Keidanren
Policy & Action

# KEIDANREN's Commitment to a Low Carbon Society Fiscal 2017 Follow-up Results Summary

＜Performance in fiscal 2016＞

(Tentative translation)

March 29, 2018
KEIDANREN

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# Introduction

The Paris Agreement, the new framework for global warming countermeasures took effect in November 2016 and parties are currently negotiating detailed rules for the implementation of the Agreement in 2020. In contrast, given U.S. President Trump's announcement of his intentions to withdraw from the Paris Agreement, uncertainties regarding its effectiveness and international fairness have increased.

In Japan, the public and private sectors are taking measures in collaboration toward the mid-term target (reducing greenhouse gas by 26% below fiscal 2013 levels by fiscal 2030). In terms of the mid-century strategy that parties are invited to communicate by 2020, the Ministry of the Environment's Long-term Low-carbon Vision Subcommittee and the Ministry of Economy, Trade and Industry's Long-term Global Warming Countermeasures Platform each compiled a report in spring last year; and therefore, the Government is expected to fully address the issue this year.

In this critical phase of ensuring the effectiveness of initiatives toward solving global warming issues at a global level, the business community is determined to continue to reduce greenhouse gas emissions in Japan and overseas by soundly promoting Keidanren's Commitment to a Low Carbon Society, which is considered to be a pillar of Japan's efforts towards achieving its mid-term target.

Keidanren has made significant accomplishments in reducing domestic $CO_2$ emissions as a result of running the PDCA cycle every fiscal year and promoting voluntary and proactive efforts on the part of industries and companies since its formulation of the Keidanren Voluntary Action Plan on the Environment in 1997 (Figure A). According to the results of the interim review of Keidanren's Commitment to a Low Carbon Society conducted in fiscal 2016, the period from fiscal 2013 through fiscal 2015 saw $CO_2$ emissions reduced in all four sectors, namely, industrial, energy conversion, commercial and transportation, collectively reducing emissions by approximately 4.7%. Therefore, the initiative has continued to make robust achievements (Figure B).

However, the efficiency of manufacturing processes in the manufacturing industry has reached world-leading levels (Figure C), leaving little room for further reductions in the future. Hence, if the Japanese business community confines its efforts to domestic business operations, then our contribution to the global issue of global warming will be limited. It has become even more important for Japan to contribute across the value

chain, which extends across Japan and overseas and to accelerate its innovative technology development.

Based on the above, the business community will aim to reduce greenhouse gas emissions globally through implementing the four pillars of Keidanren's Commitment to a Low Carbon Society (Figure D), thus continuing to deliver maximum efforts to reduce emissions from domestic business operations as well as reducing emissions through domestic and overseas value chains and enhancing medium- to long-term efforts to develop innovative technologies.

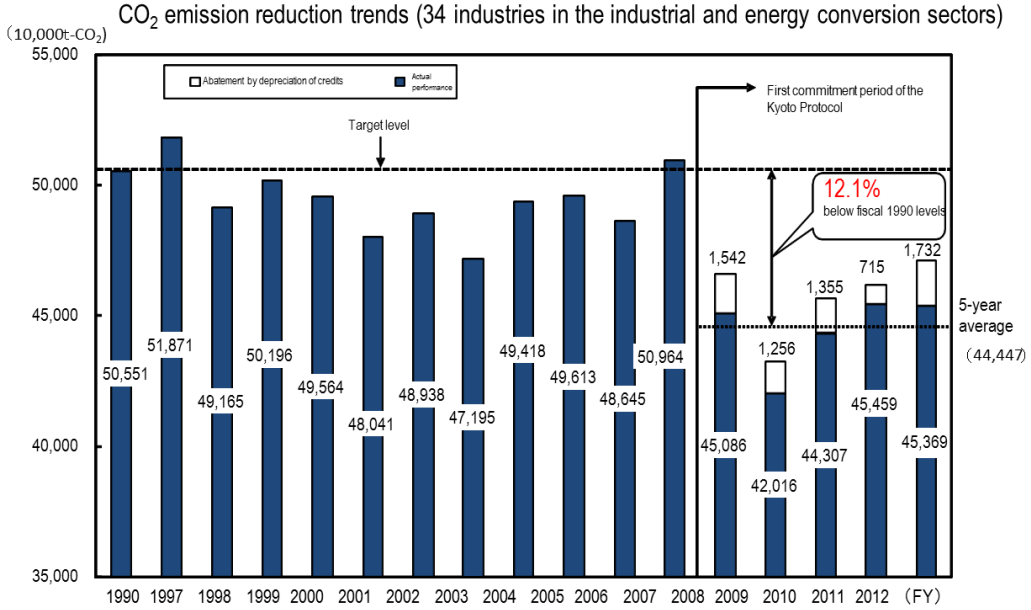
This Report (Summary) <Performance in fiscal 2016> will report on the follow-up results of 61 industries out of 62 participating industries. Details of individual efforts made by each industry can be found in the “Industry-specific Report.”

**Figure A. Accomplishments of the Keidanren Voluntary Action Plan on the Environment (Section on Global Warming)**

— First Commitment Period of the Kyoto Protocol (2008-2012) —

◆ As a result of efforts under the Voluntary Action Plan on the Environment, emissions were reduced by 12.1% (61.04 million t-$CO_2$) relative to fiscal 1990 during the first commitment period of the Kyoto Protocol (fiscal 2008-2012).

$CO_2$ emission reduction trends (34 industries in the industrial and energy conversion sectors)

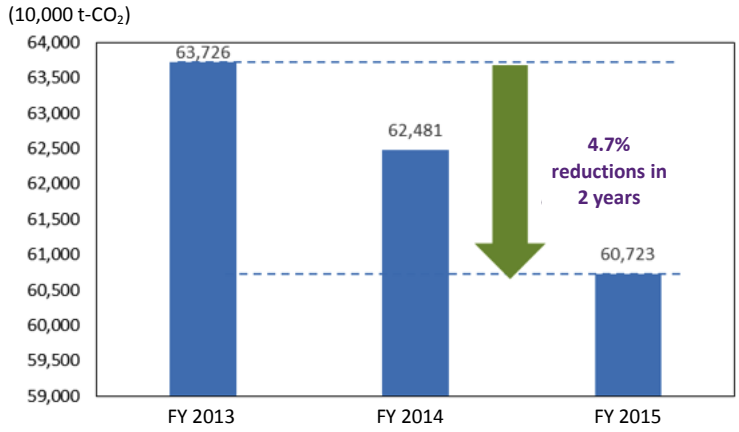



*1 Figures given for actual performance in 2008 and onwards include abatement by depreciation of credits.
*2 The five-year average (fiscal 2008-2012) before consideration of abatement by depreciation of credits is 9.5% below fiscal 1990 levels.

**Figure B. Accomplishments of Keidanren's Commitment to a Low Carbon Society**

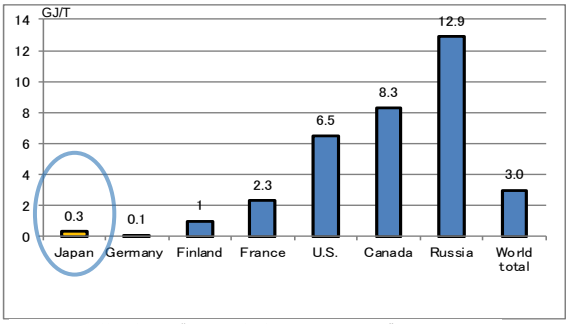
— Fiscal 2012-15 —

$CO_2$ emission trends (60 industries and companies)



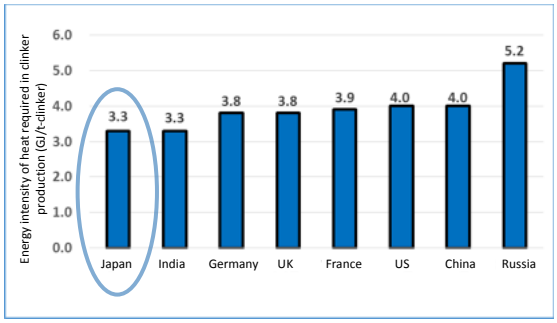
## Figure C. International comparison of energy efficiency in individual industries

Energy-saving potential of adopting BAT in the pulp and paper industry (fiscal 2012)



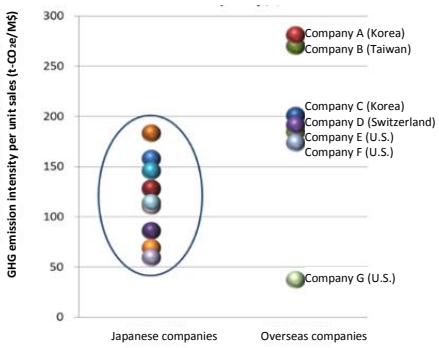

Source: compiled based on IEA "Energy Technology Perspectives 2012"

Estimates of the energy intensity of heat required in clinker production (2010)



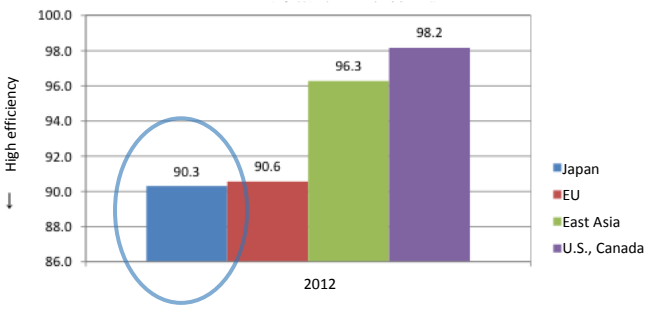

Source: compiled based on Source: Research Institute for Innovative Technology for the Earth, "CO2 Intensity Estimates as of 2010 (Cement Sector)"

Comparison of GHG emission intensity per unit sales of devices (FY 2014)



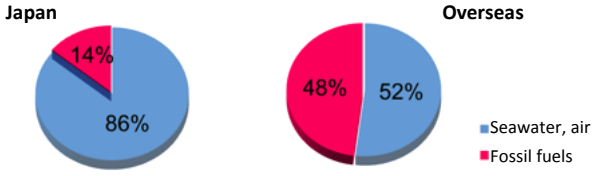

Source: compiled by the Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Protection based on disclosed data, including financial statements announced by individual companies, GHG emissions listed by CDP

Comparison of oil refinery energy consumption indices (2012)




Source: compiled by the Petroleum Association of Japan based on survey results by Solomon Associates

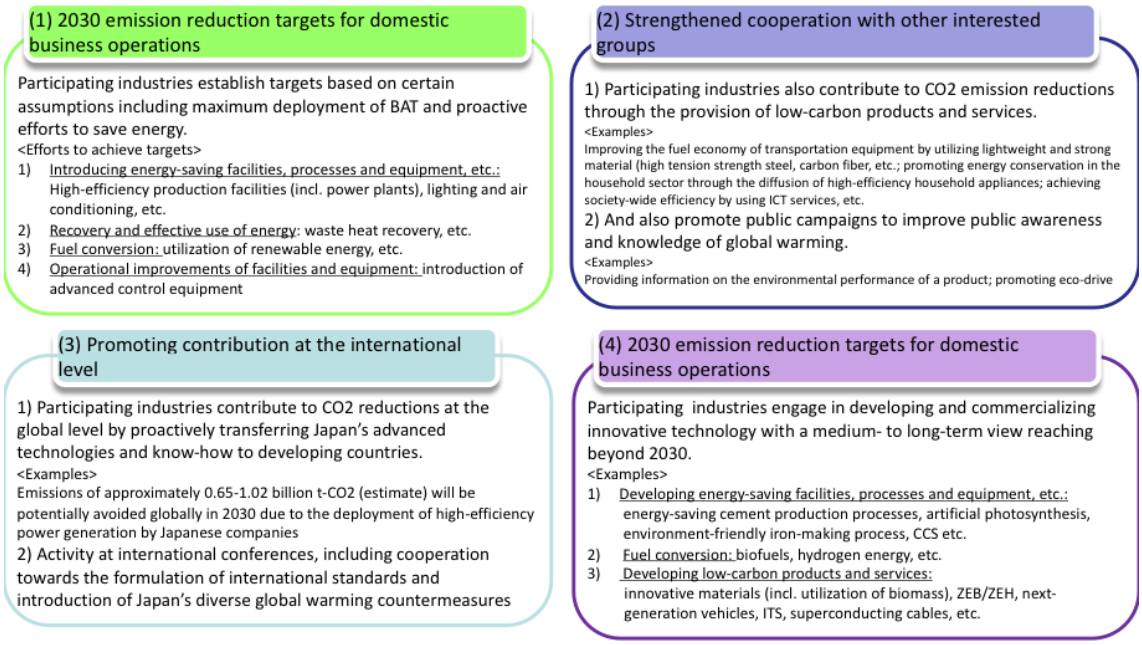
LNG receiving terminals in Japan and overseas (2013): Comparison of LNG vaporizer heat sources




LNG vaporizers that use seawater or air as their heat sources can reduce a significant amount of $CO_2$ emissions compared to those that use fossil fuels. (Japan has a higher ratio of LNG vaporizers that use seawater and air.)

Source: Other research institutions and Japan Gas Association

**Figure D. Four pillars of Keidanren's Commitment to a Low Carbon Society**




(Reference) Developments in the Keidanren Voluntary Action Plan on the Environment and Keidanren's Commitment to a Low Carbon Society

Keidanren has always taken voluntary and pioneering action before the Japanese Government is decided about its policy direction.

| | |
|---|---|
| Apr 1991 | Announced the Keidanren Global Environment Charter |
| Jun 1992 | UN Earth Summit (Rio de Janeiro) |
| Jul 1996 | Announced the Keidanren Appeal on Environment intentions to map out Voluntary Action Plan on the Environment |
| Jun 1997 | Announced the Keidanren Voluntary Action Plan on the Environment |
| Dec 1997 | Adoption of the Kyoto Protocol |
| Dec 1998 | First follow-up to the Voluntary Action Plan on the Environment (continued on an annual basis) |
| Jul 2002 | Launched the Evaluation Committee for the Voluntary Action Plan on the Environment |
| Apr 2005 | Cabinet Decision on the "Kyoto Protocol Target Achievement Plan" |
| Dec 2009 | Announced the Commitment to a Low Carbon Society Phase I (Basic Concept) |
| Jan 2013 | Formulated and announced the Commitment to a Low Carbon Society Phase I (2020 target) |
| Mar 2013 | Interim policy on global warming (Global Warming Prevention Headquarters decision) |
| Apr 2013 | Launched Keidanren's Commitment to a Low Carbon Society |
| Jul 2014 | Invited industries to formulate action plans under the Keidanren Commitment to a Low Carbon Society Phase II (2030 target) |
| Apr 2015 | Formulated and announced the Commitment to a Low Carbon Society Phase II (2030 target) |
| Jul 2015 | Finalization of Japan's Intended Nationally Determined Contribution by the Japanese Government and submission to the UN |
| Dec 2015 | Adopted the Paris Agreement |
| Nov 2016 | Entry into force of the Paris Agreement |

# Pillar 1: Emission reductions from domestic business operations

## (1) Performance in $CO_2$ emissions

Industries participating in Keidanren's Commitment to a Low Carbon Society have set up and announced individual targets to reduce $CO_2$ emissions from their business operations. Industries are engaged in efforts to fulfill their commitments to society.

Upon including the outcomes of their efforts in this report, we decided to change the scope of $CO_2$ emissions from the energy conversion sector from this fiscal year. In previous fiscal years, emissions after electric power distribution (indirect emissions) were provided for the industrial, energy conversion, commercial and transportation sectors. However, given the increasing importance of the electric power industry's follow-up on $CO_2$ emissions from its own business operations (electric power generation), the current follow-up will present $CO_2$ emissions from the energy conversion sector, including the electric power industry, as $CO_2$ emissions before electric power distribution (direct emissions) and emissions from other sectors (industrial, commercial, transportation) will be presented as emissions after electric power distribution (indirect emissions).

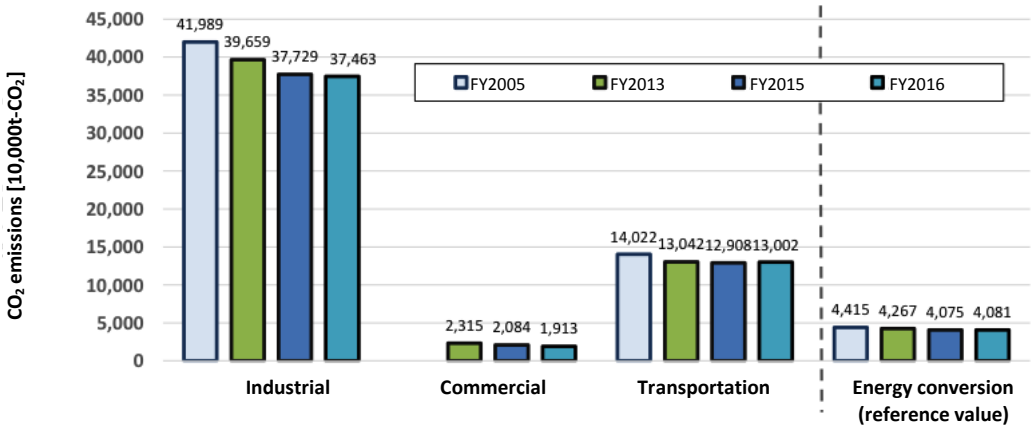
### ① All sectors

<u>$CO_2$ emission trends</u>

The Fiscal 2017 Follow-up revealed that in fiscal 2016, $CO_2$ emissions were reduced in the industrial, energy conversion, and commercial sectors relative to the previous fiscal year (-0.7%, -2.5%, and -8.2%, respectively), whereas emissions slightly increased in the transportation sector (+0.7%). In contrast, relative to fiscal 2013, the baseline year for Japan's 2030 target, emissions were reduced in all sectors (industrial:-5.5%; energy conversion: -11.9%; commercial: -17.6%; transportation: -0.3%). Relative to fiscal 2005, emissions in the industrial and transportation sectors decreased(-10.9% and -9.8%, respectively), whereas emissions in the energy conversion sector increased (+13.3%) (Figure 1).

**Figure 1. $CO_2$ emissions by sector and rate of reduction (final count)**

Emissions after electric power distribution

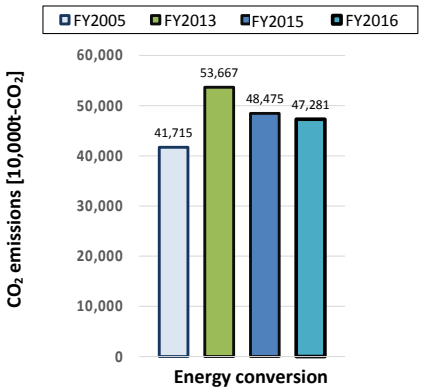



| Sector | Target industries/ participating ind. | FY2016 emissions | Relative to FY2005 | Relative to FY2013 | Relative to previous fiscal year (FY2015) |
|---|---|---|---|---|---|
| Industrial | 31/31 industries | 374.63Mt-$CO_2$ | -10.9% | -5.5% | -0.7% |
| Commercial | 14/16 industries | 19.13Mt-$CO_2$ | | -17.6% | -8.2% |
| Transportation | 12/12 industries | 130.02Mt-$CO_2$ | -9.8% | -0.3% | +0.7% |

(NOTES)

- Emissions for the energy conversion sector are provided for reference as direct $CO_2$ emissions before electric power distribution are counted for the energy conversion sector. However, emissions after electric power distribution are not covered for the Electric Power Council for a Low Carbon Society due to unsatisfactory data collection status.
- Emissions from the Real Estate Companies Association of Japan are not included.
- Data for fiscal 2005 have been collected based on the calculation method employed under Keidanren's Commitment to a Low Carbon Society for comparison purposes. However, emissions in the commercial sector in fiscal 2005 are not provided due to unsatisfactory data collection status.
- $CO_2$ emissions reflecting the decrease resulting from using post-adjustment emission coefficients stipulated in the Act on the Promotion of Global Warming Countermeasures are provided in Appendix 1.

Emissions before electric power distribution




| Sector | Target industries/ participating ind. | FY2016 emissions | Relative to FY2005 | Relative to FY2013 | Relative to previous fiscal year (FY2015) |
|---|---|---|---|---|---|
| Energy conversion | 3/3 industries | 472.81 Mt-$CO_2$ | +13.3% | -11.9% | -2.5% |

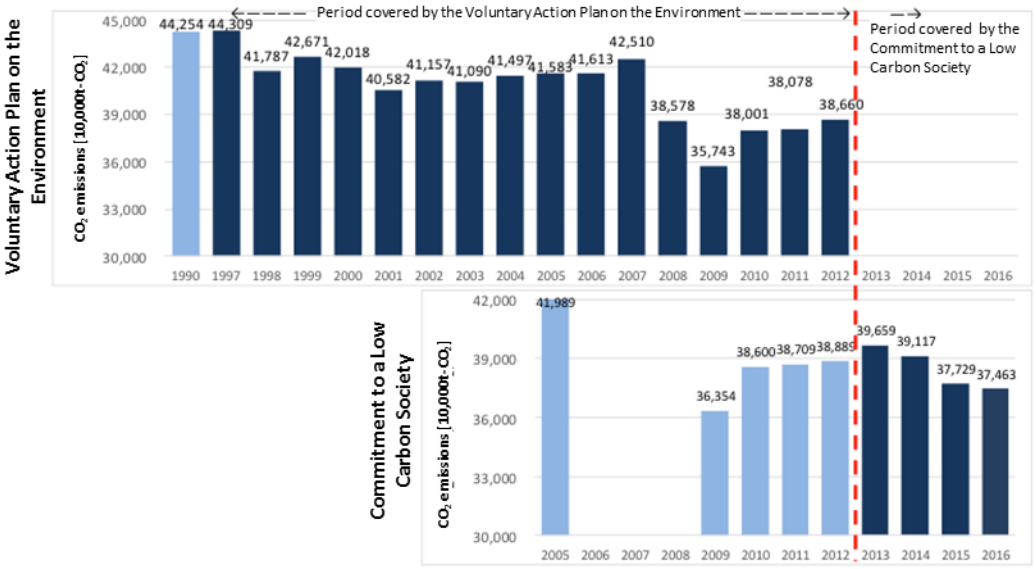
## ② Industrial Sector

### $CO_2$ emission trends

In fiscal 2016, the 31 participating industries of the industrial sector collectively emitted 374.63 million t-$CO_2$ (after electric power distribution) (10.9% below fiscal 2005 levels, 5.5% below fiscal 2013 levels, and 0.7% below previous year levels), thus continuing to follow a downward $CO_2$ emission trend (Figure 2).

**Figure 2. Emissions in the industrial sector**

**(after electric power distribution, final count)**




(NOTES)

- The Voluntary Action Plan on the Environment covered the period before fiscal 2012, and was succeeded by Keidanren's Commitment to a Low Carbon Society from fiscal 2013.
- The figures for fiscal 2005-2012 under Keidanren's Commitment to a Low Carbon Society have been calculated and provided as reference. (This is because with the implementation of the Commitment to a Low Carbon Society, calculation methods, including those for emission coefficients for electric power (switched from generation-end emission coefficients to receiving-end emission coefficients) and those for industrial boundaries in some industries, have been renewed.)

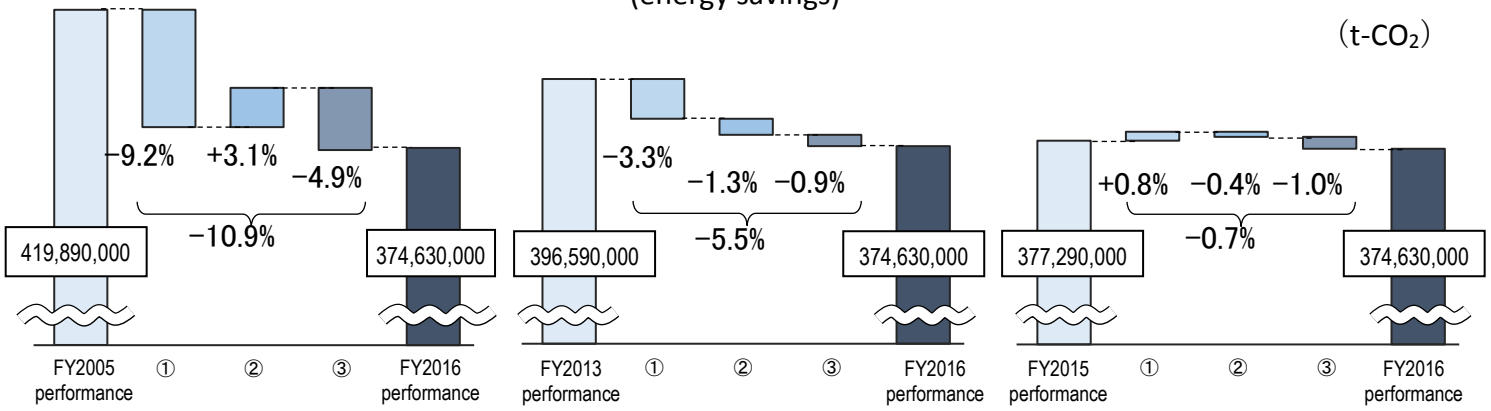
Factor analysis[1]

A factor analysis of the causes that led to changes in $CO_2$ emissions in the industrial sector (Figure 3) revealed that since fiscal 2005, $CO_2$ emissions due to "③ change in energy consumed per unit of economic activity" have followed a decreasing trend (4.9% below fiscal 2005 levels, 0.9% below fiscal 2013 levels, 1.0% below previous fiscal year levels). Relative to previous year levels, $CO_2$ emissions increased due to "① change in economic activity" (+0.8%), while emissions decreased due to "② change in $CO_2$ emission factor" and "③ change in energy consumed per unit of economic activity" (-0.4% and -1.0%, respectively), exceeding increased amounts. As a result, overall $CO_2$ emissions were reduced (-0.7%)

.

**Figure 3. Factors of change in $CO_2$ emissions (after electric power distribution, final count) in the industrial sector**

① Change in economic activity
② Change in $CO_2$ emission factor (decarbonization of energy)
③ Change in energy consumed per unit of economic activity (energy savings)




(NOTE) ・ DUE TO THE ROUNDING OF VALUES TO TWO DECIMAL PLACES, TOTALS MAY DIFFER FROM THE SUM OF INDIVIDUAL ITEMS.

In contrast, industry-specific analyses revealed that in many industries, although $CO_2$

1 In order to identify the factors that contributed to changes in $CO_2$ emissions, factors have been broken down to the following three factors in line with the Kaya Identity: "① change in economic activity," "② change in $CO_2$ emission factor (change in $CO_2$ emission factor for energy)," and "③ change in energy consumed per unit of economic activity (change attributable to energy savings)." For example, declines in values for ① would imply that $CO_2$ emissions were reduced due to less economic activity, declines in ② would imply that $CO_2$ emissions were reduced due to decarbonaization of energy, and declines in ③ would imply that $CO_2$ emissions were reduced as a result of energy saving efforts.

emissions due to "① change in economic activity" were reduced relative to previous fiscal year, $CO_2$ emissions attributable to "③ change in energy consumed per unit of economic activity" had increased, thus implying that energy intensity levels are worsening. This is the result of reduced economic activity due to the offshoring of customer companies and lower domestic consumer demand which has driven down capacity utilization rates. It is also a consequence of reduced energy efficiency due to manufacturing smaller lots of an increased diversity of products and labor shortages.

Major efforts made in fiscal 2016

The industrial sector continues to replace conventional equipment with high-efficiency equipment, improve operational processes, recover waste energy, etc. (Figure 4).

For example, given its many years of energy conservation efforts, the electrical and electronic industry is challenged with limits in cost-effective energy savings from simply deploying high-efficiency equipment, and thus proactively promotes measures such as operational improvements harnessing IoT. The dairy industry has initiated studies to introduce smart factories in the future.

**Figure and Table 4. Major efforts made in the industrial sector in fiscal 2016**

| **Improvement of efficiency of facilities** | |
|---|---|
| ・ Renewal to high-efficiency production facilities (transformers, motors, pumps, compressors, chillers, coke ovens, dust collectors, heavy machineries, facilities to fill cans at room temperature, etc.)<br>・ High-efficiency air conditioning<br>・ LED | ・ Application of thermal insulation to equipment and piping<br>・ Steamless / airless processes<br>・ Inverters (fans, pumps, turbulators, lighting, etc.)<br>・ Heat pump water heater |
| **Improvement of operational methods** | |
| ・ Reviews of facility operations and control (startup, suspension, scheduling, intermittent operations, number of equipment, etc.)<br>・ Changing baselines and settings (temperatures, frequency of ventilations, level of cleanliness, brightness, hours of operation, etc.) | ・ Cleansing facilities<br>・ Preventing water leakages and other leakages<br>・ Electric power monitoring<br>・ Improvements in pipe routing |
| **Fuel conversion / recovery of waste energy** | |
| ・ City gas, LPG, propane gas<br>・ Electrification<br>・ Biomass boiler<br>・ Biomass and solar power generation facilities | ・ Heat exchanger<br>・ Recycled oil and waste plastics<br>・ Waste heat<br>・ Cogeneration |

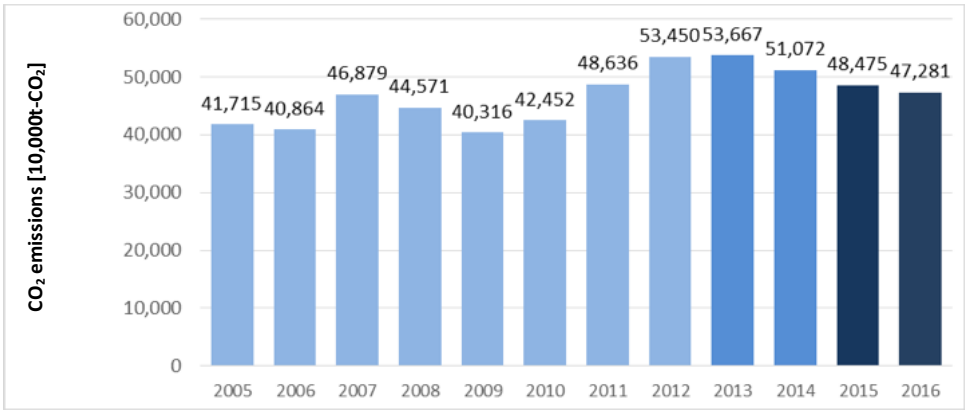
## ③ Energy conversion sector

### $CO_2$ emission trends

In fiscal 2016, the 3 participating industries of the energy conversion sector collectively emitted 472.81 million t-$CO_2$ (before electric power distribution) (13.3% above fiscal 2005 levels, 11.9% below fiscal 2013 levels, and 2.5% below previous year levels), thus a downward $CO_2$ emission trend has been observed in recent years (Figure 5).

**Figure 5. $CO_2$ emissions in the energy conversion sector**

**(before electric power distribution, final count)**




(NOTE)

- The Commitment to a Low Carbon Society covers the period from fiscal 2013. The figures for fiscal 2005-2012 have been provided as reference. The Voluntary Action Plan on the Environment did not calculate emissions before electric power distribution, and thus did not provide such figures.
- The data is not continuous, due to the inclusion of different sources in the period through fiscal 2014 and the succeeding period. (For fiscal 2015 and beyond, the performance of member operators of the Electric Power Council for a Low Carbon Society that engaged in business operations during the relevant year is provided. For fiscal years through fiscal 2014, the performance of the Federation of Electric Power Companies of Japan has been included for reference. The figures used for the Japan Gas Association through 2012 have been derived from the Voluntary Action Plan on the Environment which cover different industrial boundaries.)

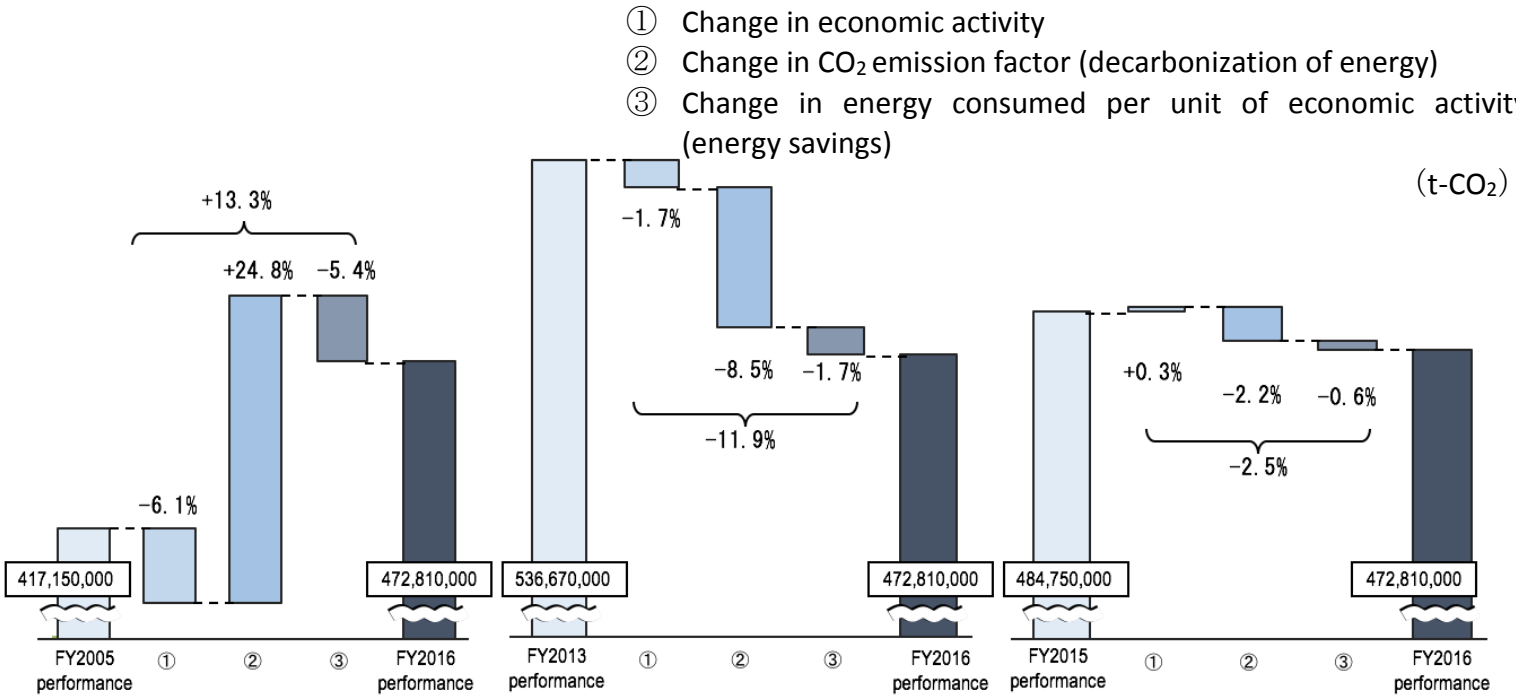
### Factor Analysis

A factor analysis of the causes that led to changes in $CO_2$ emissions (before electric power distribution) in fiscal 2016 (Figure 6) revealed that relative to fiscal 2005, $CO_2$ emissions increased (+13.3%) owing to "② change in $CO_2$ emission factor" (+24.8%).

The electric power industry has been challenged with the prolonged suspension of nuclear power plants after the Great East Japan Earthquake and has continued to rely on the intensive operation of thermal power generation plants to secure electric power supply capacity. This situation has contributed to the increase in $CO_2$ emissions relative to fiscal 2005 levels.

Relative to fiscal 2013 and to the previous fiscal year, $CO_2$ emissions decreased due to "② change in $CO_2$ emission factor" (-8.5% and -2.2%, respectively) and this contributed to overall $CO_2$ emission reductions (-11.9% and -2.5%, respectively). This is attributable to increased nuclear power generation as a result of restarting some nuclear power plants as well as to deploying cutting-edge high-efficiency thermal power generation facilities and harnessing renewable energy.

**Figure 6. Factors of change in $CO_2$ emissions (before electric power distribution, final count) in the energy conversion sector**




(NOTES)

- COMPARISONS WITH FISCAL 2005 AND FISCAL 2013 LEVELS ARE PROVIDED FOR REFERENCE BECAUSE OF THE DISCONTINUITY OF THE DATA DUE TO THE INCLUSION OF DIFFERENT SOURCES FOR THE ELECTRIC POWER INDUSTRY.

Major efforts made in fiscal 2016

The electric power industry is promoting the decarbonization of electricity through the utilization of renewable energy and nuclear power on the major premise of ensured safety, as well as improving the efficiency of thermal power generation. Furthermore, the industry provides services including environmental household account books, electric power-related data visualization services and demand response services, which lead to the efficiency use of electric power.

The petroleum industry continues to engage in energy conservation by proactively using government support programs for the rational use of energy to implement multiple individual measures.

The city gas industry promotes $CO_2$ emission reductions by introducing an apparatus for reliquefying BOG (boil-off-gas) released from LNG storage tanks using cold heat and installing more facilities that use LNG cold energy to generate power

**Figure 7. Major efforts made in the energy conversion sector in fiscal 2016**

| | |
|---|---|
| **Improvement of efficiency of facilities** | |
| ・ LNG combined cycle power generation<br>・ Ultra-supercritical coal-fired thermal power generation<br>・ BOG reliquefying facilities | ・ Mutual use of heat among oil refinery equipment<br>・ Waste heat/waste energy recovery facilities<br>・ Open rack vaporizer (ORV)<br>・ Cogeneration<br>・ Cold heat power generation |
| **Creation of low carbon emission or zero emission energy** | |
| ・ Nuclear power on the major premise of ensured safety | ・ Hydro, geothermal, solar, wind, and biomass power generation |
| **Improvement of operational methods** | |
| ・ Addressing wind and solar output variability<br>・ Highly sophisticated operation and management of refining and utility equipment at oil refineries | ・ Reviewing the amount of water circulated in BOG cooling water circulation systems |
| **Provision of services** | |
| ・ Environmental household account books<br>・ Electric power visualization service<br>・ Energy-saving consulting | ・ Deploying high-efficiency water heaters and introducing the use of energy-saving household appliances<br>・ Hosting campaigns and events to raise awareness of energy conservation |

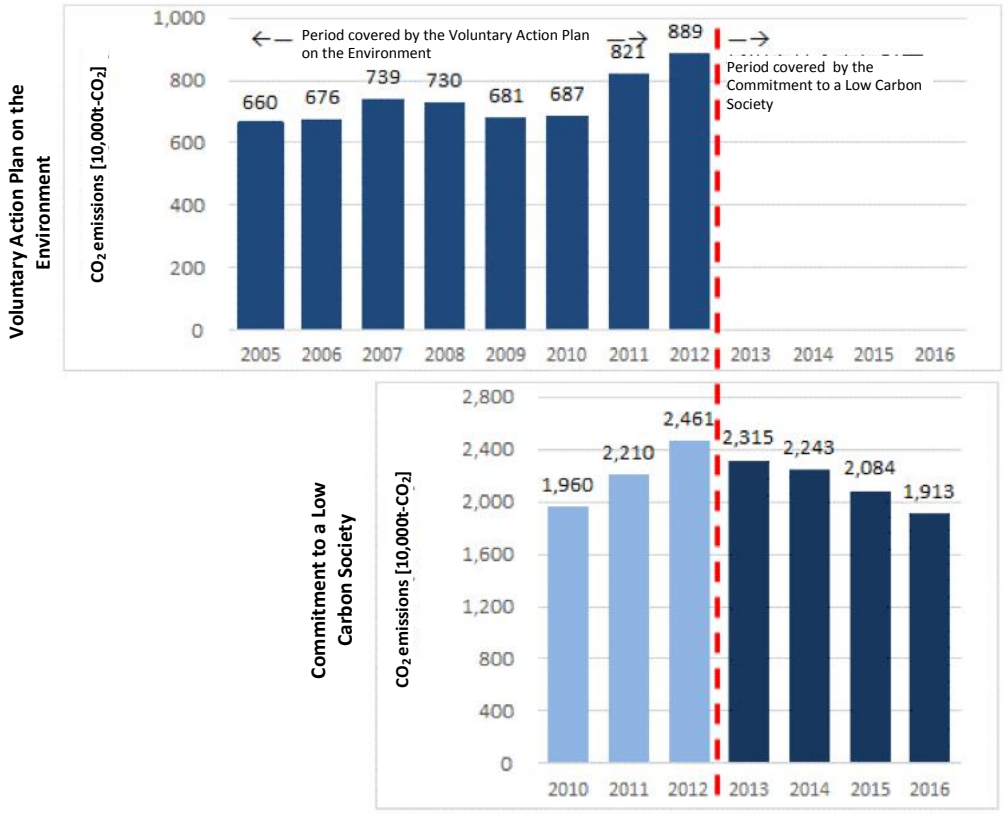
## ④ Commercial sector

### $CO_2$ emission trends

In fiscal 2016, the 14 participating industries of the commercial sector collectively emitted 19.13 million t-$CO_2$ (after electric power distribution) (17.6% below fiscal 2013 levels and 8.2% below previous year levels). Hence, after peaking in fiscal 2013, $CO_2$ emissions have followed a declining trend (Figure 8).

**Figure 8. $CO_2$ emissions in the commercial sector**

**(after electric power distribution, final count)**




(NOTES)

- THE VOLUNTARY ACTION PLAN ON THE ENVIRONMENT COVERED THE PERIOD BEFORE FISCAL 2012, AND WAS SUCCEEDED BY THE COMMITMENT TO A LOW CARBON SOCIETY FROM FISCAL 2013. THE FIGURES FOR FISCAL 2010-2012 UNDER THE COMMITMENT TO A LOW CARBON SOCIETY HAVE BEEN PROVIDED AS REFERENCE.
- WITH THE IMPLEMENTATION OF THE COMMITMENT TO A LOW CARBON SOCIETY, CALCULATION METHODS HAVE BEEN RENEWED (EMISSION COEFFICIENTS FOR ELECTRIC POWER WERE SWITCHED FROM GENERATION-END EMISSION COEFFICIENTS TO RECEIVING-END EMISSION COEFFICIENTS; AND INDUSTRIAL BOUNDARIES WERE CHANGED IN SOME INDUSTRIES).
- EMISSIONS FROM THE REAL ESTATE COMPANIES ASSOCIATION OF JAPAN ARE NOT INCLUDED DUE TO UNSATISFACTORY DATA COLLECTION STATUS.

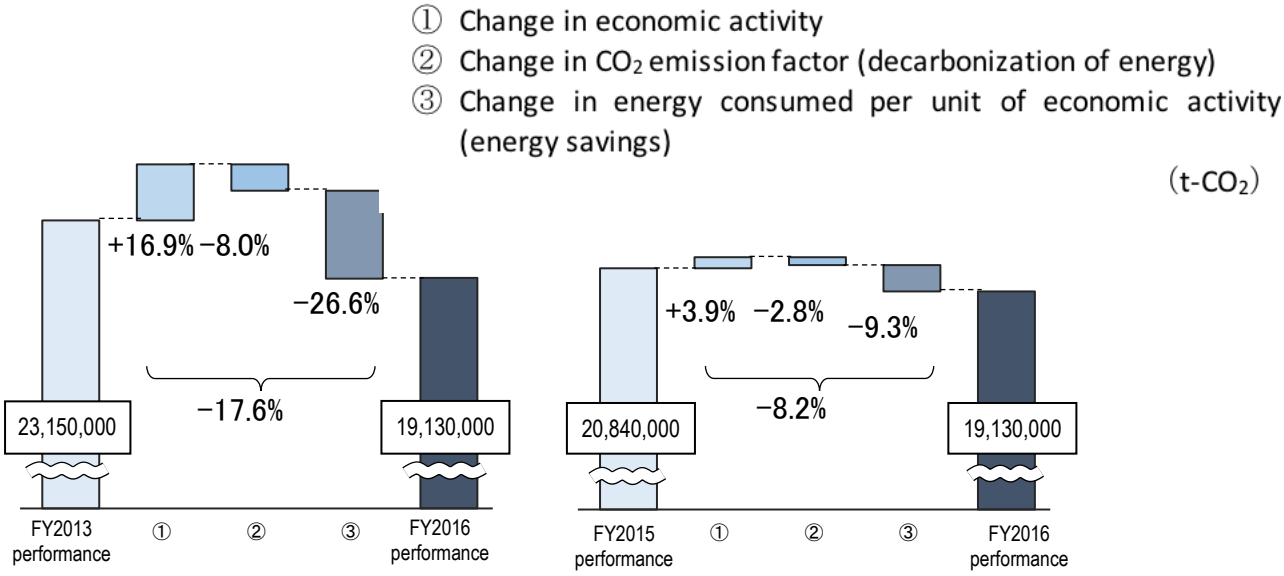
Factor analysis

A factor analysis of the causes that led to changes in $CO_2$ emissions in the commercial sector (Figure 9) revealed that since fiscal 2013 and the previous fiscal year, $CO_2$ emissions increased due to "① change in economic activity" (+16.9% and +3.9%, respectively), while $CO_2$ emissions due to "③ change in energy consumed per unit of economic activity" dropped significantly (-26.6% and -9.3%, respectively) and emissions due to "② change in CO2 emission factor" also decreased (-8.0% and-2.8%, respectively). As a result, overall emission reductions in fiscal 2016 were 17.6% below fiscal 2013 levels and 8.2% below previous fiscal year levels.

The commercial sector has continuously taken measures to replace conventional lighting and air conditioning equipment with LEDs and high-efficiency air conditioners, as well as to improve the energy efficiency of facilities and equipments. Restarting nuclear power plants and deploying renewable energy have also advanced the decarbonization of electric power, which accounts for a large share of energy use in the commercial sector. Such efforts have led to $CO_2$ emission reductions that exceed the rising emissions from increased economic activity.

The recent rapid diffusion of smartphones has been accompanied by the expansion of services into new spheres, including online shopping and SNS, as well as the emergence of a full-scale IoT society. Hence, concerns have been raised in the telecommunications, telecom services and internet provider industries that network equipment may use more electric power. In response to such circumstances, participating companies joined forces to reduce electric power use by deploying telecommunications and IT equipment featuring high energy-saving performance, building and operating efficient facilities, and implementing energy-saving measures; and therefore, they have been successful in achieving $CO_2$ emission reductions.

**Figure 9. Factors of change in $CO_2$ emissions (before electric power distribution, final count) in the commercial sector**




Major efforts made in fiscal 2016

The commercial sector has continued to renew existing building facilities to high-efficiency air conditioning and lighting equipment and to optimize operations (Figure 10). The abovementioned telecommunications industry has promoted the introduction of BAT, including hybrid HVAC systems and HVAC systems using machine learning. The real estate industry is engaged in installing thermal insulation and heat shields in new and refurbished buildings. Examples of such technologies include, high-performance thermally insulated window glass, heat-shielded films, verticals louvers, roof eaves, high-performance reflective paints, and roof greening.

Advancements have been observed in improving the efficiency of corporate vehicles. The life insurance industry has installed telematics devices in the entire corporate fleet. By using fuel consumption data and other driving data that is sent from special equipment installed in each vehicle, corporate vehicles can be meticulously managed and fuel efficiency can be improved.

**Figure 10. Major efforts made in the commercial sector in fiscal 2016**

| | |
|---|---|
| **Improvement of efficiency of buildings and facilities** | |
| ・ High-efficiency HVAC systems | ・ LED |
| ・ Ambient air cooling | ・ Automatic light off system |
| ・ Packaged air conditioners with air-cooled heat pumps | ・ Daylight louvers |
| ・ $CO_2$concentration controlled ventilation | ・ Energy-efficient elevators |
| ・ High-insulation window glass | |
| **Improvement of efficiency of other facilities** | |
| ・ Connection of servers and routers to DC power sources | ・ Hybrid cars |
| ・ Introduction of high-efficiency wireless base stations | ・ High-efficiency freezers |
| ・ Renewal of berthing velocity meters | ・ Introduction of seawater pump inverter system for BOG condensers |
| ・ Renewal of secondary substation oil Immersed transformers | |
| **Improvement of operational methods** | |
| ・ BEMS, smart meters | ・ Telematics devices for corporate vehicles |
| ・ Introduction of automatic control systems in heat source, air conditioning and lighting equipment | ・ Consolidation of floor area by relocating main office |
| ・ Improvement of air conditioning airflow | ・ Energy-saving control systems for elevators |
| ・ Shorter operation hours of perimeter air conditioning | |
| **Fuel conversion** | |
| ・ Solar power generation | |

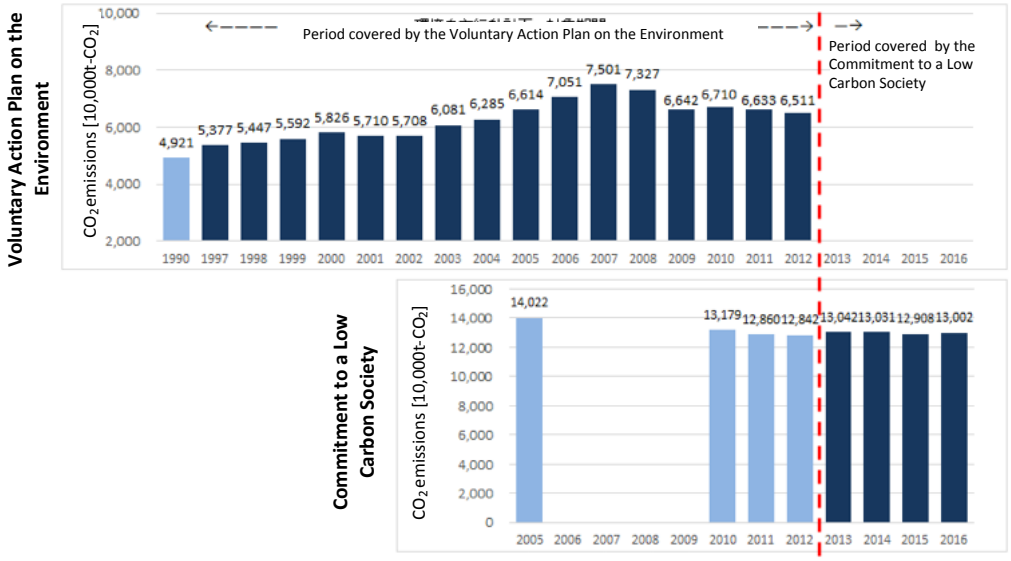
## ⑤ Transportation sector

### $CO_2$ emission trends

In fiscal 2016, the 12 participating industries of the transportation sector collectively emitted 130.02 million t-$CO_2$ (after electric power distribution) (9.8% below fiscal 2005 levels, 0.3% below fiscal 2013 levels and 0.7% above previous year levels), just recently marking a slight increase (Figure 11).

**Figure 11. $CO_2$ emissions in the transportation sector**

**(after electric power distribution, final count)**




(NOTES)

- The Voluntary Action Plan on the Environment covered the period before fiscal 2012, and was succeeded by the Commitment to a Low Carbon Society from fiscal 2013. The figures for fiscal 2005-2012 under the Commitment to a Low Carbon Society have been provided as reference. (Figures for fiscal 2005 do not include data for the Association of Japanese Private Railways and the East Japan Railway Company.) The large differences in emissions under the Voluntary Action Plan on the Environment and the Commitment to a Low Carbon Society for fiscal 2010-2012 are attributable to the increase in the number of companies reporting their emissions.
- With the implementation of the Commitment to a Low Carbon Society, calculation methods have been renewed for emission coefficients for electric power (switched from generation-end emission coefficients to receiving-end emission coefficients) and industrial boundaries for some industries.
- Overseas emissions are included for the Japanese Shipowners' Association and a part of the Scheduled Airlines Association of Japan

Factor analysis

A factor analysis of the causes that led to changes in $CO_2$ emissions in the transportation sector in fiscal 2016 (Figure 12) revealed that relative to the previous fiscal year, $CO_2$ emissions increased due to "① change in economic activity" (+1.0%) while $CO_2$ emission reductions owing to "② change in $CO_2$ emission factor" and "③ change in energy consumed per unit of economic activity" were small (-0.2% and -0.1%, respectively).

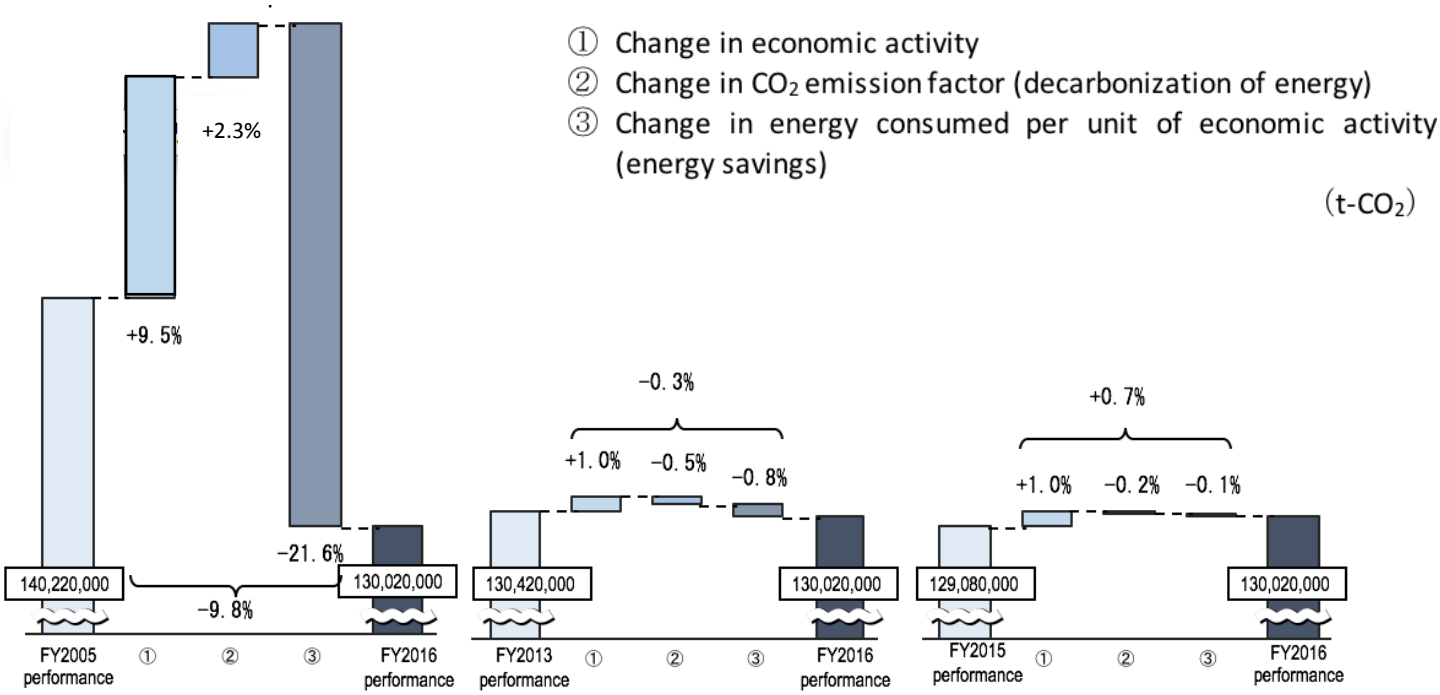
In contrast, relative to fiscal 2005 and fiscal 2013, $CO_2$ emissions increased due to "① change in economic activity" (+9.5% and +1.0%, respectively), while $CO_2$ emissions owing to "③ change in energy consumed per unit of economic activity" (-21.6% and -0.8%, respectively) exceeded increases; and therefore, emission were reduced as a whole.

The transportation sector has been engaged in energy saving efforts, such as renewing existing transportation equipment to high-efficiency models in the medium- to long-term. As a result, the industry has achieved energy savings that exceed increases in $CO_2$ emissions from economic activity. On the other hand, the slight increase in $CO_2$ emissions are presumably attributable to change in demand in emerging countries.

After the Lehman Brothers collapse, passenger aircraft demand has followed a recovering trend since 2012; and therefore, the scheduled airline industry has increased $CO_2$ emissions due to increased economic activity, but has advanced improvements in energy efficiency by renewing aircrafts, thus controlling increases in $CO_2$ emissions.

The private railways industry has deployed energy-efficiency railcars when adding or renewing equipment. The decarbonization of electric power has also contributed to the achievement of $CO_2$ emission reductions.

**Figure 12. Factors of change in $CO_2$ emissions (before electric power distribution, final count) in the transportation sector**




Major efforts made in fiscal 2016

The transportation industry not only continues to replace conventional transportation equipment, it is introducing cutting-edge technologies, such as the Super Eco Ship, the Boeing 787 aircraft, and SiC (silicon carbide) power semiconductors for railcars (Figure 13).

**Figure 13. Major efforts made in the transportation sector in fiscal 2016**

| **Introduction and operation of high-efficiency international and domestic vessels** | |
|---|---|
| ・ Super Eco Ship (SES) natural gas vessels<br>・ Low frictional resistance design, coating and devices<br>・ High combustion efficiency engines<br>・ Effective use of waste heat<br>・ Utilization of weather routing and navigating systems<br>・ Slow navigation | ・ Cleansing vessels, coating, propeller polishing<br>・ Thorough maintenance and cleansing<br>・ Use of combustion improvers<br>・ Suspension of unnecessary pumps when in harbor<br>・ Energy-saving settings for lighting and air conditioning<br>・ Utilization of shorepower<br>・ Optimization of fuel oil and ballast water |

| Introduction and operation of high-efficiency aircrafts | |
|---|---|
| ・ New aircraft models, e.g. Boeing 787<br>・ Firm implementation of engine water-washing schedule | ・ Reduce vessel load<br>・ Reviews of fuel load |
| **Introduction and operation of high-efficiency railcars** | |
| ・ SiC semiconductors<br>・ Hybrid engines<br>・ Regeneration brakes<br>・ Lightweight bogies using carbon fiber plastics | ・ Use of LED for railcar interior lighting and indicators<br>・ Dimming of railcar interior lighting<br>・ Renewal of platform and station building lighting to LED |

### (2) Progress made toward 2020 target and probability of achievement

A survey on the probability of successfully achieving Phase I (fiscal 2020) targets (Figure 14) revealed that 41 industries of the 51 participating industries find that they will be able to meet their targets.

In terms of the progress made to date, 35 industries had already achieved their targets in fiscal 2016. This is attributable to the efficiency improvement efforts that each industry made toward the achievement of the industry-specific targets that they made a social commitment to and the steady energy-saving efforts that they have accumulated. Industries that have maintained their current targets continue their endeavors to accomplish further reductions. After the interim review in fiscal 2016, 6 industries renewed their targets.

One of the reasons that industries that have overachieved their targets are not renewing their targets is that it is difficult to forecast future $CO_2$ emissions and emission intensity, given prospective changes in domestic and international supply-demand structures and business structures as well as changes in the low-carbon resource and energy procurement environment due to competition with other environmental measures, such as the 3Rs and FIT (feed-in-tariff). Some have also pointed out that performance in energy intensity tends to be varied from year to year; and therefore, progress made in fiscal 2016 is not enough to determine the probability of achieving targets.

Against this backdrop, it is becoming more and more important for industries to account for the validity or status of their targets through the PDCA cycle in order to ensure the effectiveness of the Commitment to a Low Carbon Society, which also calls for industries to consider target levels that will enable maximum commitment to society.

**Figure 14. Phase I (fiscal 2020) Probability of target achievement and rate of progress in fiscal 2016**

| | | | |
|---|---|---|---|
| Believes target can be achieved | Industrial | Japan Cement Association (287%)<br>*2Japan Chemical Industry Association (245%)<br>Brewers Association of Japan (224%)<br>*2 Japan Sanitary Equipment Industry Association (173%)<br>Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Protection (171%)<br>Japan Federation of Printing Industries(163%)<br>Lime Manufacture Association (157%)<br>Japan Mining Industry Association (157%)<br>Japanese Electric Wire & Cable Makers' Association (147%)<br>Japan Soft Drink Association (130%)<br>Japan Aluminium Association (125%) | *2Japan Industrial Vehicles Association (118%)<br>Flat Glass Manufacturers Association of Japan (114%)<br>Japan Federation of Housing Organizations (111%)<br>Federation of Pharmaceutical Manufacturers' Associations of Japan (105%)<br>*1Japan Petroleum Development Association (105%)<br>Japan Bearing Industrial Association (104%)<br>Japan Copper and Brass Association (102%)<br>*2Japan Auto Parts Industries Association (100%)<br>Limestone Association of Japan (91%)<br>*1Japan Dairy Industry Association (20%) |
| | Energy conversion | *1Japan Gas Association (103%)<br>Electric Power Council for a Low Carbon Society (89%) | |
| | Commercial | *2Telecom Services Association (363%)<br>Japan Securities Dealers Association (273%)<br>Japan Department Stores Association (232%)<br>*2Japan Foreign Trade Council (222%)<br>Japan Bankers Association (208%)<br>Life Insurance Association of Japan (182%) | Japan Hotel Association (161%)<br>General Insurance Association of Japan (149%)<br>Japan LP Gas Association (145%)<br>Japan Chain Stores Association (136%)<br>Real Estate Companies Association of Japan (108%)<br>*1Telecommunications Carriers Association (58%) |
| | Transportation | Japanese Shipowners' Association (204%)<br>Association of Japanese Private Railways (100%)<br>Scheduled Airlines Association of Japan (88%) | Shikoku Railway Company (73%)<br>All Japan Freight Forwarders Association (57%)<br>Japan Trucking Association (30%) |
| Making maximum efforts to achieve targets | Industrial | Japan Paper Association (233%)<br>Japan Machine Tool Builders' Association (223%)<br>*1 Japan Automobile Manufacturers Association (95%)<br>Japan Federation of Construction Contractors (88%)<br>*1Japan Iron and Steel Federation (82%) | Japan Association of Rolling Stock Industries (71%)<br>Japan Rubber Manufacturers Association (55%)<br>Shipbuilders' Association of Japan and Cooperative Association of Japan Shipbuilders (-18.8% (hour-based), -767.7% (ton-based)) |
| | Energy conversion | Petroleum Association of Japan(99%) | |
| | Transportation | Japan Federation of Coastal Shipping Associations (54%) | |
| Unlikely to achieve target | | None | |

The formula for calculating the status of progress is provided below:

Rate of progress (target against baseline year) = ([performance in baseline year] – [performance in current year]) / ([performance in baseline year]– [fiscal 2020 target]) ×100

Rate of progress (target against BAU) = ([BAU level for current year] – [performance in current year]) / [fiscal 2020 target] ×100

*1 Industries that renewed their targets upon the fiscal 2016 interim review

*2 Industries that intend to renew their targets (including those that need to renew their targets)

## (3) Emission reduction efforts made at corporate headquarters and other offices and in logistics

Participating industries are engaged in emission reduction efforts not only in business operations that emit the most $CO_2$, such as manufacturing processes, but also in office buildings such as corporate headquarters that account for a relatively small ratio of total corporate emissions. Companies have set up individual targets for office buildings (including tenants) and logistics (including outsourcing) to reduce emissions

(refer to Appendix 1).

### (4) Status of carbon credits

As a result of a survey on the use of carbon credits, there were no reports of utilizing credits to meet industry-specific targets. However, some industries reported that they had acquired credits under J-CREDIT, JCM or J-VER.

### (5) Coverage of current survey against total domestic emissions[2]

The ratio of $CO_2$ emissions in fiscal 2016, calculated for each sector in the current follow-up survey against total domestic sectoral $CO_2$ emissions in fiscal 2016 (preliminary figures)[3] was 80% for the industrial sector (coverage during previous fiscal year: 83%), 94% for the energy conversion sector (before electric power distribution), 9% for the commercial sector (coverage during previous fiscal year: 8%), and 29% for the transportation sector (coverage during previous fiscal year: 29%). The industrial and energy conversion sectors have maintained a high level of coverage.

2 It should be noted that the figures in National Institute for Environmental Studies "GHG Emissions Data of Japan," the source of total domestic emissions by sector in 2016 and those of the current survey have been derived using different calculation methods and boundaries due to their different purposes and backgrounds; and therefore, the coverage ratios should be used only for reference.

3 "GHG Emissions Data of Japan" (preliminary figures for fiscal 1990-2016)

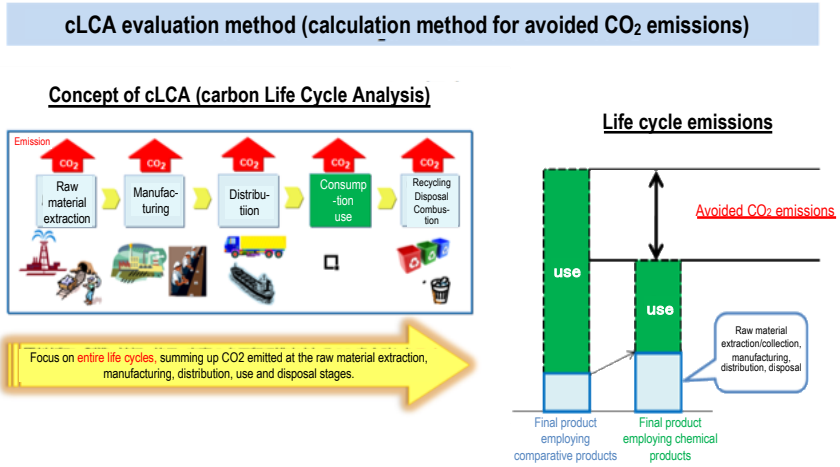
## Pillar 2: Strengthened cooperation with other interested groups

In order to achieve society-wide $CO_2$ emission reductions, it is important that $CO_2$ emission are reduced not only from corporate business activities but also with the perspective of reducing emissions through strengthened cooperation with consumers, customers, employees, local residents, government, universities, and other various actors. For example, when a manufacturer develops and provides a product or service featuring higher energy-saving performance compared to conventional products and services or the market average and it is commercialized, society-wide $CO_2$ emission reductions can be achieved through the value-added created by distributors, financial institutions government and the public relations and awareness-raising campaigns that promote its diffusion.

### (1) Efforts to reduce emissions through product and service life cycles

Many industries are not only $CO_2$ emissions sources but also contributors to reducing emissions along the value chain, from upstream (mainly in procuring products and services) to downstream (mainly in using products and services) (Figure 15). For example, most industrial products, such as automobiles and household appliances, emit larger amounts of $CO_2$ after purchase, when in use than at the manufacturing stage; and therefore, their potential for reducing emissions during use are large. Hence, many manufacturing industries are engaged in reducing $CO_2$ emissions during use by developing and manufacturing products with high energy efficiency (Figure 16). Highly efficient products with high value-added involve complex manufacturing processes, thereby resulting in increased emissions. However, when considering their entire life cycle, including the use stage, overall $CO_2$ emissions are reduced.

## Figure 15. Life cycle-based $CO_2$ emission reductions




Source: Japan Chemical Industry Association, Keidanren's Commitment to a Low Carbon Society: Fiscal 2017 Follow-up Results (Industry-specific Report)

**Figure 16. Examples of emission reduction efforts in the value chain of business operations**

| |
|---|
| Avoiding emissions by **procuring products** that emit less in processes up to manufacturing |
| ・ Biomass polyethylene packaging (The Federation of Pharmaceutical Manufacturers' Association of Japan)<br>・ Biomass plastics (Japan Federation of Printing Industries) |
| Avoiding emissions by **providing products and services** that emit less in use |
| ・ Solar power generation (Japan Chemical Industry Association, Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention, Japan Mining Industry Association, Japan Petroleum Development Association)<br>・ Cogeneration (Japan Gas Association)<br>・ Home fuel cells (Ene-Farm) (Japan LP Gas Association, Japan Gas Association, Electric Power Council for a Low Carbon Society)<br>・ Latent heat recover-type high-efficiency oil water heaters (Petroleum Association of Japan)<br>・ High-efficiency household appliances and IT products (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Protection)<br>・ Smart meters (Electric Power Council for a Low Carbon Society)<br>・ Multi-glazed glass (Flat Glass Manufacturers Association of Japan)<br>・ Water-efficient toilets (Japan Sanitary Equipment Industry Association)<br>・ High-temperature superconductive cables (The Japanese Electric Wire & Cable Makers' Association)<br>・ Low-carbon concrete (Japan Federation of Construction Contractors)<br>・ Concrete pavement (Japan Cement Association)<br>・ High-reactivity lime hydrate (Lime Manufacture Association)<br>・ Highly stabilized quality limestone (Limestone Association of Japan)<br>・ Electrical industrial vehicles (Japan Industrial Vehicles Association)<br>・ High fuel efficiency tires (Japan Rubber Association)<br>・ High-function steel (Japan Iron and Steel Federation)）<br>・ Thin high-strength copper alloy strips (for lightweight automobiles) (Japan Copper and Brass Association)<br>・ Aluminum sheets for automobiles (Japan Aluminium Association)<br>・ Super low torque tapered roller bearing (Japan Bearing Industrial Association)<br>・ Permanent magnet synchronous motor systems for railcars (Japan Association of Rolling Stock Industries)<br>・ Arranging project financing for solar generation (Japan Securities Dealers Association)<br>・ Eco-friendly products and services for retail customers (deposits, loans, etc.) (Japan Bankers Association) |
| ・ Avoiding emissions by **procuring and using products** that emit less during use |
| ・ Deploying fuel-efficient vehicles for sales and marketing operations (Federation of Pharmaceutical Manufacturers' Associations of Japan)<br>・ LTE-Advanced base station devices (Telecommunications Carriers Association) |
| ・ Avoiding emissions by providing lighter products that emit less **during distribution** |
| ・ Lightweight paper (Japan Paper Association)<br>・ Lighter container boxes (Telecommunications Carriers Association) |
| ・ Avoiding emissions by reducing emissions **at waste disposal** |
| ・ Cement production from waste and byproducts (Japan Cement Association)<br>・ Reuse of home delivery glass bottles (Japan Dairy Industry Association) |

Emission reductions in areas beyond a company's business scope are largely affected by customer preferences and regional characteristics; and therefore, it is often impossible to achieve reductions solely through the efforts of business operators. Hence, many industries have referred to calculation guidelines and publicly known standards to estimate reductions based on certain assumptions, while ensuring reliability and transparency . Participating industries have endeavored to promote their products, services and technologies for acknowledgement and wide acceptance by domestic and international consumers and customers based on such quantified reduction potential.

For example, the city gas industry estimates that the diffusion of cogeneration, which will enable the effective use of waste heat from electric power generation, will potentially reduce $CO_2$ emissions by approximately 8 million t-$CO_2$ in 2020[4]. Using this estimate, the Japan Gas Association campaigns to encourage the wide use of cogeneration through various educational opportunities, training seminars and pamphlets in collaboration with the government.

The rubber manufacturing industry confirms the effects of the Tire Labeling Scheme, which was launched in 2010 to facilitate the diffusion of high-fuel efficiency tires, by estimating the $CO_2$ emission reductions achieved by reducing the tire rolling resistance of passenger vehicles. In fiscal 2016, these tires reduced emissions by approximately 1.6 million t-$CO_2$ in comparison with versatile tires. The Japan Rubber Manufacturers Association announces the $CO_2$ emission reductions achieved through the labeling scheme to raise awareness among users.

### (2) Efforts leading to emission reductions in the residential sector

In order for the abovementioned low-carbon products and services to reduce emissions, it is important not only that we develop products featuring high performance in energy efficiency and those using low-carbon energy sources but also for users to use them wisely. Participating industries endeavor to encourage labor unions, employees and their families, as well as in the regions in which they are based, to utilize low-carbon products and services through public campaigns and original corporate activities (Figure 17).

4 Calculated from the difference between actual deployment in 2010 and deployment potential in 2020.。

**Figure 17. Examples of efforts leading to emission reductions in the residential sector**

| | |
|---|---|
| **Promotion among employees and their families** | |
| ・ Diffusion of environmental household account books<br>・ Distribution of handbooks on energy-saving household appliances and housing<br>・ Recruitment of slogans and *senryu*; posting selected slogans for awareness raising<br>・ Provision of loans by employees' mutual aid association for purchasing energy-saving household appliances and eco-cars. | ・ Implementation of in-house eco-points<br>・ Participation in the "No My Car Day (public transportation day)" campaign<br>・ Collection of used cooking oil |
| **Collaboration with local communities and governments and educational institutions** | |
| ・ Provision of environmental education and equipment<br>・ Educational activities to promote recycling<br>・ Sponsorship in awards and contests | ・ Participation in local government-led energy-saving activities<br>・ Welcoming site visits to store and factories; briefings on environmental activities |
| **Participation in public campaigns** | |
| ・ Campaigns to save electric power<br>・ Participation in campaigns initiated by the Ministry of the Environment: "COOL CHOICE," "Lights Down Campaign," "Fun to Share" | ・ Campaigns to raise environmental awareness, such as the "Green Environmental Plan Award" and the "Green City Award." |

### (3) Fostering and conservation of forest sinks

Dealing with global warming also calls for measures to foster and conserve forest sinks. Participating industries promote such measures as a part of the business operations or as CSR initiatives.

Some examples of efforts to foster forest sinks include the Japan Paper Association's overseas afforestation activities, for which it determines an afforestation area target and the mining industry (Japan Mining Industry Association, Limestone Association of Japan, Japan Cement Association) is actively involved in greening mines. Outside the forest, the housing construction industry contributes to urban greening by planting a given number of trees on the premises when building homes.

In terms of forest conservation, a broad range of industries are engaged in

conserving green areas and Satoyama in Japan and overseas, restoring tropical rain forests and effectively using forest thinnings. In Japan, industries are also promoting efforts, such as the “Corporate Forest” system in collaboration with the national and local government.

## Pillar 3: Promoting contribution at the international level

As indicated in the introduction of this report, the Japanese business community has fostered excellent energy-saving low-carbon technologies to date, achieving world-leading energy efficiency levels. The Japanese business community also possesses energy-saving or high energy efficiency products and technologies. Japan accounts for approximately 3.7% of global $CO_2$ emissions attributable to energy use, and needs to contribute to reducing not only domestic emissions but also overseas emissions in order to work towards global greenhouse gas emission reductions. Therefore, it is important for Japan to contribute to global decarbonization by transferring our advanced energy-saving low-carbon technologies to other countries and deploying products and services overseas.

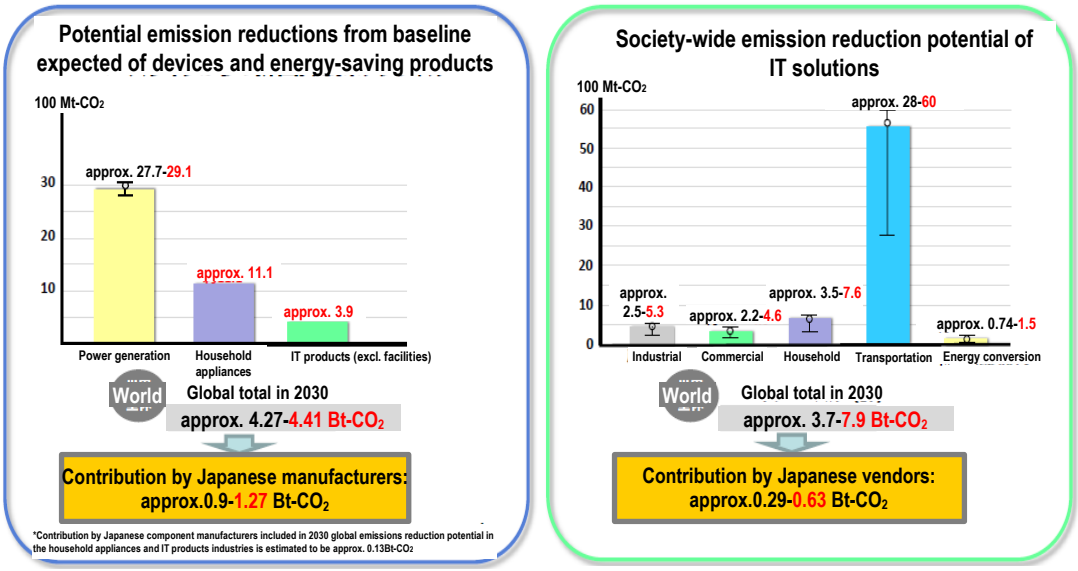
**Figure 18. Examples of overseas contribution to avoided emissions**

| **Avoiding emissions through overseas transfer of Japanese technologies and knowhow** |
|---|
| ・ Energy-efficient seawater desalination technologies (Japan Chemical Industry Association)<br>・ Energy-efficient technologies, including CDQ (coke dry quenching) and TRT (top-pressure recovery turbine plant) (Japan Iron and Steel Federation)<br>・ Hydropower generation at corporate mines (Japan Mining Industry Association)<br>・ Aluminum recycling (Japan Aluminium Association)<br>・ Permanent magnet synchronous motor technologies for railcars (Japan Association of Rolling Stock Industries)<br>・ Environmental management and energy-saving technologies (Petroleum Association of Japan)<br>・ LNG infrastructure (LNG receiving terminals, pipelines) / city gas distribution operations (Japan Gas Association)<br>・ $CO_2$ capture and underground sequestration (Japan Petroleum Development Association) |
| **Avoiding emissions through overseas diffusion of Japan's advanced low-carbon products and services** |
| ・ Lightweight paper (Japan Paper Association)<br>・ High efficiency IT products, solutions (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention)<br>・ High-temperature superconductive cables (The Japanese Electric Wire & Cable Makers' Association)<br>・ ICT services (Telecommunications Carriers Association) |

As with measures taken under Pillar 2, industries have quantified emission reductions achieved through international contribution. According to IEA (International

Energy Agency) estimates[5], maximum emission reductions of 17 billion t-$CO_2$ are expected in 2030 as a result of technological innovation and diffusion under the 2℃ scenario. For example, the electrical and electronics industry uses the IEA estimates to estimate potential contribution to globally avoided emissions made by devices and energy-saving products as well as IT solutions in 2030. It also estimates the contribution of Japanese manufacturers (Figure 19). Other industries also are making attempts to present future technological innovation and diffusion.

**Figure 19. Examples of globally estimated potential avoided emissions in 2030**




Estimates by Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention, JEITA Green IT Committee, etc. (estimated in Oct. 2014)
*Avoided emissions attributable to components (electronic parts, semiconductor devices, integrated circuits) were calculated based on their contribution ratio to final product derived from the interindustry relations table.
http://www.denki-denshi.jp/down_pdf.php?fzpdf2014/Guidelines_for_device_contribution/pdf

Estimates based on JEITA "Contribution to Global Warming Prevention by IT Solutions" (Nov. 2016)

Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Protection, Keidanren's Commitment to a Low Carbon Society Fiscal 2017 Follow-up Results (Industry-specific Report)

5 Source: IEA Energy Technology perspective 2015 "Scenarios & Strategies to 2050"

## Pillar 4: Development of innovative technologies

Existing technologies are not enough for the achievement of significant $CO_2$ emission reductions on a global scale in the long term, and it is essential that we accelerate the development of breakthrough innovative technologies, including discontinuous technology inventions.

Participating industries are proactively engaged in the development and practical application of innovative technologies in the medium- to long-term, building on industry-academia-government partnerships (Figure 20).

**Figure 20. Examples of innovative technologies and services and the timing of deployment**

| Timing of deployment | Innovative technologies and services (industries) |
|---|---|
| Deployment started | ・ Cellulose nanofiber (Japan Paper Association)<br>・ Green chemistry technologies (The Federation of Pharmaceutical Manufacturers' Associations of Japan)<br>・ Replacing drying process UV light sources to LEDs (Japan Federation of Printing Industries)<br>・ Total-oxygen combustion technologies (Flat Glass Manufacturers Association of Japan)<br>・ Smart energy networks (Japan Gas Association) |
| 2020 and beyond | ・ Fuel cell railcars (Japan Association of Rolling Stock Industries)<br>・ Alternative aviation fuels (Scheduled Airline Association of Japan)<br>・ Creating fuels from wastewater organic constituents, bio-ethanol and bio-chemicals (Japan Paper Association)<br>・ Power-saving small power sources using GaN & SiC semiconductor power devices (Telecommunications Carriers Association)<br>・ High-strength materials with heteronano structures (Japan Copper and Brass Association)<br>・ LNG bunkering technologies (Japan Gas Association)<br>・ Serial production of pharmaceuticals (Federation of Pharmaceutical Manufacturers' Associations of Japan) |
| 2030 and beyond | ・ High-temperature superconductive cables (The Japanese Electric Wire & Cable Makers' Association)<br>・ Manufacturing process of energy-saving electronic devices using innovative printing technologies (Japan Chemical Industries Association)<br>・ Evaluation platform for next-generation energy-saving materials (Japan Chemical Industries Association)<br>・ Innovative steelmaking process (COURSE50) (Japan Iron and Steel Federation)<br>・ Innovative cement manufacturing process (Japan Cement Association) |

Some innovative technologies, including energy-related technologies, require a substantial amount of time to move from the research and development stage to practical application. It is difficult for private companies to commit to such medium- to long-term research and development. Therefore, industries have collaborated with government to engage in sustained research and development.

The chemical industry uses fossil resources not only for fuel but also as raw material; and therefore, innovative technology development has become a critical issue in the medium- to long-term in terms of both fuels and materials. Hence, with a view to 2020 and beyond, the industry promotes development through collaboration with government by sharing a roadmap on technological challenges and barriers that should be addressed.

Given the setting up of $CO_2$ emission reduction targets for 2020 and 2050 in ICAO (International Civil Aviation Organization) and IATA (International Air Transport Association), the international aviation industry promotes efforts to solve issues regarding the introduction of domestic bio-jet fuel as an alternative fuel in the Committee for the Study of a Process Leading to Introduction of Bio Jet Fuel, hosted by the Ministry of Economy, Trade and Industry and the Ministry of Land, Infrastructure and Transport.

The pulp and paper industry promotes the development of inexpensive ethanol production technologies utilizing woody biomass that does not compete with food production, based on the Ministry of Economy, Trade and Industry's Biofuel Technology Innovation Plan which pursues the diversification and higher efficiency of energy.

Some industries are involved in the research and development of innovative technologies targeting 2030 and 2050, which were identified in the Cabinet Office's "Innovation Plan for Environment and Energy Technology" and "Energy and Environment Innovation Strategy." Some examples of medium- to long-term research and development led by partnership between the business community and government are: the application of superconductivity in industry, cities and other new fields by the wire and cable industry; the development of innovative production processes and ultra-lightweight materials using innovative catalytic and separation technologies, and artificial photosynthesis by the chemical industry; next-generation power electronics and high-performance electric power storage, and

next-generation solar power generation by the electric power industry; and $CO_2$ underground sequestration by the petroleum development industry.

## Controlling non-$CO_2$ greenhouse gas emissions

Energy-related $CO_2$ emissions account for approximately 86%[6] of total emissions in Japan. While the industrial sector is focused on reducing $CO_2$ emissions of energy origin, many participating industries (32 industries/companies of 61 participating industries/companies) endeavor to also reduce fluorinated gases and other non-$CO_2$ greenhouse gas emissions.

6 National Institute for Environmental Studies "GHG Emissions Data of Japan (preliminary figures for fiscal 1990-2016)"

# Conclusion

Despite the United States' announcement of its withdrawal from the Paris Agreement and suspension of its NDC (nationally determined contribution), Japan must be fully committed to achieving its mid-term goal of "26% reductions in 2030," which it has submitted to the U.N., and thus perform its responsibilities with the international community. To this end, public-private partnership based on the Plan for Global Warming Countermeasures is called for. This mid-term target is extremely ambitious and requires additional energy savings of a level equal to the energy efficiency improvements that Japan has achieved since the oil crises in 1970s to date. Japan's business community is determined to contribute to the achievement of the mid-term target by firmly and even more actively promoting our Commitment to a Low Carbon Society, which has been given central importance in the Plan for Global Warming Countermeasures.

On the other hand, in order to ensure the effectiveness of the Commitment to a Low Carbon Society, it has become increasingly important to use the PDCA cycle to account for the validity of targets and the progress made. As Phase I approaches its halfway point, we must continue our efforts towards further reductions and advance careful communications with concerned parties.

The "2℃ target" included in the Paris Agreement is to be pursued globally. Needless to say, Japan must continue to engage in domestic emission reductions. However, given Japan's approximately 3.7% share of global emissions, domestic efforts alone will not be enough to control global warming trends; and therefore, Japan needs to contribute to greenhouse gas emission reductions on a global scale. Pillars 2 and 3 of the Commitment to a Low Carbon Society, in particular, can play important roles in our contribution to significant global reductions. Japanese companies embrace various advanced energy-saving low-carbon technologies that we can take pride in. Hence, we can contribute to global reductions by deploying our products and services domestically and internationally and transferring our energy-saving technologies and infrastructure systems overseas.

In working toward such international contribution, Japan is challenged with accelerating the implementation of measures unique to our country that are aimed

toward global greenhouse gas emission reductions through the further promotion of overseas expansion under public-private partnership and the “visualization” of contribution across the value chain.

## Industry-specific trends in each sector (*1)

1. Industrial Sector

10,000t-CO2; 10,000kl crude oil equivalent; fiscal year

| Industry | (*2) (☆:target adopted by the industry) | Notes | 1990 | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2005 | Relative to FY2013 | Relative to previous |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Japan Iron and Steel Federation | CO2 emissions (actual emissions) ☆ | | 20,230 | 18,844 | 16,802 | 18,919 | 18,633 | 18,988 | 19,439 | 19,184 | 18,418 | 18,270 | -3.0% | -6.0% | -0.8% |
| | CO2 emissions (post-adjustment) | | 20,230 | 18,844 | 16,643 | 18,722 | 18,525 | 18,713 | 19,437 | 19,172 | 18,400 | 18,257 | -3.1% | -6.1% | -0.8% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.90 | 0.93 | 0.91 | 0.94 | 0.95 | 0.93 | 0.93 | 0.94 | 0.93 | 2.8% | 0.0% | -1.6% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.90 | 0.92 | 0.90 | 0.93 | 0.93 | 0.93 | 0.93 | 0.94 | 0.93 | 2.7% | -0.1% | -1.6% |
| | Energy consumption | | 6,371 | 5,902 | 5,261 | 5,933 | 5,776 | 5,813 | 5,920 | 5,841 | 5,622 | 5,603 | -5.1% | -5.4% | -0.3% |
| | Energy consumption intensity index | | 1.00 | 0.90 | 0.92 | 0.91 | 0.92 | 0.92 | 0.90 | 0.90 | 0.91 | 0.90 | 0.7% | 0.7% | -1.1% |
| | Production activity index | | 1.00 | 1.03 | 0.90 | 1.03 | 0.98 | 0.99 | 1.04 | 1.02 | 0.97 | 0.97 | -5.7% | -6.0% | 0.8% |
| Japan Chemical Industry Association | CO2 emissions (actual emissions) ☆ | | 3,450 | 6,840 | 6,215 | 6,415 | 6,337 | 6,243 | 6,329 | 6,248 | 6,104 | 5,936 | -13.2% | -6.2% | -2.7% |
| | CO2 emissions (post-adjustment) | | 3,450 | 6,840 | 6,050 | 6,228 | 6,239 | 5,996 | 6,329 | 6,245 | 6,095 | 5,931 | -13.3% | -6.3% | -2.7% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2005 | 1.00 | | | | | | | | | | | | |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | | | | | | | | | | | | |
| | Energy consumption | | 1,466 | 2,913 | 2,678 | 2,783 | 2,630 | 2,527 | 2,549 | 2,525 | 2,504 | 2,453 | -15.8% | -3.8% | -2.0% |
| | Energy consumption intensity index | Base year: FY2005 | | 1.00 | 1.02 | 1.02 | 1.02 | 1.02 | 0.98 | 0.99 | 0.97 | 0.95 | -4.7% | -3.0% | -1.5% |
| | Production activity index | | | 1.00 | 0.91 | 0.93 | 0.89 | 0.85 | 0.89 | 0.87 | 0.89 | 0.88 | -11.7% | -0.8% | -0.6% |
| Japan Paper Association | CO2 emissions (actual emissions) ☆ | | 2,583 | 2,495 | 1,978 | 1,907 | 1,891 | 1,861 | 1,872 | 1,805 | 1,781 | 1,796 | -28.0% | -4.0% | 0.9% |
| | CO2 emissions (post-adjustment) | | 2,583 | 2,495 | 1,943 | 1,869 | 1,872 | 1,815 | 1,872 | 1,804 | 1,780 | 1,796 | -28.0% | -4.1% | 0.9% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2005 | 1.13 | 1.00 | 0.91 | 0.87 | 0.89 | 0.90 | 0.87 | 0.85 | 0.85 | 0.85 | -15.3% | -2.9% | 0.0% |
| | CO2 emission intensity index (post-adjustment) | | 1.13 | 1.00 | 0.90 | 0.85 | 0.88 | 0.88 | 0.87 | 0.85 | 0.85 | 0.85 | -15.3% | -2.9% | 0.0% |
| | Energy consumption | | 968 | 890 | 706 | 687 | 658 | 630 | 629 | 608 | 598 | 603 | -32.2% | -4.1% | 0.9% |
| | Energy consumption intensity index | Base year: FY2005 | 1.19 | 1.00 | 0.92 | 0.88 | 0.87 | 0.86 | 0.82 | 0.81 | 0.80 | 0.80 | -20.2% | -2.9% | 0.0% |
| | Production activity index | | 0.92 | 1.00 | 0.87 | 0.88 | 0.85 | 0.83 | 0.86 | 0.85 | 0.84 | 0.85 | -15.0% | -1.2% | 0.9% |
| Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention *3 | CO2 emissions (actual emissions) | | 1,113 | 1,813 | 1,675 | 1,662 | 1,807 | 1,343 | 1,294 | 1,333 | 1,348 | 1,402 | -22.7% | 8.3% | 4.0% |
| | CO2 emissions (post-adjustment) | | 1,113 | 1,813 | 1,480 | 1,464 | 1,707 | 1,169 | 1,294 | 1,331 | 1,341 | 1,398 | -22.9% | 8.0% | 4.3% |
| | Energy consumption | | 646 | 994 | 963 | 956 | 875 | 597 | 569 | 599 | 623 | 664 | -33.2% | 16.7% | 6.6% |
| | Energy consmuption intensity index (reference value) | | | | | | | 1.00 | 0.92 | 0.88 | 0.91 | 0.88 | | -4.3% | -3.3% |
| | Energy consumption intensity target index ☆ | Base year: FY2012 | | | | | | 1.00 | 0.93 | 0.89 | 0.89 | 0.87 | | -6.5% | -2.2% |
| | Production activity index | | | | | | | 1.00 | 1.03 | 1.13 | 1.15 | 1.26 | | 22.3% | 9.6% |
| Japan Cement Association | CO2 emissions (actual emissions) | | 2,762 | 2,185 | 1,756 | 1,662 | 1,712 | 1,769 | 1,806 | 1,775 | 1,718 | 1,696 | -22.4% | -6.1% | -1.3% |
| | CO2 emissions (post-adjustment) | | 2,762 | 2,185 | 1,744 | 1,650 | 1,704 | 1,749 | 1,806 | 1,774 | 1,718 | 1,696 | -22.4% | -6.1% | -1.3% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2010 | 1.00 | 0.99 | 1.01 | 1.00 | 1.00 | 1.00 | 0.98 | 0.98 | 0.98 | 0.97 | -2.9% | -1.1% | -1.4% |
| | CO2 emission intensity index (post-adjustment) | | 1.01 | 1.00 | 1.01 | 1.00 | 1.01 | 1.00 | 0.98 | 0.99 | 0.99 | 0.97 | -3.0% | -1.2% | -1.4% |
| | Energy consumption | | 874 | 656 | 525 | 499 | 510 | 523 | 541 | 532 | 515 | 510 | -22.3% | -5.7% | -1.1% |
| | Energy consumption intensity index ☆ | Base year: FY2010 | 1.05 | 0.99 | 1.01 | 1.00 | 0.99 | 0.99 | 0.97 | 0.98 | 0.98 | 0.97 | -2.8% | -0.8% | -1.1% |
| | Production activity index | | 1.67 | 1.32 | 1.04 | 1.00 | 1.03 | 1.06 | 1.11 | 1.09 | 1.06 | 1.06 | -20.0% | -5.0% | 0.1% |
| Japan Automobile Manufacturers Association, Inc. / Japan Auto-Body Industries Association, Inc. | CO2 emissions (actual emissions) ☆ | | 990 | 801 | 587 | 617 | 653 | 738 | 743 | 712 | 662 | 659 | -17.7% | -11.3% | -0.5% |
| | CO2 emissions (post-adjustment) | | 990 | 801 | 540 | 568 | 628 | 667 | 743 | 711 | 660 | 657 | -18.0% | -11.6% | -0.5% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 1.00 | 0.75 | 0.69 | 0.69 | 0.71 | 0.77 | 0.70 | 0.65 | 0.59 | 0.59 | -22.1% | -16.1% | -0.5% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.75 | 0.69 | 0.69 | 0.71 | 0.77 | 0.70 | 0.65 | 0.59 | 0.59 | -22.1% | -16.1% | -0.5% |
| | Energy consumption | | 496 | 398 | 317 | 332 | 313 | 332 | 331 | 322 | 306 | 310 | -22.0% | -6.1% | 1.4% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 0.75 | 0.75 | 0.74 | 0.68 | 0.69 | 0.62 | 0.59 | 0.54 | 0.55 | -26.2% | -11.1% | 1.4% |
| | Production activity index | | 1.00 | 1.07 | 0.86 | 0.91 | 0.92 | 0.97 | 1.07 | 1.10 | 1.13 | 1.13 | 5.6% | 5.6% | 0.0% |
| Japan Auto Parts Industries Association | CO2 emissions (actual emissions) | | 764 | 744 | 547 | 600 | 680 | 757 | 768 | 743 | 687 | 697 | -6.3% | -9.2% | 1.5% |
| | CO2 emissions (post-adjustment) | | 764 | 744 | 497 | 543 | 649 | 671 | 768 | 742 | 684 | 695 | -6.5% | -9.5% | 1.7% |
| | CO2 emission intensity index (actual emissions) ☆ | | 1.00 | 0.79 | 0.59 | 0.60 | 0.66 | 0.71 | 0.70 | 0.69 | 0.66 | 0.66 | -16.4% | -5.7% | -0.4% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.79 | 0.53 | 0.54 | 0.63 | 0.63 | 0.70 | 0.69 | 0.66 | 0.66 | -16.6% | -6.0% | -0.2% |
| | Energy consumption | | 401.3 | 384 | 299 | 327 | 323 | 333 | 335 | 332 | 315 | 327 | -14.8% | -2.4% | 4.0% |
| | Energy consumption intensity index | | 1.00 | 0.77 | 0.61 | 0.62 | 0.60 | 0.59 | 0.58 | 0.59 | 0.58 | 0.59 | -24.0% | 1.4% | 2.0% |
| | Production activity index | | 1.00 | 1.24 | 1.22 | 1.32 | 1.35 | 1.40 | 1.44 | 1.41 | 1.36 | 1.39 | 12.1% | -3.7% | 1.9% |
| Japan Mining Industry Association | CO2 emissions (actual emissions) | | 411 | 396 | 376 | 374 | 408 | 443 | 449 | 441 | 405 | 369 | -6.7% | -17.7% | -8.9% |
| | CO2 emissions (post-adjustment) | | 411 | 396 | 352 | 348 | 394 | 406 | 449 | 441 | 404 | 368 | -6.9% | -17.9% | -8.8% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY1990 | 1.00 | 0.84 | 0.81 | 0.79 | 0.92 | 0.92 | 0.94 | 0.89 | 0.85 | 0.79 | -6.3% | -16.0% | -7.6% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.84 | 0.76 | 0.74 | 0.88 | 0.84 | 0.94 | 0.89 | 0.85 | 0.79 | -6.5% | -16.1% | -7.5% |
| | Energy consumption | | 170 | 161 | 161 | 161 | 159 | 162 | 163 | 163 | 154 | 144 | -10.4% | -11.3% | -6.4% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 0.83 | 0.84 | 0.83 | 0.86 | 0.82 | 0.82 | 0.80 | 0.79 | 0.75 | -10.0% | -9.4% | -5.0% |
| | Production activity index | | 1.00 | 1.14 | 1.13 | 1.15 | 1.09 | 1.17 | 1.16 | 1.20 | 1.16 | 1.14 | -0.4% | -2.1% | -1.4% |
| Japan Federation of Construction Contractors | CO2 emissions (actual emissions) | | 249 | 532 | 462 | 316 | 398 | 402 | 411 | 438 | 431 | 421 | -20.9% | 2.4% | -2.4% |
| | CO2 emissions (post-adjustment) | | 249 | 532 | 450 | 315 | 391 | 387 | 411 | 438 | 431 | 420 | -21.0% | 2.3% | -2.4% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY1990 | 1.00 | 3.32 | 3.36 | 2.66 | 3.36 | 3.28 | 3.12 | 3.14 | 3.10 | 3.05 | -7.9% | -2.0% | -1.6% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 3.32 | 3.26 | 2.64 | 3.30 | 3.17 | 3.12 | 3.13 | 3.10 | 3.05 | -8.0% | -2.1% | -1.6% |
| | Energy consumption | | 160 | 229 | 193 | 121 | 162 | 157 | 159 | 170 | 168 | 166 | -27.4% | 4.9% | -1.2% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 2.22 | 2.18 | 1.58 | 2.12 | 1.99 | 1.87 | 1.89 | 1.89 | 1.88 | -15.4% | 0.4% | -0.4% |
| | Production activity index | | 1.00 | 0.64 | 0.55 | 0.48 | 0.48 | 0.49 | 0.53 | 0.56 | 0.56 | 0.55 | -14.1% | 4.5% | -0.9% |
| Japan Federation of Housing Organizations | CO2 emissions (actual emissions) | | 487 | 326 | 235 | 240 | 245 | 262 | 260 | 240 | 239 | 242 | -25.8% | -6.9% | 1.3% |
| | CO2 emissions (post-adjustment) | | 487 | 326 | 235 | 240 | 245 | 262 | 260 | 240 | 239 | 242 | -25.8% | -6.9% | 1.3% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.84 | 0.96 | 0.90 | 0.89 | 0.91 | 0.82 | 0.90 | 0.87 | 0.85 | 0.6% | 3.3% | -2.7% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.84 | 0.96 | 0.90 | 0.89 | 0.91 | 0.82 | 0.90 | 0.87 | 0.85 | 0.6% | 3.3% | -2.7% |
| | Energy consumption | | 184 | 125 | 90 | 92 | 94 | 101 | 100 | 92 | 92 | 93 | -25.9% | -7.2% | 0.8% |
| | Energy consumption intensity index | | 1.00 | 0.86 | 0.97 | 0.91 | 0.91 | 0.93 | 0.84 | 0.91 | 0.89 | 0.86 | 0.5% | 3.0% | -3.2% |
| | Production activity index | | 1.00 | 0.79 | 0.50 | 0.55 | 0.56 | 0.59 | 0.65 | 0.55 | 0.56 | 0.59 | -26.2% | -9.9% | 4.1% |

| Industry | (*2) (☆:target adopted by the industry) | Notes | 1990 | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2005 | Relative to FY2013 | Relative to previous |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lime Manufacture Association | CO2 emissions (actual emissions) ☆ | | 357 | 308 | 244 | 268 | 234 | 227 | 246 | 246 | 223 | 225 | −27.0% | −8.7% | 0.9% |
| | CO2 emissions (post-adjustment) | | 357 | 308 | 241 | 265 | 232 | 223 | 246 | 246 | 223 | 225 | −27.0% | −8.8% | 0.9% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.86 | 0.78 | 0.76 | 0.74 | 0.76 | 0.78 | 0.78 | 0.76 | 0.74 | −14.4% | −5.0% | −2.3% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.86 | 0.77 | 0.75 | 0.74 | 0.74 | 0.78 | 0.78 | 0.76 | 0.74 | −14.5% | −5.1% | −2.3% |
| | Energy consumption | | 123 | 106 | 87 | 96 | 83 | 79 | 84 | 84 | 76 | 78 | −26.3% | −7.6% | 2.7% |
| | Energy consumption intensity index | | 1.00 | 0.86 | 0.81 | 0.79 | 0.76 | 0.77 | 0.77 | 0.77 | 0.75 | 0.74 | −13.6% | −3.9% | −0.6% |
| | Production activity index | | 1.00 | 1.00 | 0.88 | 0.99 | 0.88 | 0.84 | 0.89 | 0.89 | 0.83 | 0.85 | −14.7% | −3.9% | 3.3% |
| The Japan Rubber Manufacturers Association*4 | CO2 emissions (actual emissions) | | | 213 | 169 | 180 | 181 | 170 | 168 | 167 | 160 | 155 | −27.1% | −7.7% | −3.1% |
| | CO2 emissions (post-adjustment) | | | 213 | 149 | 159 | 197 | 186 | 209 | 203 | 189 | 179 | −15.9% | −14.3% | −5.3% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY2005 | | 1.00 | 0.99 | 0.92 | 0.91 | 0.92 | 0.90 | 0.91 | 0.93 | 0.92 | −8.2% | 2.0% | −1.6% |
| | CO2 emission intensity index (post-adjustment) | | | 1.00 | 0.87 | 0.81 | 0.99 | 1.01 | 1.12 | 1.10 | 1.10 | 1.06 | 5.9% | −5.4% | −3.9% |
| | Energy consumption | | | 113 | 98 | 105 | 105 | 100 | 98 | 96 | 93 | 90 | −20.1% | −8.1% | −3.2% |
| | Energy consumption intensity index | Baae year: FY2005 | | 1.00 | 1.09 | 1.01 | 1.00 | 1.03 | 0.99 | 0.99 | 1.02 | 1.01 | 0.6% | 1.5% | −1.8% |
| | Production activity index | | | 1.00 | 0.80 | 0.92 | 0.93 | 0.86 | 0.88 | 0.86 | 0.81 | 0.79 | −20.6% | −9.5% | −1.5% |
| The Federation of Pharmaceutical Manufacturers' Associations of Japan | CO2 emissions (actual emissions) ☆ | | 164 | 240 | 205 | 205 | 227 | 249 | 248 | 238 | 232 | 233 | −3.0% | −6.3% | 0.2% |
| | CO2 emissions (post-adjustment) | | 164 | 240 | 190 | 190 | 219 | 227 | 248 | 238 | 231 | 232 | −3.2% | −6.5% | 0.3% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2005 | 1.12 | 1.00 | 0.78 | 0.75 | 0.80 | 0.86 | 0.82 | 0.81 | 0.78 | 0.79 | −20.8% | −3.1% | 1.5% |
| | CO2 emission intensity index (post-adjustment) | | 1.12 | 1.00 | 0.72 | 0.70 | 0.77 | 0.78 | 0.82 | 0.81 | 0.78 | 0.79 | −21.0% | −3.3% | 1.6% |
| | Energy consumption | | 78 | 116 | 108 | 109 | 108 | 112 | 111 | 108 | 108 | 110 | −5.1% | −0.7% | 2.1% |
| | Energy consumption intensity index | Base year: FY2005 | 1.10 | 1.00 | 0.85 | 0.83 | 0.78 | 0.80 | 0.76 | 0.76 | 0.75 | 0.78 | −22.5% | 2.6% | 3.5% |
| | Production activity index | | 0.61 | 1.00 | 1.10 | 1.13 | 1.19 | 1.21 | 1.27 | 1.23 | 1.24 | 1.22 | 22.5% | −3.3% | −1.3% |
| Japan Aluminium Association | CO2 emissions (actual emissions) | | 155 | 168.1 | 132.4 | 138.5 | 145.0 | 147.9 | 145.3 | 148.3 | 143.7 | 144.3 | −14.1% | −0.6% | 0.4% |
| | CO2 emissions (post-adjustment) | | 155 | 168.1 | 123.9 | 129.4 | 140.2 | 135.9 | 145.3 | 148.2 | 143.3 | 144.1 | −14.3% | −0.8% | 0.5% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.97 | 0.88 | 0.85 | 0.95 | 1.01 | 1.01 | 0.95 | 0.93 | 0.94 | −3.0% | −6.9% | 0.8% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.97 | 0.88 | 0.85 | 0.95 | 1.01 | 1.01 | 0.95 | 0.93 | 0.94 | −3.0% | −6.9% | 0.8% |
| | Energy consumption | | 77 | 81 | 69 | 73 | 69 | 67 | 65 | 67 | 67 | 68 | −15.7% | 4.3% | 2.1% |
| | Energy consumption intensity index ☆ | | 1.00 | 0.94 | 0.93 | 0.90 | 0.91 | 0.92 | 0.91 | 0.87 | 0.87 | 0.89 | −4.8% | −2.3% | 2.5% |
| | Production activity index | | 1.00 | 1.12 | 0.96 | 1.05 | 0.98 | 0.94 | 0.93 | 1.01 | 0.99 | 0.99 | −11.4% | 6.7% | −0.4% |
| Japan Federation of Printing Industries | CO2 emissions (actual emissions) ☆ | | | 133 | 125 | 126 | 144 | 147 | 145 | 138 | 134 | 129 | −3.1% | −10.6% | −3.4% |
| | CO2 emissions (post-adjustment) | | | 133 | 113 | 114 | 137 | 131 | 145 | 138 | 133 | 129 | −3.3% | −10.8% | −3.3% |
| | Energy consumption | | | 72 | 70 | 71 | 70 | 66 | 64 | 63 | 62 | 61 | −14.9% | −4.2% | −1.3% |
| Flat Glass Manufacturers Association of Japan | CO2 emissions (actual emissions) ☆ | | 181 | 134 | 110 | 115 | 117 | 113 | 117 | 110 | 106 | 106 | −21.2% | −9.4% | −0.3% |
| | CO2 emissions (post-adjustment) | | 181 | 134 | 107 | 113 | 115 | 109 | 117 | 110 | 106 | 106 | −21.2% | −9.5% | −0.2% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 1.00 | 1.03 | 1.15 | 1.03 | 1.10 | 0.99 | 0.93 | 0.94 | 0.88 | 0.90 | −12.7% | −3.9% | 2.3% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 1.03 | 1.12 | 1.01 | 1.08 | 0.96 | 0.93 | 0.94 | 0.88 | 0.90 | −12.8% | −4.0% | 2.4% |
| | Energy consumption | | 73 | 52 | 44 | 46 | 45 | 43 | 44 | 42 | 41 | 42 | −19.9% | −4.7% | 1.5% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 1.00 | 1.14 | 1.03 | 1.06 | 0.95 | 0.87 | 0.88 | 0.85 | 0.88 | −11.3% | 1.0% | 4.1% |
| | Production activity index | | 1.00 | 0.72 | 0.53 | 0.62 | 0.59 | 0.63 | 0.69 | 0.65 | 0.67 | 0.65 | −9.7% | −5.7% | −2.5% |
| Japan Soft Drink Association | CO2 emissions (actual emissions) | | 47 | 102 | 103 | 104 | 110 | 117 | 121 | 115 | 114 | 113 | 10.7% | −6.2% | −0.9% |
| | CO2 emissions (post-adjustment) | | 47 | 102 | 98 | 99 | 107 | 109 | 121 | 115 | 114 | 113 | 10.6% | −6.4% | −0.9% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY1990 | 1.00 | 1.13 | 1.03 | 0.98 | 1.00 | 1.03 | 0.98 | 0.94 | 0.90 | 0.87 | −22.8% | −11.2% | −3.1% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 1.13 | 0.99 | 0.93 | 0.97 | 0.97 | 0.98 | 0.94 | 0.90 | 0.87 | −22.9% | −11.3% | −3.0% |
| | Energy consumption | | 21 | 48 | 53 | 54 | 53 | 54 | 56 | 54 | 55 | 55 | 13.7% | −2.0% | 0.5% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 1.20 | 1.19 | 1.13 | 1.08 | 1.08 | 1.02 | 0.99 | 0.97 | 0.95 | −20.7% | −7.2% | −1.7% |
| | Production activity index | | 1.00 | 1.92 | 2.11 | 2.25 | 2.34 | 2.39 | 2.60 | 2.59 | 2.69 | 2.75 | 43.4% | 5.6% | 2.2% |
| Japan Dairy Industry Association | CO2 emissions (actual emissions) | | 86 | 112 | 110 | 110 | 115 | 121 | 119 | 115 | 115 | 111 | −0.7% | −6.5% | −3.8% |
| | CO2 emissions (post-adjustment) | | 86 | 112 | 105 | 104 | 112 | 113 | 119 | 115 | 115 | 111 | −0.9% | −6.6% | −3.7% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2013 | 0.80 | 0.95 | 0.98 | 0.98 | 0.99 | 1.02 | 1.00 | 0.96 | 0.96 | 0.93 | −2.2% | −6.7% | −3.1% |
| | CO2 emission intensity index (post-adjustment) | | 0.80 | 0.95 | 0.94 | 0.93 | 0.97 | 0.95 | 1.00 | 0.96 | 0.96 | 0.93 | −2.3% | −6.8% | −3.0% |
| | Energy consumption | | 41 | 51 | 54 | 54 | 52 | 53 | 52 | 51 | 52 | 51 | −0.8% | −1.0% | −2.0% |
| | Energy consumption intensity index ☆ | Base year: FY2013 | 0.87 | 1.01 | 1.10 | 1.10 | 1.04 | 1.03 | 1.00 | 0.98 | 1.00 | 0.99 | −2.3% | −1.3% | −1.2% |
| | Production activity index | | 0.90 | 0.99 | 0.94 | 0.95 | 0.97 | 1.00 | 1.00 | 1.01 | 1.01 | 1.00 | 1.5% | 0.2% | −0.8% |
| The Japanese Electric Wire & Cable Makers' Association | CO2 emissions (actual emissions) | | 109 | 91 | 78 | 82 | 94 | 99 | 96 | 91 | 88 | 85 | −7.2% | −11.7% | −4.1% |
| | CO2 emissions (post-adjustment) | | 109 | 91 | 69 | 72 | 89 | 86 | 96 | 91 | 88 | 85 | −7.5% | −12.0% | −4.0% |
| (metal (copper/aluminnum) cable) | CO2 emission intensity index (actual emissions) | | 1.00 | 1.06 | 1.09 | 1.15 | 1.28 | 1.37 | 1.29 | 1.23 | 1.21 | 1.21 | 13.6% | −6.7% | −0.3% |
| (metal (copper/aluminnum) cable) | CO2 emission intensity index (post-adjustment) | Base year: FY1990 | 1.00 | 1.06 | 0.96 | 1.01 | 1.21 | 1.19 | 1.29 | 1.22 | 1.21 | 1.20 | 13.3% | −7.0% | −0.2% |
| (optical fiber cable) | CO2 emission intensity index (actual emissions) | | 1.00 | 0.27 | 0.22 | 0.24 | 0.26 | 0.26 | 0.28 | 0.24 | 0.22 | 0.20 | −25.5% | −28.3% | −10.4% |
| (optical fiber cable) | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.27 | 0.20 | 0.21 | 0.25 | 0.22 | 0.28 | 0.24 | 0.22 | 0.20 | −25.8% | −28.5% | −10.3% |
| | Energy consumption ☆ | | 64 | 50 | 45 | 47 | 45 | 43 | 42 | 41 | 40 | 40 | −20.9% | −4.5% | −1.6% |
| (metal (copper/aluminnum) cable) | Energy consumption intensity index | | 1.00 | 1.00 | 1.06 | 1.12 | 1.06 | 1.03 | 0.96 | 0.93 | 0.95 | 0.97 | −2.8% | 0.7% | 2.3% |
| (optical fiber cable) | Energy consumption intensity index | Base year: FY1990 | 1.00 | 0.24 | 0.20 | 0.22 | 0.20 | 0.18 | 0.19 | 0.17 | 0.16 | 0.15 | −38.8% | −21.7% | −7.8% |
| (metal (copper/aluminnum) cable) | Production activity index | | 1.00 | 0.73 | 0.57 | 0.57 | 0.58 | 0.57 | 0.59 | 0.60 | 0.58 | 0.56 | −23.3% | −4.8% | −3.2% |
| (optical fiber cable) | Production activity index | | 1.00 | 14.4 | 23.6 | 22.0 | 25.0 | 27.2 | 23.8 | 24.6 | 27.5 | 28.4 | 97.9% | 19.5% | 3.2% |
| The Japan Bearing Industrial Association | CO2 emissions (actual emissions) | | | 73 | 58 | 70 | 83 | 84 | 85 | 84 | 79 | 78 | 6.6% | −7.5% | −1.1% |
| | CO2 emissions (post-adjustment) | | | 73 | 51 | 62 | 79 | 73 | 85 | 83 | 79 | 78 | 6.3% | −7.8% | −0.9% |
| | CO2 emission intensity index (actual emissions) | | | 0.98 | 0.97 | 0.90 | 1.03 | 1.14 | 1.13 | 1.05 | 1.03 | 1.01 | 3.0% | −10.5% | −2.2% |
| | CO2 emission intensity index (post-adjustment) | Base year: FY1997 | | 0.98 | 0.86 | 0.79 | 0.98 | 0.99 | 1.13 | 1.04 | 1.03 | 1.01 | 2.6% | −10.8% | −2.0% |
| | CO2 emission intensity index (fixity coefficient) ☆ | | | 0.87 | 0.87 | 0.80 | 0.78 | 0.79 | 0.79 | 0.74 | 0.76 | 0.76 | −13.0% | −3.3% | 0.6% |
| | Energy consumption | | | 40 | 33 | 40 | 40 | 37 | 37 | 37 | 36 | 37 | −8.2% | −0.2% | 1.4% |
| | Energy consumption intensity index | Base year: FY1997 | | 0.86 | 0.88 | 0.81 | 0.79 | 0.80 | 0.79 | 0.74 | 0.76 | 0.76 | −11.4% | −3.5% | 0.3% |
| | Production activity index | | | 1.32 | 1.06 | 1.39 | 1.42 | 1.29 | 1.32 | 1.41 | 1.35 | 1.37 | 3.5% | 3.4% | 1.1% |

| Industry | (*2) (☆:target adopted by the industry) | Notes | 1990 | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2005 | Relative to FY2013 | Relative to previous |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Japan Society of Industrial Machinery | CO2 emissions (actual emissions) | | | 57 | 47 | 51 | 58 | 60 | 60 | 59 | 56 | 56 | −3.1% | −7.4% | −1.6% |
| | CO2 emissions (post-adjustment) | | | 57 | 42 | 45 | 55 | 53 | 60 | 59 | 56 | 55 | −3.4% | −7.7% | −1.4% |
| | Energy consumption | | | 30 | 26 | 28 | 28 | 27 | 26 | 26 | 26 | 26 | −14.6% | −0.5% | 0.7% |
| | Production activity index | Base year: FY2005 | | 1.00 | 1.04 | 1.04 | 1.11 | 1.07 | 1.07 | 1.15 | 1.24 | 1.16 | 15.8% | 8.3% | −6.7% |
| Japan Petroleum Development Association | CO2 emissions (actual emissions) ☆ | | 16 | 22 | 27 | 25 | 23 | 25 | 25 | 22 | 22 | 21 | −5.4% | −17.1% | −2.3% |
| | CO2 emissions (post-adjustment) | | 16 | 22 | 27 | 24 | 23 | 24 | 25 | 22 | 22 | 21 | −5.5% | −17.2% | −2.2% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY2005 | 1.19 | 0.94 | 1.01 | 0.99 | 0.93 | 1.08 | 1.18 | 1.11 | 1.10 | 1.06 | 12.6% | −10.5% | −4.3% |
| | CO2 emission intensity index (post-adjustment) | | 1.19 | 0.94 | 1.01 | 0.99 | 0.93 | 1.08 | 1.18 | 1.11 | 1.10 | 1.06 | 12.6% | −10.5% | −4.3% |
| | Energy consumption | | 6 | 9 | 10 | 10 | 10 | 10 | 11 | 9 | 9 | 10 | 12.1% | −10.0% | 2.5% |
| | Energy consumption intensity index | Base year: FY2005 | 1.25 | 1.00 | 1.01 | 1.07 | 1.12 | 1.22 | 1.37 | 1.28 | 1.33 | 1.33 | 33.5% | −2.8% | 0.4% |
| | Production activity index | | 0.54 | 0.94 | 1.07 | 0.99 | 0.99 | 0.93 | 0.85 | 0.79 | 0.77 | 0.79 | −16.0% | −7.4% | 2.1% |
| Japan Copper and Brass Association | CO2 emissions (actual emissions) | | | 43 | 39 | 42 | 45 | 47 | 47 | 46 | 42 | 45 | 6.0% | −5.1% | 6.6% |
| | CO2 emissions (post-adjustment) | | | 43 | 35 | 37 | 42 | 42 | 47 | 45 | 42 | 45 | 5.7% | −5.3% | 6.7% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2005 | | 1.00 | 1.10 | 1.05 | 1.21 | 1.35 | 1.28 | 1.20 | 1.23 | 1.21 | 20.9% | −5.4% | −2.1% |
| | CO2 emission intensity index (post-adjustment) | | | 1.00 | 0.99 | 0.95 | 1.15 | 1.19 | 1.28 | 1.20 | 1.23 | 1.21 | 20.5% | −5.7% | −2.0% |
| | Energy consumption | | | 23 | 22 | 23 | 22 | 21 | 21 | 21 | 20 | 21 | −7.3% | 1.2% | 8.9% |
| | Energy consumption intensity index ☆ | Base year: FY2005 | | 1.00 | 1.13 | 1.09 | 1.08 | 1.11 | 1.05 | 1.01 | 1.06 | 1.06 | 5.7% | 0.8% | 0.0% |
| | Production activity index | | | 1.00 | 0.83 | 0.93 | 0.87 | 0.82 | 0.87 | 0.89 | 0.81 | 0.88 | −12.3% | 0.4% | 8.8% |
| Brewers Association of Japan | CO2 emissions (actual emissions) ☆ | | 117 | 90 | 60 | 57 | 53 | 52 | 49 | 48 | 47 | 47 | −48.3% | −5.3% | −1.7% |
| | CO2 emissions (post-adjustment) | | 117 | 90 | 58 | 54 | 55 | 54 | 55 | 53 | 51 | 50 | −44.6% | −8.5% | −2.6% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.79 | 0.56 | 0.54 | 0.51 | 0.50 | 0.49 | 0.48 | 0.47 | 0.47 | −40.8% | −3.3% | −0.1% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.79 | 0.54 | 0.52 | 0.54 | 0.53 | 0.54 | 0.52 | 0.51 | 0.50 | −36.5% | −6.6% | −1.0% |
| | Energy consumption | | 56 | 43 | 32 | 30 | 28 | 28 | 26 | 25 | 25 | 25 | −43.3% | −6.5% | −2.0% |
| | Energy consumption intensity index | | 1.00 | 0.79 | 0.62 | 0.60 | 0.57 | 0.56 | 0.54 | 0.53 | 0.52 | 0.51 | −35.1% | −4.4% | −0.4% |
| | Production activity index | | 1.00 | 0.98 | 0.92 | 0.90 | 0.88 | 0.88 | 0.87 | 0.86 | 0.86 | 0.85 | −12.8% | −2.1% | −1.6% |
| The Shipbuilders' Association of Japan and the Cooperative Association of Japan Shipbuilders (hours) | CO2 emissions (actual emissions) | | | | | | | 68 | 65 | 69 | 69 | 71 | | 8.5% | 1.7% |
| | CO2 emissions (post-adjustment) | | | | | | | 59 | 65 | 69 | 69 | 70 | | 8.2% | 1.9% |
| | CO2 emission intensity index (actual emissions) ☆ (hours) | | | | | | | 1.00 | 1.05 | 1.12 | 1.00 | 1.01 | | −4.3% | 0.5% |
| | CO2 emission intensity index (post-adjustment) (hours) | | | | | | | 1.00 | 1.21 | 1.28 | 1.15 | 1.15 | | −4.6% | 0.6% |
| | CO2 emission intensity index (actual emissions) (quantity at completion) | | | | | | | 1.00 | 1.17 | 1.27 | 1.26 | 1.38 | | 18.8% | 9.9% |
| | CO2 emission intensity index (post-adjustment) ☆ (quantity at completion) | | | | | | | 1.00 | 1.34 | 1.45 | 1.44 | 1.58 | | 18.4% | 10.1% |
| | Energy consumption | | | | | | | 29 | 28 | 30 | 31 | 32 | | 17.2% | 4.9% |
| | Energy consumption intensity index (hours) | | | | | | | 1.00 | 1.04 | 1.12 | 1.04 | 1.08 | | 3.4% | 3.6% |
| | Energy consumption intensity index (quantity at completion) | | | | | | | 1.00 | 1.15 | 1.28 | 1.30 | 1.48 | | 28.3% | 13.3% |
| | Production activity index (hours) | | | | | | | 1.00 | 0.91 | 0.92 | 1.02 | 1.03 | | 13.4% | 1.3% |
| | Production activity index (quantity at completion) | | | | | | | 1.00 | 0.83 | 0.81 | 0.81 | 0.75 | | −8.7% | −7.4% |
| Limestone Association of Japan | CO2 emissions (actual emissions) ☆ | | | 25 | 20 | 21 | 24 | 27 | 28 | 28 | 27 | 27 | 6.1% | −5.9% | −2.3% |
| | CO2 emissions (post-adjustment) | | | 25 | 19 | 19 | 23 | 24 | 28 | 28 | 27 | 27 | 5.9% | −6.2% | −2.1% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2010 | | 1.00 | 1.01 | 1.02 | 1.14 | 1.22 | 1.22 | 1.21 | 1.22 | 1.21 | 21.3% | −0.4% | −0.2% |
| | CO2 emission intensity index (post-adjustment) | | | 1.00 | 0.94 | 0.93 | 1.09 | 1.10 | 1.22 | 1.21 | 1.21 | 1.21 | 21.1% | −0.7% | −0.1% |
| | Energy consumption | | | 12 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | 11 | −6.0% | −1.0% | −0.5% |
| | Energy consumption intensity index | Base year: FY2010 | | 1.00 | 1.04 | 1.04 | 1.04 | 1.03 | 1.03 | 1.04 | 1.06 | 1.07 | 7.5% | 4.8% | 1.6% |
| | Production activity index | | | 1.00 | 0.81 | 0.83 | 0.85 | 0.89 | 0.93 | 0.92 | 0.89 | 0.87 | −12.5% | −5.5% | −2.1% |
| Japan Machine Tool Builders' Association | CO2 emissions (actual emissions) | | 25.1 | 27 | 20 | 26 | 32 | 35 | 36 | 37 | 36 | 33 | 23.6% | −7.8% | −5.8% |
| | CO2 emissions (post-adjustment) | | 25.1 | 27 | 17 | 23 | 30 | 31 | 36 | 37 | 35 | 33 | 23.2% | −8.1% | −5.7% |
| | CO2 emission intensity index (actual emissions) | | 1.00 | 0.84 | 1.41 | 1.09 | 1.15 | 1.23 | 1.31 | 1.13 | 1.04 | 1.06 | 26.0% | −19.6% | 1.3% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.84 | 1.24 | 0.96 | 1.08 | 1.07 | 1.31 | 1.13 | 1.04 | 1.05 | 25.6% | −19.9% | 1.5% |
| | Energy consumption | | 14.6 | 15 | 11 | 15 | 15 | 15 | 15 | 16 | 16 | 15 | 5.0% | −0.2% | −3.6% |
| | Energy consumption intensity index ☆ | | 1.00 | 0.78 | 1.36 | 1.05 | 0.94 | 0.91 | 0.96 | 0.85 | 0.80 | 0.83 | 7.1% | −13.0% | 3.7% |
| | Production activity index | | 1.00 | 1.29 | 0.56 | 0.95 | 1.10 | 1.14 | 1.10 | 1.31 | 1.36 | 1.26 | −1.9% | 14.7% | −7.1% |
| Japan Sanitary Industry Equipment Association | CO2 emissions (actual emissions) ☆ | | 50 | 36 | 26 | 24 | 28 | 26 | 26 | 23 | 20 | 20 | −46.4% | −23.5% | −1.9% |
| | CO2 emissions (post-adjustment) | | 50 | 36 | 24 | 22 | 27 | 24 | 26 | 23 | 20 | 20 | −46.5% | −23.6% | −1.8% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 1.00 | 0.69 | 0.57 | 0.45 | 0.52 | 0.48 | 0.42 | 0.39 | 0.34 | 0.32 | −53.1% | −23.6% | −5.5% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.69 | 0.54 | 0.42 | 0.50 | 0.44 | 0.42 | 0.39 | 0.34 | 0.32 | −53.2% | −23.8% | −5.4% |
| | Energy consumption | | 23 | 17 | 13 | 12 | 13 | 12 | 12 | 11 | 9 | 9 | −45.7% | −19.1% | 0.2% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 0.69 | 0.62 | 0.50 | 0.52 | 0.46 | 0.41 | 0.38 | 0.34 | 0.33 | −52.5% | −19.2% | −3.4% |
| | Production activity index | | 1.00 | 1.07 | 0.92 | 1.07 | 1.08 | 1.10 | 1.22 | 1.20 | 1.18 | 1.22 | 14.3% | 0.2% | 3.8% |
| Flour Millers Association | CO2 emissions (actual emissions) | | 19 | 23 | 22 | 23 | 28 | 31 | 30 | 30 | 29 | 28 | 17.8% | −9.4% | −3.7% |
| | CO2 emissions (post-adjustment) | | 19 | 23 | 19 | 20 | 26 | 26 | 30 | 30 | 29 | 28 | 17.4% | −9.7% | −3.6% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY2013 | 0.72 | 0.77 | 0.74 | 0.74 | 0.92 | 1.01 | 1.00 | 0.99 | 0.93 | 0.90 | 16.6% | −10.4% | −3.9% |
| | CO2 emission intensity index (post-adjustment) | | 0.72 | 0.77 | 0.64 | 0.64 | 0.86 | 0.86 | 1.00 | 0.99 | 0.93 | 0.89 | 16.2% | −10.7% | −3.8% |
| | Energy consumption | | 12 | 13 | 13 | 14 | 14 | 13 | 13 | 13 | 13 | 13 | −4.4% | −2.3% | −1.1% |
| | Energy consumption intensity index | Base year: FY2013 | 1.05 | 1.02 | 1.02 | 1.02 | 1.03 | 1.02 | 1.00 | 1.01 | 0.98 | 0.97 | −5.4% | −3.4% | −1.3% |
| | Production activity index | | 0.86 | 1.00 | 0.98 | 1.01 | 1.01 | 1.00 | 1.00 | 1.00 | 1.01 | 1.01 | 1.0% | 1.1% | 0.2% |
| Japan Industrial Vehicles Association | CO2 emissions (actual emissions) ☆ | | 6.6 | 7.0 | 4.4 | 4.9 | 5.9 | 6.0 | 4.8 | 4.7 | 4.4 | 4.3 | −38.9% | −10.6% | −2.9% |
| | CO2 emissions (post-adjustment) | | 6.6 | 7.0 | 4.1 | 4.5 | 5.6 | 5.4 | 4.8 | 4.7 | 4.4 | 4.3 | −39.0% | −10.9% | −2.8% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2005 | 0.85 | 1.00 | 1.18 | 0.96 | 1.04 | 1.12 | 0.90 | 0.85 | 0.80 | 0.81 | −19.1% | −10.3% | 1.0% |
| | CO2 emission intensity index (post-adjustment) | | 0.85 | 1.00 | 1.09 | 0.88 | 0.99 | 1.01 | 0.90 | 0.85 | 0.80 | 0.81 | −19.3% | −10.6% | 1.1% |
| | Energy consumption | | 3.5 | 3.6 | 2.4 | 2.7 | 2.8 | 2.7 | 2.1 | 2.1 | 2.0 | 2.0 | −44.5% | −4.6% | −0.5% |
| | Energy consumption intensity index | Base year: FY2005 | 0.86 | 1.00 | 1.22 | 1.01 | 0.95 | 0.96 | 0.77 | 0.74 | 0.71 | 0.73 | −26.6% | −4.2% | 3.5% |
| | Production activity index | | 1.11 | 1.00 | 0.54 | 0.73 | 0.81 | 0.77 | 0.76 | 0.79 | 0.79 | 0.76 | −24.5% | −0.3% | −3.9% |

| Industry | (*2) (☆:target adopted by the industry) | Notes | 1990 | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2005 | Relative to FY2013 | Relative to previous |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Japan Association of Rolling Stock Industries | CO2 emissions (actual emissions) ☆ | | 4.6 | 3.7 | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 | 3.4 | 3.4 | −7.9% | −6.4% | −0.7% |
| | CO2 emissions (post-adjustment) | | 4.6 | 3.7 | 3.2 | 3.1 | 3.5 | 3.2 | 3.6 | 3.6 | 3.4 | 3.4 | −8.2% | −6.7% | −0.6% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 1.00 | 0.56 | 0.43 | 0.48 | 0.55 | 0.61 | 0.50 | 0.51 | 0.44 | 0.49 | −12.1% | −3.0% | 11.8% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.56 | 0.38 | 0.42 | 0.52 | 0.54 | 0.50 | 0.51 | 0.43 | 0.49 | −12.4% | −3.2% | 12.0% |
| | Energy consumption | | 2.6 | 2.0 | 2.0 | 2.0 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | −20.9% | 0.5% | 1.7% |
| | Energy consumption intensity index | Base year: FY1990 | 1.00 | 0.55 | 0.43 | 0.49 | 0.47 | 0.49 | 0.40 | 0.41 | 0.36 | 0.41 | −24.5% | 4.2% | 14.6% |
| | Production activity index | | 1.00 | 1.43 | 1.80 | 1.59 | 1.44 | 1.27 | 1.56 | 1.53 | 1.69 | 1.50 | 4.8% | −3.6% | −11.2% |
| Emissions from industrial processes *5 | CO2 emissions | | 6,024 | 5,080 | 4,094 | 4,189 | 4,151 | 4,176 | 4,368 | 4,327 | 4,141 | 4,202 | −17.3% | −3.8% | 1.5% |
| Revisions *4 | CO2 emissions (actual emissions) | | | 23 | 24 | 25 | 43 | 53 | 52 | 48 | 43 | 38 | | | |
| | CO2 emissions (post-adjustment) | | | | | | | | | | | | | | |
| Total *6 | CO2 emissions (actual emissions) | | 40,399 | 41,989 | 36,354 | 38,600 | 38,709 | 38,889 | 39,659 | 39,117 | 37,729 | 37,463 | −10.9% | −5.5% | −0.7% |
| | CO2 emissions (post-adjustment) | | 40399 | 41,966 | 35,525 | 37,697 | 38,222 | 37,750 | 39,650 | 39,088 | 37,672 | 37,419 | −11.0% | −5.6% | −0.7% |
| | Energy consumption | | 12331 | 13550 | 11997 | 12732 | 12316 | 12000 | 12115 | 11993 | 11691 | 11672 | −14.1% | −3.7% | −0.2% |

*1 Due to the rounding off, totals may differ from the sum of individual items.

*2 Intensity indices have been calculated by having each industry set a base year, the figure for which is used as 1. Unlessotherwise specified in remarks (BAU baseline etc.), the base year is fiscal 1990.

*3 The Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention has implemented the Commitment to Low Carbon Society as a new scheme independent of the conventional Voluntary Action Plan
on the Environment. Therefore, data for participating industries under Keidanren's commitment to a Low Carbon Society are available for only the years following the base year (fiscal 2012).
The figures provided for fiscal 1990-2011 have been derived from the Voluntary Action Plan on the Environment as reference.

*4 Figures for the Japan Rubber Manufacturers Association have been caclulated using the coefficient for thermal power generation and a fixity coefficent for fiscal 2005 (base year) has been used to calculate actual emissions. The
difference between a simple sumincluding relevant industries and the total is provided as "Revisions".

*5 Emissions from industrial processes refer to CO2 emissions from manufacturing processes that are not energy-oriented.

*6 The rate of change from fiscal 2005 to fiscal 2016 is calculated except for industries with no data for fiscal 2005.

## 2. Energy Conversion Sector

10,000t-CO2; 10,000kl crude oil equivalent; fiscal year

| Industry | (*1) (☆:target adopted by the industry) | Notes | 2001 | 2002 | 2003 | 2004 | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2005 | Relative to FY2013 | Relative to previous FY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Federation of Electric Power Companies *2 | CO2 emissions (actual emissions) | | 31,000 | 34,000 | 36,100 | 36,200 | 37,300 | 36,100 | 38,200 | 44,600 | 49,400 | 49,400 | 47,000 | 44,400 | 43,200 | +15.8% | −12.6% | −2.7% |
| | CO2 emissions (post-adjustment) | | 31,000 | 34,000 | 36,100 | 36,200 | 37,300 | 30,800 | 32,500 | 41,600 | 41,700 | 49,300 | 46,900 | 44,100 | 43,000 | +15.3% | −12.8% | −2.5% |
| | CO2 emission intensity index (actual emissions ☆ | | 0.90 | 0.97 | 1.04 | 1.00 | 1.01 | 0.99 | 0.99 | 1.22 | 1.36 | 1.36 | 1.33 | 1.28 | 1.24 | +22.4% | −8.7% | −3.1% |
| | CO2 emission intensity index (post-adjustment | | 0.90 | 0.97 | 1.04 | 1.00 | 1.01 | 0.85 | 0.84 | 1.14 | 1.15 | 1.36 | 1.32 | 1.27 | 1.24 | +21.8% | −9.1% | −3.0% |
| | Energy consumption intensity index | | 0.94 | 0.94 | 0.94 | 0.94 | 0.95 | 0.91 | 0.90 | 0.90 | 0.90 | 0.89 | 0.87 | 0.90 | 0.90 | −5.3% | +0.7% | −0.7% |
| | Production activity index | | 1.25 | 1.28 | 1.27 | 1.31 | 1.34 | 1.32 | 1.40 | 1.33 | 1.32 | 1.32 | 1.29 | 1.26 | 1.27 | −5.5% | −4.1% | +0.4% |
| Petroleum Association of Japan | CO2 emissions (actual emissions) | | 4,062 | 4,032 | 4,075 | 4,054 | 4,154 | 3,960 | 4,003 | 3,785 | 3,820 | 4,032 | 3,824 | 3,834 | 3,845 | −7.4% | −4.6% | +0.3% |
| | CO2 emissions (post-adjustment) | | 4,062 | 4,032 | 4,075 | 4,054 | 4,154 | 3,945 | 3,987 | 3,776 | 3,795 | 4,032 | 3,824 | 3,834 | 3,844 | −7.5% | −4.7% | +0.3% |
| | CO2 emission intensity index (actual emissions | Base year: FY1990 | 0.88 | 0.88 | 0.88 | 0.87 | 0.85 | 0.85 | 0.84 | 0.85 | 0.85 | 0.86 | 0.85 | 0.83 | 0.83 | −1.4% | −2.6% | +0.1% |
| | CO2 emission intensity index (post-adjustment | | 0.88 | 0.88 | 0.88 | 0.87 | 0.85 | 0.84 | 0.84 | 0.84 | 0.84 | 0.86 | 0.85 | 0.83 | 0.83 | −1.4% | −2.6% | +0.1% |
| | Energy consumption | | 1,657 | 1,650 | 1,665 | 1,665 | 1,714 | 1,633 | 1,651 | 1,556 | 1,575 | 1,652 | 1,565 | 1,574 | 1,590 | −7.2% | −3.8% | +1.0% |
| | Energy consumption intensity index | Base year: FY1990 | 0.87 | 0.87 | 0.87 | 0.86 | 0.84 | 0.85 | 0.84 | 0.84 | 0.85 | 0.85 | 0.84 | 0.83 | 0.83 | −1.1% | −1.6% | +0.8% |
| | Production activity index | | 1.48 | 1.47 | 1.49 | 1.50 | 1.58 | 1.50 | 1.52 | 1.44 | 1.44 | 1.52 | 1.45 | 1.48 | 1.48 | −6.2% | −2.1% | +0.2% |
| The Japan Gas Association *3 | CO2 emissions (actual emissions) | | 73 | 66 | 59 | 54 | 47 | 34 | 34 | 38 | 40 | 46 | 48 | 45 | 46 | −2.0% | +0.9% | +3.0% |
| | CO2 emissions (post-adjustment) | | 73 | 66 | 59 | 54 | 47 | 32 | 31 | 36 | 36 | 46 | 48 | 45 | 46 | −2.3% | +0.7% | +3.1% |
| | CO2 emission intensity index (actual emissions ☆ | Base year: FY1990 | 0.33 | 0.28 | 0.24 | 0.21 | 0.17 | 0.12 | 0.11 | 0.12 | 0.12 | 0.13 | 0.13 | 0.13 | 0.12 | −25.4% | −5.1% | −2.9% |
| | CO2 emission intensity index (post-adjustment | | 0.33 | 0.28 | 0.24 | 0.21 | 0.17 | 0.11 | 0.10 | 0.11 | 0.11 | 0.13 | 0.13 | 0.13 | 0.12 | −25.6% | −5.3% | −2.8% |
| | Energy consumption | | 38 | 34 | 30 | 28 | 25 | 19 | 19 | 19 | 18 | 21 | 22 | 21 | 22 | −10.1% | +6.4% | +5.3% |
| | Energy consumption intensity index | Base year: FY1990 | 0.35 | 0.29 | 0.25 | 0.22 | 0.18 | 0.13 | 0.12 | 0.12 | 0.11 | 0.12 | 0.12 | 0.12 | 0.12 | −31.6% | +0.1% | −0.7% |
| | Production activity index | | 1.62 | 1.76 | 1.82 | 1.94 | 2.10 | 2.21 | 2.33 | 2.38 | 2.39 | 2.59 | 2.64 | 2.60 | 2.76 | +31.4% | +6.3% | +6.1% |
| Emissions from industrial processes *4 | CO2 emissions | | 233 | 220 | 229 | 225 | 214 | 222 | 214 | 213 | 190 | 189 | 200 | 196 | 190 | −11.3% | −3.0% | −3.0% |
| Total (Emissions before electric power distribution) | CO2 emissions (actual emissions) | | 35,368 | 38,318 | 40,462 | 40,533 | 41,715 | 40,316 | 42,452 | 48,636 | 53,450 | 53,667 | 51,072 | 48,475 | 47,281 | +13.3% | −11.9% | −2.5% |
| | CO2 emissions (post-adjustment) | | 35,368 | 38,318 | 40,462 | 40,533 | 41,715 | 34,998 | 36,732 | 45,625 | 45,721 | 53,567 | 50,971 | 48,174 | 47,080 | +12.9% | −12.1% | −2.3% |
| | Energy consumption | | 19,349 | 19,670 | 19,527 | 20,233 | 20,731 | 19,634 | 20,655 | 19,583 | 19,430 | 19,289 | 18,376 | 18,667 | 18,610 | −10.2% | −3.5% | −0.3% |

*1 Intensity indices have been calculated by having each industry set a base year, the figure for which is used as 1. Unless oth erwise specified in remarks (BAU baseline etc.), the base year is fiscal 1990.

*2 Because the Federation of Electric Power Companies was established in fiscal 2015, the data before fiscal 2014 is reference.
Energy consumption intensity index is based on the figure of the Federation of Electric Power Companies, and other figuresare based on the Federation of Electric Power Companies and PPS.

*3 The data for the Japan Gas Association in and before 2012 are based on industrial boundaries defined under the Voluntary A ction Plan on the Environment. The calculated CO2 emissions differ from
the figures dervied using the marignal adjustment method (cogeneration) that the Japan Gas Association has adopted as targ et indices.

*4 Emissions from industrial processes refer to CO2 emissions from manufacturing processes that are not energy-oriented.

## 3. Commercial Sector

10,000t-CO2; 10,000kl crude oil equivalent; fiscal year

| Industry | (*1) (☆: target adopted by the industry) | Notes | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY2013 | Relative to previous FY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Japan Chain Stores Association | CO2 emissions (actual emissions) | | 646 | 668 | 692 | 783 | 540 | 496 | 395 | 292 | -46.0% | -26.1% |
| | CO2 emissions (post-adjustment) | | 552 | 569 | 646 | 662 | 540 | 495 | 393 | 291 | -46.2% | -25.9% |
| | Energy consumption | | 389 | 402 | 338 | 342 | 233 | 219 | 181 | 138 | -40.9% | -24.0% |
| Telecommunications Carriers Association | CO2 emissions (actual emissions) | | 453 | 427 | 532 | 576 | 571 | 566 | 555 | 522 | -8.4% | -5.9% |
| | CO2 emissions (post-adjustment) | | 387 | 364 | 497 | 487 | 571 | 565 | 552 | 520 | -8.8% | -5.7% |
| | Energy consumption | | 273 | 257 | 260 | 251 | 246 | 251 | 254 | 247 | +0.2% | -3.0% |
| | Energy consumption intensity index ☆ | Base year: FY2013 | | 2.36 | 1.91 | 1.46 | 1.00 | 0.77 | 0.52 | 0.35 | -65.1% | -32.9% |
| | Production activity index | | | 0.44 | 0.55 | 0.70 | 1.00 | 1.33 | 1.98 | 2.87 | +187.0% | +44.7% |
| Japan Franchise Association | CO2 emissions (actual emissions) | | | 297 | 364 | 422 | 438 | 459 | 451 | 449 | +2.5% | -0.5% |
| | CO2 emissions (post-adjustment) | | | 253 | 340 | 357 | 438 | 458 | 449 | 447 | +2.1% | -0.4% |
| | Energy consumption | | | 179 | 178 | 184 | 189 | 203 | 207 | 212 | +12.2% | +2.5% |
| Japan Department Store Association | CO2 emissions (actual emissions) | | 171 | 157 | 178 | 194 | 190 | 172 | 159 | 152 | -19.9% | -4.8% |
| | CO2 emissions (post-adjustment) | | 151 | 138 | 168 | 169 | 190 | 172 | 159 | 151 | -20.2% | -4.6% |
| | CO2 emission intensity index (actual emissions) | | 0.87 | 0.85 | 0.94 | 1.01 | 1.00 | 0.92 | 0.84 | 0.81 | -18.7% | -3.3% |
| | CO2 emission intensity index (post-adjustment) | | 0.77 | 0.75 | 0.88 | 0.88 | 1.00 | 0.92 | 0.84 | 0.81 | -18.9% | -3.2% |
| | Energy consumption | | 99 | 91 | 87 | 86 | 83 | 77 | 73 | 72 | -13.5% | -2.3% |
| | Energy consumption intensity index ☆ | Base year: FY2013 | 0.84 | 0.81 | 0.75 | 0.74 | 0.72 | 0.67 | 0.64 | 0.63 | -12.2% | -0.8% |
| | Production activity index | | 1.85 | 1.74 | 1.80 | 1.81 | 1.79 | 1.77 | 1.79 | 1.77 | -1.5% | -1.5% |
| Japan Association of Refrigerated Warehouses | CO2 emissions (actual emissions) | | 76 | 80 | 90 | 106 | 106 | 103 | 98 | 96 | -10.1% | -2.6% |
| | CO2 emissions (post-adjustment) | | 65 | 68 | 84 | 90 | 106 | 103 | 98 | 95 | -10.5% | -2.4% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 0.88 | 0.92 | 1.08 | 1.22 | 1.20 | 1.15 | 1.09 | 1.06 | -11.9% | -3.1% |
| | CO2 emission intensity index (post-adjustment) | | 0.76 | 0.78 | 1.01 | 1.03 | 1.20 | 1.15 | 1.09 | 1.05 | -12.3% | -2.9% |
| | Energy consumption | | 46 | 48 | 44 | 46 | 46 | 46 | 45 | 45 | -1.6% | +0.4% |
| | Energy consumption intensity index ☆ | Base year: FY1990 | 0.83 | 0.86 | 0.82 | 0.83 | 0.81 | 0.79 | 0.78 | 0.78 | -3.6% | -0.1% |
| | Production activity index | | 1.39 | 1.40 | 1.35 | 1.40 | 1.43 | 1.45 | 1.45 | 1.45 | +2.1% | +0.5% |
| Japanese Bankers Association | CO2 emissions (actual emissions) | | 121 | 122 | 130 | 141 | 139 | 134 | 127 | 120 | -13.8% | -5.2% |
| | CO2 emissions (post-adjustment) | | 104 | 104 | 122 | 119 | 139 | 134 | 126 | 120 | -14.1% | -5.0% |
| | Energy consumption | | 73 | 73 | 64 | 62 | 60 | 59 | 58 | 57 | -5.6% | -2.3% |
| | Electric power consumption intensity (power consumption / total floor area) ☆ | Base year: FY2009 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | -6.4% | -2.7% |
| The Life Insurance Association of Japan | CO2 emissions (actual emissions) | | 104 | 101 | 108 | 116 | 111 | 102 | 96 | 85 | -22.8% | -11.0% |
| | CO2 emissions (post-adjustment) | | 90 | 88 | 102 | 99 | 111 | 102 | 95 | 85 | -23.1% | -10.9% |
| | Energy consumption | | 61 | 60 | 53 | 51 | 48 | 45 | 44 | 40 | -16.4% | -8.8% |
| | Production activity index | Base year: FY2009 | 1.00 | 0.96 | 0.97 | 0.94 | 0.94 | 0.91 | 0.89 | 0.89 | -5.1% | -0.5% |
| Japan Foreign Trade Council Inc. | CO2 emissions (actual emissions) | | 4.9 | 5.0 | 5.1 | 5.5 | 5.3 | 5.0 | 4.4 | 4.0 | -23.9% | -8.7% |
| | CO2 emissions (post-adjustment) | | 4.2 | 4.3 | 4.8 | 4.7 | 5.3 | 5.0 | 4.4 | 4.0 | -24.2% | -8.6% |
| | Energy consumption | | 2.9 | 3.0 | 2.5 | 2.4 | 2.3 | 2.2 | 2.0 | 1.9 | -17.1% | -6.0% |
| | Electric power consumption intensity (power consumption poer unit floor area in entire company) ☆ | Base year: FY2009 | 1.00 | 1.04 | 0.88 | 0.85 | 0.82 | 0.80 | 0.75 | 0.71 | -13.5% | -5.1% |
| The General Insurance Association of Japan | CO2 emissions (actual emissions) | | 27 | 27 | 28 | 31 | 30 | 28 | 26 | 25 | -16.7% | -4.4% |
| | CO2 emissions (post-adjustment) | | 24 | 23 | 27 | 26 | 30 | 28 | 26 | 25 | -17.0% | -4.3% |
| | Energy consumption | | 16 | 16 | 14 | 13 | 13 | 13 | 12 | 12 | -9.7% | -1.8% |
| | Electric power consumption intensity (power consumption/total floor area) ☆ | Base year: FY2009 | 1.00 | 1.01 | 0.87 | 0.85 | 0.85 | 0.87 | 0.84 | 0.84 | -0.8% | +0.7% |
| | Production activity index | | 1.00 | 0.98 | 0.98 | 0.97 | 0.95 | 0.91 | 0.89 | 0.87 | -8.4% | -2.4% |
| Japan LP Gas Association | CO2 emissions (actual emissions) | | 2.4 | 2.4 | 2.9 | 3.2 | 3.1 | 3.0 | 2.8 | 2.8 | -10.2% | -1.8% |
| | CO2 emissions (post-adjustment) | | 2.0 | 2.0 | 2.7 | 2.7 | 3.1 | 3.0 | 2.8 | 2.8 | -10.7% | -1.8% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2010 | 1.00 | 1.00 | 1.19 | 1.43 | 1.48 | 1.40 | 1.45 | 1.36 | -7.7% | -5.8% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 1.00 | 1.19 | 1.43 | 1.48 | 1.40 | 1.45 | 1.36 | -7.7% | -5.8% |
| | Energy consumption ☆ | | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | -1.9% | +1.0% |
| | Energy consumption intensity index | Base year: FY2010 | 1.00 | 1.00 | 0.97 | 1.03 | 1.06 | 1.03 | 1.10 | 1.07 | +0.8% | -3.1% |
| | Production activity index | | 1.0 | 1.00 | 1.02 | 0.94 | 0.88 | 0.89 | 0.82 | 0.86 | -2.7% | +4.2% |
| The Real Estate Companies Association of Japan | CO2 emission intensity index (actual emissions) | Base year: FY2005 | 0.76 | 0.75 | 0.84 | 0.85 | 0.99 | 0.93 | 0.86 | 0.86 | -13.2% | -0.4% |
| | CO2 emission intensity index (post-adjustment) | | 0.87 | 0.86 | 0.89 | 0.97 | 0.99 | 0.93 | 0.86 | 0.86 | -13.0% | -0.6% |
| | Energy consumption intensity index ☆ | | 0.89 | 0.88 | 0.79 | 0.79 | 0.78 | 0.74 | 0.73 | 0.73 | -5.9% | -0.0% |
| Japan Securities Dealers Association | CO2 emissions (actual emissions) | | 19 | 19 | 19 | 20 | 19 | 18 | 17 | 16 | -16.4% | -4.4% |
| | CO2 emissions (post-adjustment) | | 16 | 16 | 18 | 17 | 19 | 18 | 17 | 16 | -16.7% | -4.2% |
| | Energy consumption | | 12 | 11 | 9 | 9 | 8 | 8 | 8 | 8 | -8.5% | -1.4% |
| | Electric power consumption per unit floor ☆ | [kWh/㎡] | | | | | 189 | 185 | 180 | 175 | -7.4% | -2.4% |
| Japan Hotel Association | CO2 emissions (actual emissions) | | | 56 | 58 | 63 | 61 | 60 | 57 | 54 | -10.9% | -4.6% |
| | CO2 emissions (post-adjustment) | | | 51 | 56 | 56 | 61 | 60 | 57 | 54 | -11.2% | -4.5% |
| | Energy consumption | | | 34 | 32 | 32 | 30 | 30 | 30 | 29 | -4.7% | -2.1% |
| | Energy consumption intensity index ☆ | Base year: FY2010 | | 1.00 | 0.94 | 0.92 | 0.89 | 0.86 | 0.84 | 0.84 | -5.5% | -0.5% |
| | Production activity index | | | 1.00 | 0.99 | 1.02 | 1.03 | 1.04 | 1.05 | 1.03 | -0.1% | +0.4% |
| Telecom Services Association | CO2 emissions (actual emissions) | | | | | | 102 | 96 | 90 | 90 | -12.1% | -0.3% |
| | CO2 emissions (post-adjustment) | | | | | | 102 | 96 | 89 | 89 | -12.5% | -0.1% |
| | Energy consumption | | | | | | 44 | 43 | 41 | 42 | -3.8% | +2.8% |
| | Energy consumption intensity index ☆ | Base year: FY2013 | | | | | 1.00 | 0.97 | 0.94 | 0.96 | -3.9% | +2.3% |
| | Production activity index | | | | | | 1.00 | 0.99 | 1.00 | 1.00 | +0.1% | +0.4% |
| Japan Internet Providers Association | CO2 emissions (actual emissions) | | | | | | | | 6 | 5 | | -8.2% |
| | CO2 emissions (post-adjustment) | | | | | | | | 6 | 5 | | -8.1% |
| | Energy consumption | | | | | | | | 3 | 3 | | -5.4% |
| | Energy consumption intensity index ☆ | Base year: FY2015 | | | | | | | 1.00 | 0.91 | | -8.8% |
| Revisions | CO2 emissions (actual emissions) | | | | | | | | | | | |
| | CO2 emissions (post-adjustment) | | | | | | | | | | | |
| | Energy consumption | | | | | | | | | | | |
| Total *1 | CO2 emissions (actual emissions) | | 1,625 | 1,960 | 2,210 | 2,461 | 2,315 | 2,243 | 2,084 | 1,913 | -17.6% | -8.2% |
| | CO2 emissions (post-adjustment) | | 1,395 | 1,680 | 2,067 | 2,089 | 2,315 | 2,239 | 2,073 | 1,906 | -17.9% | -8.1% |
| | Energy consumption | | 972 | 1,175 | 1,081 | 1,080 | 1,005 | 997 | 959 | 907 | -9.8% | -5.5% |

*1 Intensity indices have been calculated by having each industry set a base year, the figure for which is used as 1. Unless otherwise specified in remarks (BAU baseline etc.), the base year is fiscal 1990.

## 4. Transportation Sector

10,000t-CO2; 10,000kl crude oil equivalent; fiscal year

| Industry | (*1) (☆:target adopted by the industry) | Note | 2005 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Relative to FY1990 | Relative to FY2005 | Relative to FY2013 | Relative to previous FY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Japanese Shipowners' Association | CO2 emissions (actual emissions) | | 5,574 | 5,751 | 5,769 | 5,673 | 5,499 | 5,539 | 5,417 | 5,215 | 5,258 | +36.4% | −5.7% | −5.1% | +0.8% |
| | CO2 emissions (post-adjustment) | | 5,574 | 5,751 | 5,769 | 5,673 | 5,499 | 5,539 | 5,417 | 5,215 | 5,258 | +36.4% | −5.7% | −5.1% | +0.8% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: FY1990 | 0.88 | 0.82 | 0.83 | 0.77 | 0.73 | 0.62 | 0.57 | 0.59 | 0.61 | −38.6% | −30.0% | −0.3% | +3.6% |
| | CO2 emission intensity index (post-adjustment) | | 0.88 | 0.82 | 0.83 | 0.77 | 0.73 | 0.62 | 0.57 | 0.59 | 0.61 | −38.6% | −30.0% | −0.3% | +3.6% |
| | Energy consumption | | 2,012 | 2,076 | 2,083 | 2,048 | 1,986 | 1,931 | 1,889 | 1,821 | 1,836 | +31.8% | −8.8% | −4.9% | +0.8% |
| | Energy consumption intensity index | Base year: FY1990 | 0.88 | 0.82 | 0.83 | 0.77 | 0.73 | 0.59 | 0.55 | 0.57 | 0.59 | −40.7% | −32.3% | −0.2% | +3.6% |
| | Production activity index ## | | 1.65 | 1.81 | 1.79 | 1.91 | 1.95 | 2.33 | 2.48 | 2.28 | 2.22 | +122.2% | +34.8% | −4.7% | −2.7% |
| Japan Trucking Association | CO2 emissions (actual emissions) | | 4,720 | 4,470 | 4,337 | 4,161 | 4,101 | 4,079 | 4,100 | 4,091 | 4,068 | −18.7% | −13.8% | −0.3% | −0.5% |
| | CO2 emissions (post-adjustment) | | 4,720 | 4,470 | 4,337 | 4,161 | 4,101 | 4,079 | 4,100 | 4,091 | 4,068 | −18.7% | −13.8% | −0.3% | −0.5% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: 1996 | 0.75 | 0.71 | 0.63 | 0.63 | 0.71 | 0.69 | 0.71 | 0.73 | 0.70 | −29.8% | −6.9% | +2.0% | −3.2% |
| | CO2 emission intensity index (post-adjustment) | | 0.75 | 0.71 | 0.63 | 0.63 | 0.71 | 0.69 | 0.71 | 0.73 | 0.70 | −29.8% | −6.9% | +2.0% | −3.2% |
| | Energy consumption | | 1,776 | 1,682 | 1,632 | 1,566 | 1,543 | 1,527 | 1,534 | 1,531 | 1,523 | −19.1% | −14.3% | −0.3% | −0.5% |
| | Energy consumption intensity index | Base year: 1996 | 0.75 | 0.71 | 0.63 | 0.63 | 0.71 | 0.68 | 0.70 | 0.72 | 0.70 | −30.2% | −7.4% | +2.0% | −3.2% |
| | Production activity index | | 1.25 | 1.26 | 1.38 | 1.31 | 1.16 | 1.18 | 1.16 | 1.13 | 1.16 | +15.9% | −7.4% | −2.2% | +2.7% |
| The Scheduled Airlines Association of Japan | CO2 emissions (actual emissions) | | 2,667 | 2,106 | 1,901 | 1,753 | 1,884 | 1,979 | 2,086 | 2,218 | 2,305 | +34.2% | −13.6% | +16.5% | +3.9% |
| | CO2 emissions (post-adjustment) | | 2,667 | 2,106 | 1,901 | 1,753 | 1,884 | 1,979 | 2,086 | 2,218 | 2,305 | +34.2% | −13.6% | +16.5% | +3.9% |
| | CO2 emission intensity index (actual emissions) ☆ | Base year: 2005 | 1.00 | 0.93 | 0.88 | 0.88 | 0.89 | 0.88 | 0.84 | 0.85 | 0.82 | −20.7% | −18.2% | −7.2% | −3.2% |
| | CO2 emission intensity index (post-adjustment) | | 1.00 | 0.93 | 0.88 | 0.88 | 0.89 | 0.88 | 0.84 | 0.85 | 0.82 | −20.7% | −18.2% | −7.2% | −3.2% |
| | Energy consumption | | 1,026 | 810 | 731 | 674 | 724 | 748 | 789 | 839 | 872 | +32.0% | −15.0% | +16.5% | +3.9% |
| | Energy consumption intensity index | Base year: 2005 | 1.00 | 0.93 | 0.88 | 0.88 | 0.89 | 0.87 | 0.82 | 0.83 | 0.80 | −22.0% | −19.6% | −7.2% | −3.2% |
| | Production activity index | | 1.00 | 0.85 | 0.81 | 0.74 | 0.79 | 0.84 | 0.93 | 0.98 | 1.06 | +69.3% | +5.7% | +25.5% | +7.4% |
| Japan Federation of Coastal Shipping Associations | CO2 emissions (actual emissions) ☆ | | 789 | 655 | 704 | 686 | 704 | 722 | 726 | 704 | 713 | −16.9% | −9.6% | −1.2% | +1.3% |
| | CO2 emissions (post-adjustment) | | 789 | 655 | 704 | 686 | 704 | 722 | 726 | 704 | 713 | −16.9% | −9.6% | −1.2% | +1.3% |
| | CO2 emission intensity index (actual emissions) | Base year: FY1990 | 1.04 | 1.09 | 1.09 | 1.10 | 1.11 | 1.09 | 1.11 | 1.09 | 1.11 | +10.5% | +5.9% | +1.1% | +1.3% |
| | CO2 emission intensity index (post-adjustment) | | 1.04 | 1.09 | 1.09 | 1.10 | 1.11 | 1.09 | 1.11 | 1.09 | 1.11 | +10.5% | +5.9% | +1.1% | +1.3% |
| | Energy consumption | | 288 | 239 | 256 | 250 | 256 | 255 | 256 | 249 | 252 | −19.8% | −12.5% | −1.2% | +1.3% |
| | Energy consumption intensity index | Base year: FY1990 | 1.04 | 1.09 | 1.09 | 1.09 | 1.10 | 1.06 | 1.07 | 1.05 | 1.07 | +6.7% | +2.6% | +1.2% | +1.3% |
| | Production activity index | | 0.88 | 0.70 | 0.75 | 0.73 | 0.74 | 0.77 | 0.76 | 0.75 | 0.75 | −24.8% | −14.7% | −2.3% | +0.0% |
| The Association of Japanese Private Railways | CO2 emissions (actual emissions) | | | | 216 | 258 | 289 | 286 | 274 | 263 | 257 | | | −10.2% | −2.3% |
| | CO2 emissions (post-adjustment) | | | | 184 | 240 | 244 | 286 | 274 | 261 | 256 | | | −10.5% | −2.1% |
| | Energy consumption | | | | 130 | 126 | 126 | 123 | 121 | 120 | 121 | | | −1.7% | +0.8% |
| | Energy consumption intensity index | Base year: FY2010 | | | 1.00 | 0.98 | 0.97 | 0.94 | 0.93 | 0.92 | 0.92 | | | −2.1% | +0.7% |
| | Production activity index | | | | 1.00 | 0.99 | 1.00 | 1.00 | 1.01 | 1.01 | 1.01 | | | +0.4% | +0.1% |
| Shikoku Railway Company | CO2 emissions (actual emissions) | | 8 | 8 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | −18.8% | −8.6% | −4.5% | −0.6% |
| | CO2 emissions (post-adjustment) | | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | −19.0% | −8.8% | −4.7% | −0.6% |
| | CO2 emission intensity index (actual emissions) | Base year: FY2010 | 1.05 | 0.98 | 1.00 | 1.04 | 1.13 | 1.14 | 1.11 | 1.09 | 1.08 | −19.5% | +2.6% | −5.1% | −1.1% |
| | CO2 emission intensity index (post-adjustment) | | 1.11 | 0.98 | 1.00 | 1.07 | 1.11 | 1.20 | 1.17 | 1.15 | 1.13 | −19.7% | +2.4% | −5.3% | −1.2% |
| | Energy consumption ☆ | | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | −17.8% | −14.4% | −0.3% | +1.4% |
| | Energy consumption intensity index | Base year: FY2010 | 1.03 | 0.97 | 1.00 | 0.97 | 1.00 | 1.00 | 0.99 | 0.98 | 0.99 | −18.6% | −3.8% | −0.9% | +0.8% |
| | Production activity index | | 1.07 | 1.06 | 1.00 | 0.96 | 0.95 | 0.95 | 0.93 | 0.95 | 0.95 | +0.9% | −10.9% | +0.6% | +0.6% |
| All Japan Freight Forwarders Association | CO2 emissions (actual emissions) ☆ | Base year: FY2009 | 14.1 | 13.3 | 12.8 | 12.7 | 12.8 | 12.9 | 12.9 | 12.7 | 12.5 | | −11.5% | −3.6% | −1.9% |
| | CO2 emissions (post-adjustment) | | 14.1 | 13.3 | 12.8 | 12.7 | 12.8 | 12.9 | 12.9 | 12.7 | 12.5 | | −11.5% | −3.6% | −1.9% |
| | Production activity index | | | | | | | | | | | | | | |
| Revisions *2 | CO2 emissions (actual emissions) | | 249 | 238 | 233 | 310 | 344 | 416 | 408 | 397 | 381 | | | −8.5% | |
| | CO2 emissions (post-adjustment) | | 249 | 205 | 201 | 298 | 296 | 413 | 403 | 392 | 380 | | | −8.0% | |
| Total *3 | CO2 emissions (actual emissions) | | 14,022 | 13,239 | 13,179 | 12,860 | 12,842 | 13,042 | 13,031 | 12,908 | 13,002 | | −9.8% | −0.3% | +0.7% |
| | CO2 emissions (post-adjustment) | | 14,022 | 13,206 | 13,115 | 12,831 | 12,749 | 13,039 | 13,026 | 12,901 | 13,001 | | −9.8% | −0.3% | +0.8% |
| | Energy consumption | | 5,219 | 4,920 | 4,944 | 4,794 | 4,763 | 4,739 | 4,745 | 4,715 | 4,758 | | −12.0% | +0.4% | +0.9% |

*1 Intensity indices have been calculated by having each industry set a base year, the figure for which is used as 1. Unless otherwise specified in remarks (BAU baseline etc.), the base year is fiscal 1990.

*2 The total value of closed participant companies (East Japan Railway Company, West Japan Railway Company, Central Japan Railway Company, Kyushu Railway Company, Shikoku Railway Company, Japan Freight Railway Company) lists it in
Revisions.

*3 The rate of change from fiscal 2005 to fiscal 2016 is calculated except for industries with no data for fiscal 2005.