the amount of material and machinery transported to construction sites and reducing the amount of construction by-products generated.
- Properly servicing heavy construction vehicles.
- Reducing the by-products of construction activity.
- Turning lights off whenever they are not necessary.
- Promoting use of highly efficient construction-site electrical equipment.
- Reducing instances of excess cooling and heating.
- Promoting reasonable heating and cooling.
- Reasonable use of heaters etc. at construction sites.

Were the voluntary action plan not executed, CO_2 emissions in 2010 would be 4.96 million t-CO_2 , or 1% less than in fiscal 1990.

2. Other efforts to deal with global warming

Measures to deal with greenhouse gases other than CO_2

- HFC: Advice and guidance to owners of equipment on removal methods for such equipment; evaluation and instruction on ways of reducing urethane foam insulation.
- SF_6: Advice and guidance to senior electricians at the commencement of construction; selection of transformers, breakers, etc. that do not use SF_6.

3. Environmental management; environmental conservation in overseas business activities

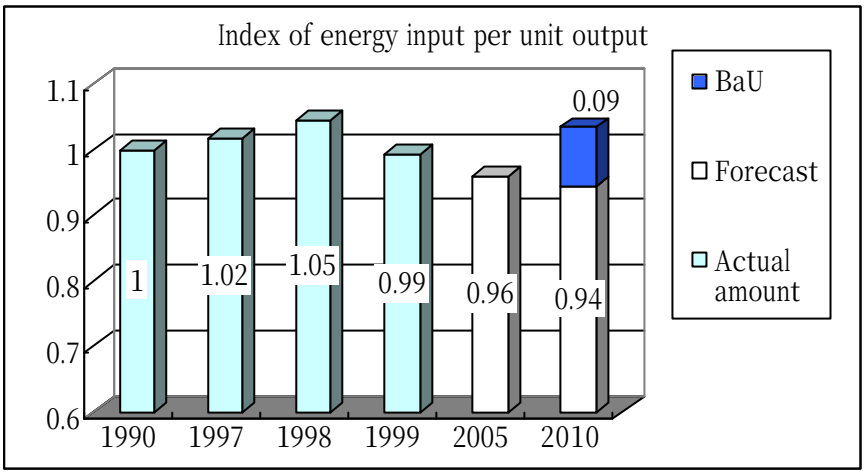
- Establishing environmental management systems by encouraging the spread of ISO 14001 certification

Note: The principal business of the industry is civil engineering-related construction. The participation rate in the current follow-up survey was 0.03% (180 companies out of 580,000 companies), representing 34% of total construction completed by the industry. The forecast for fiscal 2010 assumes that construction volume in the industry will remain unchanged from its level in fiscal 1996.

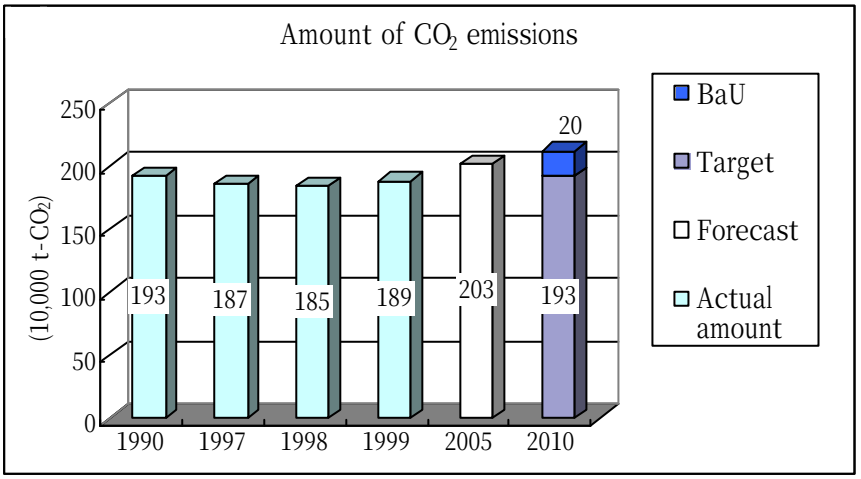
The Japan Rubber Manufacturers Association

Target: To maintain energy input per unit output and total CO_2 emissions at 1990 levels in 2010.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.



Assigning a value of 1 to energy consumption in fiscal 1990, the index of energy input per unit output stood at 1.02 in fiscal 1997, 1.05 in fiscal 1998, and 0.99 in fiscal 1999. The rubber industry is forecasting index values of 0.96 for fiscal 2005 and 0.94 for fiscal 2010.

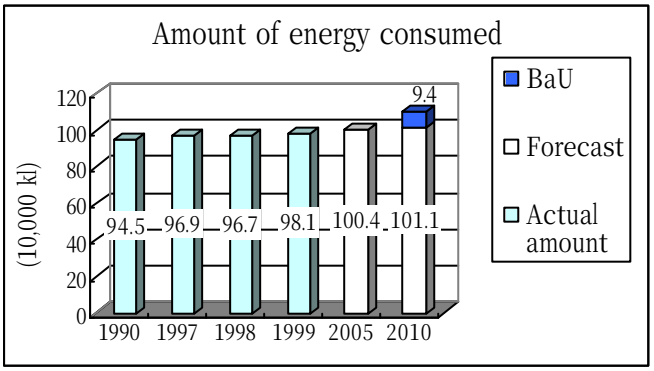
The industry has emitted the following amounts of CO_2: 1.93 million t-CO_2 in fiscal 1990; 1.87 million t-CO_2 in fiscal 1997; 1.85 million t-CO_2 in fiscal 1998; and 1.89 million t-CO_2 in fiscal 1999. It is forecasting emissions of 2.03 million t-CO_2 in fiscal 2005,

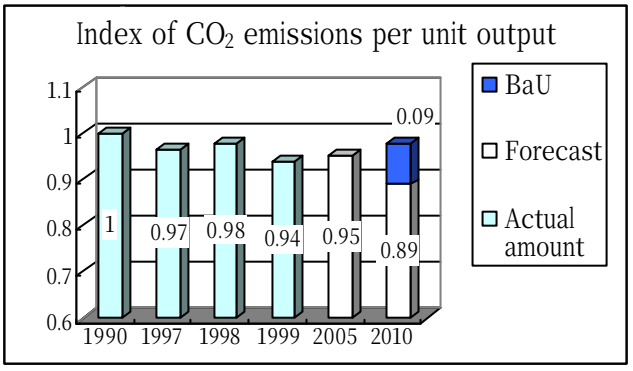
a 5% increase compared to fiscal 1990, and is aiming for emissions of 1.93 million t-CO_2 in fiscal 2010, the same level as in 1990. Toward this end, it has adopted the following principal measures.

- Control of revolutions in motors
- Effective use of waste material
- Recovery of waste heat
- Introduction of cogeneration
- Conversion to other fuels
- Introduction of city gas

Were the voluntary action plan not executed, CO_2 emissions in fiscal 2010 would be 2.13 million t-CO_2, a 10% increase compared to fiscal 1990.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

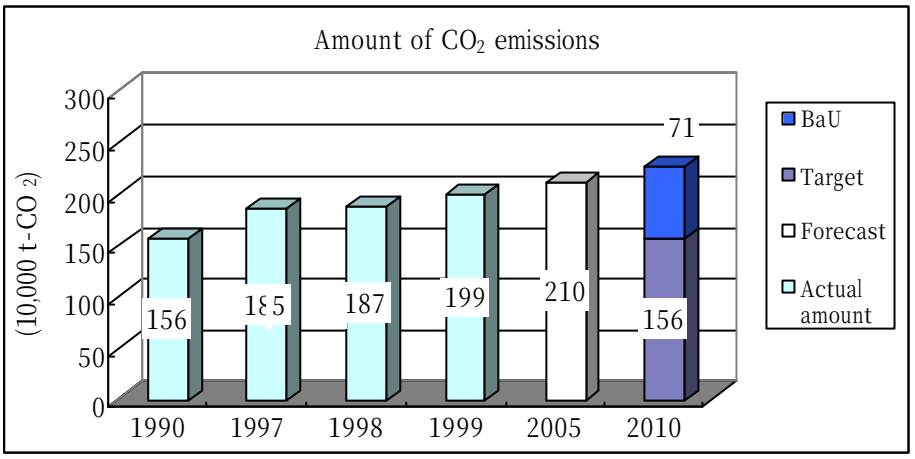
The industry has consumed the following amounts of energy (in terms of crude oil equivalents): 945,000 kl in fiscal 1990; 969,000 kl in fiscal 1997; 967,000 kl in fiscal 1998; and 981,000 kl in fiscal 1999. It is forecasting consumption of 1.004 million kl in fiscal 2005 and 1.011 million kl in fiscal 2010, 6% and 7% more, respectively, than in 1990. Assuming a value of 1 for emissions in fiscal 1990, the index of CO_2 emissions per unit of output stood at 0.97 in fiscal 1997, 0.98 in fiscal 1998, and 0.94 in fiscal 1999. The industry is forecasting index values of 0.95 for fiscal 2005 and 0.89 for fiscal 2010.

Note: The principal products in this industry are automobile tires, conveyor belts, rubber hoses, footwear, etc. The percentage of companies participating in this follow-up survey was 2.9% (23 out of 805 companies), representing a coverage rate of approximately 85% in terms of the consumption of new rubber.

Federation of Pharmaceutical Manufacturers' Association of Japan;
Japan Pharmaceutical Manufacturers Association

Target: To keep the amount of CO_2 emitted by pharmaceutical companies in 2010 at less than the level emitted in 1990.

1. Degree of progress toward goal



The industry has emitted the following amounts of CO_2: 1.56 million t-CO_2 in fiscal 1990; 1.85 million t-CO_2 in fiscal 1997; 1.87 million t-CO_2 in fiscal 1998; and 1.99 million t-CO_2 in fiscal 1999. It attributes the higher emissions in fiscal 1999 to: increases in production output; the establishment of new production facilities; installation of more efficient air conditioning equipment to meet GMP requirements; and renovations and additions to research facilities. Although companies reduced their energy consumption in fiscal 1999 by 13,000 kl in terms of crude oil equivalents, or by 1.2% year-on-year, mainly through installing, operating and improving energy-conserving equipment, this was nullified by the factors noted above, leading to an overall increase for the industry.

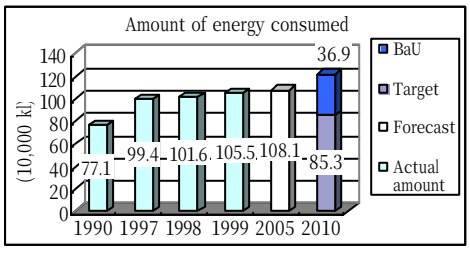
The industry is forecasting CO_2 emissions of 2.10 million t-CO_2 in fiscal 2005, a 35% increase compared to fiscal 1990, and is aiming to achieve an emissions target of 1.56 million t-CO_2 in fiscal 2010, the same level as in 1990. Were the voluntary action plan not executed, CO_2 emissions in 2010 would be 2.27 million t-CO_2 in fiscal 2010, a 46% increase over fiscal 1990. However, the industry is endeavoring to keep emissions of carbonic acid gas at less than the level emitted in 1990. Moreover, 41% of the companies surveyed are assuming that they will be able to lower CO_2 emissions in 2010 to below 1990 levels.

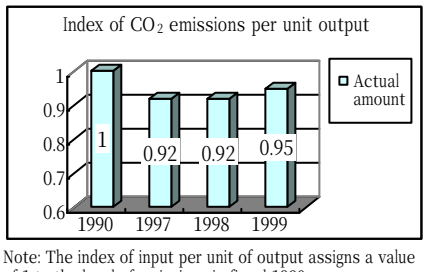
As a result of national policies to cut medical expenditures, reductions in NHI prices, etc., pharmaceutical production appears set to grow only slightly hereafter.

Despite this, CO_2 emissions in fiscal 1999 were 28% higher than in fiscal 1990, indicating that radical measures to reduce energy consumption will be necessary to allow the industry to achieve its target for 2010. To achieve its goals, industry has adopted the following principal measures.

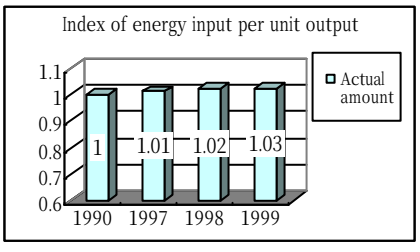
- Conversion to energy-conserving facilities and equipment.
- Introduction of cogeneration facilities (based on careful evaluation of the ability of each facility to conserve energy and reduce emissions of carbonic gas)
- Recovering waste heat, and strengthening the monitoring of energy-saving modes of operation.
- Promoting energy conservation through more effective implementation of environmental management systems.
- Evaluating potential improvements in how air conditioning systems and refrigeration and heating equipment are used, including starting, stopping, and hours of operation.
- Introducing small boilers, and conserving energy through restrictions of their number.
- Converting to fans, mixers, and lights that incorporate inverter technology.
- Installing lighting that is controlled by timers, and turning off lights when they are not required, by using devices that blink automatically.
- Reviewing methods for controlling energy-supply equipment, and adopting efficient methods of operation for such equipment.
- Recovering drained steam, and adopting measures to deal with radiated heat.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

The industry has consumed the following amounts of energy: 771,000 kl in fiscal 1990; 994,000 kl in fiscal 1997; 1.016 million kl in fiscal 1998; and 1.055 million kl in fiscal 1999. Although it is forecasting consumption of 1.081 million kl in 2005, a 40% increase vis-à-vis 1990, it is aiming to achieve consumption of 853,000 kl in 2010. The industry expects its consumption of energy to grow at a slower rate than its emissions of carbonic gas emissions hereafter, and expects the rate of growth in energy consumption to decline. It will continue to evaluate different types of fuels for use in cogeneration, and to endeavor to reduce emissions of carbonic gas.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.92 in both fiscal 1997 and 1998, and at 0.95 in fiscal 1999.

Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 1.01 in fiscal 1997, 1.02 in fiscal 1998, and 1.03 in fiscal 1999.

2. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

- Carrying out joint delivery of products.
- Reducing loads on the environment in each company's transportation division by adopting measures such as: engine stops during idling; appropriate loading for delivery vehicles; and use of low-pollution vehicles.
- Reducing environmental loads by adopting packaging-related measures such as: creating lighter product containers (bottles); using recycled paper; and shifting from plastic to paper.

(2) Measures to deal with greenhouse gases other than CO_2

- Reducing the quantity of leakage from manufacturing equipment
- Finding substitutes for HFC
- Limiting use of HFC
- Future measures
  {1} Use limitations: endeavoring to limit the development, manufacture, and sale of products that use HFC, other than when absolutely necessary for medical purposes.
  {2} Conversion: promoting conversion to products that do not use HFC, such as those that use DPI.
  {3} Recovery and decomposition of HFC: promoting the recovery and decomposition of HFC from inferior products and products that are taken back as returns.

3. Environmental management; environmental conservation in overseas business activities

- As of August 23, 2000, 40 plants and operational centers (of 24 companies) had obtained ISO 14001 certifications, with an additional 14 (representing 7 companies) under evaluation (based on companies belonging to the Japan Pharmaceutical Manufacturers Association).

In their overseas operations, companies naturally endeavor to comply with the

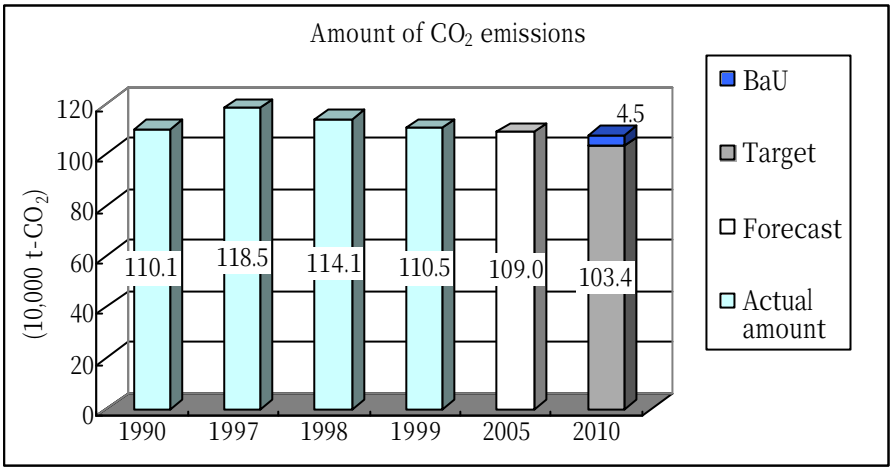
rules and regulations of countries in which they are investing. In addition, based on policies for voluntary actions established by the Japan Pharmaceutical Manufacturers Association, they endeavor to adopt a global perspective in their measures to protect the environment.

Note: The principal product of this industry is pharmaceuticals. The percentage of companies participating in the current follow-up survey was 5.3% (83 out of 1,562 companies), representing a coverage ratio in terms of revenues generated of 88.1%. Forecasts for fiscal 2010 are based on the assumptions of each member company, with the industry not establishing any premises of its own.

Brewers Association of Japan

Target: In fiscal 2010, to reduce CO_2 emissions from beer production at beer plants to 94% of the level in fiscal 1990.

1. Degree of progress toward goal

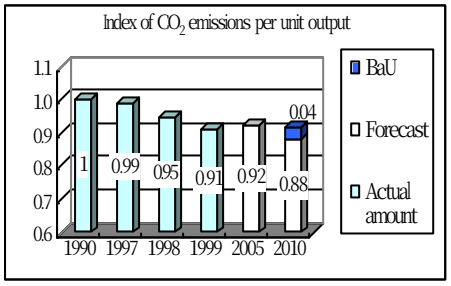


The beer industry has emitted the following amounts of CO_2: 1.101 million t-CO_2 in fiscal 1990; 1.185 million t-CO_2 in fiscal 1997; 1.141 million t-CO_2 in fiscal 1998; and 1.105 million t-CO_2 in fiscal 1999. It is forecasting emissions of 1.090 million t-CO_2 for fiscal 2005, 1% less than in 1990, and is aiming for goal of 1.034 million t-CO_2 for fiscal 2010, 6% less than in 1990. Toward these ends, it has adopted the following principal measures.

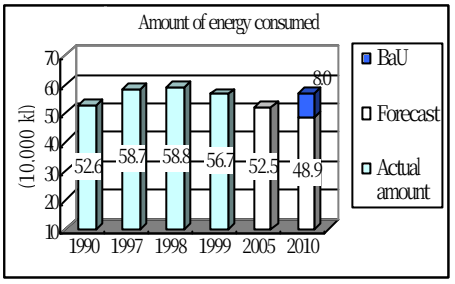
- Installing more efficient anaerobic waste-water processing equipment.
- Recovering waste heat.
- Introducing cogeneration systems.
- Introducing fuel cells.
- Installing non-flon facilities.
- Installing more efficient facilities for capturing and liquefying carbonic acid gas.
- Converting to new fuels.
- Installing more efficient facilities for the capture of CO_2 produced through fermentation.
- Reducing fuel requirements through the installation of new boilers.

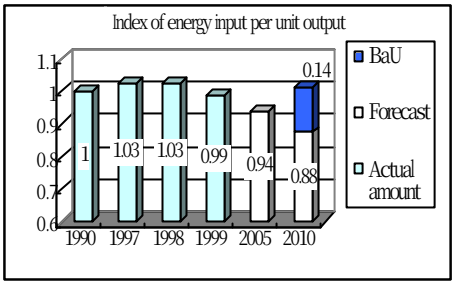
On a business as usual basis, the industry forecasts that CO_2 emissions would be 1.079 million t-CO_2 in fiscal 2010, 2% less than in fiscal 1990.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.99 in fiscal 1997, 0.95 in fiscal 1998, and 0.91 in fiscal 1999. The industry is forecasting index values of 0.92 for fiscal 2005, and 0.88 for fiscal 2010. It has recorded the following amounts of energy consumption (in terms of crude oil equivalents): 526,000 kl in fiscal 1990; 587,000 kl in fiscal 1997; 588,000 kl in fiscal 1998; and 567,000 kl in fiscal 1999. The industry is forecasting consumption of 525,000 kl in 2005 and 489,000 kl in 2010, 0.2% and 7% less, respectively, than in 1990. Were a voluntary action plan not executed, the forecast for energy consumption in fiscal 2010 would be 569,000 kl, an 8% increase compared to fiscal 1990. Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 1.03 in fiscal 1997, 1.03 in fiscal 1998, and 0.99 in fiscal 1999. The industry is forecasting index values of 0.94 for fiscal 2005 and 0.88 for fiscal 2010.

2. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

The industry has adopted the following measures that contribute to the transportation, offices and households sector.

- Shift to lighter cans and bottles.
- Shift to lighter packaging materials such as cardboard.
- Movement to promote the stoppage of engines by trucks during idling.
- Reduction of CO_2 through joint delivery of products.

(2) Measures to deal with greenhouse gases other than CO_2

- Installation of non-flon equipment.
- Strict adherence to procedures to capture unnecessary flon.

3. Environmental management; environmental conservation in overseas business activities

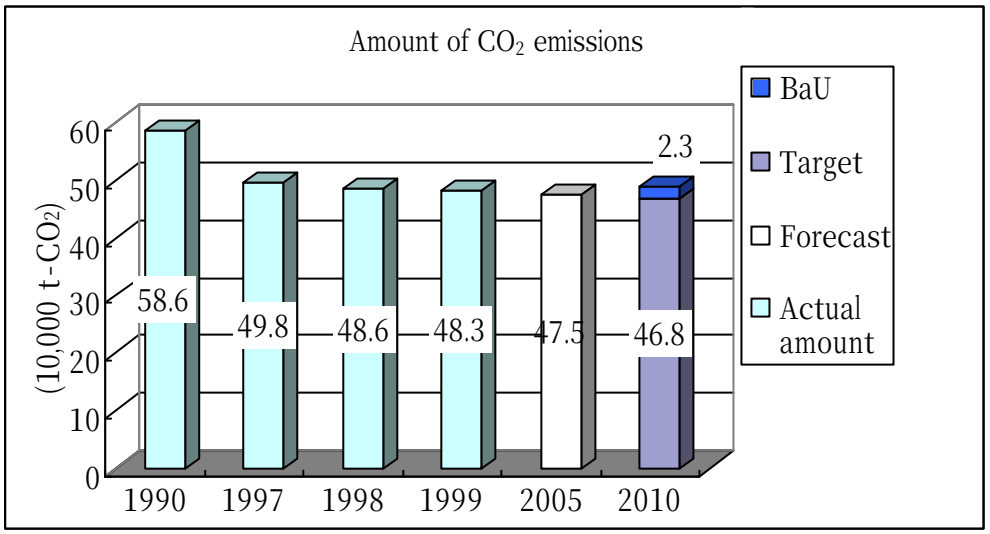
- Obtaining ISO 14001 certification at individual plants
- Issuing environmental reports; adoption of environmental accounting.

Note: The principal product of the industry is beer (including *happoshu* beer substitutes). The percentage of companies participating in this follow-up survey was 80% (4 out of 5 companies), representing a coverage ratio in terms of revenues of 99%. For fiscal 2010, the industry is projecting a 6.9% increase in production compared to fiscal 1990.

Japan Sugar Refiners' Association

Target: To reduce industry emissions of CO_2 in 2010 by 20%compared to the level in fiscal 1990.

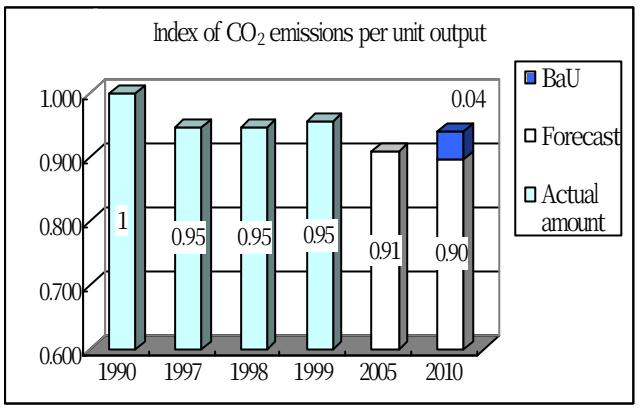
1. Degree of progress toward goal



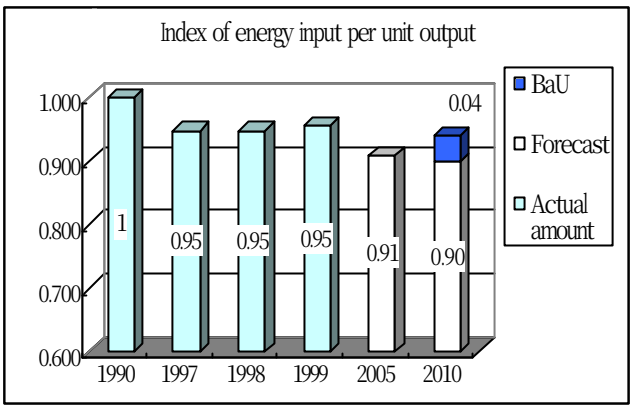
The sugar refining industry has recorded the following amounts of CO_2 emissions: 586,000 t-CO_2 in fiscal 1990; 498,000 t-CO_2 in fiscal 1997; 486,000 t-CO_2 in fiscal 1998; and 483,000 t-CO_2 in fiscal 1999. It attributes the year-on-year decline in emissions in fiscal 1999 to improvements in the efficiency of energy use. It is forecasting emissions of 475,000 t-CO_2 in fiscal 2005, a 19% decline compared to 1990, and has set as its target emissions of 468,000 t-CO_2 in fiscal 2010, a 20% reduction compared to 1990. The industry will adopt the following major measures for achieving these targets: change of fuels; installation of individual steam recompression-type concentrators; installation of vacuum crystallizers with attached agitators; introduction of automatic boiling in conjunction with vacuum crystallizers; introduction of cogeneration facilities; introduction of steam accumulators; control of revolutions in motors using inverters; recovery of waste heat from boilers; adding turbochargers to compressors; change to energy-saving transformers; installation of absorption-type air-conditioning equipment; introduction of vacuum breaking devices; preservation of heat in steam pipes.

Were the voluntary action plan not executed, emissions would be 491,000 t-CO_2 in 2010, or 16% less than in 1990.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

Assuming a value of 1 for the CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit of output remained constant at 0.95 in fiscal years 1997, 1998, and 1999. The industry is forecasting index values of 0.91 for fiscal 2005 and 0.90 for fiscal 2010.

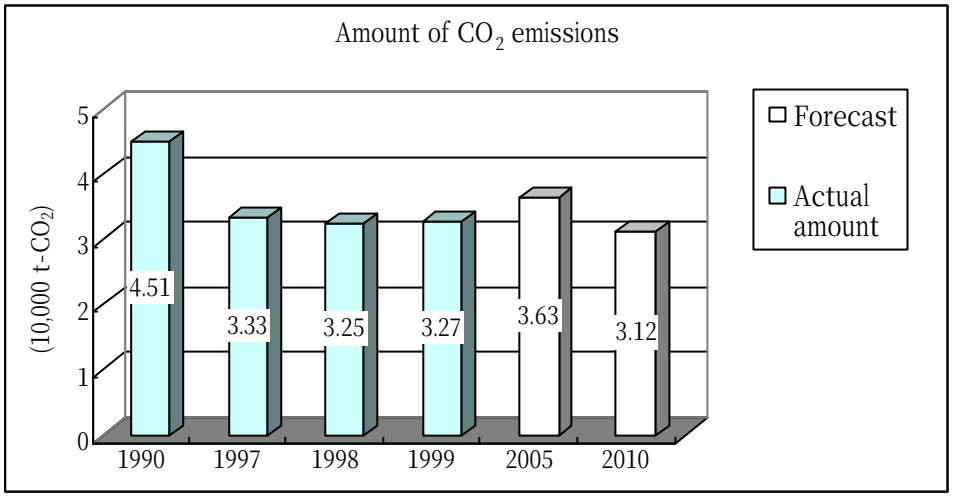
Assuming a value of 1 for energy consumption in fiscal 1990, the index of energy input per unit output remained constant at 0.95 in fiscal years 1997, 1998, and 1999. The industry is forecasting index values of 0.91 for fiscal 2005 and 0.90 for fiscal 2010.

Note: The principal product for this industry is sugar. The percentage of companies participating in this follow-up survey was 90.5% (19 out of 21 companies), representing a coverage ratio for energy consumed by the industry of 99%. In calculating its forecasts for fiscal 2010, the industry assumed that sugar consumption would remain stable through fiscal 2010, with perhaps a slightly upward bias, and that production and energy efficiency would improve.

Japan Association of Rolling Stock Industries

Target: To reduce CO_2 emissions in fiscal 2010 by 10% compared to fiscal 1990.

1. Degree of progress toward goal



The rolling stock industry has emitted the following amounts of CO_2: 45,100 t-CO_2 in fiscal 1990; 33,300 t-CO_2 in fiscal 1997; 32,500 t-CO_2 in fiscal 1998; and 32,700 t-CO_2 in fiscal 1999. It is forecasting emissions of 36,300 t-CO_2 for fiscal 2005 and 31,200 t-CO_2 for fiscal 2010, 20% and 31% less, respectively, than in fiscal 1990. Toward these ends, it has adopted the following principal measures.

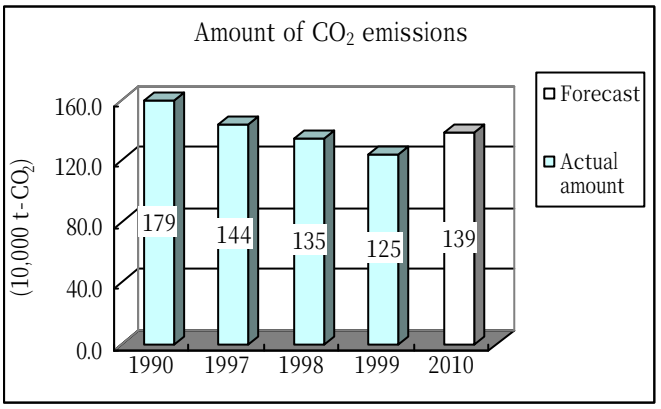
- Conversion of production equipment and machinery
- Preventing leakage of air and steam; control of temperatures in heating and air conditioning systems
- Conversion of fuels used in heating facilities
- Selection of highly energy-efficient equipment for new installations and replacements
- Conversion to municipal gas for the fueling of boilers
- Appropriate utilization of existing facilities

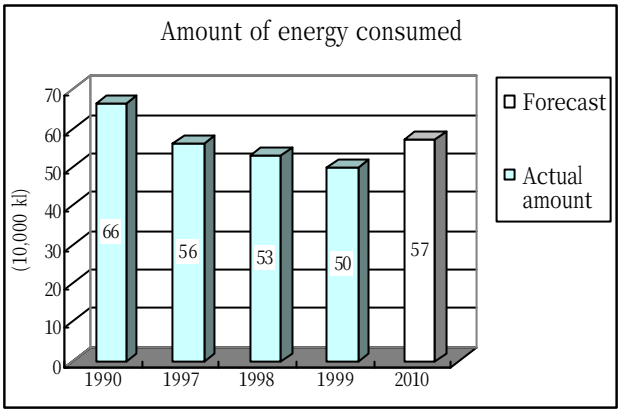
Note: The principal product of this industry is rolling stock. The rate of participation in this follow-up survey was 17% (7 out of 42 companies), representing a coverage rate in terms of revenue of 58%. In its forecast of production in 2010, the industry assumed slightly higher production for both the domestic and export markets.

Japan Glass Bottle Association

Target: In relation to manufacturing processes, to reduce CO_2 emissions and energy consumption in 2010 by more than 10% compared to levels in 1990.

1. Degree of progress toward goal





Note: Emissions include CO_2 emitted from industrial processes.

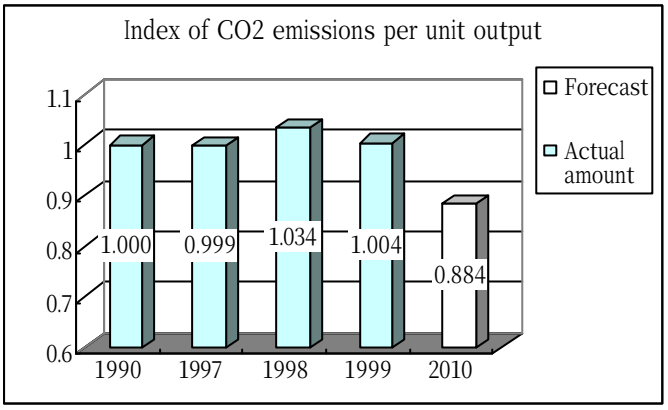
The glass bottle industry has emitted the following amounts of CO_2: 1.79 million t-CO_2 in 1990; 1.44 million t-CO_2 in 1997; 1.35 million t-CO_2 in 1998; and 1.25 million t-CO_2 in 1999. It is forecasting emissions of 1.39 million t-CO_2 in 2010, 22% less than in 1990. It attributes the decline in emissions in 1999 to its ability to increase rates of use of cullet, promote the production of eco-bottles, encourage the shift to lighter glass bottles, and convert factory fuels to LNG.

The energy has consumed the following amounts of energy (in terms of crude oil equivalents): 660,000 kl in 1990; 560,000 kl in 1997; 530,000 kl in 1998; and 500,000 kl in 1999. It is forecasting energy consumption of 570,000 kl in 2010, a 14% decline compared to 1990.

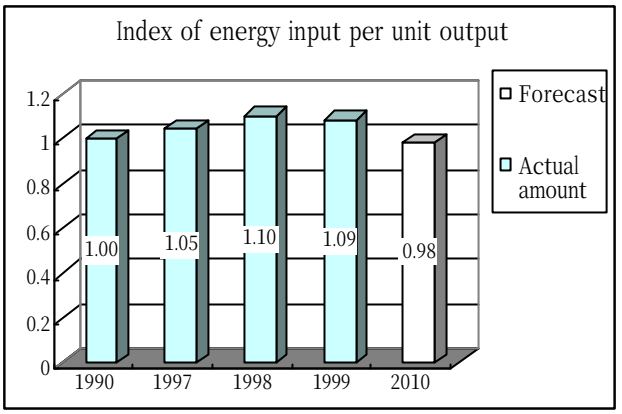
Toward this end, the industry is adopting the following principal measures.

- Increasing the rate of use of cullet.
- Promoting the production of eco-bottles.
- Encouraging a shift to lighter glass bottles.
- Improving yields of glass bottle production processes
- Converting factory fuels to LNG.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990

The index of CO_2 emissions per unit of output, based on a value of 1 for emissions in 1990, stood at: 0.999 in 1997; 1.034 in 1998; and 1.004 in 1999. The industry is forecasting an index value of 0.884 for 2010.

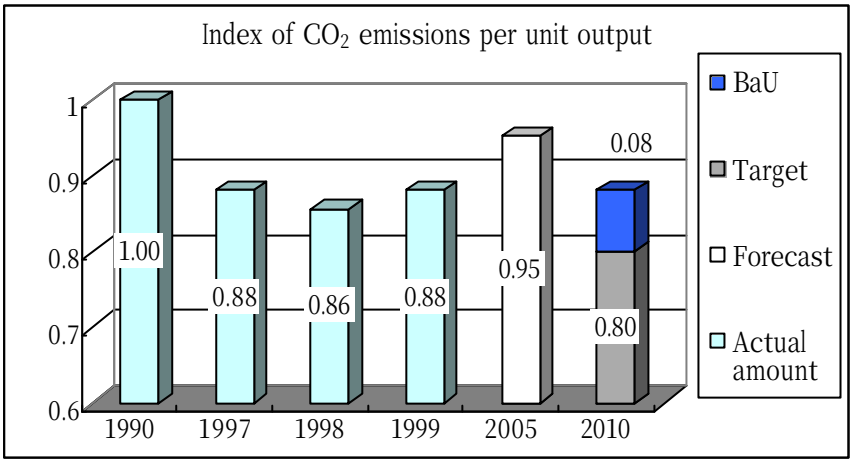
On the other hand, the index of energy input per unit of output, based on a value of 1 for energy consumption in 1990, stood at: 1.05 in 1997; 1.10 in 1998; and 1.09 in 1999. The industry is forecasting an index value of 0.98 for 2010.

Note: The principal product of the industry is glass bottles. Twenty companies participated in the current follow-up survey (7 members of the Japan Glass Bottle Association, and 13 other glass bottle manufacturers), representing a coverage ratio in terms of production output and revenues of approximately 90%. The production forecast for 2010 assumes that production of glass bottles will increase by 1% per year after 1997.

Federation of Electric Power Companies

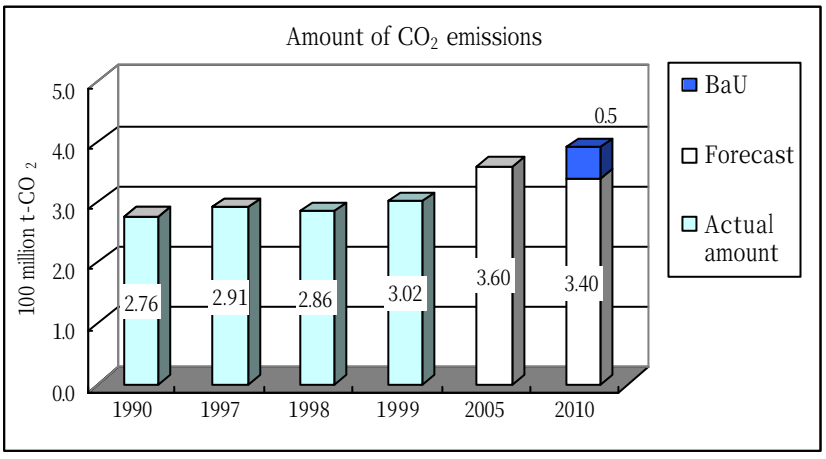
Target: To endeavor to reduce CO_2 emissions per unit of output in the electric power industry by around 20% of the level of 1990 in fiscal 2010 (to around 0.3 kg-CO_2/kWh).

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990 (and uses emissions per unit output on a end-use electricity basis).

2. Amount of CO_2 emissions



The electric power industry has emitted the following amounts of CO_2 per unit of output: 0.42 kg-CO_2/kWh in fiscal 1990; 0.37 kg-CO_2/kWh in fiscal 1997; 0.36 kg-CO_2/kWh in fiscal 1998; and 0.37 kg-CO_2/kWh in fiscal 1999. It is forecasting emissions of 0.4 kg-CO_2/kWh for fiscal 2005, and is aiming to reduce emissions by around 20% of the 1990 level in fiscal 2010 (to around 0.3 kg-$C0_2$/kWh). CO_2 emissions per unit of output increased in fiscal 1999 primarily because the amount of electric power

accounted for by nuclear energy declined (percentage of electric power accounted for by nuclear power in fiscal 1998: approximately 37%→ percentage from nuclear power in fiscal 1999: approximately 35%). The reason for the higher CO_2 emissions per unit of output in fiscal 2005 compared to fiscal 1999 is also a lower percentage of electric power generated by nuclear energy.

The electric power industry will adopt the following measures for achieving these targets.

- Expanded use of non-fossil energy (increased utilization of nuclear and LNG thermal power generation, and the development and dissemination of renewable natural sources of energy)
- Improved efficiency of power generation facilities (improving efficiency of thermal power plants, reducing loss rates from electricity transmission)

The industry is also committed on a medium-term basis to the task of developing new technologies for the recovery, disposal, fixing, and effective use of CO_2.

The electric power industry has emitted the following amounts of CO_2: 276 million t-CO_2 in fiscal 1990; 291 million t-CO_2 in fiscal 1997; 286 million t-CO_2 in fiscal 1998; and 302 million t-CO_2 in fiscal 1999. It attributes the increase in CO_2 emissions in fiscal 1999 to a 2.2% year-on-year increase in demand for electric power and, again, to a lower ratio of power generation via nuclear energy. It is forecasting emissions of 360 million t-CO_2 in fiscal 2005 and 340 million t-CO_2 in fiscal 2010, 30% and 23% more, respectively, than in 1990. With 1990 as the base year, it is forecasting that while electric power output will increase by about 1.5 times in 2010, it will be possible to hold CO_2 emissions down to about 1.2 times increase in that year.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

By improving the rate of CO_2 emissions per unit of output, the industry is estimating that emissions in the transportation, offices and household sector will be reduced by approximately 18 million t-CO_2 in 2010.

(2) Measures to deal with greenhouse gases other than CO_2

The industry will take every possible step to reduce emissions of greenhouse gases other than CO_2, focusing on implementation of recovery and reutilization measures such as those indicated below (total emissions from the electric power industry of the five gases in question amount to roughly 1/200th of the amount of CO_2 emissions generated by the industry).

- SF_6: Suppressing emissions during equipment servicing and disposal through the establishment of recovery and reutilization systems (by 2005, reducing the percentage of emissions to around 3% during servicing, and to around 1% during disposal).
- HFC: Suppressing emissions by cooperating in efforts to prevent leakage when facilities are being installed or repaired, and to recover and reuse gases that escape.
- PFC: Although the industry uses liquid PFC as a coolant and insulator in some of its transformers, the chemical is easy to collect and reutilize. PFC thus does not escape into the atmosphere when machinery is being scrapped, nor, of course, during normal operations.
- N_2O: Every attempt is being made to suppress emissions through improvements in thermal efficiency (the industry assumes that emissions of N_2O from fuel combustion at thermal power plants account for approximately 2% of total emissions in Japan).
- CH_4: The concentration of CH_4 in gas emitted from thermal power plants is less than the concentration of CH_4 in the atmosphere, so the industry is not generating any real emissions.

(3) Involvement in AIJ etc.

The industry's involvement in Activities Implemented Jointly includes projects in Indonesia (equipping solar power plants and building small hydraulic power stations); it is also involved in an afforestation project (Australia), and participates the World Bank's Prototype Carbon Fund and the carbon fund of the European Bank for Reconstruction and Development.

4. Environmental management; environmental conservation in overseas business activities

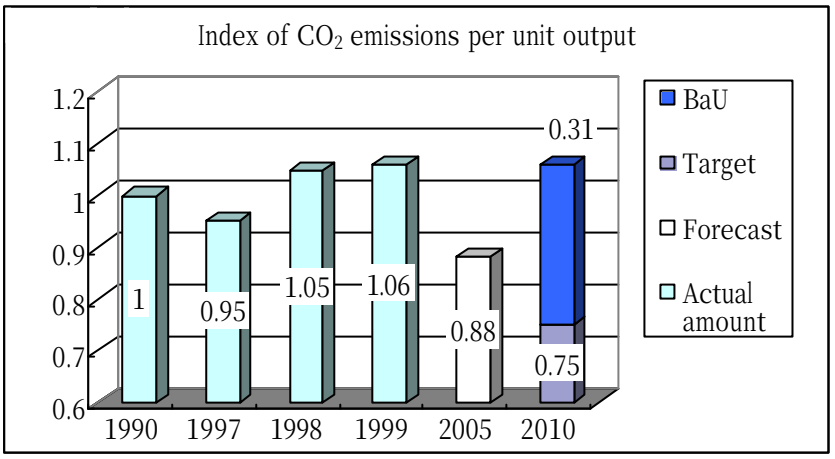
- Besides establishing internal environmental management systems, companies are publicizing their respective activities on environmental conservation through publications such as the "Environmental Action Report."
- As the acquisition of ISO 14000 series certification by a number of companies indicates, the industry is stepping up its efforts to reduce environmental loads.
- In its overseas projects to date, the industry has always adopted measures to conserve the environment; it will continue to fully heed the needs of the environment in its future overseas business activities.

Note: The principal product of the industry is electricity. The percentage of companies participating in this follow-up survey was 100% (12 companies), representing a coverage ratio for energy consumed of 100%. In its forecast for fiscal 2010, the industry has assumed electric power demand of 1 trillion kWh.

Communications Industry Association of Japan; Electronic Industries Association of Japan; Japan Electronic Industry Development Association

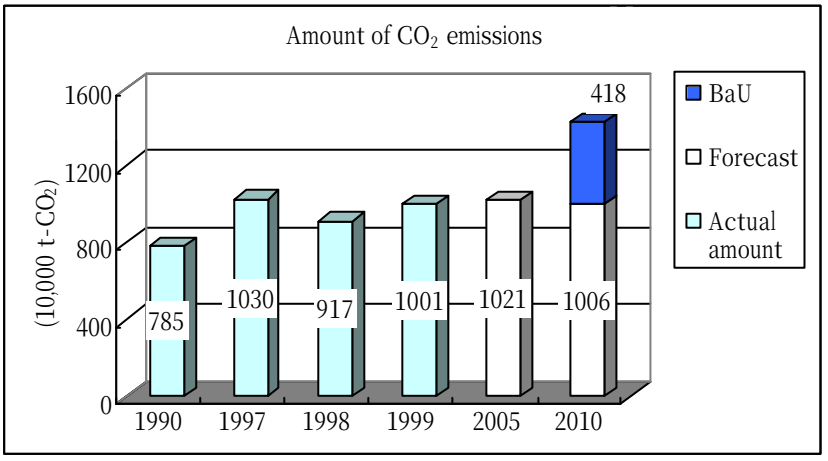
Target: To improve CO_2 emissions per unit output by over 25% of the fiscal 1990 level by 2010.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

2. CO_2 emissions

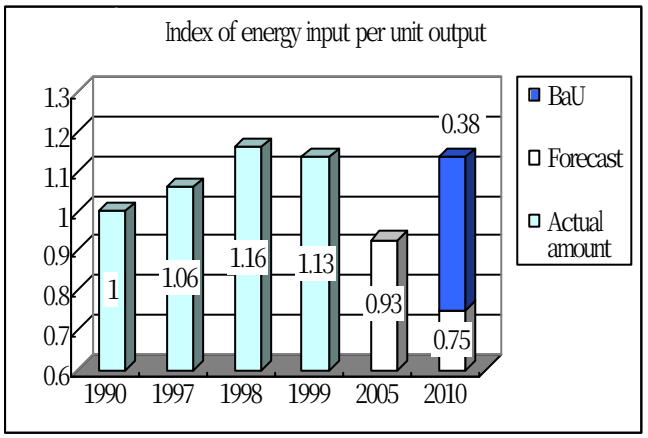


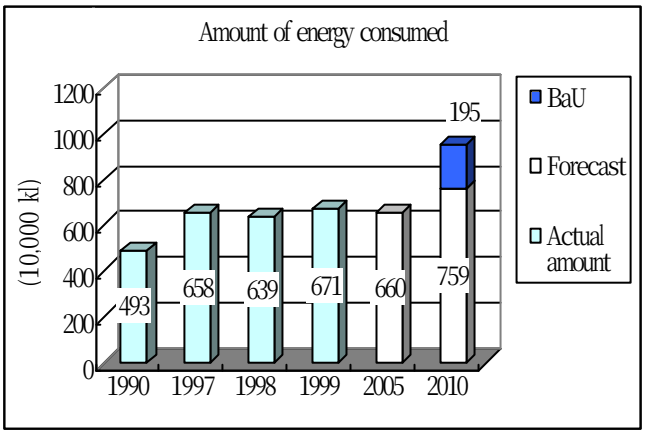
Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit of output stood at 0.95 in fiscal 1997, 1.05 in fiscal 1998, and 1.06 in fiscal 1999. The industries are forecasting an index value of 0.88 for fiscal 2005, and are aiming for a target value of 0.75 for fiscal 2010. Although CO_2 emissions increased in fiscal 1999 as a result of greater production output, CO_2 emissions per unit of output remained unchanged from 1998 as a result of energy conservation efforts on the part of individual companies. To achieve their goals, the industries have adopted the following principal measures.

- Promoting the employment of highly efficient devices.
- Improving production and manufacturing processes.
- Promoting the use of waste heat.
- Promoting control of number of revolutions.
- Promoting the use of new and unused forms of energy.
- Strengthening managerial control

The industries have emitted the following amounts of CO_2: 7.85 million t-CO_2 in fiscal 1990; 10.30 million t-CO_2 in fiscal 1997; 9.17 million t-CO_2 in fiscal 1998; and 10.01 million t-CO_2 in fiscal 1999. They are forecasting total emissions of 10.21 million t-CO_2 in fiscal 2005 and 10.06 million t-CO_2 in fiscal 2010, 30% and 28% increases, respectively, compared to fiscal 1990. Were the voluntary action plan not executed, CO_2 emissions would be 14.24 million t-CO_2 in 2010, 81% higher than in 1990.

Reference data





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit of output stood at 1.06 in fiscal 1997, 1.16 in fiscal 1998, and 1.13 in fiscal 1999. The industries are forecasting an index value of 0.93 in fiscal 2005 and one of 0.75 in fiscal 2010. They have recorded the following amounts of energy consumption: 4.93 million kl in fiscal 1990; 6.58 million kl in fiscal 1997; 6.39 million kl in fiscal 1998; and 6.71 million kl in fiscal 1999. Their forecasts for consumption for fiscal 2005 and 2010 are 6.60 million and 7.59 million, respectively.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and household sector (effect of products and services)

Effect of improvements in annual amount of electricity consumed per television set: with 1996 as the base year, 21k/Wh per year through 2003 → (2.058 kg-CO_2) X 100 million sets = 205,800 t-CO_2

(2) Measure to deal with greenhouse gases other than CO_2

The industries have taken steps to suppress emissions of PFCs and SF_6. Their goal with respect to PFC (liquid), which is used to wash electronic components, is to reduce total emissions in fiscal 2010 by in excess of 60% of the amount emitted in fiscal 1995. And, as a result of substituting other substances for PFC and of taking steps to increase recovery rates, PFC emissions in fiscal 1999 were held at the same level as fiscal 1995. Despite efforts to reduce the amounts of PFC and SF_6 used in the manufacture of semiconductors and liquid crystal displays (by improving the efficiency of gas utilization, substituting other gases, and installing gas removal devices), total emissions have increased as a result of greater production output. In the area of semiconductors, the industries have adjusted their targets for emissions reductions to make them consistent with the international objectives agreed upon at the World Semiconductor Conference. Thereupon, they have restated their goals for reduction of these gases to figures expressed in terms of total amount of emissions (GWP conversion), replacing goals expressed as standard inputs per unit of output prior to the adjustments, and are now aiming to reduce emissions on this basis by 10% or more in fiscal 2010 compared to fiscal 1995.

3. Environmental management; environmental conservation in overseas business activities

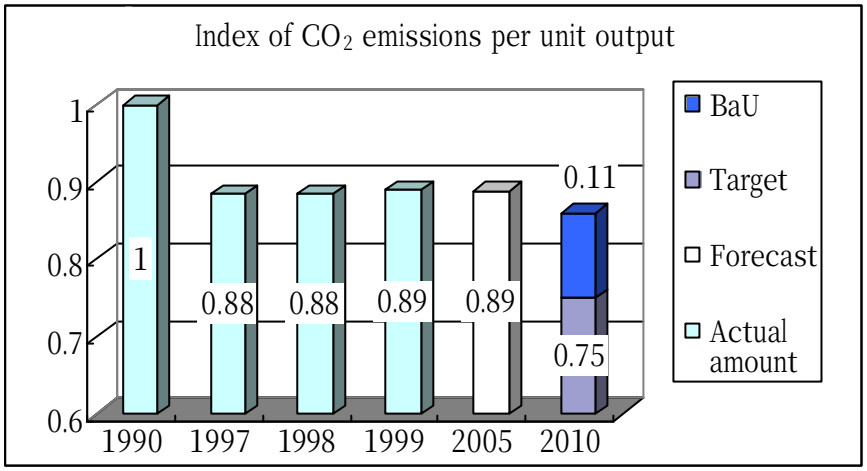
Domestically, the percentage of production and operational centers that have received ISO 14001 certification in the electrical machinery industry is approximately 27% (4,131 locations; as of July 2000); overseas, among Japanese firms in Asia (which account for roughly 70% of all overseas Japanese production ventures), the percentage of companies with ISO 14001 certification has reached approximately 30%. Moreover, approximately 48% of all Japan-related companies in Asia were reported to be making preparations for certification (see "Asian Companies with Japanese Equity Ties Making Allowances for the Environment," June 1999). Companies that have already been certified are taking systematic steps to reduce environmental loads (see "Environmental Measures and Environmental Issues Faced by Japanese-related Asian Companies," Japan Association of Machinery Exporters, September 2000).

Note: The principal products of this industry are electronic devices for civilian use, electronic equipment for industrial use, electronic components, and electronic devices (telephones, facsimiles, televisions, VCRs, electronic components, semiconductors, liquid crystal displays, computers, etc.). The percentage of companies in the industry participating in this follow-up survey was approximately 66% (387 of 590 companies), representing a coverage ratio for energy consumed between 70-80%. The forecasts for fiscal 2010 assume that production value will grow by an annual rate of 2.72%.

Japan Electrical Manufacturers' Association

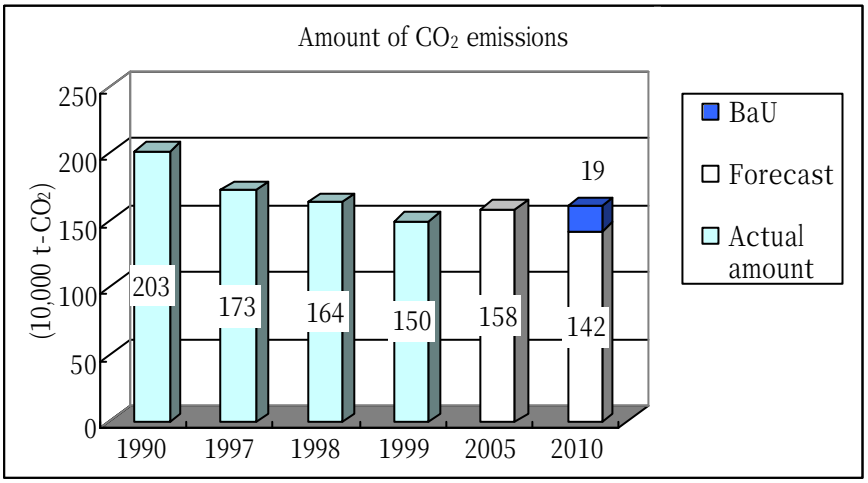
Target: By 2010, energy conservation in production will be improved to 25% below the 1990 level in terms of CO_2 emissions per unit of production value.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

2. Amount of CO_2 emissions



Assuming a value of 1 for CO_2 emitted in fiscal 1990, the index of CO_2 emissions per unit output at factories (plants and other operational sites) stood at 0.88 in both fiscal 1997 and 1998, and at 0.89 in fiscal 1999. The industry is forecasting an index value of 0.89 for fiscal 2005, and is aiming for a target value of 0.75 for fiscal 2010. Toward this end, it will adopt the following principal measures.

(1) Introduction of highly efficient instruments and equipment (methodically

introduced at time of equipment replacement)

(2) Introduction of instruments and equipment that use new forms of energy or previously unused forms of energy (introductions will accelerate as a result of improvements to social infrastructure)

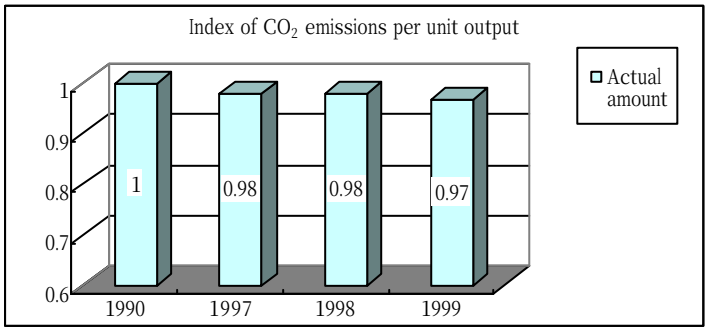
(3) Conversion to other sources of energy; improving methods of monitoring energy consumption

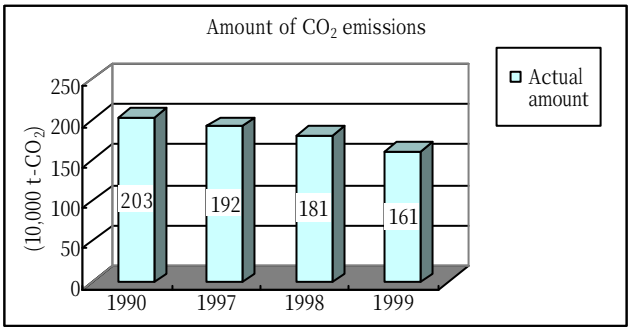
(4) Building highly efficient production systems (conversion to manufacturing lines designed for high productivity)

(5) Energy conservation measures for offices

Projecting from trends in the above index of CO_2 emissions per unit output at factories, the electrical manufacturing industry has emitted the following amounts of CO_2: 2.03 million t-CO_2 in fiscal 1990; 1.73 million t-$C0_2$ in fiscal 1997; 1.64 million t-$C0_2$ in fiscal 1998; and 1.50 million t-CO_2 in fiscal 1999. The decline in CO_2 emissions in fiscal 1999 occurred amid deteriorating business conditions that saw a reduction in production value. Even so, this decline in emissions also reflected continuous efforts in energy conservation on the part of industry, which led to energy consumption being reduced at a faster rate than the decline in production value. In terms of the index of energy consumption per unit of production value, a measurement of the effects of the industry's voluntary efforts, the results in fiscal 1999 were approximately 3% better than in fiscal 1998, and approximately 6% better than in fiscal 1990. The industry is forecasting emissions of 1.58 million t-CO_2 in fiscal 2005 and of 1.42 million t-CO_2 in fiscal 2010, representing 22% and 30% declines, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, emissions would be 1.61 million t-CO_2 in 2010, or 21% less than in 1990.

Reference data





Note: Actual emissions, based on the assumption that CO_2 emissions from purchased electricity per unit output (on an end-use electricity basis) are fixed at actual amounts in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output was 0.98 in both fiscal 1997 and 1998, and 0.97 in fiscal 1999. The industry has recorded the following actual amounts of CO_2 emissions: 2.03 million t-CO_2 in fiscal 1990; 1.92 million t-CO_2 in fiscal 1997; 1.81 million t-CO_2 in fiscal 1998;

and 1.61 million t-CO_2 in fiscal 1999.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

Development and promotion of energy-conserving household appliances

With new standards for efficiency of energy consumption ("top runner" standards) under the revised energy conservation law now applying to household refrigerators (models designed to meet restrictions on designated chlorofluorocarbons), companies are taking steps to achieve these new standards.

Use of non-fossil fuels; developing and providing a stable supply of high-efficiency generators and equipment (including also high-efficiency instruments and equipment for industrial use)

With respect to the following, the industry is carrying out R & D on implementation of new technologies; it is also promoting improvements in efficiency and sophistication of existing technologies and taking steps to assure a stable supply of such improved existing technologies.

- Nuclear power generating systems
- Highly efficient thermal power plants, including combined cycle plants.
- Power generation systems fueled by new energy sources (sunlight, fuel cells, wind power, etc.).
- Highly efficient devices for industrial use (industrial use motors, transformers, engine speed control devices, etc.).

(2) Measures to deal with greenhouse gases other than CO_2

Controlling emissions of HFC from household refrigerators

- Reducing leakage during manufacturing to less than 0.5% of amount used by 2000.
- Establishing the capability to dispose of 100% of the used household refrigerators that are turned in to manufacturers after the Household Appliance Recycling Law takes effect (2001).

Controlling emissions of SF_6 insulation

- In relation to leakage prevention during manufacturing, reducing emissions to less than 3% of net purchased amounts by 2005 (a 30% emissions rate in 1995, which was improved to an 18% emissions rate in 1999)
- Recovering and reusing gas through strengthening and renovating facilities, and through carefully reviewing production procedures, etc.

4. Environmental management; environmental conservation in overseas business activities

The ratio of plants and other operational sites that have received ISO 14001 certification in the domestic electrical machinery industry is now around 27% of a total of 4,131 sites in operation (as of July 2000). This same ratio in terms of Japanese-related firms operating in Asia (which account for approximately 70% of firms doing business abroad in the industry) is now approximately 30%. In addition, approximately 48% of the firms in the industry are undertaking preparations for certification. The firms that have been certified are taking steps to reduce loads on the environment in a methodical and systematic fashion.

Note 1. The calculation of the various indices takes into consideration actual emissions in fiscal 1999; assumptions regarding value of production (i.e., that this value will increase by 1% per year starting in fiscal 2000); an average annual 1% improvement (i.e., achievement of non-binding targets under the Energy Conservation Law) in energy per unit of production value, beginning in fiscal 2000; and improvements in the end use-electricity coefficient for CO_2 emissions per unit of input of electric power. Moreover, we have fixed the electrification ratio (= CO_2 emissions from purchased electricity/total CO_2 emissions) for all succeeding years at the actual rate for fiscal 1999.

Note 2. For business as usual, we assumed that it would not be possible to achieve the non-binding 1% average annual improvements in energy per unit of production starting in fiscal 2000 that are called for under the Energy Conservation Law, and have assumed in its place continuation of the level achieved in fiscal 1999.

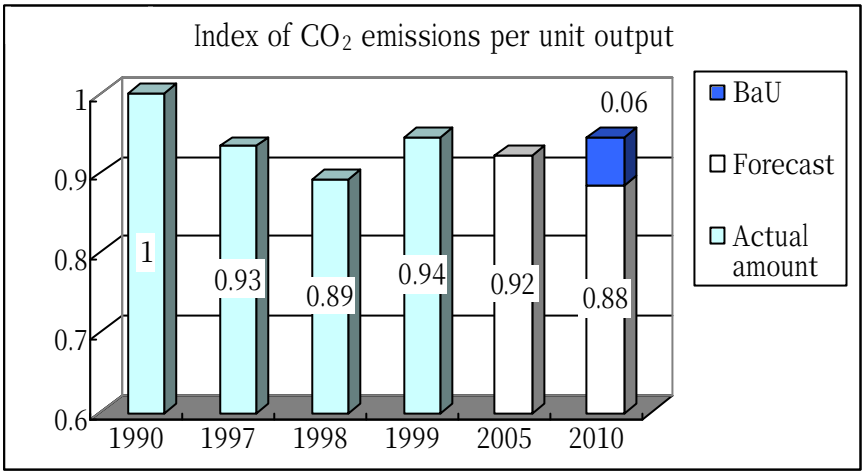
Note 3. The number of companies participating in this follow-up survey was 80, representing a coverage ratio for energy consumed of approximately 80%.

Note 4. Increases in fuel expended by plants as a result of adoption of cogeneration systems have been added to amounts of energy consumed for purposes of calculating energy input per unit of output and CO_2 emissions. Therefore, when using average CO_2 emissions per unit of production on an all power-sources basis, the incorporation of cogeneration systems results, ironically, in an increase in CO_2 emissions. Because methods of assessing CO_2 emissions relating to the introduction of cogeneration systems are not yet established at this point, we have provided the data for this current follow-up without revision.

Japan Camera Industry Association

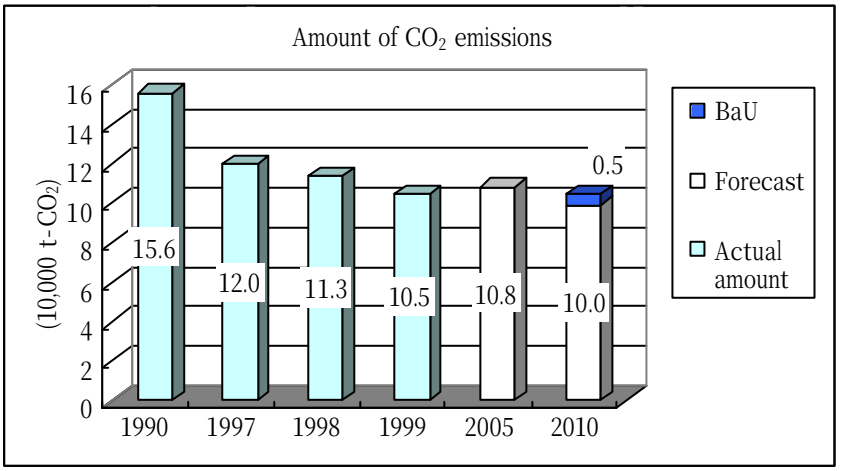
Target: To reduce the index of CO_2 emissions per unit of output (based on 1990 price levels) in fiscal 2010 by 10% compared to fiscal 1990.

1. Degree of progress toward goal



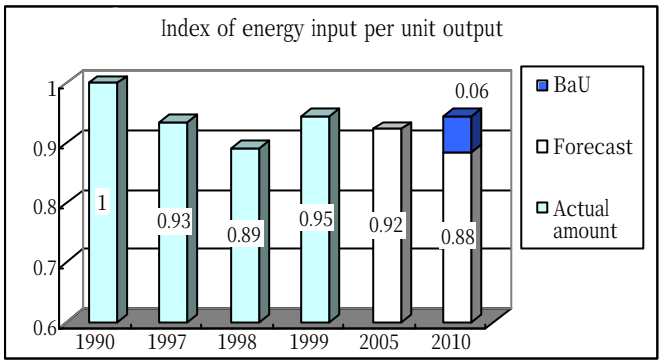
Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

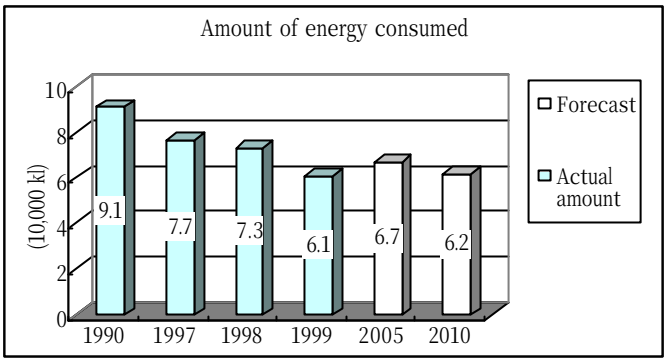
2. Amount of CO_2 emissions



Assuming a value of 1 for amounts emitted in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.93 in fiscal 1997, 0.89 in fiscal 1998, and 0.94 in fiscal 1999. The camera industry is forecasting index values of 0.92 in fiscal 2005 and 0.88 in fiscal 2010. It has emitted the following amounts of CO_2: 156,000 t-CO_2 in fiscal 1990; 120,000 t-CO_2 in fiscal 1997; 113,000 t-CO_2 in fiscal 1998; and 105,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 108,000 t-CO_2 in fiscal 2005 and 100,000 t-CO_2 in fiscal 2010, 31% and 36% less, respectively, than in 1990. Were a voluntary action plan not executed, emissions would be 105,000 t-CO_2 in 2010, a 33% decrease vis-à-vis 1990.

Reference data





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990

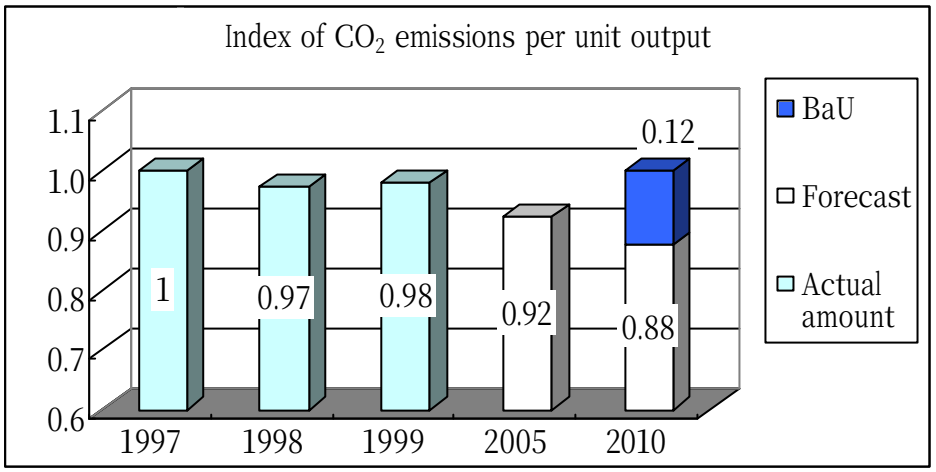
Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 0.93 in fiscal 1997, 0.89 in fiscal 1998, and 0.95 in fiscal 1999. The industry is forecasting index values of 0.92 for fiscal 2005 and 0.88 for fiscal 2010. It has consumed the following amounts of energy: 91,000 kl in fiscal 1990, 77,000 kl is fiscal 1997, 73,000 kl in fiscal 1998, and 61,000 kl in fiscal 1999. It is forecasting energy consumption of 67,000 kl in fiscal 2005 and 62,000 kl in fiscal 2010, 26% and 32%, respectively, less than in 1990. Were a voluntary action plan not executed, energy consumption in fiscal 2010 would be 61,000 kl, a 33% reduction compared to fiscal 1990.

Note: The principal products of the Japan Camera Industry Association are cameras and replacement lenses. For each year in the survey, the industry uses as its carbon conversion coefficient for electric power the figure of 0.102 kg-C/kWh. Seventy-one percent of the companies belonging to the Japan Camera Industry Association's Committee on the Environment (12 out of 17 companies) participated in this follow-up survey. CO_2 emissions for the industry are an extrapolated estimate of amounts reported by these companies, with this estimate considered to be 100% of the industry's emissions.

Japan Society of Industrial Machinery Manufacturers

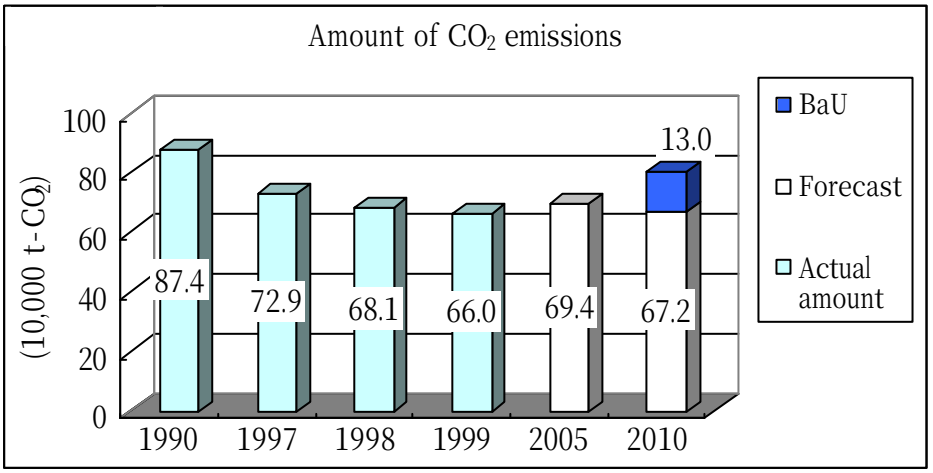
Target: To endeavor to reduce CO_2 emissions from production processes by over 1% a year on a per unit of output basis.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1997.
Forecasts for CO_2 emissions per unit of output were calculated on the assumption that the per unit of output value would decrease by 1% a year.

2. Amount of CO_2 emissions



Note: For fiscal 2005, the industry uses as its forecast 694,000 t-CO_2, which is mid-point in a range of 672,900 to 714,300 t-CO_2.
For fiscal 2010, it uses 672,000 t-CO_2, which is mid-point in a range of 639,900 to 703,900 t-CO_2.

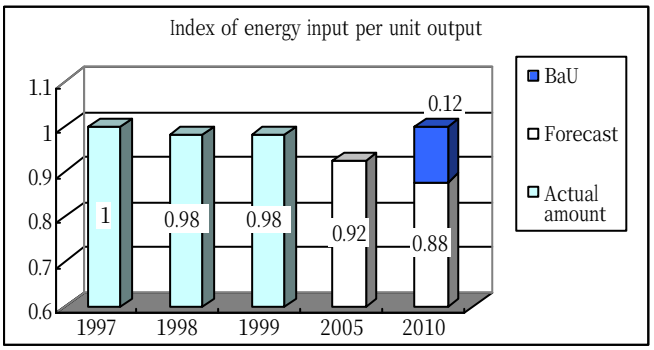
Assuming a value of 1 for CO_2 emissions in fiscal 1997, the index of CO_2 emissions per unit output stood at 0.97 in fiscal 1998 and 0.98 in fiscal 1999. The

industry is forecasting index values of 0.92 for fiscal 2005 and 0.88 for fiscal 2010. Toward these ends, it has adopted the following principal measures.

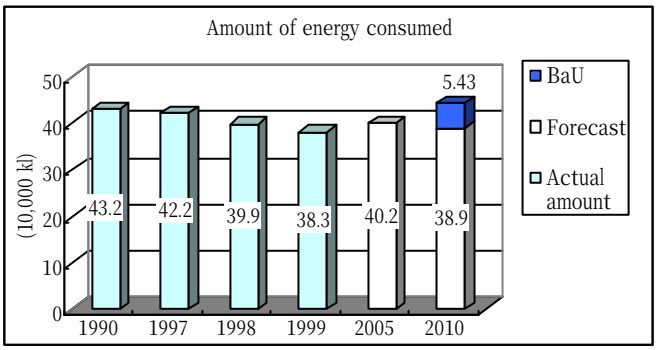
- Product-related measures (development and propagation of high efficiency boilers; development and propagation of high efficiency combustion systems for waste disposal plants; the incorporation of energy conservation requirements into the development and design of plant and equipment).
- Adoption of cogeneration systems.
- Converting to equipment that incorporates inverter technology.
- Placing limits on the number of compressors in use; operating compressors efficiently through centralized control.

The industry has emitted the following amounts of CO_2: 874,000 t-CO_2 in fiscal 1990; 729,000 t-CO_2 in fiscal 1997; 681,000 t-CO_2 in fiscal 1998; and 660,000 t-CO_2 in fiscal 1999. It attributes the decline in emissions in 1999 to the effects of the prolonged recession, which has caused it to limit production activity and resulted in reductions in the amount of energy used in manufacturing processes. It is forecasting emissions of between 673,000~714,000 t-CO_2 for fiscal 2005 and between 640,000~704,000 t-CO_2 for fiscal 2010 (note from secretariat: the figures in the graph are the mid-point values of these forecasts). Were the voluntary action plan not executed, emissions in 2010 would be 802,000 t-CO_2.

Reference data



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1997.



Notes: Estimated from units of heat.
For fiscal 2005, the industry uses as its forecast 402,000 kl, which is mid-point in a range of 389,500 to 413,800 kl.
For fiscal 2010, the industry is forecasting consumption of 389,000 kl, which is mid-point in a range of 370,700 to 407,900 kl.

Assuming a value of 1 for energy consumed in fiscal 1997, the index of energy input per unit output stood at 0.98 in fiscal 1998 and 0.98 in fiscal 1999. The industry is forecasting index values of 0.92 for fiscal 2005 and 0.88 for fiscal 2010. It has recorded the following amounts of energy consumption: 432,000 kl in fiscal 1990; 422,000 kl in fiscal 1997; 399,000 kl in fiscal 1998; and 383,000 kl in fiscal 1999. It is forecasting consumption of 402,000 kl in fiscal 2005 and 389,000 kl in fiscal 2010. Were a voluntary

action plan not executed, consumption of energy would be 444,000 kl in 2010.

3. Other efforts to deal with global warming

Involvement in Activities Implemented Jointly

The society is generally aware of activities being carried out among member companies that could, in the future, be cited as examples of AIJ, joint implementation, and Clean Development Mechanisms—such as afforestation projects, technical cooperation, and other activity overseas. However, because of the following reasons, the society has not reported on specific actions at this time: (1) such joint activities have not been clearly identified as areas of evaluation in either the society's voluntary action plan on the environment or in its list of regular survey items for the current fiscal year, and consequently it does not have concrete data; (2) it is difficult for the society to make evaluations when, even now, the COP framework has not been clarified and when the details of each of these activities remain fluid.

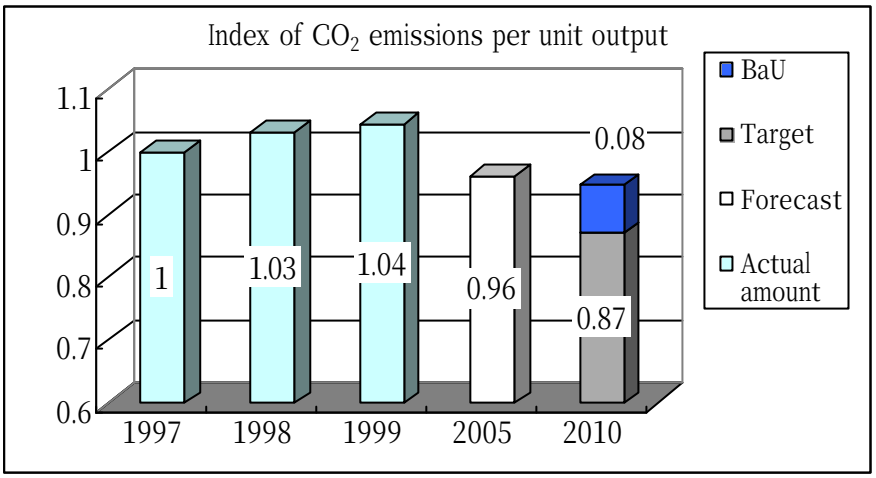
After the schemes become finalized globally and domestically at the end of the current year, the society hopes to take steps toward gathering data and making other efforts in this regard.

Note: The principal products in this industry are: boilers; engines; mining machinery; chemical machinery; environmental devices; tanks; plastic manufacturing equipment; wind and waterpower equipment (pumps, compressors, ventilators); transportation equipment; power transmission devices; steel-making equipment; and industrial washing machines. The results of the current follow-up survey are based on responses from 211 companies. The forecasts of production in value terms in fiscal 2010 assumed that production would vary between a range of unchanged and + 10% vis-à-vis the 1997 level.

Japan Bearing Industrial Association

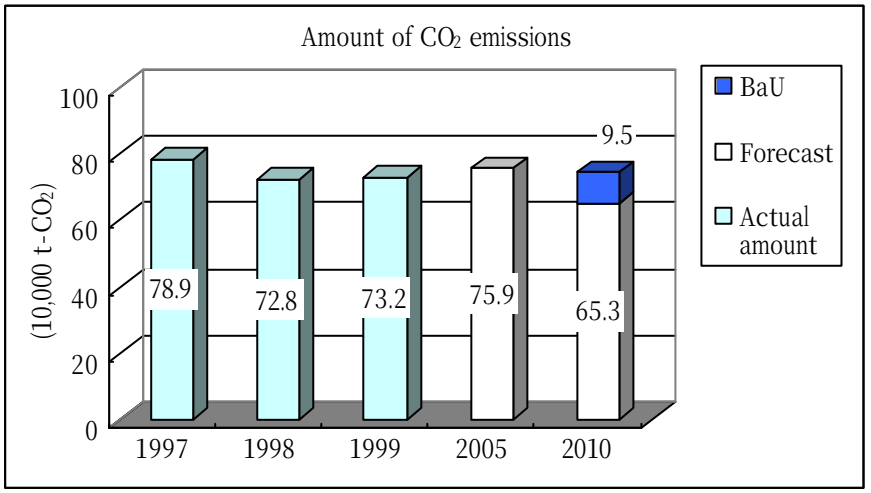
Target: By fiscal 2010, to endeavor to reduce the index of CO_2 input per unit of output by 13% compared to fiscal 1997.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1997.

2. Amount of CO_2 emissions

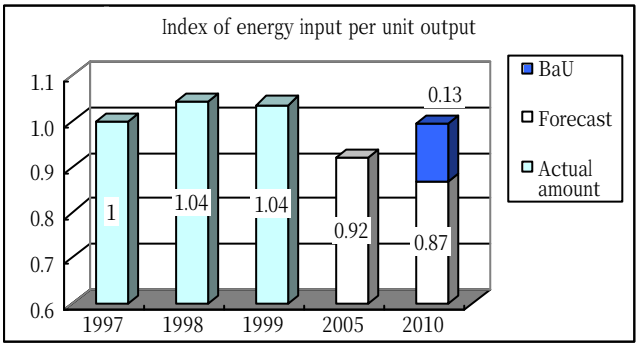


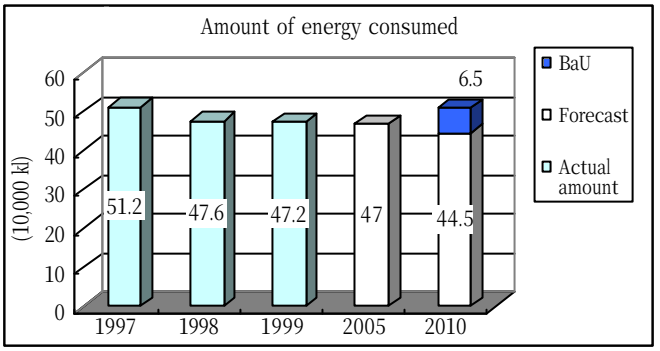
Assuming a value of 1 for CO_2 emissions in fiscal 1997, the index of CO_2 emissions per unit of output stood at 1.03 in fiscal 1998 and 1.04 in fiscal 1999. The industry attributes the deterioration (+1.3%) in the CO_2 emissions index in 1999 to the effects of the electric power/CO_2 conversion coefficient (+3.4%). It is forecasting an index value of 0.96 for fiscal 2005 and is aiming for a target value of 0.87 in fiscal 2010. Toward these ends, it took the following actions in fiscal 1999: measures to prevent leakage of air from compressors and to reduce air pressure in compressors; fuel conversion and use of

waste heat in heat-treatment facilities; installation of ice thermal storage air conditioning systems and GHP; installation of high efficiency lighting equipment; adoption of lights-out policies; improving the efficiency of motors and promoting conversion to inverters;; etc.

The industry has emitted the following amounts of CO_2: 789,000 t-CO_2 in fiscal 1997; 728,000 t-CO_2 in fiscal 1998; and 732,000 t-CO_2 in fiscal 1999. In fiscal 1999, production output declined by 0.6% year-on-year. The industry is forecasting emissions of 759,000 t-CO_2 in fiscal 2005 and 653,000 t-CO_2 in fiscal 2010, 4% and 17% less, respectively, than in fiscal 1997. Were a voluntary action plan not executed, CO_2 emissions in fiscal 2010 would be 748,000 t-CO_2, or 5% less than the level in fiscal 1997.

Reference data





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

Assuming a value of 1 for energy consumed in fiscal 1997, the index of energy input per unit output was 1.04 in fiscal 1998 and 1.04 in fiscal 1999. The industry is forecasting index values of 0.92 and 0.87 for fiscal 2005 and 2010, respectively. It has consumed the following amounts of energy (in terms of crude oil equivalents): 512,000 kl in fiscal 1997; 476,000 kl in fiscal 1998; and 472,000 kl in fiscal 1999. And it is forecasting energy consumption of 470,000 kl in fiscal 2005 and 445,000 kl in fiscal 2010, 8% and 13% less, respectively, than in fiscal 1997. Were a voluntary action plan not executed, consumption would be 510,000 kl in 2010, or approximately unchanged compared to 1997.

3. Other efforts to deal with global warming

Contributions to the transportation, offices and households sector (effect of products and services)

Roller bearings have been contributing to energy conservation because of their inherently low-friction characteristics. A considerable amount of research and development, however, continues to take place on roller bearings used in automobiles, one of the most common areas of application. This is producing bearings with lower torque, and resulting in conversions from sliding bearings to roller bearings, which are

contributing to further improvements in automobile fuel efficiency.

4. Environmental management; environmental conservation in overseas business activities

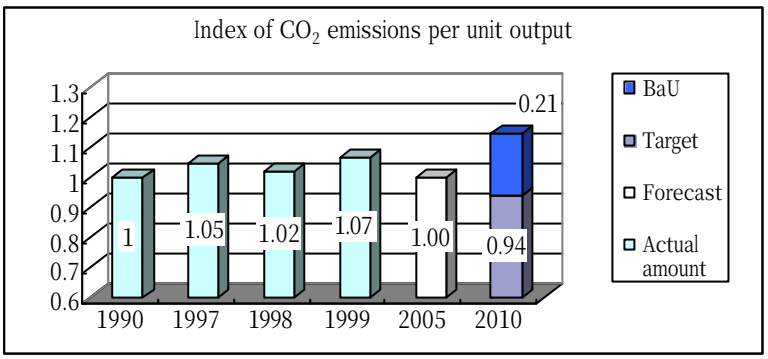
With respect to ISO 14001 certification, member companies as of July 2000 had obtained certification at 41 plants and operational sites domestically and at 26 sites overseas.

Note: The principal product of this industry is bearings. The percentage of companies participating in this follow-up was 89% (32 out of 36 companies), representing a coverage ratio in terms of value of production of 99.6% Forecasts for fiscal 2010 assume that production output will remain unchanged from their levels of fiscal 1997.

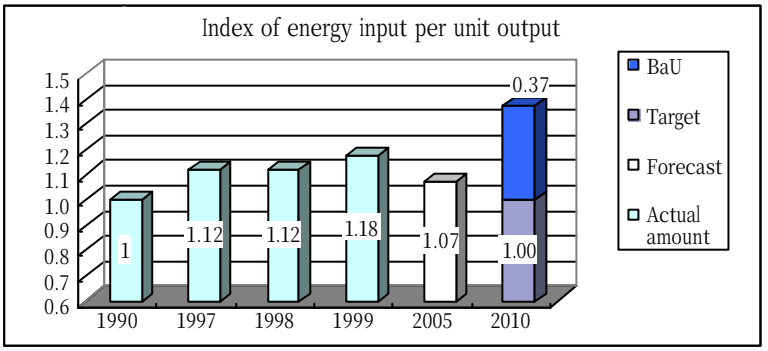
The Japan Soft Drinks Association

Targets: To reduce CO_2 emissions per unit output in 2010 by 6% compared to 1990, and to keep energy input per unit output in 2010 at the same level as in 1990.

1. Degree of progress toward goal

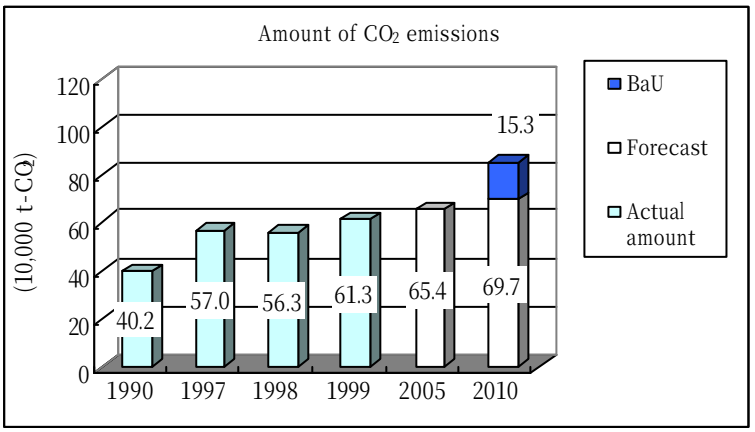


Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



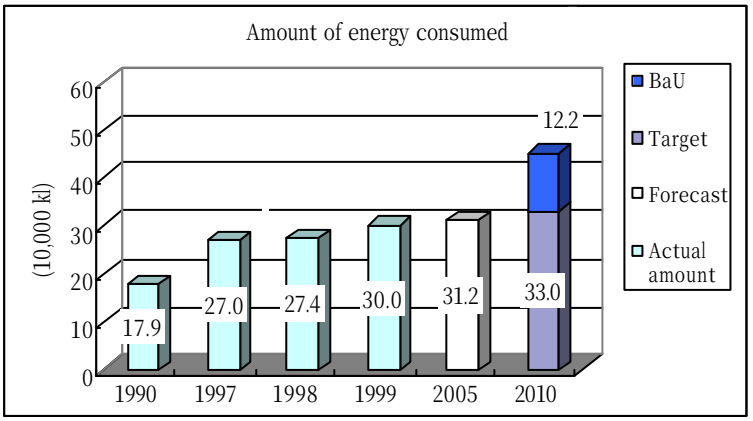
Assuming a value of 1 for CO_2 emitted in fiscal 1990, the index of CO_2 emissions

per unit output stood at 1.05 in fiscal 1997, 1.02 in fiscal 1998, and 1.07 in fiscal 1999. The industry is forecasting an index value of 1.00 for fiscal 2005, and is aiming for a target value of 0.94 in fiscal 2010. Again, assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 1.12 in fiscal 1997, 1.12 in fiscal 1998, and 1.18 in fiscal 1999. The industry is forecasting an index value of 1.07 in fiscal 2005, and is aiming for a target value of 1.00 in fiscal 2010. Toward these ends, it has adopted the following measures.

- Use of cogeneration
- Reutilization of water
- Use of heat-transfer equipment
- Recovery and utilization of methane gas
- Use of high efficiency boilers
- Use of waste heat from steam
- Use of new energy sources (fuel cells, etc.)
- Promotion of technologies that recover heat
- Development and installation of energy-conserving vending machines
- Conversion to new fuels
- Improvement of lighting and air conditioning systems
- Improvement of freezer and chilling equipment
- Improvement of water disposal systems
- Use of solar and wind energy

The industry has emitted the following amounts of CO_2: 402,000 t-CO_2 in fiscal 1990; 570,000 t-CO_2 in fiscal 1997; 563,000 t-CO_2 in fiscal 1998; and 613,000 t-CO_2 in fiscal 1999. It attributes the increase in emissions in fiscal 1999 to changes in the product mix and to the shift to an “implant” system for containers. The industry is forecasting emissions of 654,000 t-CO_2 in fiscal 2005 and 697,000 t-CO_2 in fiscal 2010, increases of 63% and 73%, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, emissions of CO_2 would be 850,000 t-CO_2 in 2010, 111% more than in 1990.

Refence data



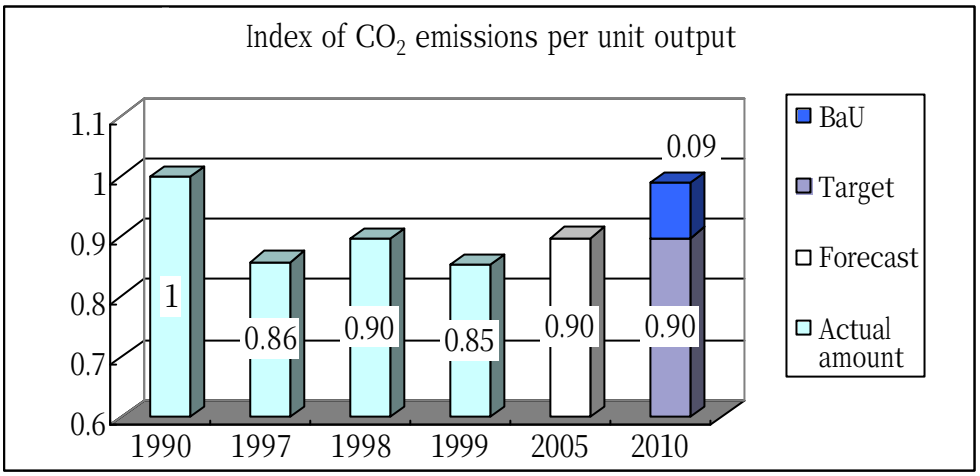
The industry has consumed the following amounts of energy: 179,000 kl in fiscal 1990; 270,000 kl in fiscal 1997; 274,000 kl in fiscal 1998; and 300,000 kl in fiscal 1999. It is forecasting consumption of 312,000 kl in fiscal 2005 and 330,000 in fiscal 2010, 74% and 84% more, respectively, than in fiscal 1990. Were an action plan not executed, consumption would be 452,000 kl in fiscal 2010, 153% more than in fiscal 1990.

Note: The principal product of the industry is soft drinks. In terms of production output, the companies participating in this follow-up survey represented a coverage ratio of 44. 2%. The industry's forecasts for fiscal 2010 assumes an annual increase in production of 2.5%.

Japan Shipowners' Association

Target: To reduce CO_2 emissions in 2010 on a per unit transported basis by approximately 10% compared to 1990.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990. Input per unit output is expressed in terms of CO_2 emissions per amount of freight transported.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.86 in fiscal 1997, 0.90 in fiscal 1998, and 0.85 in fiscal 1999. The industry is forecasting an index value of 0.95 for fiscal 2005, and is aiming for a target value of 0.90 for fiscal 2010. Toward these ends, it is adopting the following principal measures.

- Conversion to new ships with greater energy efficiency, adoption of energy-saving equipment, etc.
- Research into/adoption of voyage support systems that enable the planning of optimum routes etc.
- Research into/implementation of energy-saving navigation technologies on board ship, and encouraging strict compliance to energy-saving measures
- Research and development into effective ways of using wasted energy to increase propulsion efficiency and to improve fuel efficiency.
- Optimally designed ships that increase the efficiency of transportation
- Energy conservation measures for offices on shore, including adjustments to the temperatures set for air conditioning and heating, adjustments of the duration of their use, and the installation of energy conserving OA equipment.

2. Other efforts to deal with global warming

Measures to deal with greenhouse gases other than CO_2

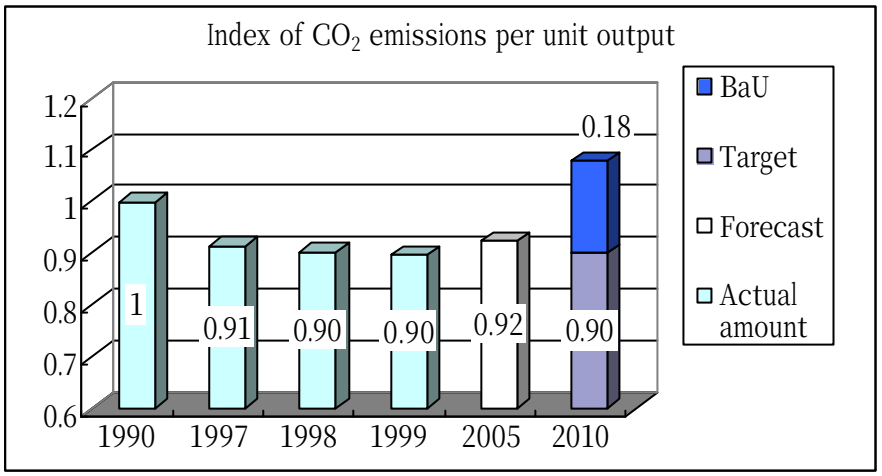
Regarding chlorofluorocarbon substitutes for the HFC etc. used in air conditioning equipment, food warehouses, and reefer containers, the industry will monitor the development of refrigerants that have a minimal impact on global warming, and endeavor to adopt HFC substitutes hereafter. It will also endeavor to prevent the gases in question from escaping into the atmosphere during the servicing or repair of such facilities.

Note: While the industry is involved in ocean shipping generally, the goals contained in this report apply only to overseas shipping. In calculating its forecast for annual shipping volume in 2010, the industry generated estimates based on trends in freight volumes carried by Japanese merchant fleets (source: Ministry of Transport) over the most recent five year period. In addition, although CO_2 emissions are affected by the distances that freight is transported, this was not considered for purposes of this report.

The Scheduled Airlines Association of Japan

Target: In fiscal 2010, to reduce CO_2 emissions per unit of output in terms of passenger seat-distance provided by approximately 10% compared to the level of fiscal 1990.

1. Degree of progress toward goal



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output in terms of passenger seat-distance provided stood at 0.91 in fiscal 1997, and at 0.90 in both fiscal 1998 and 1999. The airline industry attributes the reduction in the index in fiscal 1999 to the introduction of new fuel-efficient aircraft. It is forecasting an index value of 0.92 for fiscal 2005, and is aiming for a target value of 0.90 for fiscal 2010. Toward these ends, the industry has adopted the following principal measures.

- Promoting a shift toward new aircraft that offer improved rates of fuel consumption (purchased 19 new aircraft in fiscal 1999)
- Shortening routes and flight times, and improving the precision of routes taken, through the introduction of air navigation systems etc.
- Selecting optimum flight altitudes and speeds, and the shortest possible flight routes, in everyday service.
- Fueling planes with optimum amounts of fuel; lightening the material loaded on to planes; reducing use of supplementary power devices; reducing actual flight training and evaluation time through the use of simulators; shortening the amount of time used to test engines.

2. Other efforts to deal with global warming

Measures to deal with greenhouse gases other than CO_2

By preventing leakage during the servicing and maintenance of equipment that uses substitute chlorofluorocarbons, and through collection and reutilization of such gases, the industry is contributing to the control of such emissions (its use of advanced gas recovery equipment has enabled it to achieve a collection rate of virtually 100%).

3. Environmental management; environmental conservation in overseas business activities

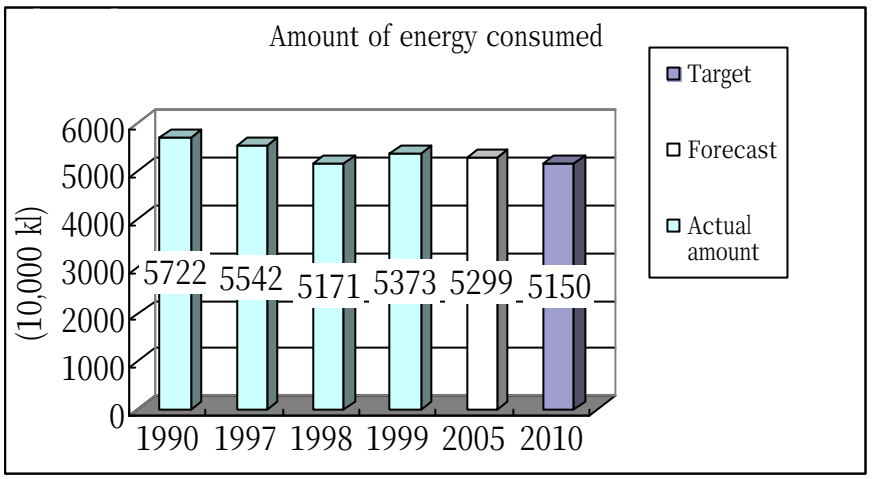
- Airlines are either promoting efforts to obtain ISO 14001 certification or are establishing environmental management systems that are modeled on ISO 14001 requirements. Previously certified companies are endeavoring to make further improvements.
- Airlines abide by the rules and regulations of overseas airports, and make allowances for environmental measures required by each airport.

Note: The principal business of The Scheduled Airlines Association is providing regularly scheduled air transportation service. The percentage of companies participating in this follow-up survey was 92% (11 of 12 companies), representing a coverage ratio in terms of energy consumed by the industry of 99.7%. Forecasts for fiscal 2010 assume that demand will increase by 4.0% on international routes and 3.1% on domestic routes each year over the forecast period.

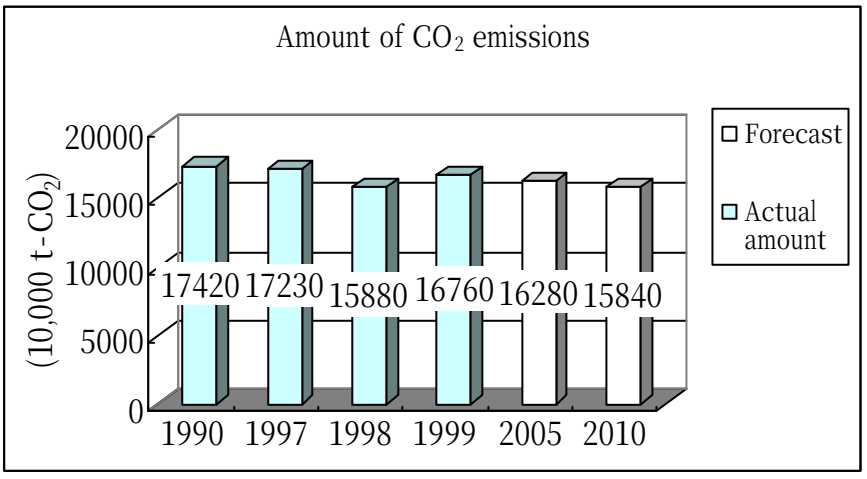
Japan Iron and Steel Federation

Targets: With fiscal 1990 as the base year, to reduce the amount of energy consumed by 10% in fiscal 2010. As an additional endeavor, the industry will take steps to utilize waste plastic to generate roughly 1.5% of the fuel consumed by shaft furnaces in fiscal 1990 (assuming the development of a proper collection system) by 2010.

1. Degree of progress toward goal



2. Amount of CO_2 emissions



Note: Excludes CO_2 emissions from industrial processes.

The steel industry has recorded the following amounts of energy consumption (in terms of crude oil): 57.22 million kl in fiscal 1990; 55.42 million kl in fiscal 1997; 51.71 million kl in fiscal 1998; and 53.73 million kl in fiscal 1999. It is forecasting consumption of 52.99 million kl for fiscal 2005, and is aiming to achieve the goal of 51.50 million kl in fiscal 2010. Assuming that the industry undertakes additional efforts involving the use of waste plastic as fuel in its shaft furnaces etc., the target for 2010 would be 50.60 million

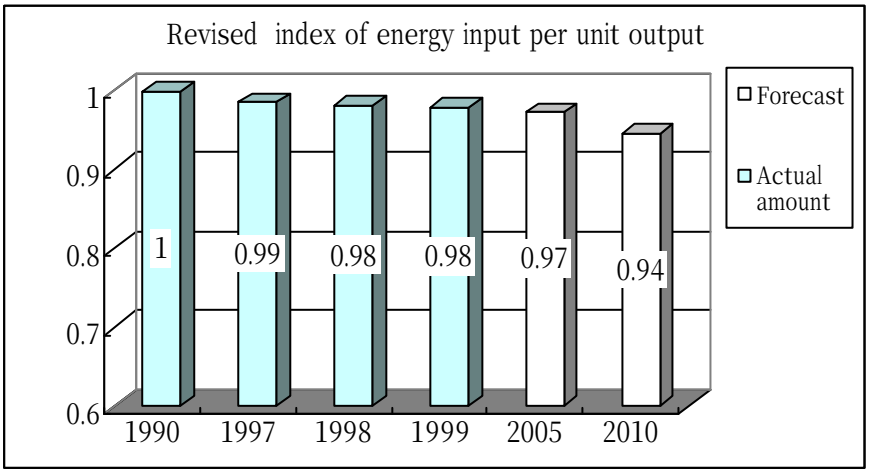
kl. The industry will adopt the following principal measures for achieving its targets.

- Engaging in efforts to conserve energy during production processes (increasing dissemination of waste-heat recovery systems; promoting greater efficiency in production facilities; promoting the introduction of next-generation steel-making technology, etc.)
- Effective utilization of waste plastic
- Utilization of unused energy in neighboring regions
- Contributing to energy conservation in society through products and by-products
- Contributing to energy conservation through international technical cooperation (joint execution, CDM, etc.)

The steel industry has recorded the following amounts of CO_2 emissions (excluding amounts emitted through industrial processes): 174.2 million t-CO_2 in fiscal 1990; 172.3 million t-CO_2 in fiscal 1997; 158.8 million t-CO_2 in fiscal 1998; and 167.6 million t-CO_2 in fiscal 1999. It is forecasting CO_2 emissions of 162.8 million t-CO_2 in fiscal 2005 and 158.4 million t-CO_2 in fiscal 2010, 7% and 9% declines, respectively, compared to 1990.

Moreover CO_2 emissions from limestone and dolomite, two non-energy sources of CO_2, are as follows: 11.6 million t-CO_2 in fiscal 1990; 10.5 million t-CO_2 in fiscal 1997; 9.6 million t-CO_2 in fiscal 1998; and 9.9 million t-CO_2 in fiscal 1999.

Reference data



Note: This index assigns a value of 1 to the amounts of energy consumed in fiscal 1990. (Production conditions have been adjusted to the conditions existing in fiscal 1995)

Assuming a value of 1 for energy consumed in fiscal 1999, the revised index of energy input per unit of output stood at 0.99 in fiscal 1997, 0.98 in fiscal 1998, and 0.98 in fiscal 1999. The industry is forecasting index values of 0.97 in fiscal 2005 and 0.94 in

fiscal 2010.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services etc.)

The industry has been moving vigorously to develop high-performance products that exploit steel's special attributes, such as high-tensile steel sheets for automobiles, electromagnetic steel plates for transformers, and ultra-thin steel for cans. Each of these products is making a significant contribution to energy conservation when actually used in society.

(2) Involvement in AIJ etc.

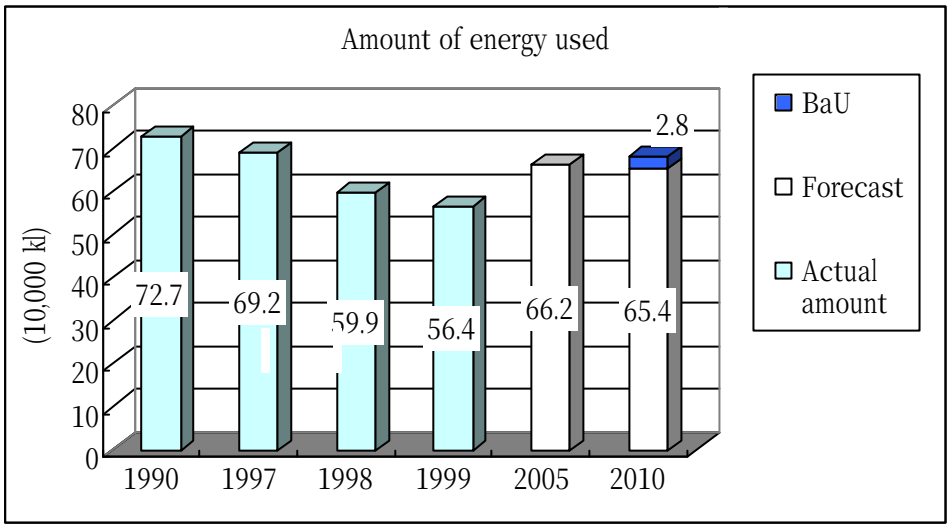
- Since 1996, the industry has completed work on four "Green Aid Plan" energy conservation model projects, and is currently pursuing six others. Four of these model projects have been approved as Activities Implemented Jointly with other countries, with one project already completed. Hence the industry's projects have received international recognition.
- To investigate the possibility of participation in future AIJ, CDM, etc., the industry has evaluated a number of national projects (NEDO) since fiscal 1998 (basic surveys on the promotion of AIJ etc.), undertaking seven project development studies in fiscal 1998 and fourteen project development studies in fiscal 1999.

Note: For CO_2 emissions per unit of output from electricity in 2010, the industry uses 0.102 kg C/kWh, which was the actual value in fiscal 1990. It assumes crude steel production of approximately 100 million tons in fiscal 2010.

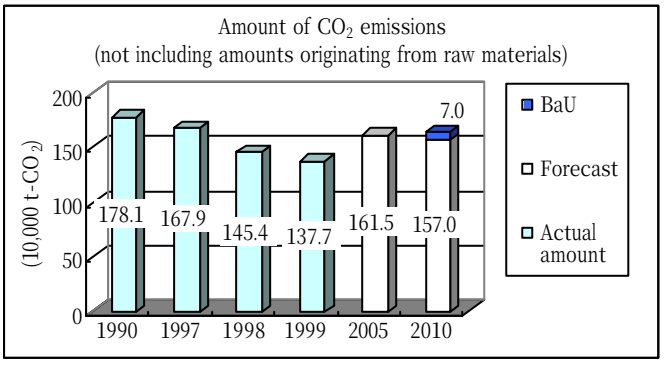
Flat Glass Association of Japan

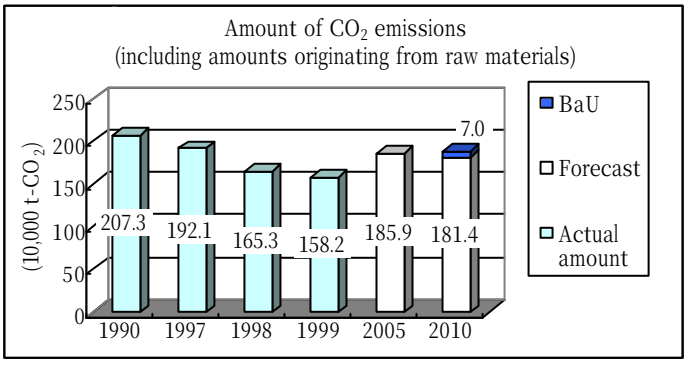
Target: To reduce the amount of energy used in the production process by 9% of the amount consumed in fiscal 1990 by fiscal 2005, and by 10% of the amount consumed in fiscal 1990 by fiscal 2010.

1. Degree of progress toward goal



2. Amount of CO_2 emissions





The flat glass industry has consumed the following amounts of energy (in terms of crude oil equivalents): 727,000 kl in fiscal 1990; 692,000 kl in fiscal 1997; 599,000 kl in fiscal 1998; and 564,000 kl in fiscal 1999. It is forecasting consumption of 662,000 kl in fiscal 2005 and 654,000 kl in fiscal 2010, 9% and 10% declines, respectively, compared to 1990. Toward this end, it has adopted the following measures.

- Improvements in energy efficiency through periodic repairs of melting kilns and greater concentration of production facilities.

- Technological development aimed at reducing CO_2 in the production process, and development of technologies for energy conversion.
- Promoting the propagation of multiplex glass.

Were the voluntary action plan not executed, energy consumption would be 682,000 kl in fiscal 2010, a 6% reduction vis-à-vis 1990.

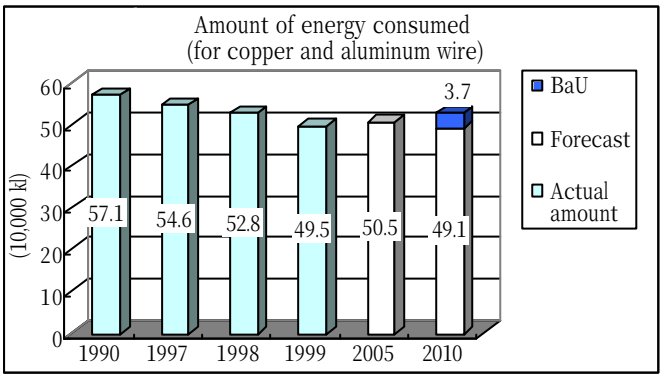
Excluding emissions that originate in raw materials, the industry has emitted the following amounts of CO_2: 1.781 million t-CO_2 in fiscal 1990; 1.679 million t-CO_2 in fiscal 1997; 1.454 million t-CO_2 in fiscal 1998; and 1.377 million t-CO_2 in fiscal 1999. It attributes the reduction of emissions in 1999 to improvements in the rate of heat recovered from melting kilns, higher operating rates due to greater concentration of production facilities, and to improved yields on new heat-absorbing colored glass. It is forecasting CO_2 emissions of 1.615 million t-CO_2 in fiscal 2005 and 1.57 million t-CO_2 in fiscal 2010, 9% and 12% less, respectively, than in fiscal 1990. Were a voluntary action plan not executed, emissions in fiscal 2010 would be 1.64 million t-CO_2, 8% less than in fiscal 1990.

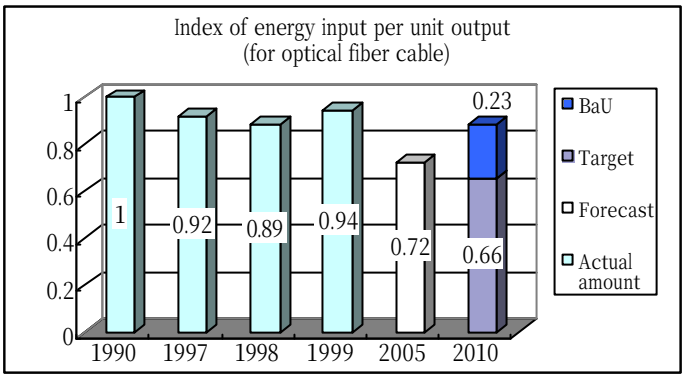
Note: The principal product of this industry is flat glass. The percentage of companies participating in this follow-up survey was 100% (3 out of 3 companies), representing a coverage rate for energy consumed by the industry of 100%. The forecast of production output in fiscal 2010 assumes that production will remain at about the same level as in 1995, the data for which became available to the industry just prior to its preparation of voluntary plans.

Japan Electric Wire and Cable Makers' Association

Targets: In fiscal 2010, to keep the amount of energy consumed in production plants for copper and aluminum wire at the level consumed in fiscal 1990. Furthermore, in fiscal 2010, to reduce the amount of energy consumed per unit in production plants for optical fiber cable by 35% compared to fiscal 1990.

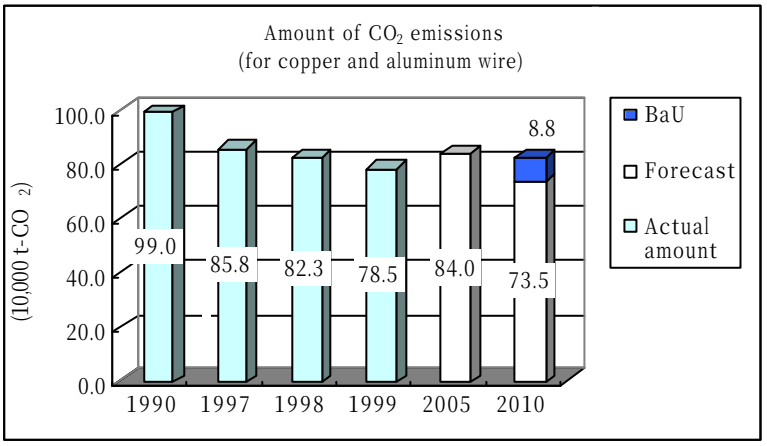
1. Degree of progress toward goal





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



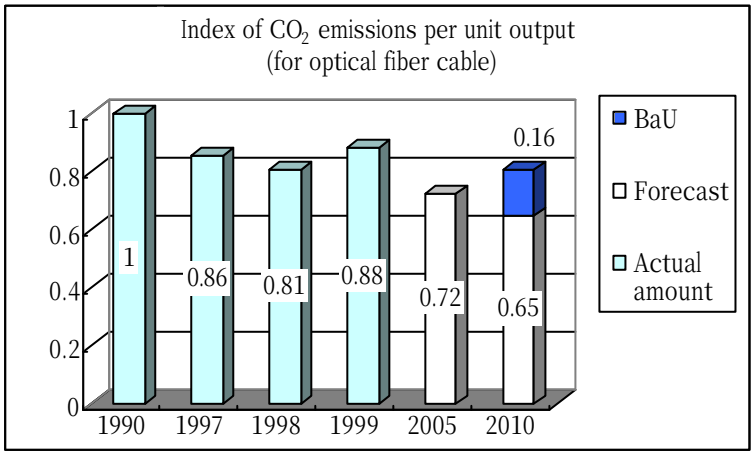
In production plants for copper and aluminum wire, the wire and cable manufacturing industry has consumed the following amounts of energy: 571,000 kl in fiscal 1990; 546,000 kl in fiscal 1997; 528,000 kl in fiscal 1998; and 495,000 kl in fiscal 1999. It attributes the decline in consumption in fiscal 1999 to a decline in production volume. The industry is forecasting consumption of 505,000 kl in fiscal 2005 and 491,000 kl in fiscal 2010, 12% and 14% declines, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, the forecast for consumption in 2010 would be 528,000 kl, 8% less than in 1990. On the other hand, assuming a value of 1 for energy

consumed in the production of optical fiber in 1990, the index for of energy consumed per unit output stood at 0.92 in fiscal 1997, 0.89 in fiscal 1998, and 0.94 in fiscal 1999. The industry is forecasting an index value of 0.72 for fiscal 2005 and is aiming for a target value of 0.66 for fiscal 2010. Toward these ends, it is adopting the following principal measures.

- Measures to increase energy efficiency (renewing existing equipment to new and superior energy-efficient models)
- Measures to reduce energy losses
- Measures to conserve energy through improvements in wire manufacturing processes
- Measures to conserve energy in the production of optical fiber cables

In producing copper and aluminum wire, the industry has emitted the following amounts of CO_2: 990,000 t-CO_2 in fiscal 1990; 858,000 t-CO_2 in fiscal 1997; 823,000 t-CO_2 in fiscal 1998; and 785,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 840,000 t-CO_2 for fiscal 2005 and 735,000 t-CO_2 for fiscal 2010, representing 15% and 26% reductions, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, CO_2 emissions in fiscal 2010 would be 823,000 t-CO_2, a 17% decline compared to fiscal 1990.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for emissions in fiscal 1990, the index of CO_2 emissions per unit output for optical fiber cable stood at 0.86 in fiscal 1997, 0.81 in fiscal 1998, and 0.88 in fiscal 1999. The industry is forecasting index values of 0.72 in fiscal 2005 and 0.65 in fiscal 2010.

3. Other efforts to deal with global warming

Measures dealing with greenhouse gases other than CO_2

With respect to SF_6 and HFC, the industry is taking steps to prevent leakage during servicing and repair, and to collect and reuse gases.

4. Environmental management; environmental conservation in overseas business activities

As a means of ensuring their commitment to voluntary efforts and to continual improvements with respect to the environmental problem, companies are endeavoring to introduce and/or build environmental management systems. As of July 2000, out of the 151 member companies of the association, 14 companies, operating through 25 business locations, had obtained ISO 14001 certification.

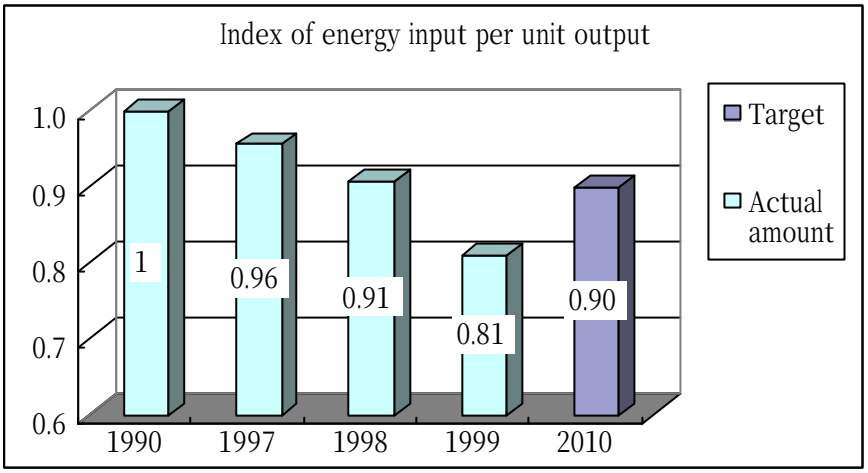
Companies, of course, are endeavoring to comply with local environmental standards in their overseas business activities, while also abiding by the section on "environmental concerns in relation to overseas business development" that is incorporated into the Keidanren "Global Environmental Charter." They also refer to Japanese environmental standards and other standards as guidelines in their efforts to do all that is possible to protect the environment.

Note: The principal products of this industry are copper, aluminum and optical fiber cable. The percentage of companies participating in this follow-up survey was 91% (137 out of 151 companies), representing a coverage ratio in terms of energy consumed of 100%. The industry's forecast for fiscal 2010 assumes that annual quantities of copper and aluminum cable produced will remain unchanged after fiscal 1998, and that energy consumption will be reduced by 0.5% per year over this period. In addition, the forecast assumes that production amounts of optical fiber cable will increase by 10% per year through fiscal 2010, and that energy consumption per unit output in this activity will be 35% less in 2010 than in 1990.

The Shipbuilders' Association of Japan

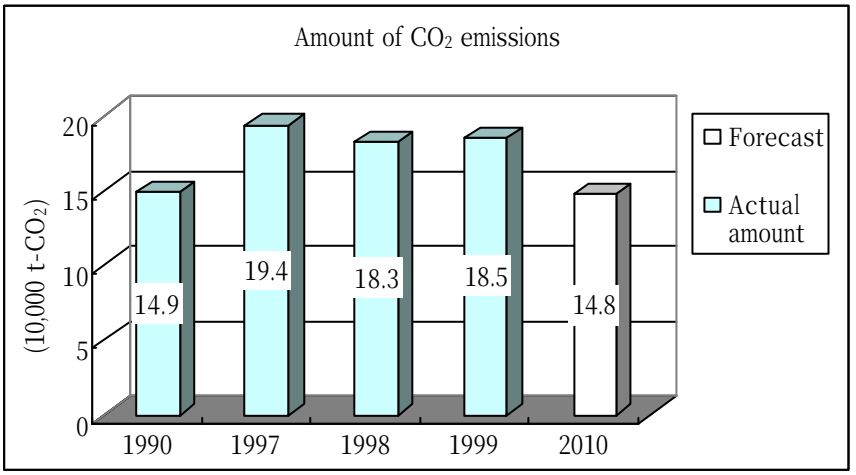
Target: By 2010, to reduce the amount of energy consumed on a per unit of output basis by approximately 10% of the level in the base year (1990).

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 0.96 in fiscal 1997, 0.91 in fiscal 1998, and 0.81 in fiscal 1999. The industry is aiming for a target index value of 0.90 for fiscal 2010. Toward this end, it has adopted as its principal measure investing in automated equipment for the purpose of promoting greater efficiency and technical sophistication in production.

The shipbuilding industry has emitted the following amounts of CO_2 : 149,000

t-CO_2 in fiscal 1990; 194,000 t-CO_2 in fiscal 1997; 183,000 t-CO_2 in fiscal 1998; and 185,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 148,000 t-CO_2 in fiscal 2010, 1% less than in 1990.

Note: When measured in terms of tonnage completed, the rate of participation in this follow-up survey was 82%. Estimates used in forecasts for fiscal 2010 assumed a 30% increase in tonnage completed over 1990.

Petroleum Association of Japan

Targets: [Production and distribution stages]

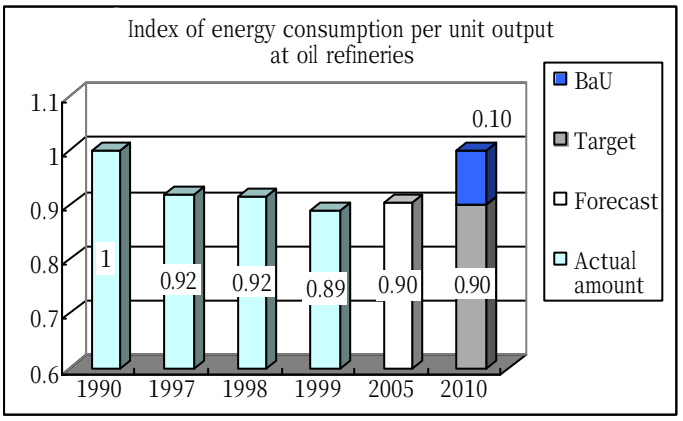
The industry is targeting the following goals for energy conservation in fiscal 2010 compared to fiscal 1990.

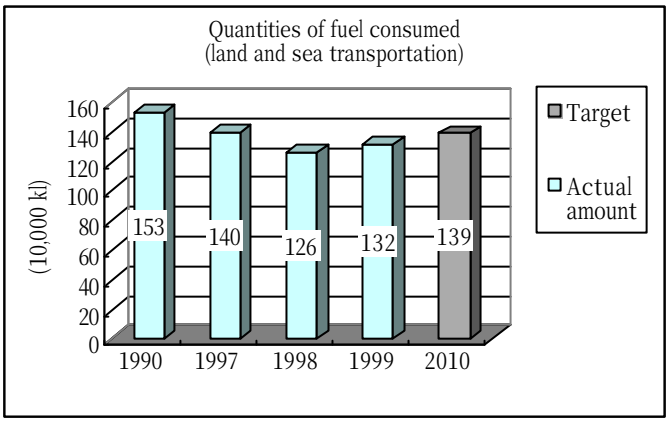
- A 10% reduction of energy input per unit of output at oil refineries.
- A 9% reduction in fuel used to transport oil products.

[Consumption sector]

- Achieving an annual reduction of 1 million kl in oil consumed through greater use of cogeneration.

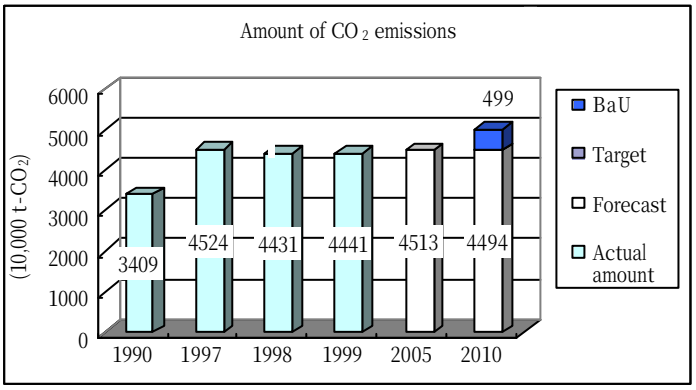
1. Degree of progress toward goal





Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



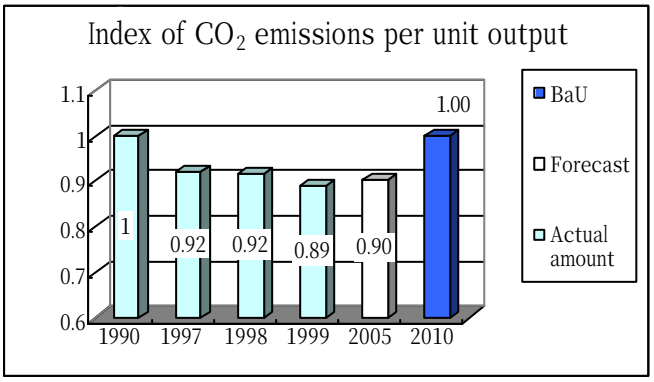
Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy consumption per unit output at oil refineries stood at 0.92 in fiscal 1997, 0.92 in fiscal 1998, and 0.89 in fiscal 1999. The industry is forecasting an index value of 0.90 for fiscal 2005 and is aiming for a target value of 0.90 for fiscal 2010. In terms of both land and sea transportation, the industry has consumed the following amounts of energy: 1.53 million

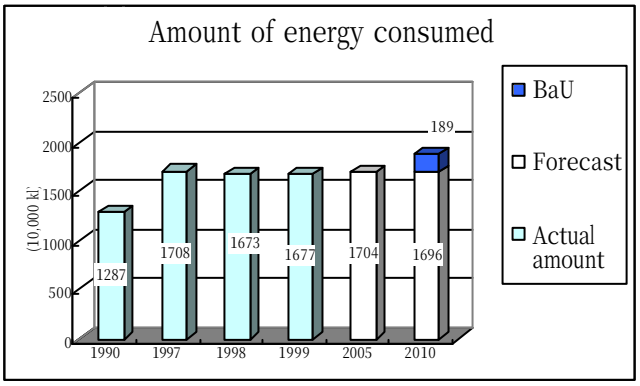
kl in fiscal 1990; 1.40 million kl in fiscal 1997; 1.26 million kl in fiscal 1998; and 1.32 million kl in fiscal 1999. It is aiming for consumption of 1.39 million kl in 2010, a 9.0% reduction compared to 1990. Toward these ends, it has adopted the following principal measures.

- Energy conservation at oil refineries (advanced energy conservation management; reduction of steam; recovery of waste heat; development and introduction of new technologies)
- Increased efficiency of land transportation (increasing the size of tankers; improving fuel efficiency; increasing loads per vehicle)
- Increased efficiency of sea transportation (reducing amounts transported; increasing the size of ships; reducing transportation distances)
- Conservation in the consumption sector (promoting the dissemination of petroleum cogeneration)

The industry has emitted the following amounts of CO_2: 34.09 million in fiscal 1990; 45.24 million t-CO_2 in fiscal 1997; 44.31 million t-CO_2 in fiscal 1998; and 44.41 million t-CO_2 in fiscal 1999. It attributes the increase in emissions in fiscal 1999 to increased unit production and an increase in energy consumed through secondary processing equipment because of a shift toward more highly refined qualities of oil and the need to incorporate environmental quality measures into production. This increase in emissions occurred despite declines in energy input per unit output, the measure by which the industry is defining its goals. It is forecasting consumption of 45.13 million t-CO_2 in fiscal 2005 and 44.94 million t-CO_2 in fiscal 2010, the latter a 32% increase compared to fiscal 1990. Were a voluntary action plan not executed, CO_2 emissions in fiscal 2010 would be 49.93 million t-CO_2, a 47% increase compared to fiscal 1990.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for CO_2 emitted in fiscal 1990, the index of CO_2 emissions per unit of output stood at 0.92 in fiscal 1997, 0.92 in fiscal 1998, and 0.89 in fiscal 1999.

The industry is forecasting an index value of 0.90 for fiscal 2005, and a "business-as-usual" value of 1.00 for fiscal 2010. It has recorded the following amounts of energy consumption (in terms of crude oil equivalents): 12.87 million kl in fiscal 1990; 17.08 million kl in fiscal 1997; 16.73 million kl in fiscal 1998; and 16.77 million kl in fiscal 1999. The industry is forecasting energy consumption of 17.04 million kl in fiscal 2005 and 16.96 million kl in fiscal 2010, both 32% increases compared to 1990. Were a voluntary action plan not executed, consumption would be 18.85 million kl in 2010, 46% more than in 1990.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

By promoting the spread of petroleum cogeneration, the industry expects to achieve energy conservation of 1 million kl (in terms of crude oil equivalents)/year each year through 2010.

(2) Measures to deal with greenhouse gases other than CO_2

- SF_6 is used in breakers that are found in power receiving equipment, but there is no structural leakage of gas. When the gas is let out, the procedure is carried out in a closed environment and the gas is recaptured.

4. Environmental management; environmental conservation in overseas business activities

- As of the end of March 1999, the number of plants and other operational sites that had obtained either ISO 14001 certification or recognition for an equivalent environmental management system had reached 75.
- Through the Petroleum Energy Center, NEDO, JICA and other organizations, the industry is engaged in solar electricity development, training in energy conservation, and other overseas projects.

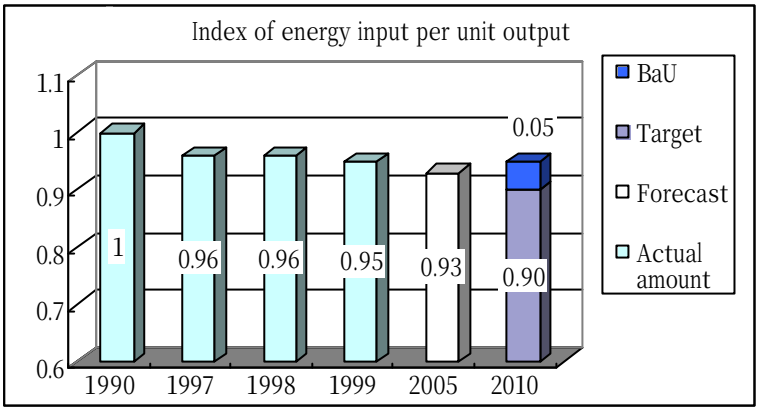
Note: The industry's principal products are gasoline, gas oil, LPG, jet fuel, naphtha, kerosene, fuel oil, and asphalt. All of the companies in the industry, including non-members of the association, participated in this survey (28 out of 28 companies). The energy coverage ratio was 52.4% of primary energy supplied (for fiscal 1998).

Regarding energy consumption per unit of output at oil refineries: Depending on the quality of crude oil and the composition of demand for products, oil refineries operate desulfurization and cracking devices at different rates. In order to compare energy inputs per units of output, it is necessary to adjust these figures so that they are based on identical rates of operation. The resulting revised values are known as energy consumption per unit of output at oil refineries.

Japan Chemical Industry Association

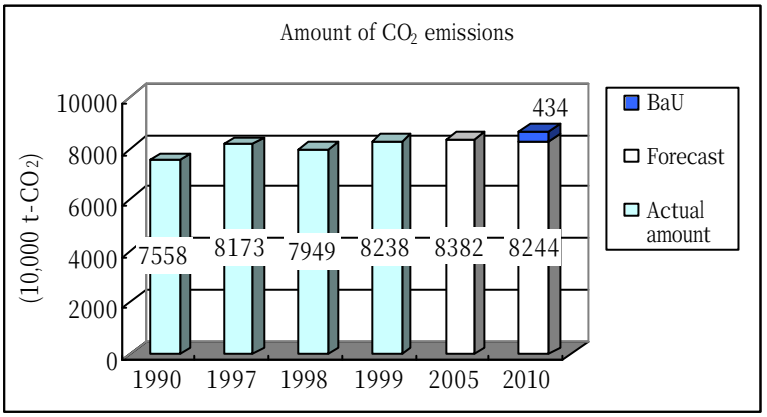
Target: To endeavor to reduce energy input per unit of output to 90% of the 1990 level in 2010.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



Based on a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 0.96 in both fiscal 1997 and 1998, and at 0.95 in fiscal 1999. The chemical industry is forecasting an index value of 0.93 for fiscal 2005, and is aiming for a target value of 0.90 for fiscal 2010. Toward this end, it will adopt the following principal measures.

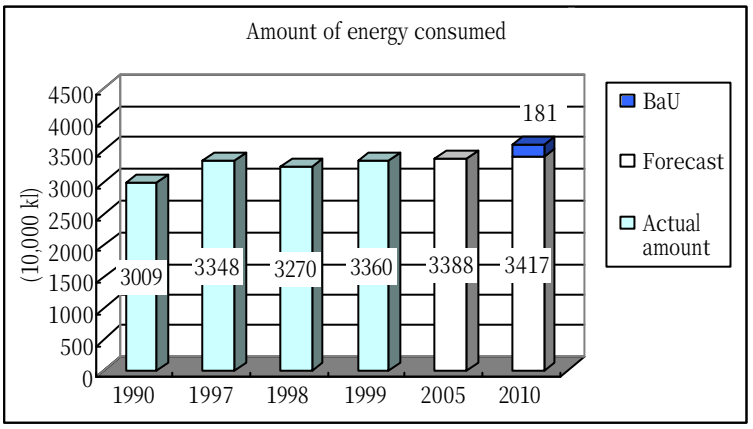
- Increasing the efficiency of facilities and equipment by improving the performance of equipment, installing highly efficient facilities, etc. (measures that will account for nearly 40% of industry-wide reductions)
- Achieving improvements in operational methods by altering operational conditions, such as reutilization, recycling, pressure, temperature, flow, etc.

(measures that will account for 33% of industry-wide reductions)

- Recovery of discharged energy through use of warm and cool discharged heat and other means.
- Process rationalization; process improvement through changes in manufacturing methods.

The chemical industry has emitted the following amounts of CO_2: 75.58 million t-CO_2 in fiscal 1990; 81.73 million t-CO_2 in fiscal 1997; 79.49 million t-CO_2 in fiscal 1998; and 82.38 million t-CO_2 in fiscal 1999. It attributes the increase in CO_2 emissions in fiscal 1999 primarily to an increase in production, as well as to an increase in energy consumption that resulted from higher quality products, a larger number of lots, and a shift to more energy-intensive products. It is forecasting emissions of 83.82 million t-CO_2 in fiscal 2005, and 82.44 million t-CO_2 in fiscal 2010, 11% and 9% more, respectively, than in 1990. Were a voluntary action plan not executed, emissions in fiscal 2010 would be 86.78 million t-CO_2, or 15% higher than in fiscal 1990.

Reference data



The industry has recorded the following amounts of energy consumption: 30.09 million kl in fiscal 1990; 33.48 million kl in fiscal 1997; 32.70 million kl in fiscal 1998; and 33.60 million kl in fiscal 1999. It is forecasting consumption of 33.88 million kl in fiscal 2005 and 34.17 million kl in fiscal 2010, 13% and 14% increases, respectively, compared to 1990. Were a voluntary action plan not executed, emissions would be 35.98 million kl in 2010, or 20% higher than in 1990.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services etc.)

- Through the spread of photovoltaic systems (embedded in roof tiles or other roofing material), the industry is contributing to a 5,600 kl/year reduction in energy consumption, measured in terms of crude oil consumption.
- By supplying synthetic rubber, coupling agents, and carbon black for use in

energy-efficient tires, the industry has contributed to a 5~6% reduction in automobile fuel consumption, which reduces CO_2 emissions by approximately 2 million tons per year.

- By decreasing the size of products, providing lighter and thinner containers, and adopting a system of refill bottles, the industry is endeavoring to reduce the amount of plastic and packaging material being used and to lighten the weight of shipments being transported.

(2) Measures to deal with greenhouse gases other than CO_2

The industry is adopting the following measures to suppress emissions of HFC and other greenhouse gases.

- Sealing off plant and equipment; carrying out stricter equipment servicing practices; engaging in preventative maintenance; and recovering gases that escape from leaks.
- Establishing exclusive container filling lines; increasing container size; developing optimum filling schedules.
- Using check-valves to prevent backward flows; recovering leftover gas in gas cylinders; increasing amounts filled; adopting exclusive-use containers.
- In conjunction with user industries, reutilizing recovered gas and developing technologies for decomposing or disposing gases that cannot be reused.
- Developing substitutes for HFC etc., and developing gases with minimal greenhouse impact.

4. Environmental management; environmental conservation in overseas business activities

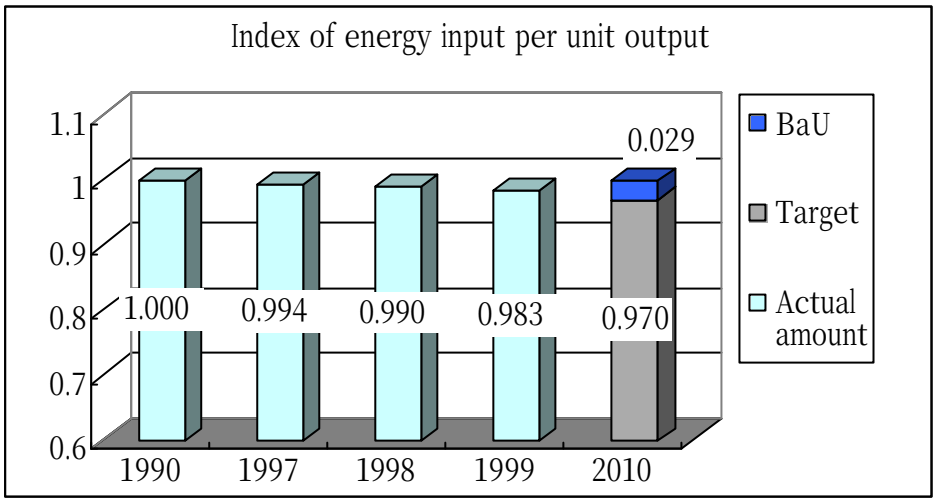
- Active efforts to obtain environmental management certification (ISO 14001). (The chemical industry ranks second among all industries in percentage of companies that has obtained ISO 14001 certification.)
- In developing its businesses overseas, the industry abides by the laws and standards of the country in which it is investing, and is endeavoring to transfer the latest energy conservation technologies.

Note: The principal products of this industry are: chemical fertilizers; industrial inorganic chemicals (industrial soda products, inorganic chemicals, inorganic pigments, high-pressure gas); industrial organic chemicals (synthetic dyes, organic chemicals, petrochemical-based fragrances, synthetic resins, synthetic rubber); fats and processed products; paints; printing inks; cosmetics; photosensitive material for photography; synthetic fibers; and lime. The latest follow-up survey covered 304 companies, representing an energy-coverage ratio of approximately 90%. The forecast for fiscal 2010 was arrived at by adding each company's estimates for energy use for that year. CO_2 emissions from consumption of electric power were calculated on the basis of the emissions coefficient for production-use electricity.

Cement Association of Japan

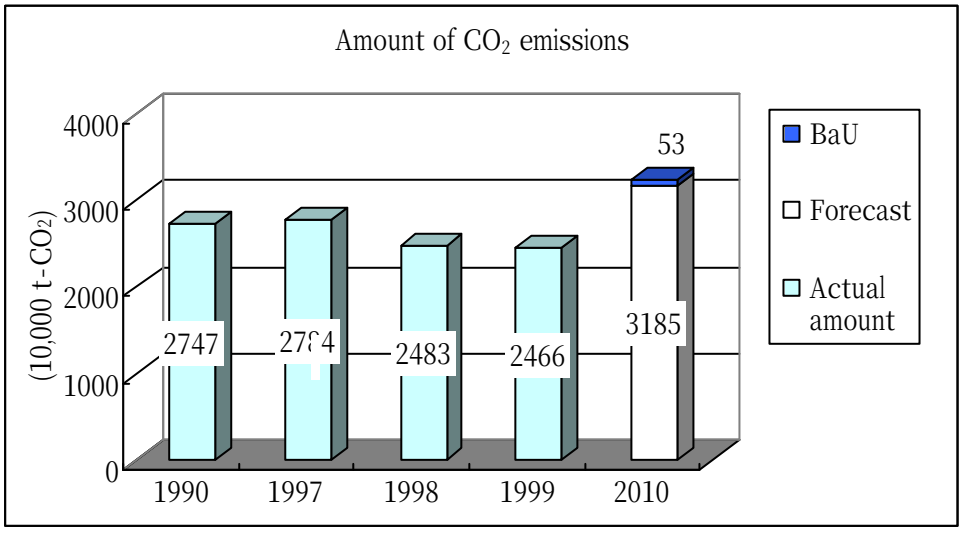
Target: To reduce energy input per unit of output in cement manufacturing by around 3% of the level of fiscal 1990 in fiscal 2010.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions

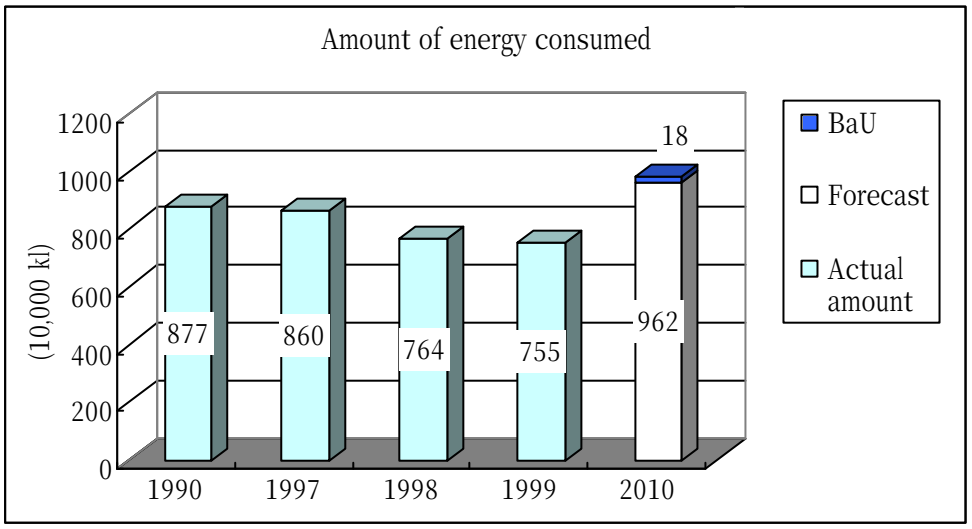


Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output for cement manufacturing stood at 0.994 in fiscal 1997, 0.990 in fiscal 1998, and 0.983 in fiscal 1999. The cement industry is aiming to achieve an index value of 0.970 for fiscal 2010, and will adopt the following measures to reach this target.

- Promoting the dissemination of energy-saving equipment
- Expanding the use of industrial wastes as fuel
- Increasing the production ratio of blended cement
- Expanding the use of other industrial waste materials

The cement industry has recorded the following amount of CO_2 emissions: 27.47 million t-CO_2 in fiscal 1990; 27.84 million t-CO_2 in fiscal 1997; 24.83 t-CO_2 in fiscal 1998; and 24.66 t-CO_2 in fiscal 1999. It attributes the lower emissions in fiscal 1999 to a decline in production (-0.5% compared to fiscal 1998) and to an improvement (-1.3%) in fuel input per unit output in cement manufacturing (excluding industrial waste). It is forecasting emissions of 31.85 million t-CO_2 in fiscal 2010, a 16% increase over fiscal 1990. Were a voluntary action plan not executed, emissions would be 32.38 million t-CO_2 in 2010, 18% higher than in 1990.

Reference data



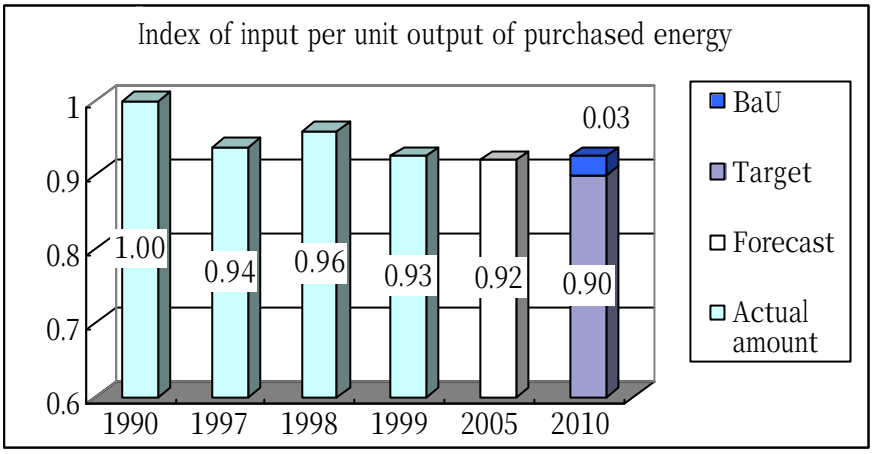
Energy consumption for cement manufacturing (in terms of crude oil) was 8.77 million kl in fiscal 1990, 8.60 million kl in fiscal 1997, 7.64 million kl in fiscal 1998, and 7.55 million kl in fiscal 1999. The industry is forecasting consumption of 9.62 million kl in fiscal 2010, a 10% increase over fiscal 1990. Were a voluntary action plan not executed, consumption in 2010 would be 9.80 million kl, or 12% higher than in 1990.

Note: The principal product of this industry is cement. The percentage of companies participating in this follow-up survey was 100%, representing a coverage ratio for energy consumed by the industry of 100%. Forecasts for fiscal 2010 assume a 0.4% rate of increase in production per year, starting from a base in fiscal 1996.

Federation of Paper Manufacturers in Japan

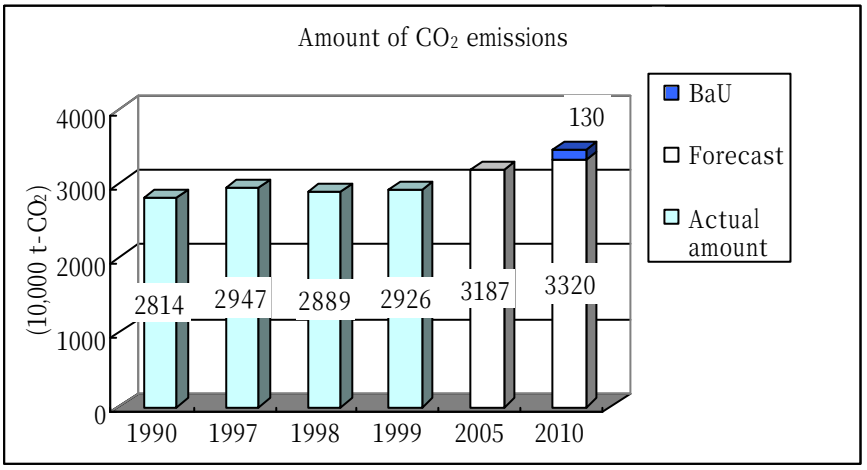
Target: To reduce purchased energy input per unit output for each product by 10% of the 1990 level by 2010.

1. Degree of progress toward goal



Note: The index of input per unit output assigns a value of 1 to the actual value for fiscal 1990.

2. Amount of CO_2 emissions



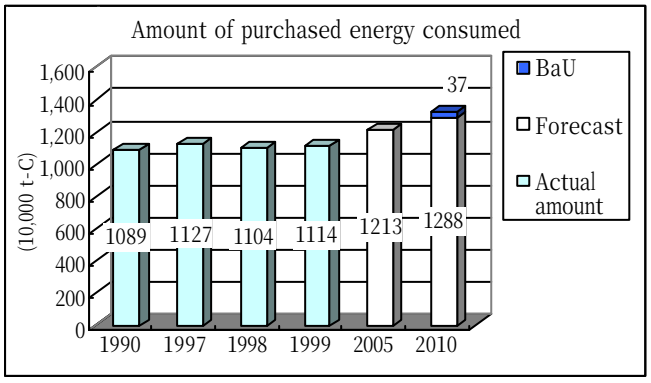
Assuming a value of 1 for amount of energy purchased in fiscal 1990, the index of input per unit output of purchased energy stood at 0.94 in fiscal 1997, 0.96 in fiscal 1998, and 0.93 in fiscal 1999. The paper industry is forecasting an index value of 0.92 for fiscal 2005, and is aiming to achieve an index value of 0.90 in fiscal 2010. Toward this end, it will adopt the following principal measures: utilization of pulp runoff; active introduction of co-generation; prevention of heat loss, and recovery and utilization of waste heat; conservation of electricity consumed by pumps, fan agitators, etc.; energy efficient production facilities; rationalization of fuel and use of alternate energy; measures relating to raw materials, chemicals, etc. Regarding other greenhouse gases,

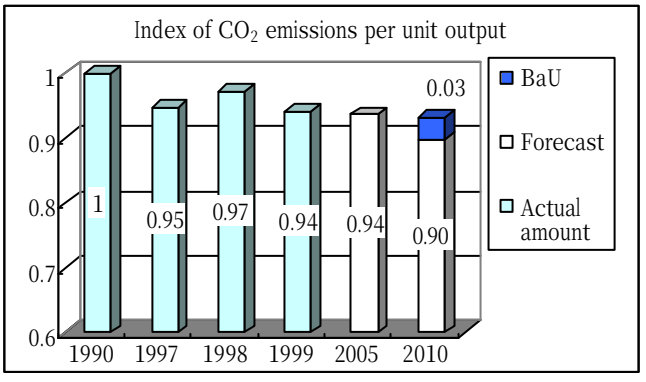
the industry is endeavoring to promote afforestation projects in Japan and other countries, while aiming to expand the amount of forests that it owns or controls by 550,000 hectares by 2010. From the standpoint of reducing waste and of conserving forestry resources and saving energy, it is taking steps to promote the collection and use of recycled paper. The reduction of waste is especially promising as a means of reducing methane gas and CO_2, the former generated by landfills and having a high global-warming coefficient. In fiscal 1999, the industry achieved its goal of achieving a 56% rate of utilization of recycled paper by 2000, utilizing recycled paper for 56.3% of its production in that year. It is currently working toward establishing a new goal for recycled paper.

The industry is also actively promoting afforestation projects overseas, with companies currently (1999) involved in 22 projects, covering 250,000 hectares, primarily in the Southern Hemisphere. By 2010, an additional 25 projects, including several already announced, will bring the total area of overseas afforestation to approximately 410,000 hectares.

The paper industry has emitted the following amounts of CO_2: 28.14 million t-CO_2 in fiscal 1990; 29.47 million t-CO_2 in fiscal 1997; 28.89 million t-CO_2 in fiscal 1998; and 29.26 million t-CO_2 in fiscal 1999. It attributes the larger amount of emissions generated in fiscal 1999 to an increase in the amount of paper produced as a result of the economic recovery; however, thanks to an improvement in energy consumption per unit of output, the rate of growth in both consumption of purchased energy and CO_2 emissions was less than the rate of growth in production. Industry is forecasting emissions of 31.87 million t-CO_2 in fiscal 2005 and 33.20 million t-CO_2 in fiscal 2010, 13% and 18% more, respectively, than in fiscal 1990. Were a voluntary action plan not executed, the industry would emit 34.49 million t-CO_2 in fiscal 2010, a 23% increase over 1990.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

The paper industry has recorded the following amounts of energy consumption (in terms of crude oil): 10. 89 million kl in fiscal 1990; 11.27 million kl in fiscal 1997; 11.04 million kl in fiscal 1998; and 11.14 million kl in fiscal 1999. It is forecasting consumption of 12.13 million kl for fiscal 2005 and 12.88 million kl for fiscal 2010, representing 11% and 18% increases, respectively, compared to 1990. Were the voluntary action plan not executed, industry would consume 13.25 million kl of purchased energy in fiscal 2010, 22% more than in fiscal 1990.

Assuming a value of 1 for amounts emitted in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.95 in fiscal 1997, 0.97 in fiscal 1998, and 0.94 in fiscal 1999. The industry is forecasting an index value of 0.94 for fiscal 2005, and a value of 0.90 for fiscal 2010.

3. Other efforts to deal with global warming

(1) Contributions to the transportation, offices and households sector (effect of products and services)

The industry is endeavoring to reduce its total CO_2 emissions by shifting from long-distance trucks to railroad cars for the transportation of certain products.

(2) Involvement in AIJ etc.

- Although the paper industry is involved in fairly large overseas afforestation projects, it has not applied to have these recognized as Activities Implemented Jointly.
- This reflects the fact that systems are still incomplete for AIJ and Clean Development Mechanisms.

4. Environmental management; environmental conservation in overseas business activities

There has been a significant increase in ISO 14001 certification in the industry, with 26 plants and operational centers now certified. The paper industry is improving its capabilities in environmental management, with the number of operational centers planning to obtain certification increasing, and with other operational centers adopting management structures that are modeled on the requirements for ISO 14001 certification.

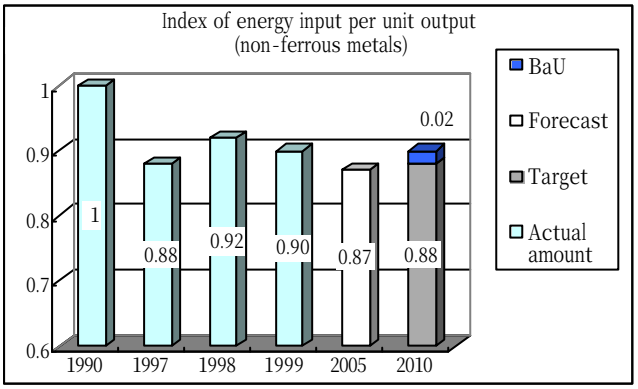
Note: The principal products of this industry are paper and cardboard. The percentage of companies participating in this follow-up survey was 13% (50 out of 390 companies), representing a coverage ratio for energy consumed of 88%. The forecast for production in 2010 is based on the following assumptions: annual real growth in GDP of 1.9%/year between 1995-2010; GDP elasticity of demand for paper and cardboard 0.904 (based on actual demand between 1990-1995); net balance of trade in unit terms: a deficit of 1.89 million tons.

Japan Mining Industry Association

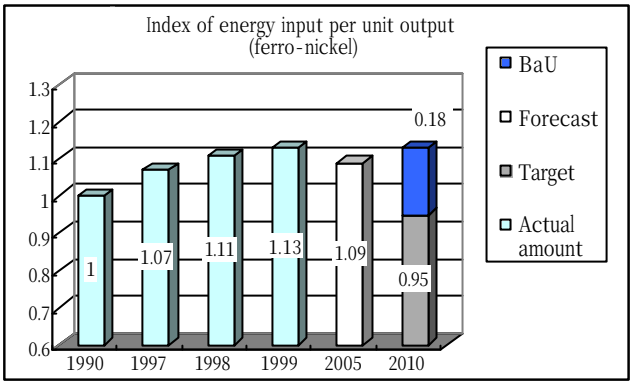
Targets: To reduce energy input per unit of output in fiscal 2010 as follows, in comparison to fiscal 1990.

- In non-ferrous metal mining (copper, lead, zinc, nickel), by 12%.
- In ferro-nickel mining, by 5%.

1. Degree of progress toward goal

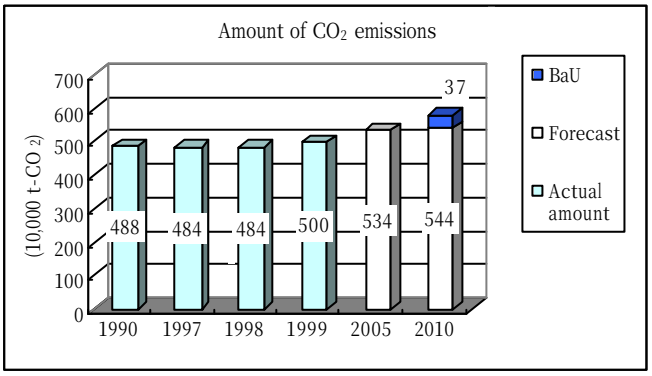


Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



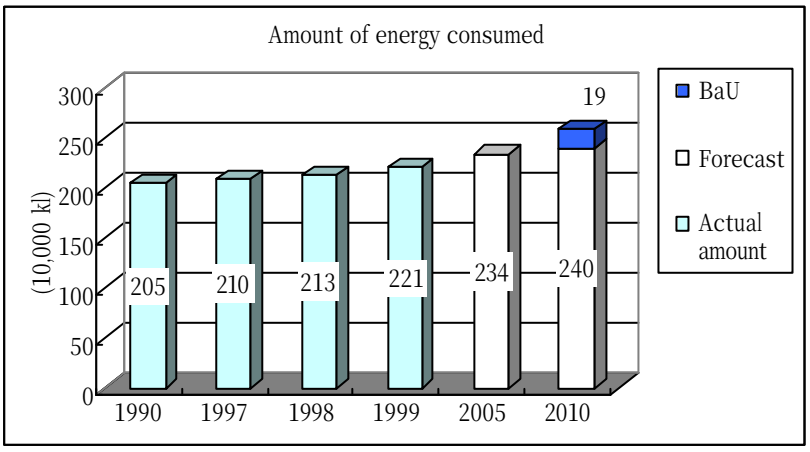
Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output for non-ferrous metal production (copper, lead, zinc, nickel) stood at 0.88 in fiscal 1997, 0.92 in fiscal 1998, and 0.90 in fiscal 1990. Given that the industry is forecasting an index value of 0.87 for fiscal 2005, and is aiming for a target value of 0.88 for fiscal 2010, it appears to be well on its way toward achieving its goals. Again, assuming a value of 1 for energy consumed in fiscal 1990, energy input per unit of output for ferro-nickel production stood at 1.07 in fiscal 1997, 1.11 in fiscal 1998, and 1.13 in fiscal 1999. The industry is forecasting an index value of 1.09 for fiscal 2005, and is aiming for a target value of 0.95 for fiscal 2010.

Toward these ends, the mining industry has adopted the following principal measures.

- Reduction of the amount of material that is repeatedly placed in furnaces.
- Strengthening controls over operations, such as those relating to combustion in blast furnaces.
- Improving the thermal efficiency of boilers that use waste heat.
- Improving energy input per unit of output for dryers, by recovering waste heat from electric furnaces.
- Improving drying efficiency through the upgrading of dryer lifters.

The industry has emitted the following amounts of CO_2: 4.88 million t-CO_2 in fiscal 1990; 4.84 million t-CO_2 in fiscal 1997; 4.84 million t-CO_2 in fiscal 1998; and 5.0 million t-CO_2 in fiscal 1999. Despite declines in energy input per unit out in fiscal 1999, emissions of CO_2 increased by 3% during the year because of a 5% increase in production output compared to 1998 in both the non-ferrous and ferro-nickel segments. The industry is forecasting emissions of 5.34 million t-CO_2 in fiscal 2005 and 5.44 million t-CO_2 in fiscal 2010, 10% and 12% more, respectively, than in 1990. Were the voluntary action plan not executed, CO_2 emissions would be 5.81 million t-CO_2 in fiscal 2010, 19% more than in fiscal 1990.

Reference data



The non-ferrous metal mining sector has consumed the following amounts of energy (in crude oil equivalents): 2.05 million kl in fiscal 1990; 2.10 million kl in fiscal 1997; 2.13 million kl in fiscal 1998; and 2.21 kl in fiscal 1999. The industry is forecasting consumption of 2.34 million kl in fiscal 2005, and 2.40 million kl in fiscal 2010, 14% and 17% more, respectively, than in 1990. We the voluntary action plan not executed, consumption would be 2.59 million kl in fiscal 2010, 26% more than in 1990.

3. Environmental management; environmental conservation in overseas business activities

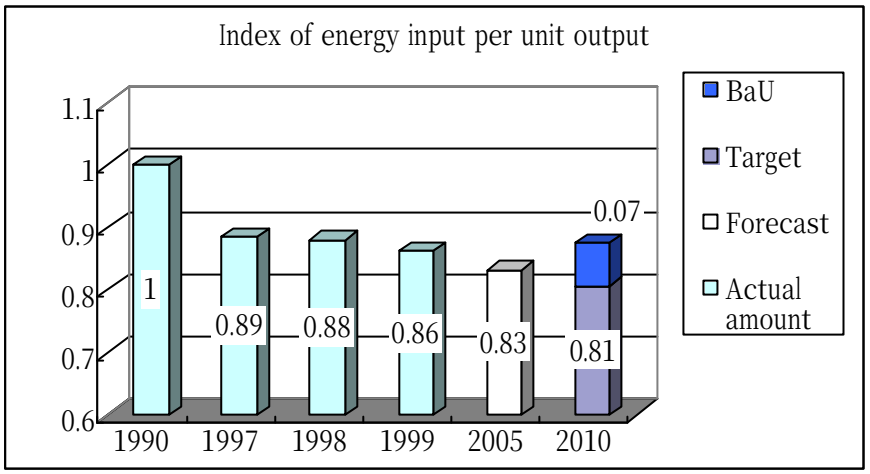
- Based on environmental protection technology that it has developed over the years, the mining industry is adopting measures to develop and deepen its system of voluntary environmental management, including by incorporating the thinking behind ISO 14001 and other measures.
- As in its domestic operations, the industry is establishing environmental management systems in its overseas operations as a means of assuring the protection of the environment. It is also making available domestically developed technology and know-how on environmental management to overseas partners, and is promoting its transfer and acceptance in overseas projects.

Note: The principal products of this industry are copper, lead, zinc, nickel, ferro-nickel alloys, etc. The percentage of companies participating in this follow-up survey was 63% (15 of 24 companies), representing a coverage ratio for energy consumed by the industry of approximately 80%. The forecast for production in 2010 assumes 18% growth for non-ferrous metal mining and 13% growth for ferro-nickel mining, in comparison to the levels of fiscal 1999.

Japan Aluminium Federation

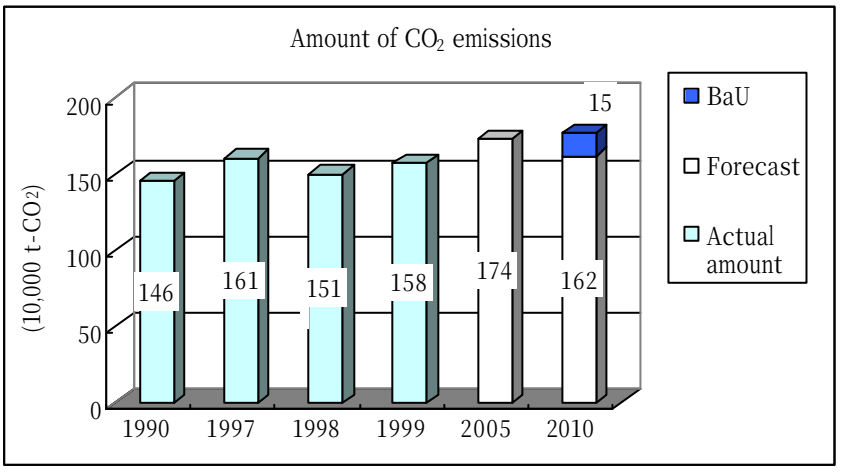
Target: In fiscal 2010, to achieve a 10% improvement in energy conservation compared to fiscal 1995, as measured by energy input per unit output (an estimated 19% improvement compared to fiscal 1990).

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



Assuming a value of 1 for energy consumed per unit output in fiscal 1990, the index of energy input per unit output stood at 0.89 in fiscal 1997, 0.88 in fiscal 1998, and 0.86 in fiscal 1999. The aluminum industry is forecasting an index value of 0.83 for fiscal 2005, and is aiming for a target value of 0.81 for fiscal 2010. Toward this end, it is adopting the following principal measures.

- Improving the efficiency of energy utilization through energy-saving operations

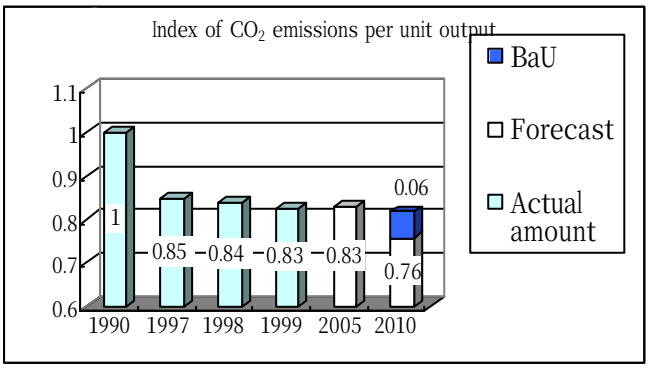
and improvements in manufacturing processes (increases in yields, etc.)

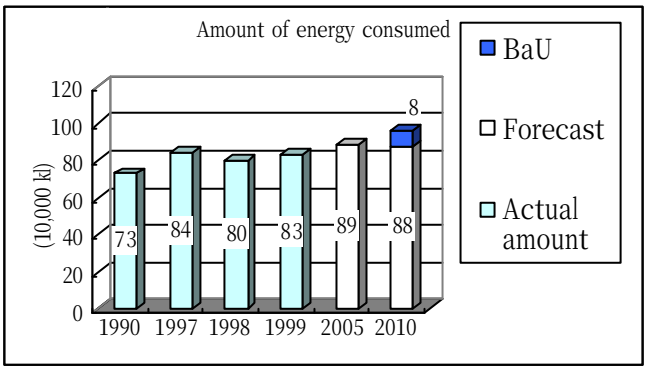
- Promoting improvements in equipment that enable recovery of energy, more efficient use of energy, etc.
- Organizing meetings for the announcement of successful examples of energy conservation, and promoting the adoption of such technologies throughout the industry.

The industry has emitted the following amounts of CO_2: 1.46 million t-CO_2 in fiscal 1990; 1.61 million t-CO_2 in fiscal 1997; 1.51 million t-CO_2 in fiscal 1998; and 1.58 million t-CO_2 in fiscal 1999. Despite a 1.4% improvement in emissions per unit of output during the year, CO_2 emissions increased in fiscal 1999 as a result of a 6.5% year-on-year increase in production. Again due to higher production, the industry is forecasting CO_2 emissions of 1.74 million t-CO_2 in fiscal 2005 and 1.62 million t-CO_2 in fiscal 2010, increases of 19% and 11%, respectively, compared to fiscal 1990. Were the voluntary action plan not executed, CO_2 emissions in fiscal 2010 would be 1.77 million t-CO_2, a 21% increase over 1990. The industry also expects the following measures to contribute toward curbing global warming.

- Vigorous promotion of aluminum recycling
- Supporting the move toward lighter weights for automobiles, rolling stock, etc. through use of aluminum.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.85 in fiscal 1997, 0.84 in fiscal 1998, and 0.83 in fiscal 1999. The industry is forecasting index values of 0.83 and 0.76 for fiscal 2005 and 2010 respectively.

The industry has recorded the following amounts of energy consumption (in terms of crude oil equivalents): 730,000 kl in fiscal 1990; 840,000 kl in fiscal 1997;

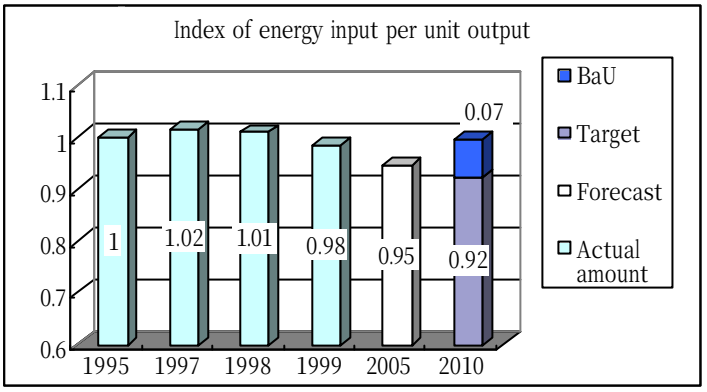
800,000 kl in fiscal 1998; and 830,000 kl in fiscal 1999. It is forecasting consumption of 890,000 kl in fiscal 2005 and 880,000 kl in fiscal 2010, 22% and 21% more, respectively, than in 1990. Were a voluntary action plan not executed, the forecast for energy consumption in 2010 would be 960,000 kl, a 31% increase compared to fiscal 1990.

Note: The principal products of this industry are rolled aluminum products. The percentage of companies participating in this follow-up survey was 11% (7 of 65 companies), representing a coverage ratio of 65.6% (estimated on the basis of amounts produced) for energy consumed by the entire industry. In this context, energy input per unit output does not simply mean the amount of energy consumed per unit of production output; rather it refers to the amount of energy consumed per amount of rolled product, a concept that gives consideration to energy loads required for the rolling process. The forecast for production in fiscal 2010 assumes an annual rate of growth of 1% per year for the 20-year period from fiscal 1990 to fiscal 2010.

Japan Brass Makers Association

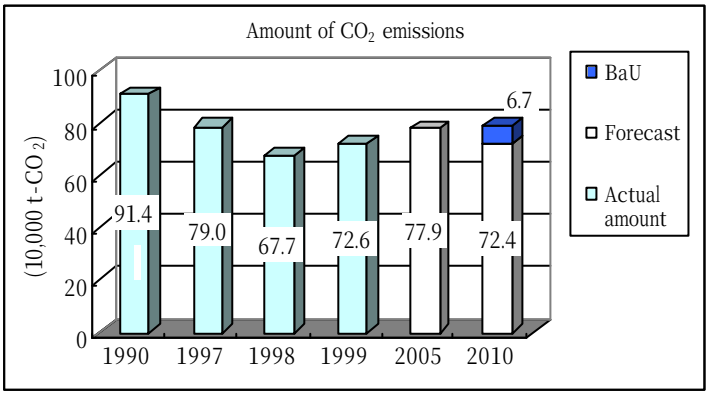
Target: By fiscal 2010, to reduce energy input per unit output in manufacturing by 7.5% compared to fiscal 1995.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1995.

2. Amount of CO_2 emissions



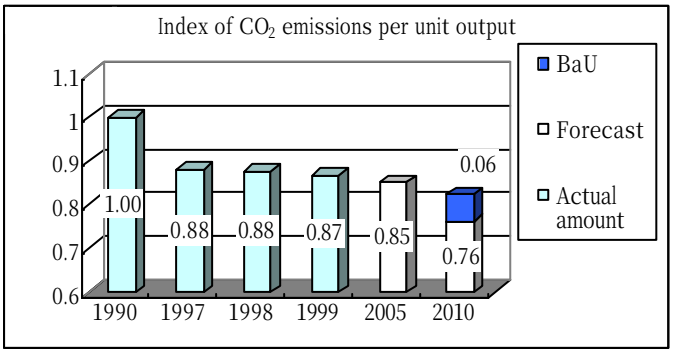
Assuming a value of 1 for energy consumed by manufacturing in fiscal 1995, the index of manufacturing energy input per unit output stood at 1.02 in fiscal 1997, 1.01 in fiscal 1998, and 0.98 in fiscal 1999. The industry is forecasting an index value of 0.95 for fiscal 2005, and is aiming for a target value of 0.92 for fiscal 2010. Toward this end, it will adopt the following principal measures.

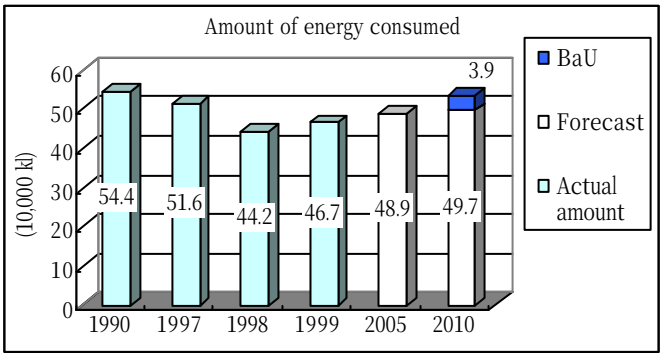
- Promoting uniformly adopted actions at all plants and operational sites (converting to 75kW energy-conserving compressors; converting to high-efficiency compressors; improving methods of operation for large capacity compressors; maintaining 100% power receiving-end ratios; converting to high-efficiency power transformers)

- Installation, renewal, and improvement of facilities (adopting inverter technology for 5.5 kW equipment; adopting measures to conserve heat in electric melting furnaces on non-operating days; converting to heat exchangers in preheating furnaces)
- Improving process and production-line controls, and operational management (improving each manufacturing process {from casting to rolling}; turning off cooling fans and cold water pumps; shifting from continuous to intermittent operations of cooling blowers used on indirect press coilers; reducing the number of processes through on-line production management)
- Enlarging and integrating equipment (concentrating production activity on lines using the most advanced equipment while terminating operations on those using dated equipment; increasing size of slabs and billets; improving production efficiency and yields; increasing the speeds of rollers; integrating boiler functions {terminating operations of one low-efficiency boiler})
- Changing fuels and collecting waste heat (changing to gas furnaces that use electrical regenerating burners; converting from electric to LPG furnaces; installing boilers that use waste heat)

The brass industry has emitted the following amounts of CO_2: 914,000 t-CO_2 in fiscal 1990; 790,000 t-CO_2 in fiscal 1997; 677,000 t-CO_2 in fiscal 1998; and 726,000 t-CO_2 in fiscal 1999. Despite a 1% year-on-year improvement in the index of CO_2 emissions per unit output in fiscal 1999, emissions increased during the year because of an 8.3% increase in production output. More specifically, the effects of energy-conservation and the positive impacts of higher production rates were nullified and exceeded by higher energy use resulting from a shift to higher quality products and by the absolute increase in production output. The industry is forecasting emissions of 779,000 t-CO_2 in fiscal 2005 and 724,000 t-CO_2 in fiscal 2010, 15% and 21% declines, respectively, compared to fiscal 1990. Were a voluntary action plan not executed, emissions in fiscal 2010 would be 791,000 t-CO_2, a 13% decline vis-à-vis fiscal 1990.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.88 in fiscal 1997 and 1998, and at 0.87 in fiscal 1999. The industry is forecasting index values of 0.85 and 0.76 for fiscal 2005 and 2010, respectively.

The industry has consumed the following amounts of energy: 544,000 kl in fiscal 1990; 516,000 kl in fiscal 1997; 442,000 kl in fiscal 1998; and 467,000 kl in fiscal 1999. It is forecasting consumption of 489,000 kl in fiscal 2005 and 497,000 kl in fiscal 2010, 10% and 9% less, respectively, than in fiscal 1990. Were a voluntary action plan not executed, consumption would be 536,000 kl in 2010, or 1% less than in 1990.

3. Other efforts to deal with global warming

Contributions to the transportation, offices and households sector (effect of products and services)

- As electronic equipment takes on increasingly high-performance capabilities, the brass industry has contributed to energy conservation in final products through its active development of materials capable of responding to demands for greater lightness, processing malleability, and performance.
- The industry has contributed to enhanced energy efficiency of heat exchange systems used in room air conditioners and other products through its development of high-performance heat transmitting pipes.

4. Environmental management; environmental conservation in overseas business activities

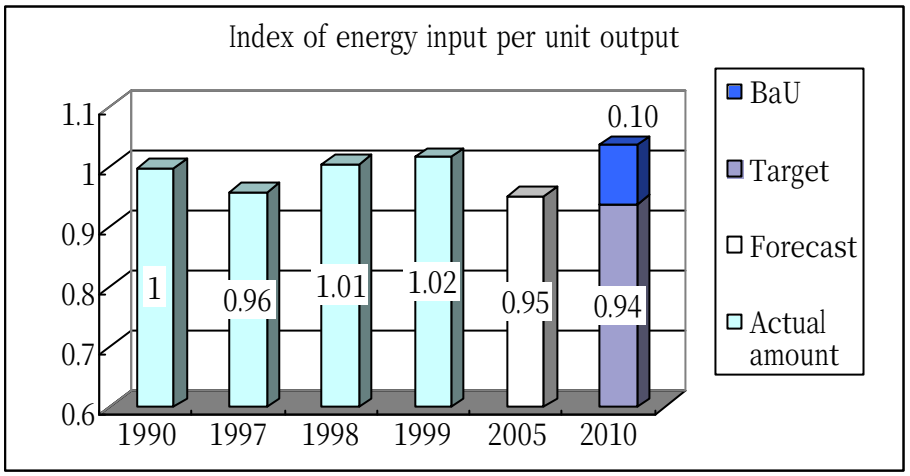
Efforts to obtain ISO 14000 certification are occurring primarily among the plants and operational sites of the major firms. The industry association is currently aware of only six instances of actual certification, but expects the number to increase among the major companies over the next year or two. It also expects this activity to spread increasingly among small and medium-size plants hereafter.

Note: The principal products of this industry are sheets, rods, and pipes made of copper and copper alloys. The percentage of companies participating in this follow-up survey was 24% (12 out of 50 companies), representing a coverage ratio for energy consumed by the industry of 74%. The industry's forecasts for fiscal 2010 are based on the following assumptions: through fiscal 2005, that rates of growth will be the same as those used in the industry's medium-term forecast of demand for the period 1999~2003; thereafter, that rates of growth will be roughly 1% per year.

Limestone Association of Japan

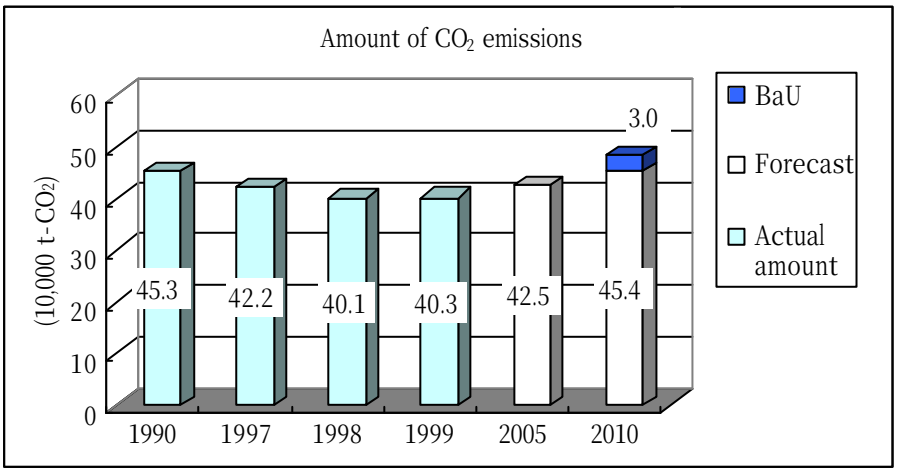
Target: By fiscal 2010, to reduce energy input per unit output in limestone production (per unit output for gas oil and electricity consumed) to 6% less than the level of fiscal 1990.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions



Assuming a value of 1 for energy consumed (gas oil and electric power) in fiscal 1990, the index of energy input per unit output stood at 0.96 in fiscal 1997, 1.01 in fiscal 1998, and 1.02 in fiscal 1999. The limestone industry is forecasting an index value of 0.95 for fiscal 2005, and is aiming for a target value of 0.94 for fiscal 2010. Toward this end, it has adopted the following principal measures.

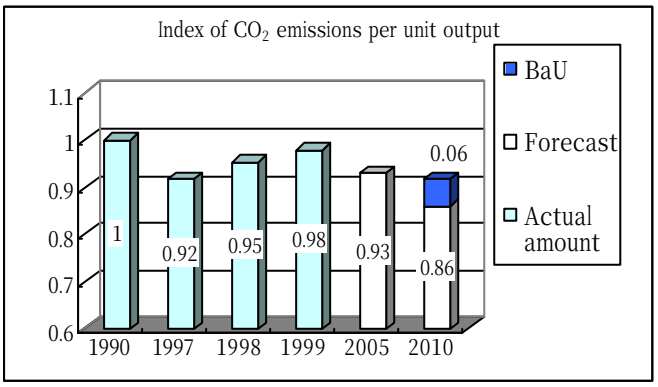
- Measures to promote absorption of CO_2 (promotion of various greenery

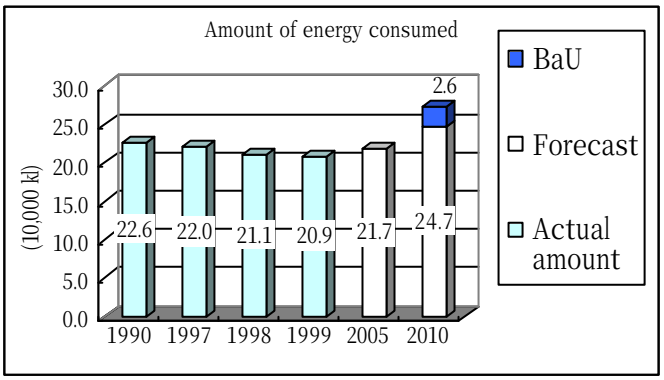
development projects)

- Measures to deal with waste disposal (continuation of current zero emissions)
- Reduction of gas oil consumption (promoting use of efficiency-enhancing additives; promoting the development and introduction of diesel engines that are adapted to the environment; using larger heavy equipment and using heavy equipment that is suitable to the task at hand; innovating mining technologies)
- Reduction of electricity consumption (developing energy-saving production facilities; shortening production processes; etc.)
- Introduction of cogeneration
- Strengthening the cost councils (discussions on energy conservation etc.) that have been established at each mine

The industry has emitted the following amounts of CO_2: 453,000 t-CO_2 in fiscal 1990; 422,000 t-CO_2 in fiscal 1997; 401,000 t-CO_2 in fiscal 1998; and 403,000 t-CO_2 in fiscal 1999. It attributes the decline in emissions in 1999 to lower quantities of limestone produced. It is forecasting emissions of 425,000 t-CO_2 in fiscal 2005, 6% lower than in fiscal 1990, and 454,000 t-CO_2 in fiscal 2010, unchanged vis-à-vis 1990. Were a voluntary action plan not executed, emissions would be 484,000 t-CO_2 in fiscal 2010, 6% higher than in fiscal 1990.

Reference data





Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for CO_2 emissions in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.92 in fiscal 1997, 0.95 in fiscal 1998, and 0.98 in fiscal 1999. The industry is forecasting index values of 0.93 for fiscal 2005 and 0.86 for fiscal 2010. The limestone industry has recorded the following amounts of energy consumption (in terms of crude oil equivalents): 226,000 kl in fiscal 1990; 220,000 kl in fiscal 1997; 211,000 kl in fiscal 1998; and 209,000 kl in fiscal 1999. It is forecasting consumption of 217,000 kl for fiscal 2005 and 247,000 kl for fiscal 2010, a 4% decline and a 9% increase, respectively, vis-à-vis fiscal 1990. Were a voluntary action plan not executed, energy consumption in fiscal 2010 would be 273,000 kl, or 21% higher than in

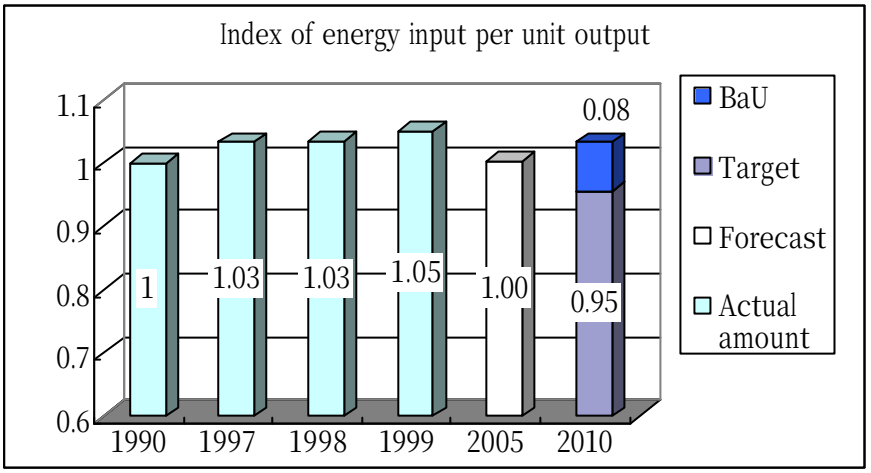
1990.

Note: The principal product of the industry is limestone. The percentage of companies participating in this follow-up survey was 42% (99 out of 238 companies), representing a coverage ratio of 86% of total production output in the industry. Forecasts of production in 2010 are based on the outlook contained in the Report of the Limestone Industry Research Institute (Agency of Natural Resources and Energy).

Japan Dairy Industry Association

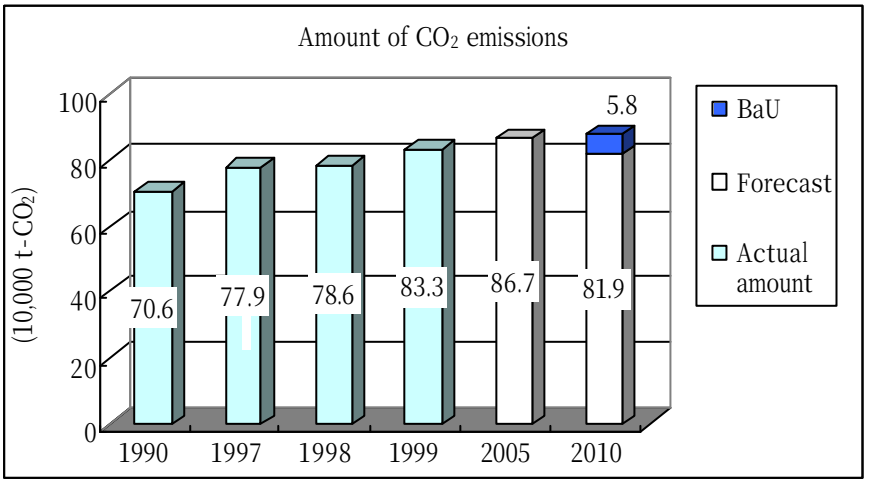
Targets: Using fiscal 1997 as the base year, the industry will reduce its energy input per unit output by 0.5% per year between fiscal 2000 and fiscal 2002, and by a further 1.0% per year over the 8-year period from fiscal 2003 to fiscal 2010.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.

2. Amount of CO_2 emissions

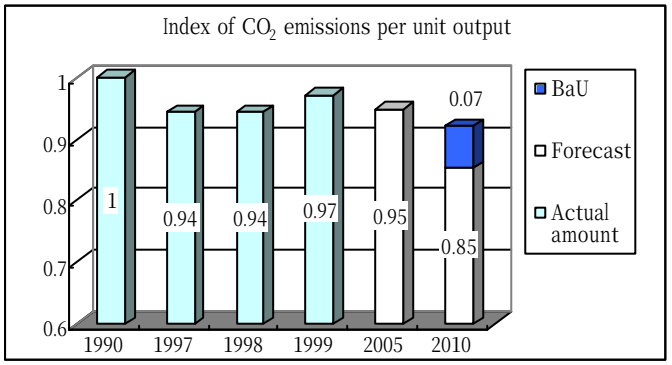


Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit output stood at 1.03 in both fiscal 1997 and 1998, and at 1.05 in fiscal 1999. The dairy industry is forecasting an index value of 1.00 in fiscal 2005, and is aiming to achieve a value 0.95 in fiscal 2010. Toward this end, it will adopt the following principal measures: reorganizing and integrating milk processing plants, incorporating sharing arrangements among companies; reorganizing existing methods of

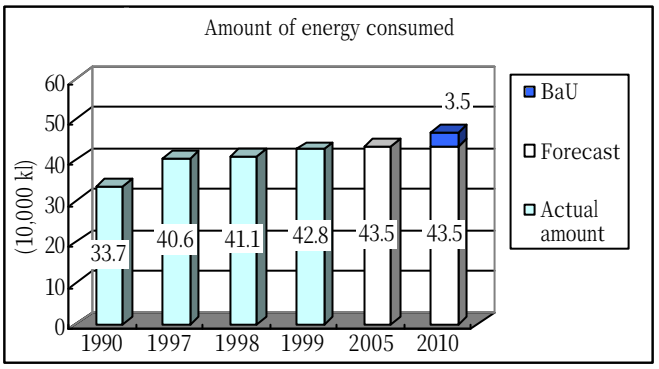
transportation for raw milk and processed products; introducing energy-saving equipment, such as cogenerating boilers; installing solar electricity generating equipment; regulating pressures on air conditioning compressors; adopting energy-conserving measures and steps to replace chlorofluorocarbons in refrigeration equipment; decreasing rates of product spoilage and product disposal through quality control and management of distribution systems; reassessing systems based on frequent deliveries of small amounts; etc.

The industry has emitted the following amounts of CO_2: 706,000 t-CO_2 in fiscal 1990; 779,000 t-CO_2 in fiscal 1997; 786,000 t-CO_2 in fiscal 1998; and 833,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 867,000 t-CO_2 in fiscal 2005 and 819,000 t-CO_2 in fiscal 2010, 23% and 16% increases, respectively, over 1990. Were a voluntary action plan not executed, emissions would be 877,000 t-CO_2 in 2010, 24% higher than in fiscal 1990.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.



Assuming a value of 1 for amounts emitted in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.94 in both fiscal 1997 and 1998, and at 0.97 in fiscal 1999. The industry is forecasting index values of 0.95 in fiscal 2005 and 0.85 in fiscal 2010. It has recorded the following amounts of energy consumption (in terms of crude oil): 337,000 kl in fiscal 1990; 406,000 kl in fiscal 1997; 411,000 kl in fiscal 1998; and 428,000 kl in fiscal 1999. It is forecasting consumption of 435,000 kl for both 2005 and 2010, which equals a 29% increase over fiscal 1990. Were a voluntary action plan not executed, energy consumption would be 470,000 kl in 2010, or 39% higher than in fiscal 1990.

3. Other efforts to deal with global warming

Measures to deal with greenhouse gases other than CO_2

- Converting refrigerants in large freezers from chlorofluorocarbons to ammonia (two plants)
- Installing freezers that use ammonia refrigerants in new plants

4. Environmental management; environmental conservation in overseas business activities

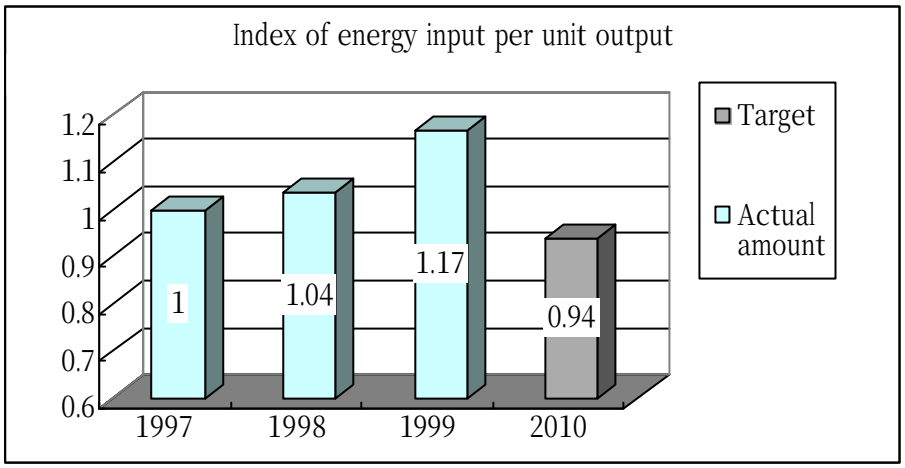
- Nationwide implementation of environmental management system (Snow Brand Milk Products)
- Preparation of report on the environment for fiscal 1999 (Meiji Milk Products)
- Preparation of report on the environmental for fiscal 2000 (Morinaga Milk Industry)

Note: The principal products of the industry are milk and milk-related products. Six companies participated in the current follow-up survey, representing 51.7% of total industry sales. The industry's forecasts for fiscal 2010 assume annual growth of 1% for the period between fiscal 2000 and fiscal 2010.

Japan Machine Tool Builder's Association

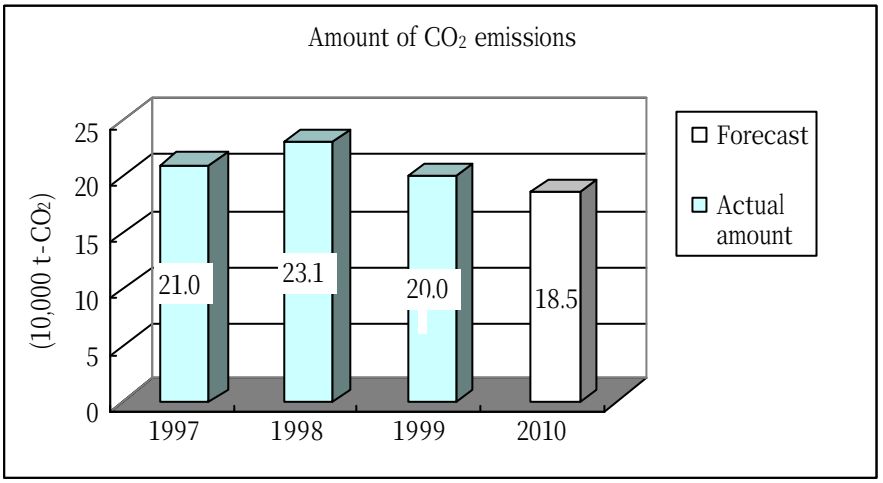
Target: By 2010, to reduce the amount of energy used on a value-of-production basis by 6% compared to 1997.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1997.

2. Amount of CO_2 emissions



Assuming a value of 1 (139.5 l/¥million) for energy consumed in 1997, the index of energy input per unit output stood at 1.04 (144.7 l/¥ million) in 1998 and 1.17 (163.1 l/¥million) in 1999. The industry is aiming for a target index value of 0.94 for 2010. Toward this end, it has adopted the following principal measures.

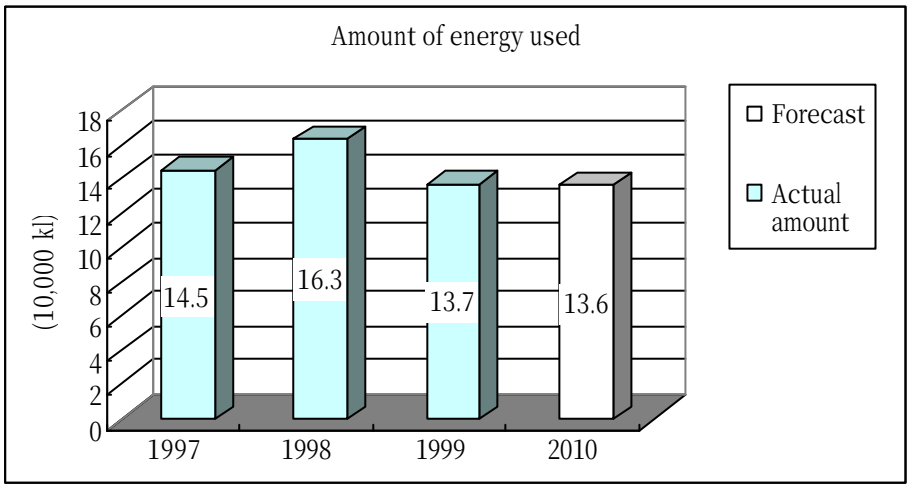
- Further expansion of energy-saving measures (adoption of high efficiency equipment; adjustment of air conditioning and lighting; utilization of heated water

from incinerators, etc.)

- Improving logistics of physical distribution inside and outside factories
- Expanding use of inverter motors
- Adoption of cogeneration systems
- Promoting utilization of natural energy
- Increasing value of production through the manufacturing of increasingly sophisticated devices

The industry has emitted the following amounts of CO_2: 210,000 t-CO_2 in 1997; 231,000 t-CO_2 in 1998 (as a result of an increase in production output); and 200,000 t-CO_2 in 1999. It attributes the decline in emissions in 1999 primarily to a reduction in hours of plant operation that reflected a decline in production output during 1999 (25.4% year-on-year in value terms). It is forecasting emissions of 185,000 t-CO_2 in 2010, a 12% decline compared to 1997.

Reference data



The industry has consumed the following amounts of energy: 145,000 kl in 1997; 163,000 kl in 1998; and 137,000 in 1999. It is forecasting energy consumption of 136,000 kl in 2010, 6% less than in 1997.

Note: The principal product of this industry is metal machine tools. The companies participating in this follow-up survey represented approximately 93% of the total output of the industry in value terms. The industry's forecast for 2010 assumes that: there will be no change in the value of machine tool production from the level of 1997; that the industry will attain its goal for energy use (a 6% decline compared to 1997); and that that the fuel mix for energy used in 2010 will remain unchanged from in 1997.

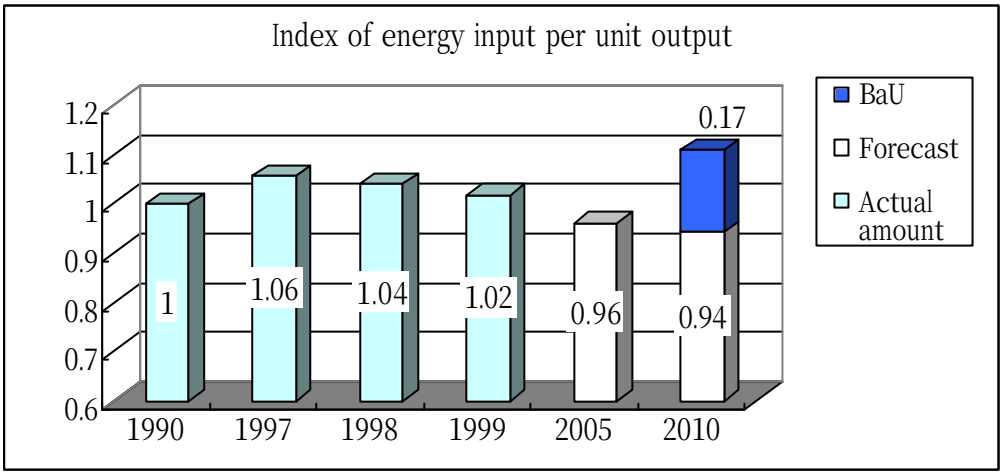
Flour Millers Association

Targets: By fiscal 2010:

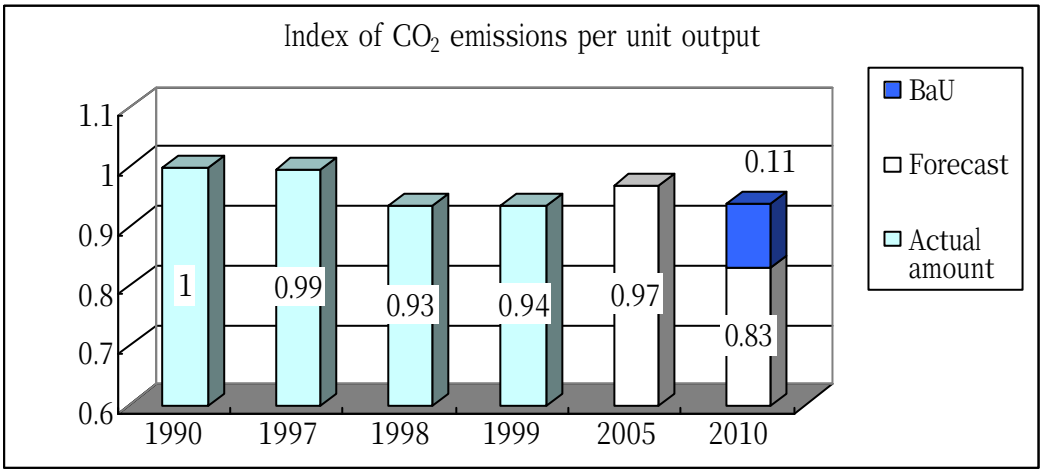
(1) To reduce energy input per unit output by more than 2% compared to fiscal 1990.

(2) To reduce CO_2 emissions per unit output by more than 5% compared to fiscal 1990.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990.



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy consumed per unit output stood at 1.06 in fiscal 1997, 1.04 in fiscal 1998, and 1.02 in fiscal 1999. The flour industry is forecasting index values of 0.96 and 0.94, respectively, for fiscal 2005 and 2010. Assuming a value of 1 for CO_2 emitted in fiscal 1990, the index of CO_2 emissions per unit output stood at 0.99 in fiscal 1997, 0.93 in fiscal 1998, and 0.94

in fiscal 1999. The industry is forecasting index values of 0.97 and 0.83, respectively, for fiscal 2005 and 2010. Toward this end, it has adopted the following principal measures.

- Integrating plants and achieving high operating rates
- Introducing co-generation systems
- Utilizing new forms of energy
- Adopting use of high-efficiency motors
- Installing high-efficiency transmissions
- Improving lighting equipment
- Commencing use of energy-conserving production equipment

2. Environmental management and environmental conservation measures

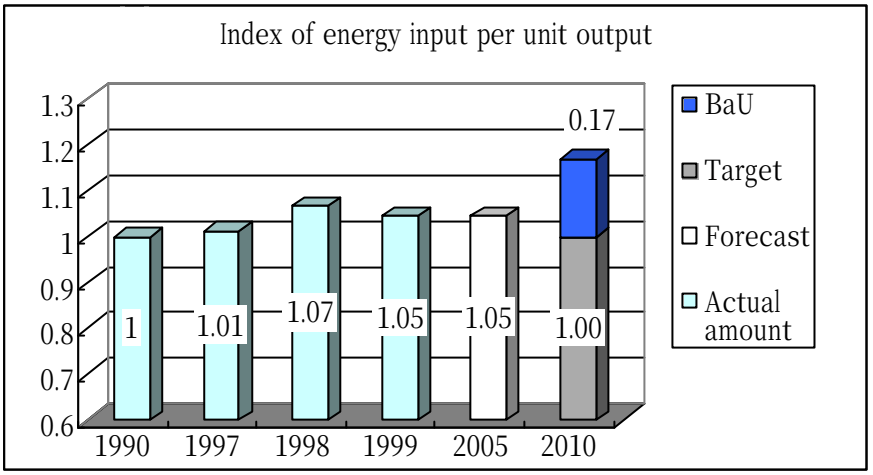
A large number of companies have either established, or are considering the establishment of, internal environmental conservation organizations. While working toward obtaining ISO 14000 certification, each company is vigorously moving to conserve energy and reduce waste.

Note: The principal products of the industry are flour and bran. The participation rate for the current follow-up was 25% (32 out of 129 companies), representing a coverage ratio of 88% in terms of product output in the industry. Forecasts for fiscal 2010 assume an annual rate of growth in production of 1%.

The Real Estate Companies Association of Japan

Target: To endeavor to reduce energy consumption per unit of floor area in fiscal 2010 (consumption per unit of output) to the level of fiscal 1990.

1. Degree of progress toward goal



Note: The index of energy input per unit output assigns a value of 1 to actual amounts consumed in fiscal 1990

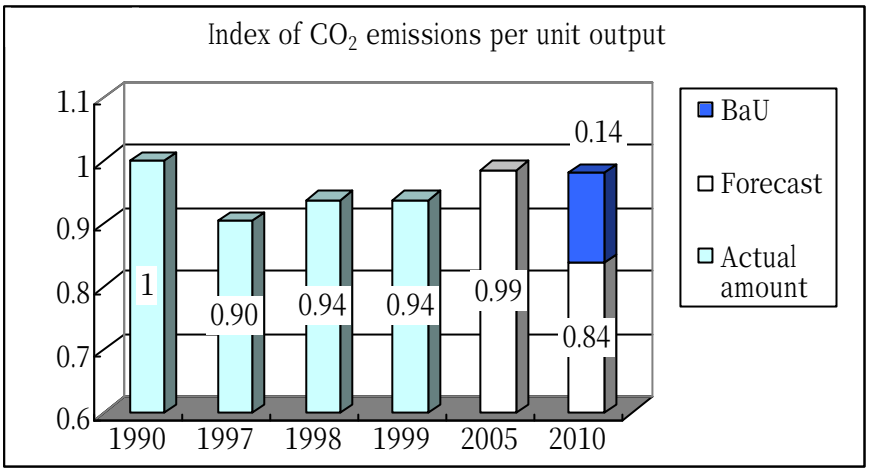
Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy input per unit of output stood at 1.01 in fiscal 1997, 1.07 in fiscal 1998, and 1.05 in fiscal 1999. The industry is forecasting an index value of 1.05 in fiscal 2005 and is aiming for a target value of 1.00 in fiscal 2010.

Toward these ends, it has adopted the following principal measures.

- In the new construction and renovation of buildings and other properties, adopting designs that further energy conservation and lower CO_2 emissions; also, promoting use of designs that extend building life, and that facilitate the reutilization of construction waste materials.
- Selecting construction materials and air conditioning systems that make allowances for the reduction of HFC.
- Promoting energy conservation in the management and operations of buildings and other properties.
- Promoting measures to reduce energy consumption in the development of major designated regional developments, in relation to construction activities, materials used, etc.
- Surveys aimed at gaining an accurate understanding of energy use (questionnaires).
- Making allowances for the environment in the use of one's own buildings.

- Making various allowances for the environment in development, rental and other activity.

Reference data



Note: The index of input per unit of output assigns a value of 1 to the level of emissions in fiscal 1990.

The index of CO_2 emissions per unit of output, based on a value of 1 for emissions in fiscal 1990, stood at 0.90 in fiscal 1997, 0.94 in fiscal 1998, and 0.94 in fiscal 1999. The industry is forecasting values of 0.99 for fiscal 2005 and 0.84 for fiscal 2010.

2. Other efforts to deal with global warming

Contributions to the transportation, offices and households sector (effect of products and services)

Companies in the industry are beginning to take energy conservation into account not only in their own use of buildings but also in the use of buildings by tenants and others, as indicated by efforts to obtain ISO 14000 series certification for building rental and management operations.

3. Environmental management; environmental conservation in overseas business activities

The acquisition of ISO 14000 series certification or preparations for such acquisition (Mitsubishi Estate, Tokyo Tatemono)

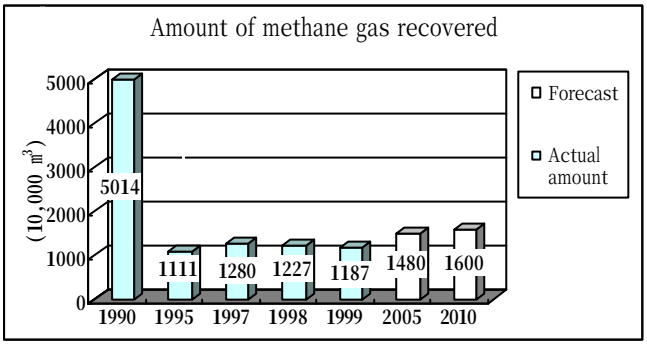
Note. The principal operations of members of the Real Estate Companies Association of Japan are real estate and subdivision development, real estate leasing, real estate brokerage, and building maintenance. Member companies that have participated in the follow-up survey own total floor space in buildings and other properties that amounts to 4 to 5% of nationwide inventory.

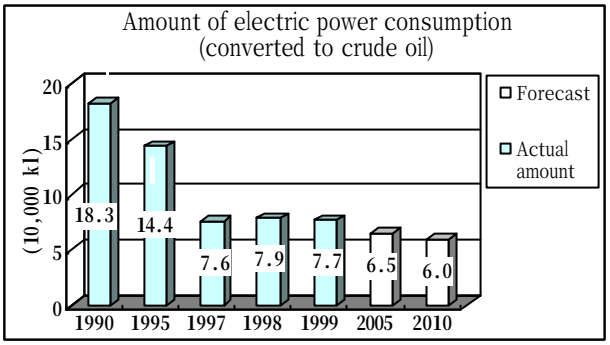
Japan Coal Energy Center

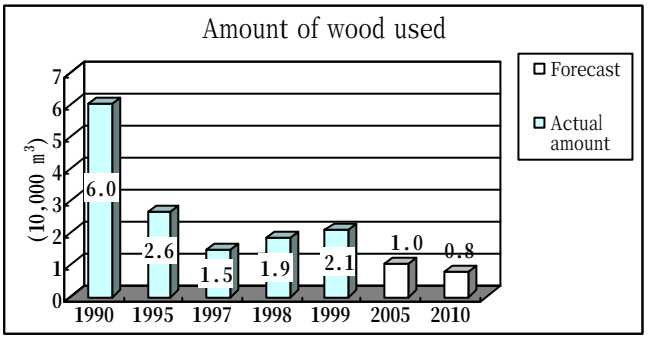
Targets: The industry's targets for fiscal 2010 are as follows, with comparisons made against fiscal 1995.

- To increase the amount of methane gas recovered in coal mining processes by 44%.
- To reduce electric power consumption by 58%.
- To reduce wood consumption by 71%.

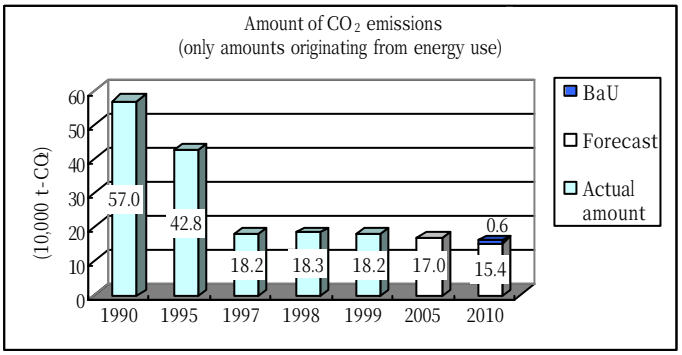
1. Degree of progress toward goal







2. Amount of CO_2 emissions



The coal industry has recovered the following amounts of methane gas from its coal mining activities: 50.14 million m^3 in fiscal 1990; 11.11 million m^3 in fiscal 1995,

12.80 million m^3 in fiscal 1997; 12.27 million m^3 in fiscal 1998; and 11.87 million m^3 in fiscal 1999. It is forecasting recovery of 14.80 million m^3 in fiscal 2005, and 16.0 million m^3 in fiscal 2010, 33% and 44% more, respectively, than in fiscal 1995.

The industry has consumed the following amounts of electric power (in terms of crude oil equivalents): 183,000 kl in fiscal 1990; 144,000 kl in fiscal 1995; 76,000 kl in fiscal 1997; 79,000 kl in fiscal 1998; and 77,000 kl in fiscal 1999. It is forecasting consumption of 65,000 kl in fiscal 2005 and 60,000 kl in fiscal 2010, 55% and 58% less, respectively, than in fiscal 1995.

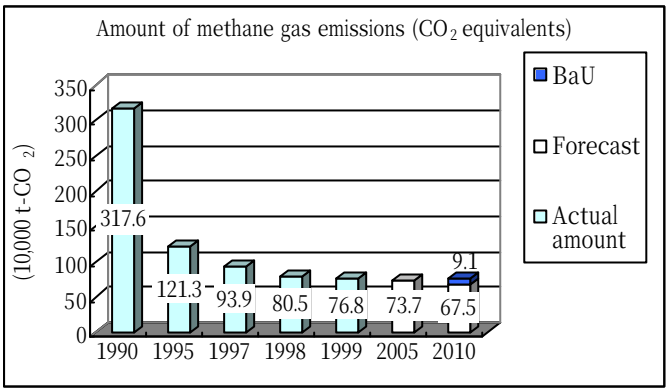
The industry has consumed the following amounts of wood: 60,000 m^3 in fiscal 1990; 26,000 m^3 in fiscal 1995; 15,000 m^3 in fiscal 1997; 19,000 m^3 in fiscal 1998; and 21,000 m^3 in fiscal 1999. The industry is forecasting usage of 10,000 m^3 in fiscal 2005 and 8,000 m^3 in fiscal 2010, 62% and 71% less, respectively, than in fiscal 1995.

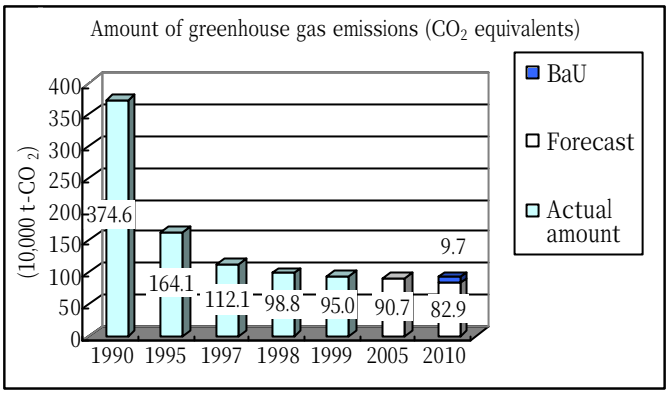
Toward these ends, the industry has adopted the following principal measures.

- Methane: Promotion of methane recovery through gas-extraction boring (development and introduction of ultra-long hole boring machines), and effective use of the recovered methane. Transfer of methane-recovery technology to other coal-producing countries.
- Electric power: Reduction of scale and integration of mines; enhancing efficiency through innovations and technical improvements relating to mining machinery.
- Wood: Reducing the amount of wood used through improvements in mining methods, including replacing wood with steel for tunnel supports, and through expanded use of shafts built out of concrete.

The industry has emitted the following amounts of CO_2: 570,000 t-CO_2 in fiscal 1990; 428,000 t-CO_2 in fiscal 1995; 182,000 t-CO_2 in fiscal 1997; 183,000 t-CO_2 in fiscal 1998; and 182,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 170,000 t-CO_2 in fiscal 2005, and 154,000 t-CO_2 in fiscal 2010, 70% and 73% less, respectively, than in 1990. Were a voluntary action plan not executed, emissions in 2010 would be 160,000 t-CO_2, 72% less than in 1990.

3. Reference data





Note: The figures in the graph are the total of CO_2 emissions (that originate in energy) and methane gas, converted into CO_2 equivalents.

Through its coal production activities, the industry has emitted the following amounts of methane gas (converted into equivalent units of CO_2): 3.176 million t-CO_2 in fiscal 1990; 1.213 million t-CO_2 in fiscal 1995; 939,000 t-CO_2 in fiscal 1997; 805,000 t-CO_2 in fiscal 1998; and 768,000 t-CO_2 in fiscal 1999. It is forecasting emissions of 737,000 t-CO_2 in fiscal 2005 and 675,000 t-CO_2 in fiscal 2010, 77% and 79% less, respectively, than in 1990.

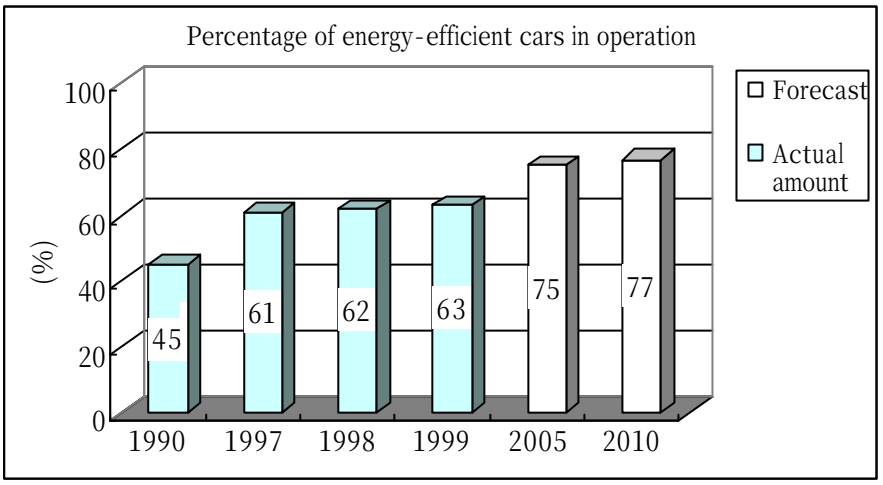
Total emissions of greenhouse gases, combining CO_2 equivalents of methane gas and of CO_2 emissions from energy consumption, were: 3.746 million t-CO_2 in fiscal 1990; 1.641 million t-CO_2 in fiscal 1995; 1.121 million t-CO_2 in fiscal 1997; 988,000 t-CO_2 in fiscal 1998; and 950,000 t-CO_2 in fiscal 1999. Although emissions of greenhouse gases from energy consumption remained more or less unchanged year-to-year in fiscal 1999, they declined in total as a result of reductions in methane gas generated inside shafts and as a result of reductions in consumption of energy other than electric power. The industry is forecasting greenhouse gas emissions of 907,000 t-CO_2 in fiscal 2005 and 829,000 t-CO_2 in fiscal 2010, 76% and 78% less, respectively, than in fiscal 1990. Moreover, were the voluntary action plan not executed, the industry forecasts that greenhouse gases (in terms equivalent units of CO_2) in 2010 would be 926,000 t-CO_2, 75% less than in 1990.

Note: The principal product of this industry is coal. Two major mines participated in this follow-up survey, representing a coverage ratio for energy consumed by the industry of 100%. Compared to the 21 mines that were in operation as of the end of fiscal 1990, only 13 were in production as of the end of fiscal 1999. Moreover, between fiscal 1990 and fiscal 1999, the number of major mines declined from six to two. Finally, the industry is forecasting annual production of 3.1 million tons for the period between fiscal 2005 and fiscal 2010.

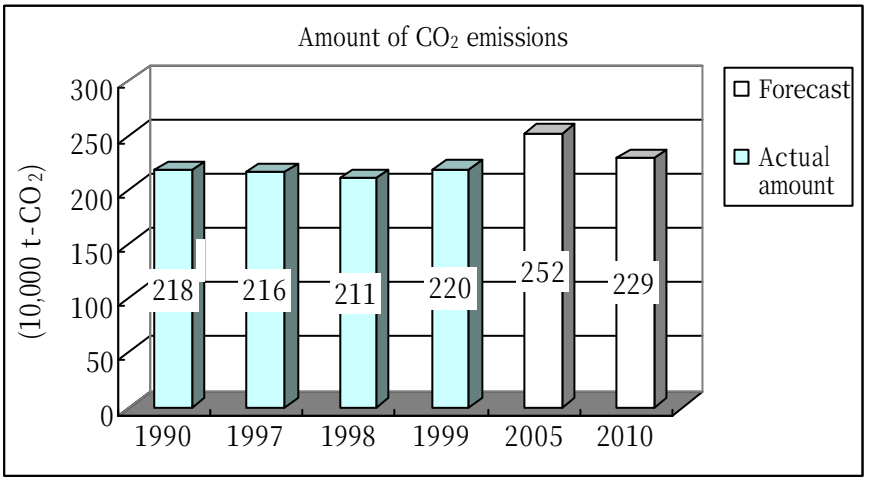
Japan Non-Government Railways Association

Target: The industry forecasts that energy-efficient cars as a percentage of total cars in operation will increase from 45% in fiscal 1990 to 77% in fiscal 2010, resulting in a 7% decline in the amount of energy consumed in fiscal 2010 compared to fiscal 1990.

1. Degree of progress toward goal



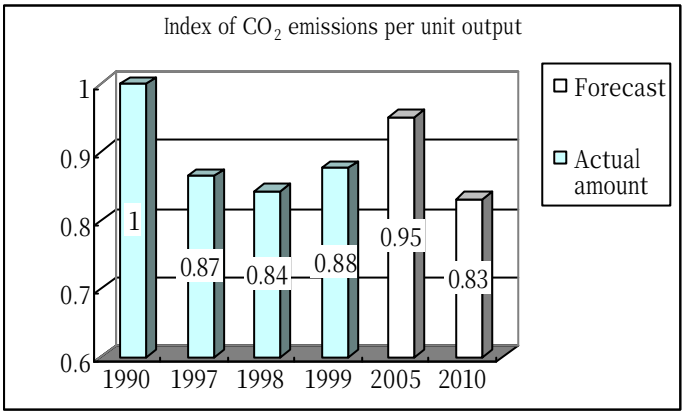
2. Amount of CO_2 emissions

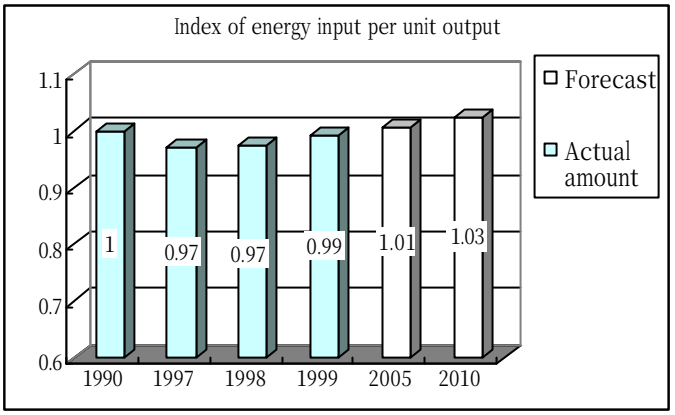


The percentage of energy-efficient cars in operation was 45% in fiscal 1990, 61% in fiscal 1997, 62% in fiscal 1998, and 63% in fiscal 1999. The private railways industry is forecasting an increase in this percentage to 75% in 2005 and 77% in 2010, and toward this end is endeavoring to introduce energy-efficient cars whenever rolling stock is increased or renewed.

The industry has emitted the following amounts of CO_2: 2.18 million t-CO_2 in fiscal 1990; 2.16 million t-CO_2 in fiscal 1997; 2.11 million t-CO_2 in fiscal 1998; and 2.20 million t-CO_2 in fiscal 1999. It is forecasting emissions of 2.52 million t-CO_2 in fiscal 2005 and 2.29 million t-CO_2 in fiscal 2010, 16% and 5% more, respectively, than in 1990.

3. Reference data





Input-output indices assume a value of 1 for emissions generated or energy used in fiscal 1990.

Assuming a value of 1 for emissions in fiscal 1990, the index of CO_2 emissions per unit of output stood at 0.87 in fiscal 1997, 0.84 in fiscal 1998, and 0.88 in fiscal 1999. The industry is forecasting index values of 0.95 for fiscal 2005 and 0.83 for fiscal 2010.

Assuming a value of 1 for energy consumed in fiscal 1990, the index of energy consumption per unit of output stood at 0.97 in fiscal 1997, 0.97 in fiscal 1998, and 0.99 in fiscal 1999. The industry is forecasting index values of 1.01 for fiscal 2005 and 1.03 for fiscal 2010.

Note: The Japan Non-Government Railways Association carries out activities aimed at promoting increases in transportation capacity and improved transportation safety, and at fostering the healthy development of the railroad business. The percentage of companies participating in the current follow-up survey was 83% (60 that operate electrical railways out of a total of 72 member companies).