Keidanren
Policy & Action

KEIDANREN's Commitment to a Low Carbon Society Fiscal 2020 Follow-up Results Summary

＜Performance in Fiscal 2019＞

[Final Version]

- Tentative Translation -

March 31, 2021

KEIDANREN

(Japan Business Federation)

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Introduction

The Paris Agreement took effect in 2016 as a global framework aiming to substantially reduce global greenhouse gas emissions in the long term, and countries began taking concrete measures in 2020. The Japanese Government is taking measures toward its mid-term target for global warming countermeasures (reducing greenhouse gas emissions by 26% below fiscal 2013 levels by fiscal 2030), and Prime Minister Suga announced in his first policy speech in October 2020 that Japan would challenge to achieve carbon neutrality by 2050. Given these circumstances, in December 2020, Keidanren announced its determination to work with the Government to take measures to achieve "Society 5.0 with Carbon Neutral" with unwavering resolve and set forth the necessary actions[1].

Keidanren has run the PDCA cycle every fiscal year, promoting voluntary and proactive approaches by industries and companies, since it formulated the Keidanren Voluntary Action Plan on the Environment in June 1997, ahead of the adoption of the Kyoto Protocol in December 1997 (Figures A and B). As a result, it successfully reduced average emissions during fiscal 2008-2012 by 12.1% relative to fiscal 1990 levels, substantially overachieving the initial target (Figure C). Later in 2013, it expanded on the Keidanren Voluntary Action Plan and formulated the Commitment to a Low Carbon Society (hereinafter "Commitment"), under the four pillars of which the Japanese business community has engaged in measures toward achieving a low carbon society (Figure D). As a result, from fiscal 2013 through fiscal 2019, the industrial, energy conversion, commercial and transportation sectors collectively and consistently reduced total CO_2 emissions, achieving around 10.7% emission reductions in the fiscal 2019 survey (Figure E).

The measures taken under the Commitment are considered to be a pillar of Japan's efforts towards achieving its mid-term target in the Plan for Global Warming Countermeasures (Cabinet Decision of May 2016) and are included in the Japan's Long-term Strategy under the Paris Agreement (Cabinet Decision of June 2019) as voluntary approaches taken by the business community.

In order to achieve carbon neutrality by 2050, new innovative creations are essential. At the same time, "Society 5.0 with Carbon Neutral" cannot be reached without consistent measures toward 2020 and 2030 under the Commitment. It is important for the Japanese business community to play a pioneering role in global efforts, as well as domestic measures, by presenting to wide audiences in Japan and

[1] Keidanren "Toward Realizing Carbon Neutrality by 2050 ("Society 5.0 with Carbon Neutral") -Determination and Actions of the Business Community-" (December 15, 2020)

overseas corporate attitudes dedicated to engaging global warming countermeasures for more than twenty years.

The *Fiscal 2020 Follow-up Results: Summary [Final Version]* will report on the follow-up results of all 62 participating industries. Details of individual efforts made by each industry can be found in the “Industry-specific Report.”

Figure A. Developments in the Keidanren Voluntary Action Plan on the Environment and Keidanren's Commitment to a Low Carbon Society

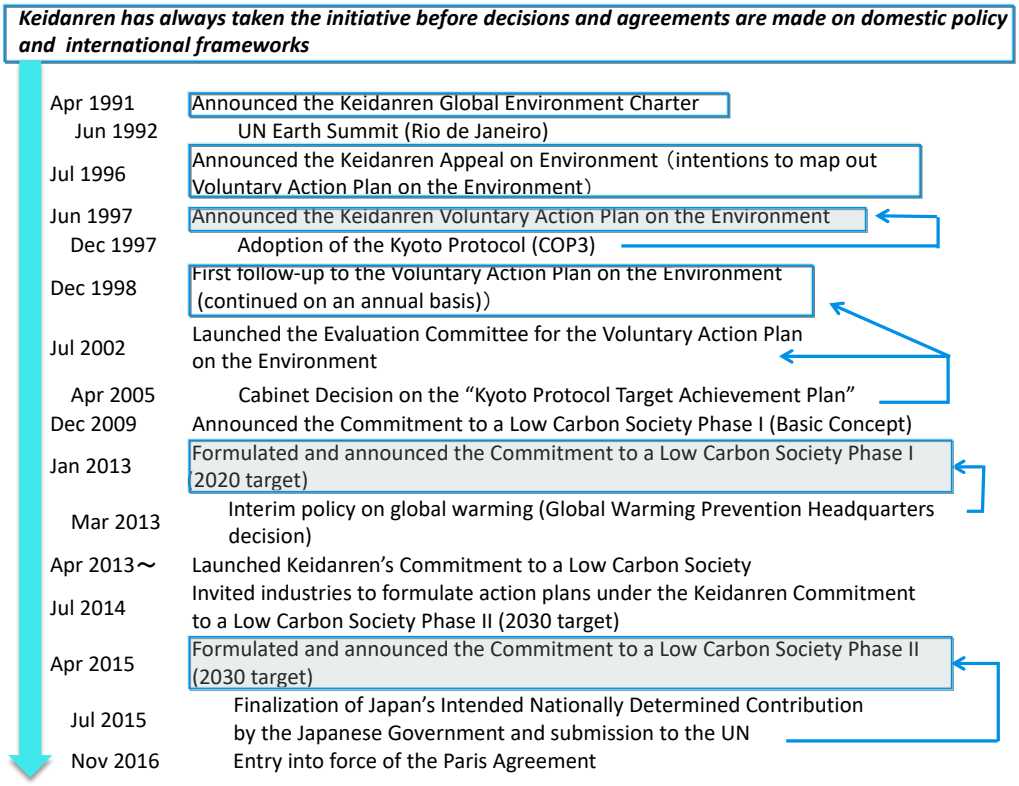


Figure B. PDCA Cycle under the Keidanren's Commitment to a Low Carbon Society

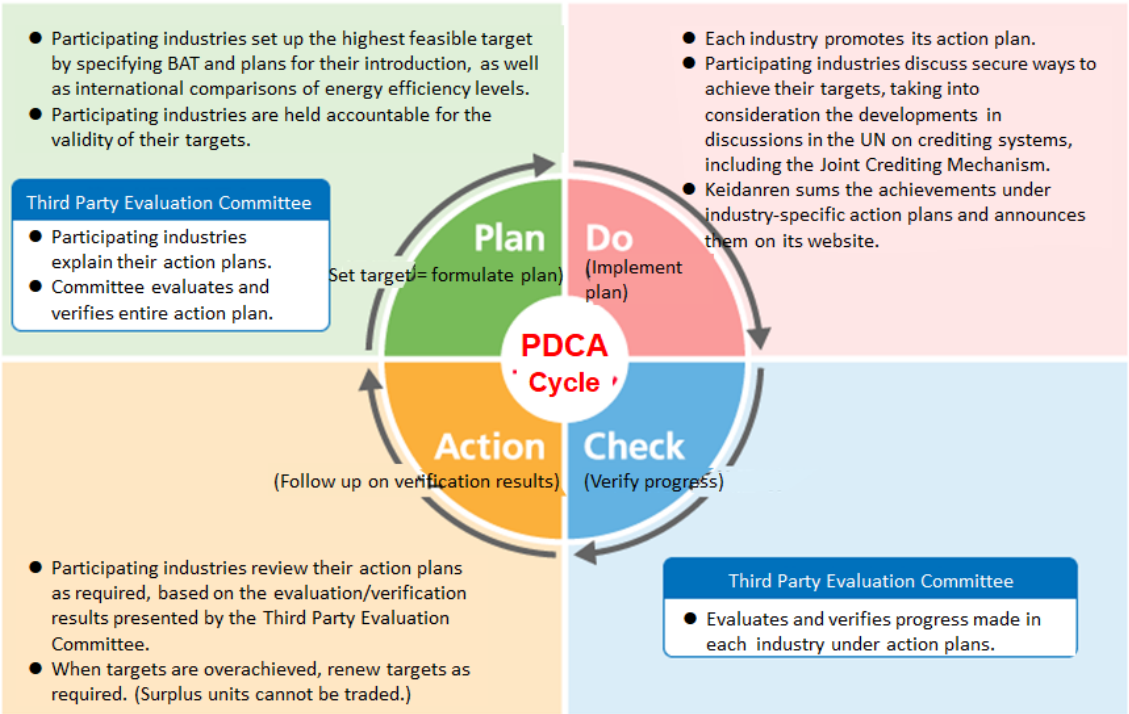
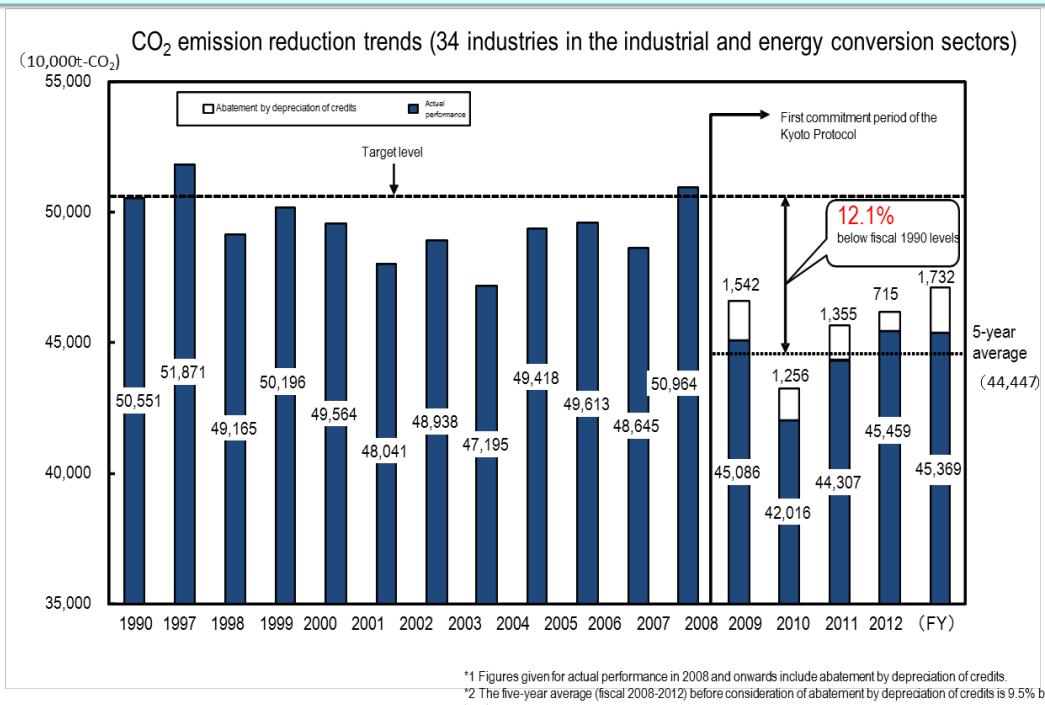


Figure C. Accomplishments of the Keidanren Voluntary Action Plan on the Environment (Section on Global Warming)

— 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).



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

(1) Emission reductions from domestic business operations

Participating industries establish targets based on certain assumptions including maximum deployment of BAT and proactive efforts to save energy.

<Efforts to achieve targets>
1) Introducing energy-saving facilities, processes and equipment, etc.: High-efficiency production facilities (incl. power plants), lighting and air conditioning, etc.
2) Recovery and effective use of energy: waste heat recovery, etc.
3) Fuel conversion: utilization of renewable energy, etc.
4) Operational improvements of facilities and equipment: introduction of advanced control equipment

(2) Strengthened cooperation with other interested groups

Participating industries
1) Contribute to CO2 emission reductions through the provision of low-carbon products and services; and
<Examples>
Improving the fuel economy of transportation equipment by utilizing lightweight and strong material (high tension strength steel, carbon fiber, etc.); promoting energy conservation in the household sector through the diffusion of high-efficiency household appliances; achieving society-wide efficiency by using ICT services, etc.

2) Promote public campaigns to improve public awareness and knowledge of global warming.
<Examples>
Providing information on the environmental performance of a product; promoting eco-drive

(3) Promoting contribution at the international level

Participating industries
1) Contribute to CO2 reductions at the global level by proactively transferring Japan's advanced technologies and know-how to developing countries; and
<Examples>
Emissions of approximately 0.65-1.02 billion t-CO2 (estimate) will be potentially avoided globally in 2030 due to the deployment of high-efficiency power generation by Japanese companies

2) Engage in activities at international conferences, including cooperation towards the formulation of international standards and introduction of Japan's diverse global warming countermeasures.

(4) Innovative technology development

Participating industries engage in developing and commercializing innovative technology with a medium- to long-term view reaching beyond 2030.

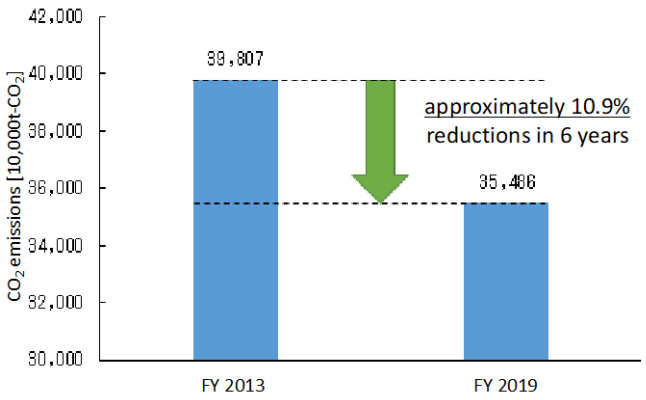
<Examples>
1) Developing energy-saving facilities, processes and equipment, etc.: energy-saving cement production processes, artificial photosynthesis, environment-friendly iron-making process, CCS etc.
2) Fuel conversion: biofuels, hydrogen energy, etc.
3) Developing low-carbon products and services: innovative materials (incl. utilization of biomass), ZEB/ZEH, next-generation vehicles, ITS, superconducting cables, etc.

Figure E. Accomplishments of the Keidanren's Commitment to a Low Carbon Society

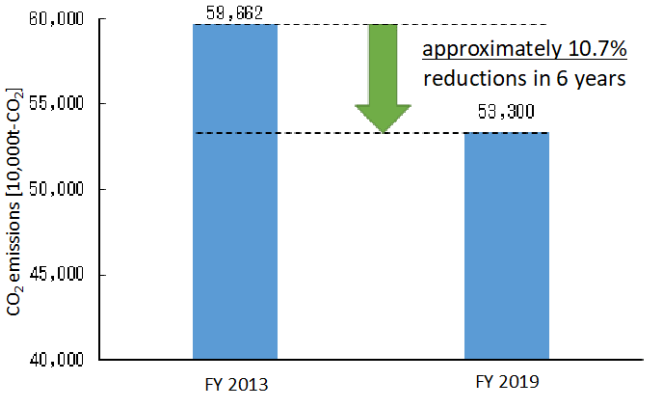
— Performance in fiscal 2013-2019 —

(Fiscal 2020 Follow-up Results, final count)

<Industrial sector>



<Total, all sectors>



Notes:

- The figure given for Fiscal 2020 Follow-up Results, final count <total, all sectors> represent total CO_2 emissions (after electric power distribution) from 60 industries out of the 62 industries currently participating in the Commitment, and the figure given for <Industrial sector> represent that for 31 industries. Furthermore, CO_2 emissions are calculated using updated calorific values and carbon emission factors available at the time of calculation; and therefore, CO_2 emissions may differ for the same fiscal year.
- The coverage of emissions differs between fiscal 2013 and fiscal 2019 for reasons including offshoring.

Pillar 1: Emission reductions from domestic business operations

(1) Performance in CO_2 emissions

Industries participating in the Commitment have set up and announced individual targets to reduce CO_2 emissions from their business operations as commitments to society and are engaged in efforts to achieve their targets.

It should be noted that given the increasing importance of the electric power industry's follow-up on CO_2 emissions from its own business operations (electric power generation), since the fiscal 2017 follow-up, the follow-up report presents the outcome of efforts as CO_2 emissions before electric power distribution (direct emissions) for CO_2 emissions from the energy conversion sector including the electric power industry, and as emissions after electric power distribution (indirect emissions) for emissions from other sectors (industrial, commercial, transportation). Furthermore, the preliminary CO_2 emission factor[2] for electric power use (emission coefficient for electricity) was used to calculate total CO_2 emissions in fiscal 2019. This survey uses the updated figures for energy-specific standard calorific values for use in Comprehensive Energy Statistics, published by the Japanese Agency for Natural Resources and Energy in January 2020.

①All sectors

CO_2 emission trends[3]

In fiscal 2019, CO_2 emissions were reduced in all sectors relative to fiscal 2013 levels (emission levels for the baseline year for Japan's 2030 target for global warming countermeasures in the medium term), and in the three sectors (industrial sector, energy conversion sector, commercial sector) excluding the transportation sector on a year on year basis (relative to fiscal 2018) (Figure 1). The year on year increase in CO_2 emissions in the transportation sector in fiscal 2019 mainly owes to widened scope of economic activity in the overseas shipping industry covered by the follow-up survey (subsection

[2] Basic emission coefficient (emission coefficient for actual emissions): 4.44t-CO2/10,000kWh; post-adjustment emission coefficient: 4.44 t-CO2/10,000kWh

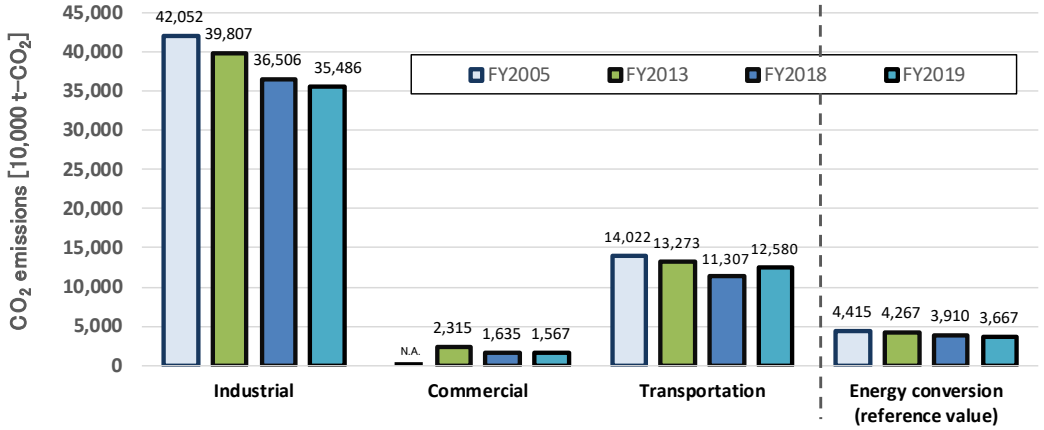
[3] Participating industries in each sector are as follows. Attachment should be referred to for emissions, etc. in each industry:
Industrial sector: manufacturing (iron and steel, chemical, pulp and paper, electrical and electronics, cement, automobiles, etc.), mining, construction
Energy conversion sector: sectors that convert primary energy, such as crude oil, coal and natural gas into electric power and petroleum products (electric power generation, coal and petroleum manufacturing, gas manufacturing)
Commercial sector; tertiary industries excluding transportation-related and energy conversion businesses (telecommunications, retail, finance, etc.)
Transportation sector: passenger transportation, freight transportation

⑤Transportation sector should be referred to for details). Furthermore, total CO_2 emissions in all sectors after electric power distribution were reduced by approximately 10.7% relative to fiscal 2013 levels, decreasing by approximately 10% in six years (Figure E).

It should be noted that a limited number of industries raised impacts of COVID-19, which spread globally from the end of fiscal 2019, as factors of reduced economic activity.

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

Emissions after electric power distribution

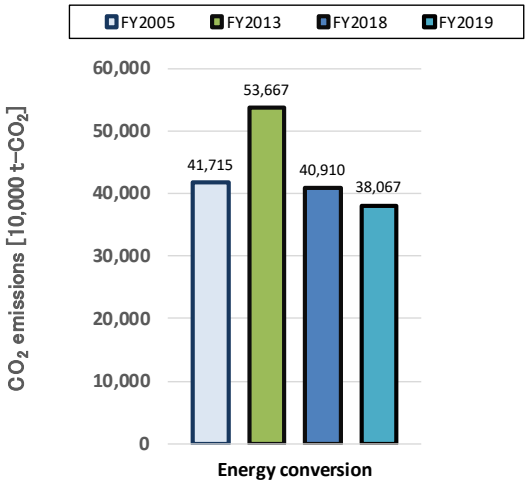


Sector	Target industries / participating ind.	Fiscal 2019 actual emissions	Relative to fiscal 2005	Relative to fiscal 2013	Relative to previous FY (fiscal 2018)
Industrial	31/31 industries	354.86 Mt-CO_2	-15.6%	-10.9%	-2.8%
Commercial	14/16 industries	15.67 Mt-CO_2		-32.3%	-4.1%
Transportation	12/12 industries	125.80 Mt-CO_2	-13.8%	-5.2%	+11.3%

NOTES:

- As emissions before electric power distribution are counted for the energy conversion sector, emissions after electric power distribution are provided for reference.
- Under the commercial sector, the Real Estate Companies Association of Japan and Japan Building Owners and Managers Association have not reported CO_2 emissions thus are not included in total actual emissions.
- Emissions data for fiscal 2005 have been recalculated based on the calculation method employed under the Commitment to a Low Carbon Society for the purpose of comparison. However, emissions in the commercial sector in fiscal 2005 are not provided due to a large difference in the industries covered.

Emissions before electric power distribution



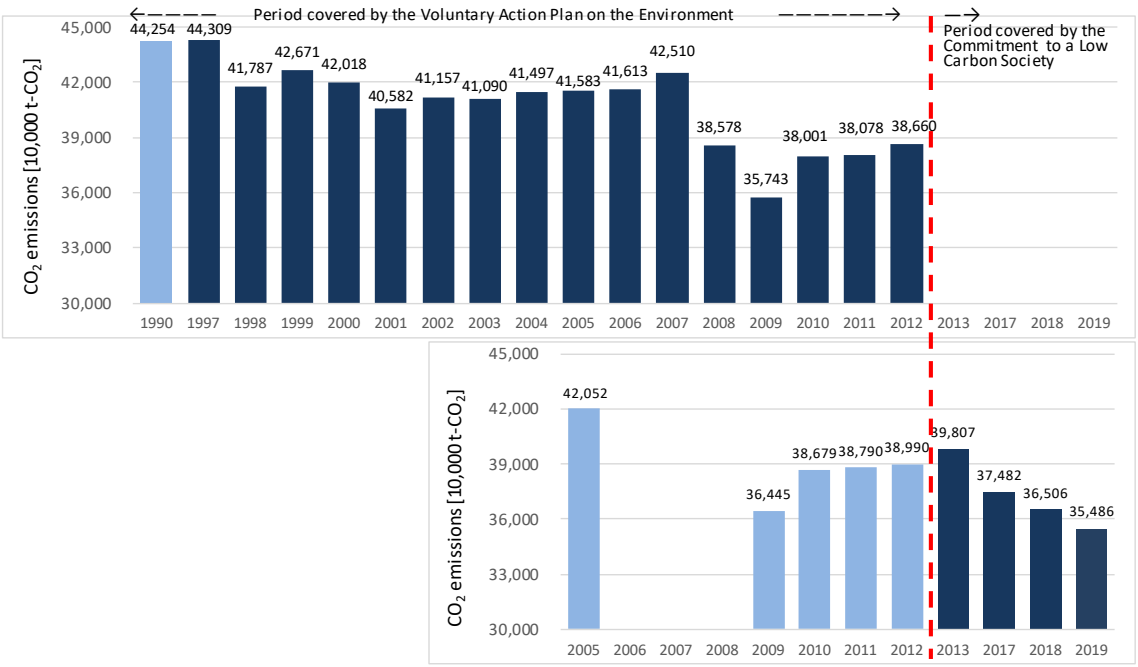
Sector	Target industries/ participating ind.	Fiscal 2019 CO_2 emissions	Relative to fiscal 2005	Relative to fiscal 2013	Relative to previous FY (fiscal 2018)
Energy conversion	3/3 industries	380.67 Mt-CO_2	-8.7%	-29.1%	-6.9%

②Industrial sector

CO_2 emission trends

In fiscal 2019, 354.86 million t-CO_2 of CO_2 (after electric power distribution) (15.6% below fiscal 2005 levels, 10.9% below fiscal 2013 levels, and 2.8% below previous fiscal year levels) were emitted from the 31 industries of the industrial sector, thus continuing to follow a downward CO_2 emission trend since the Commitment was launched (Figure 2).

Figure 2. Emissions in the industrial sector
(after electric power distribution, final count)



NOTES:

- THE PERIOD BEFORE AND INCLUDING FISCAL 2012 WAS COVERED BY THE KEIDANREN VOLUNTARY ACTION PLAN ON THE ENVIRONMENT, AND WAS SUCCEEDED BY KEIDANREN'S COMMITMENT TO A LOW CARBON SOCIETY, WHICH HAS COVERED THE PERIOD FROM FISCAL 2013.
- THE FIGURES FOR FISCAL 2005-2012 UNDER KEIDANREN'S COMMITMENT TO A LOW CARBON SOCIETY HAVE BEEN CALCULATED AND PROVIDED FOR REFERENCE. WITH THE IMPLEMENTATION OF KEIDANREN'S COMMITMENT TO A LOW CARBON SOCIETY, CALCULATION METHODS WERE RENEWED FOR EMISSION COEFFICIENTS FOR ELECTRIC POWER (FROM GENERATION-END EMISSION COEFFICIENTS TO RECEIVING-END EMISSION COEFFICIENTS) AND FOR SOME INDUSTRIAL BOUNDARIES.
-

Factor analysis[4]

An analysis of changes in CO_2 emissions in the industrial sector (Figure 3) revealed that since fiscal 2005, CO_2 emissions due to "① change in economic activity" have followed a decreasing trend (12.4% below fiscal 2005 levels, 6.9% below fiscal 2013 levels, 3.3% below previous fiscal year levels). Relative to previous year levels, overall CO_2 emissions decreased (-2.8%) despite an increase in CO_2 emissions due to "③ change in energy consumed per unit of economic activity" (+0.9%), as a result of CO_2

[4] 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 decarbonization of energy, and declines in ③ would imply that CO_2 emissions were reduced as a result of energy saving efforts.

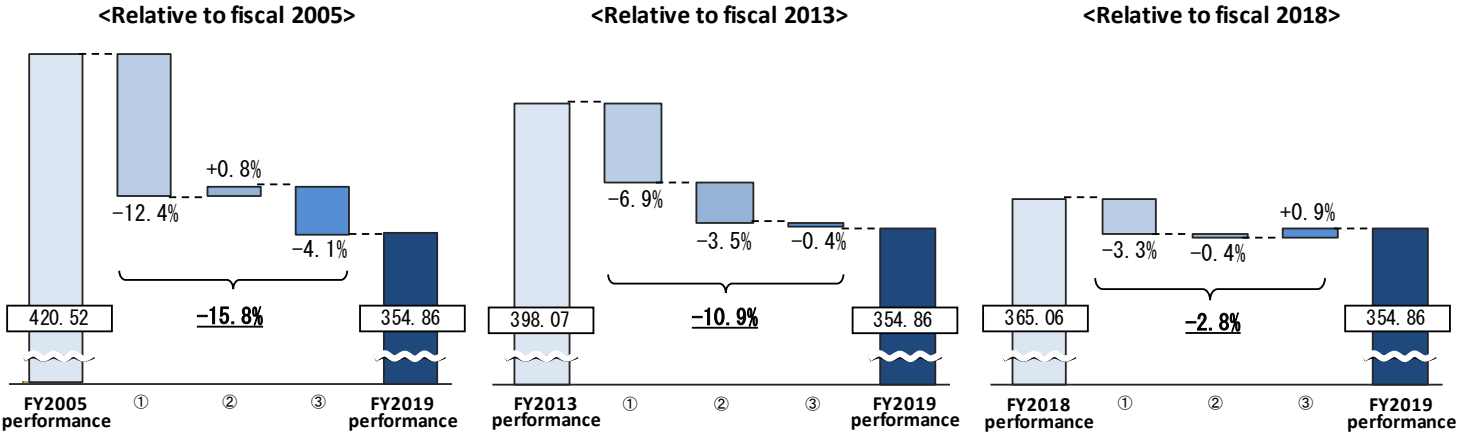
emission reductions due to "② change in CO2 emission factor" (-0.4%) in addition to reductions due to "① change in economic activity" (-3.3%).

Since fiscal 2018, CO_2 emissions due to "③ change in energy consumed per unit of economic activity" have continued to increase year over year because energy consumption did not decrease as much as production did for the following reasons: a given amount of energy use is required regardless of production levels, despite decreased production in industries highly dependent on exports caused by the continued economic slowdown in China and across the world through fiscal 2019; the updating of aged or deteriorating equipment have yet to be completed due to labor shortage and cost-related restrictions; and increased high-mix low-volume production has given rise to energy-intensive production methods.

Figure 3. Factor analysis 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)

($Mt-CO_2$)



NOTE: FIGURES HAVE BEEN ROUNDED OFF; AND THEREFORE, THE SUM OF ①, ② AND ③ MAY DIFFER FROM THE RATE OF REDUCTION RELATIVE TO A FISCAL YEAR.

Major efforts made in fiscal 2019

The industrial sector continues to significantly contribute to reducing CO_2 emissions through ongoing efforts in fuel conversion, energy recovery and use, introducing high-efficiency equipment, and improving operational processes (Table 1).

In the steel industry, publicly available information confirms that as a result of

continued efforts under plans addressing the deterioration of refractory bricks for coke ovens, a contributing factor to increased CO_2 emissions, capital investments amounting to more than 190 billion yen were made to complete renewals of a total of at least 11 coke ovens.

The chemical industry has promoted the renewal of existing facilities, making capital investments of 38.5 billion yen in fiscal 2019, thereby reducing 380,000 t-CO_2. Eighty percent of the capital expenditures were focused on efficiency improvements of facilities and equipment, such as ethylene manufacturing facilities, caustic soda manufacturing facilities, and steam production facilities.

Many industries have recently advanced the introduction of systems that visualize energy management. The electrical and electronics industry, in particular, has digitally visualized production process data using wireless sensor network systems and utilizes cloud servers on which data can be analyzed, allowing experts at corporate headquarters to remotely work with employees on site to solve issues, including improving manufacturing processes. This has contributed to CO_2 emission reductions through energy conservation, halving electric power use for HVAC and reducing office-wide electric power use by 8.6%.

In fuel conversion, industries continue to switch from heavy oil to natural gas and LPG. In addition, the iron and steel, chemical, cement, mining, lime, rubber, pharmaceuticals, printing, food (including soft drink and beer), and electric wire and cable industries, among many others, are taking various measures in energy recovery and use, recovering waste heat, byproducts and steam from manufacturing processes for use as heat in power generation and HVAC. (“Pillar 1” Section (6)-② should be referred to for details.)

Some industries pointed out that a challenge faced by the industrial sector was that there is limited room for investment in highly effective energy saving as a result of its cumulative reduction efforts over many years and others reported that there will be a declining trend in the cost-effectiveness of investment focused only on the introduction of high-efficiency equipment. Furthermore, some industries have yet to complete updating aged or deteriorating equipment due to a shortage of labor and cost-related restrictions. In addition, with recent changes in the product mix from low-mix high-volume production to high-mix low-volume production, some industries have been seeing less CO_2 emission reductions resulting from improved production efficiency.

Table 1. Major efforts made in the industrial sector in fiscal 2019

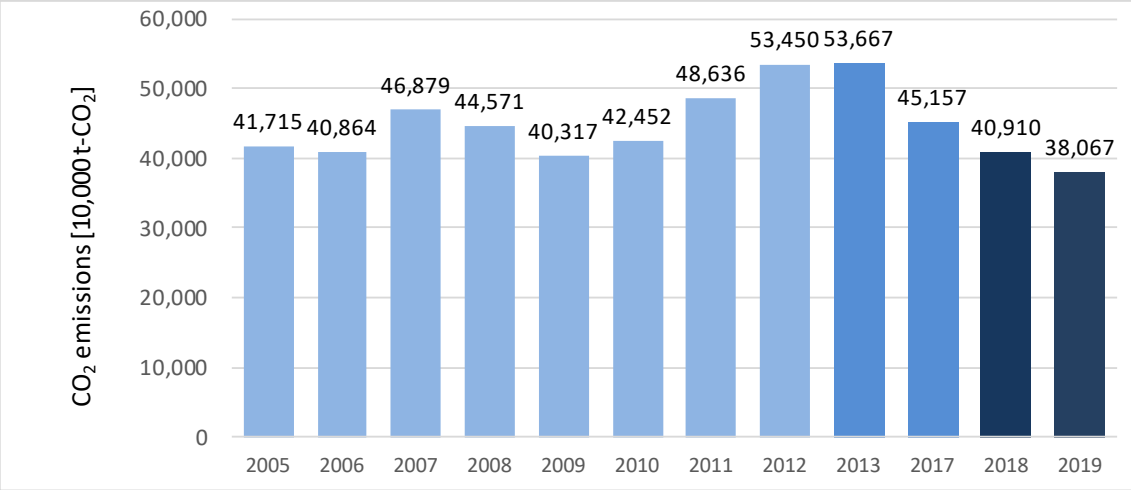
Improvement of efficiency of facilities	
・ Deployment of high-efficient equipment (heating furnaces, cracking furnaces, power generating facilities, HVAC equipment, transformers, pumps, compressors, motors, fans, freezers, etc.)	・ Apply inverter technology to compressors ・ Renewal of coke ovens ・ Updating to high efficiency power generation facilities ・ Renewal to LED lighting
Improvement of operations and processes	
・ Optimization of operational conditions and methods ・ Changing baselines and settings (temperatures, frequency of ventilation, level of cleanliness, brightness, hours of operation, etc.)	・ Visualization of energy use
Fuel conversion / energy recovery	
・ Conversion from heavy oil and kerosene to city gas, LPG, propane gas, electric power, alternative fuels (wooden pellets, recycled oil, recycled carbon fuels)	・ Cogeneration ・ Regenerative burners ・ Waste heat recovery (enhanced thermal insulation of steam piping and hot water devices, reduction of heat carried away by products)

③Energy conversion sector

CO_2 emission trends

In fiscal 2019, the three participating industries of the energy conversion sector collectively emitted 380.67 million t-CO_2 of CO_2 (before electric power distribution) (8.7% below fiscal 2005 levels, 29.1% below fiscal 2013 levels, and 6.9% below previous fiscal year levels), thus continuing to follow a downward emission trend (Figure 4).

Figure 4. CO_2 emissions in the energy conversion sector (before electric power distribution, final count)



NOTES:

- The Keidanren's Commitment to a Low Carbon Society covers the period from fiscal 2013. CO_2 emission figures under the Keidanren Voluntary Action Plan on the Environment, covering the period before and including 2012, were calculated as emissions after electric power distribution, and are therefore provided for reference.
- Since the Electric Power Council for a Low Carbon Society was established in fiscal 2015, earlier data are provided as reference. The data for fiscal years up to fiscal 2006 represent only the Federation of Electric Power Companies of Japan (FECP), and the data for fiscal 2007-2014 cover FECP and participating power producers and supplies (PPS). The figures used for the Japan Gas Association through 2012 have been derived from performance under the Voluntary Action Plan on the Environment which cover different boundaries.

Factor analysis

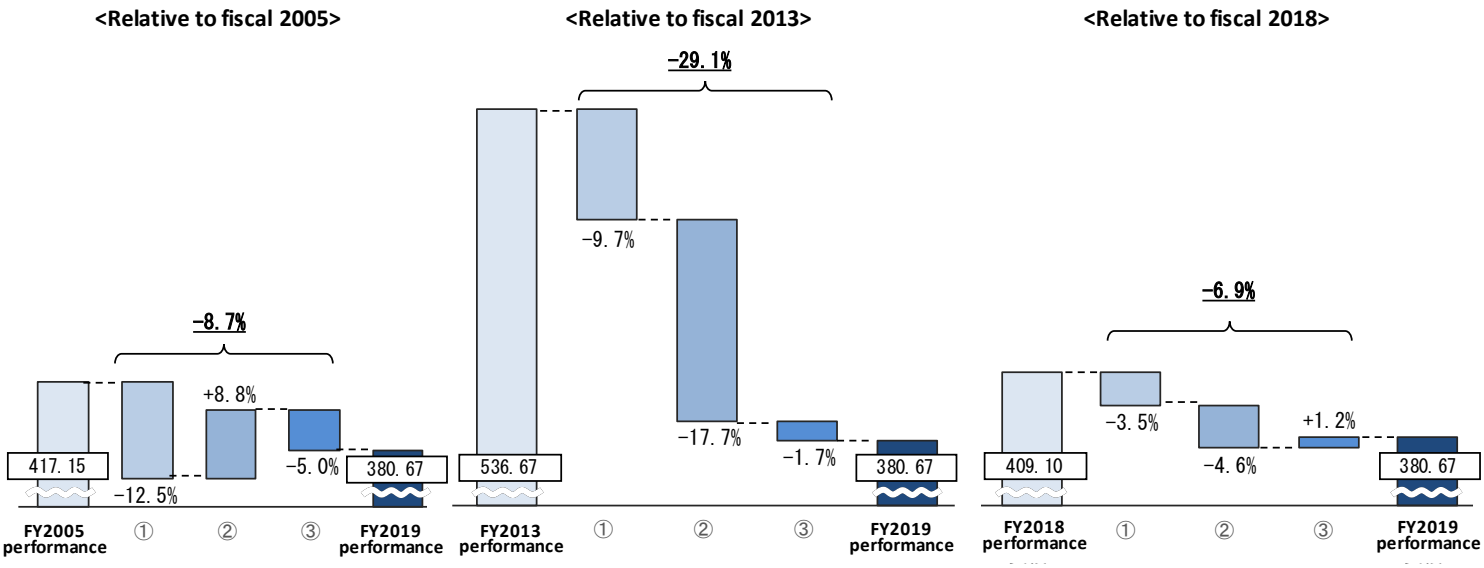
An analysis of the causes that led to changes in CO_2 emissions (before electric power distribution) in fiscal 2019 (Figure 5) revealed that while relative to fiscal 2005, CO_2 emissions due to "② change in CO2 emission factor" increased (+8.8%) given the prolonged suspension of nuclear power plants after the Great East Japan Earthquake in 2011, emissions due to "① change in economic activity" and "③ change in energy consumed per unit of economic activity" both decreased (-12.5% and -5.0%, respectively), and thus overall CO_2 emissions decreased (-8.7%).

Relative to fiscal 2013 and to the previous fiscal year, CO_2 emissions decreased mainly due to "② change in CO_2 emission factor" (-17.7% and -4.6%, respectively), and as a result, overall CO_2 emissions were reduced (-29.1% and -6.9%, respectively). This is attributable mainly to the continued operation of restarted nuclear power plants[5], the increased use of renewable energy and the deployment of cutting-edge high-efficiency thermal power generation facilities. On the other hand, emissions due to "③ change in energy consumed per unit of economic activity" increased (+1.2%) from the previous fiscal year. This is attributable mainly to reduced power generation efficiency (on an actual performance basis) due to increased output control at thermal power plants, the regulated power supply, to accommodate increasing renewable energy supply.

Figure 5. Factors of change in CO_2 emissions (before electric power distribution, final count) in the energy conversion sector

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

(Mt−CO_2)



- NOTE: COMPARISONS WITH FISCAL 2005 AND FISCAL 2013 LEVELS ARE PROVIDED FOR REFERENCE BECAUSE OF THE DISCONTINUITY OF THE DATA BEFORE AND INCLUDING FISCAL 2014 AND BEYOND FISCAL 2015.

Major efforts made in fiscal 2019

The electric power industry promotes the utilization of nuclear power on the major premise of ensured safety, the development of hydro, geothermal, solar, wind,

[5] In fiscal 2018, Ohi Power Station Units 3 & 4, Genkai Nuclear Power Station Units No. 3 & 4 resumed operations.

and biomass power generation, and the purchasing and deployment of renewable power under the FIT (feed-in-tariff) system. The industry is also engaged in reducing CO_2 emissions through continued efforts to improve the efficiency of thermal power generation, including LNG combined cycle power generation and ultra-supercritical coal-fired thermal power generation, and the introduction of efficient energy supply services harnessing AI (Table 2).

The petroleum industry reduces CO_2 emissions by compiling a broad range of individual measures, including the further sophistication of operation and management of refineries and utility plants, increased mutual heat utilization among devices, increased installation of waste heat and other waste energy recovery equipment, and adoption of high-efficiency devices and catalysts. The industry also uses government support programs for the rational use of energy to promote energy efficiency programs.

It has been difficult in recent years for the city gas industry to achieve substantial reductions as almost all companies have finished renewing LNG production processes, etc. However, the industry promotes further CO_2 emission reductions by installing high-efficiency equipment (utilization of waste heat from neighboring waste treatment plants and power plants, introduction of cogeneration, etc.) when updating facilities and altering facility operations within a scope that does not affect the stable supply of city gas (reviewing pump operations, etc.).

Table 2. Major efforts made in the energy conversion sector in fiscal 2019

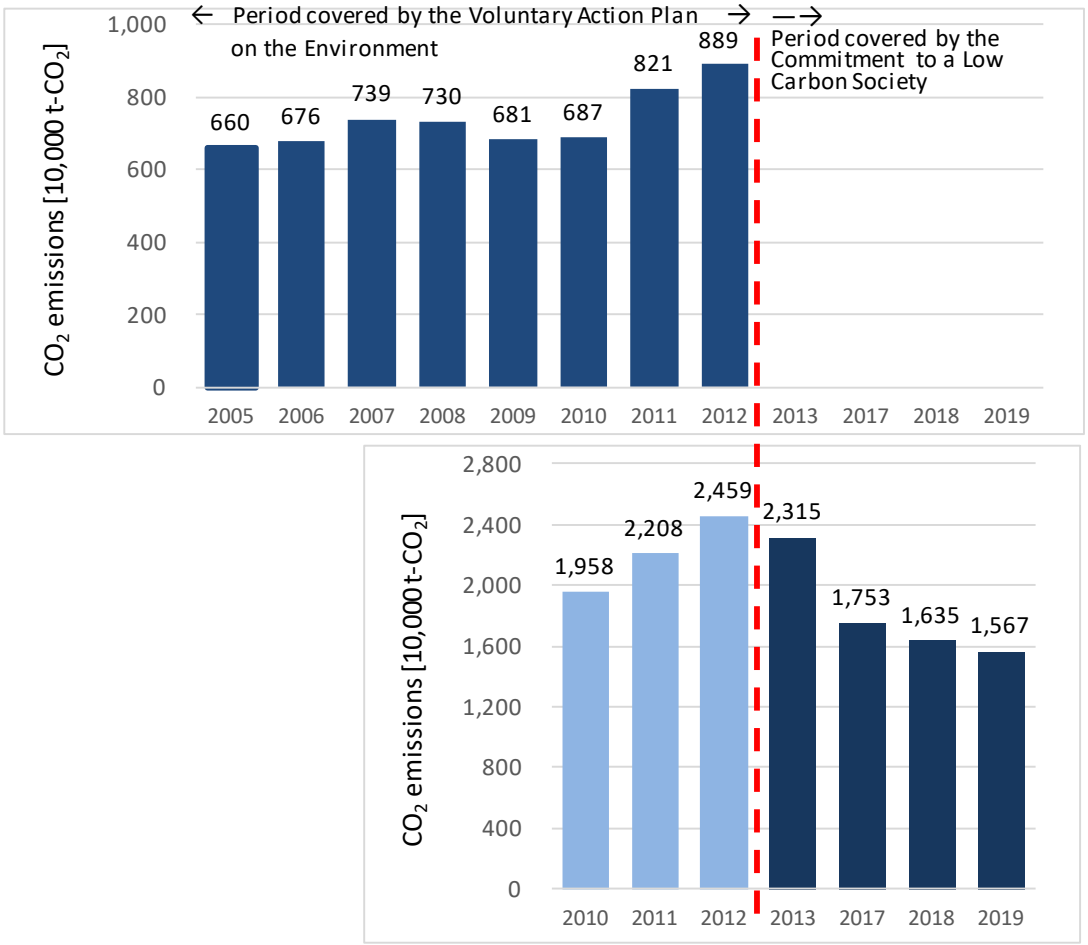
Introduction of high-efficiency facilities	
・ LNG combined cycle power generation ・ Ultra-supercritical coal-fired thermal power generation, etc. ・ Mutual heat utilization among devices ・ Waste heat/waste energy recovery facilities ・ Adoption of high-efficiency devices and catalysts	・ Utilization of waste heat from neighboring waste treatment facilities and power plants ・ Cold heat power generation ・ Open rack vaporizers (ORV) ・ Cogeneration
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	・ Combined combustion of wood biomass at coal-powered thermal power generation plants
Improvement of operations	
・ Addressing wind and solar output variability ・ Further sophistication of control technologies and operation and management of refining and utility facilities at oil refineries	・ Improved operation rates of cold heat power generation facilities
Provision of services	
・ Efficient energy supply services using AI ・ Provision of virtual renewable energy choices using non-fossil certificates	・ Energy-saving consultation services ・ Deployment of high-efficiency water heaters ・ Electric power visualization services ・ Environmental household account books

④Commercial sector

CO_2 emission trends

In fiscal 2019, the 14 participating industries of the commercial sector collectively emitted 15.67 million t-CO_2 of CO_2 (after electric power distribution) (32.3% below fiscal 2013 levels and 4.1% below previous fiscal year levels), and thus CO_2 emissions have followed a declining trend since fiscal 2013 (Figure 6).

Figure 6. CO_2 emissions in the commercial sector (after electric power distribution, final count)



NOTES:

- The period before and including fiscal 2012 was covered by the Keidanren Voluntary Action Plan on the Environment, and was succeeded by Keidanren's Commitment to a Low Carbon Society, which has covered the period from fiscal 2013. The figures for fiscal 2010-2012 under Keidanren's Commitment to a Low Carbon Society are provided for reference.
- With the implementation of Keidanren's Commitment to a Low Carbon Society, calculation methods were renewed. (emission coefficients for electric power were changed from generation-end emission coefficients to receiving-end emission coefficients and some industrial boundaries were changed.)
- The Real Estate Companies Association of Japan and the Japan Building Owners and Managers Association have not reported emissions and are not included in the graph.

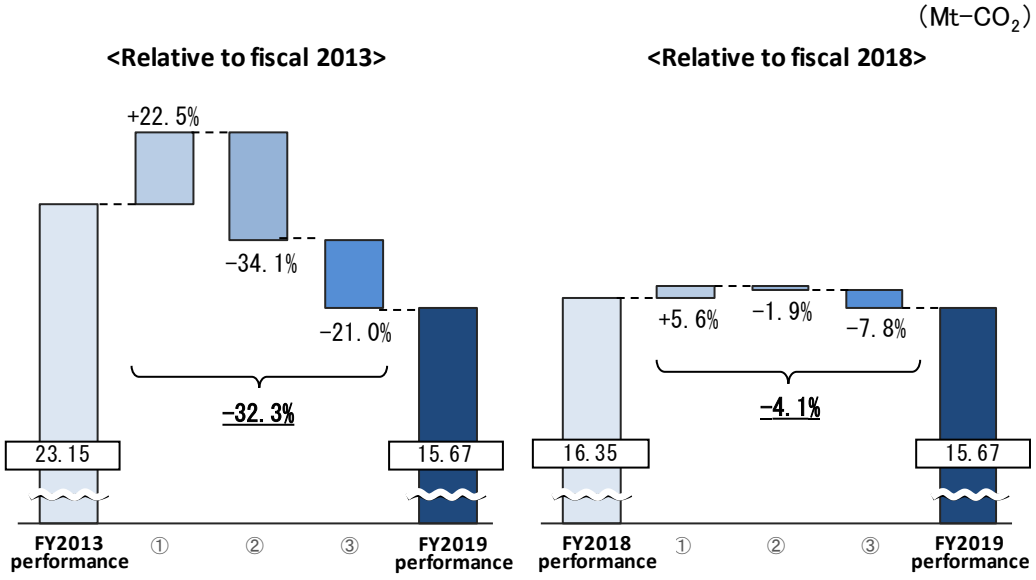
Factor analysis

An analysis of CO_2 emissions (after electric power distribution) in the commercial sector in fiscal 2019 (Figure 7) has revealed that relative to both fiscal 2013 and the previous fiscal year, CO_2 emissions increased due to "① change in economic activity" (+22.5% and +5.6%, respectively). Increased emissions from fiscal 2013 and the previous fiscal year are mainly attributable to increased internet use and the widespread use of smartphones and tablets, as well as the emergence of diverse services and applications, such as the distribution of high quality contents, including HD (high definition) images. This has led to a significant rise in information distributed across networks, thus increasing communications traffic. Furthermore, relative to fiscal 2013, an increase in the number of convenience stores has contributed to increased electric power use. However, CO_2 emissions decreased due to "② change in CO2 emission factor" (-34.1% and -1.9%, respectively) in addition to decreasing due to "③ change in energy consumed per unit of economic activity" (-21.0% and -7.8%, respectively); and as a result, overall CO_2 emission reductions (after electric power distribution) in fiscal 2019 were 32.3% below fiscal 2013 levels and 4.1% below previous fiscal year levels.

Factors leading to the reduction of CO_2 emissions due to "③ change in energy consumed per unit of economic activity" include the sector's continued efforts in deploying telecommunications equipment with high energy saving performance, efficiently setting up and operating data center facilities, etc., deploying high-efficiency HVAC equipment and LED lighting, and deploying energy management systems, such as BEMS (Building Energy Management System), despite increased communications traffic and electric power use. Furthermore, most of the CO_2 emissions in the commercial sector are attributable to electric power use, and thus are largely affected by the emission coefficient for electric power. As indicated in the factor analysis of emissions in the energy conversion sector, the continued operation of restarted nuclear power plants, increased deployment of renewable energy and the deployment of cutting-edge high-efficiency thermal power generation facilities have lowered the emission coefficient for electric power, thereby reducing CO_2 emissions due to "② change in CO2 emission factor."

Figure 7. Factors of change in CO_2 emissions
(before electric power distribution, final count) in the commercial sector

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



NOTE: FIGURES HAVE BEEN ROUNDED OFF; AND THEREFORE, THE SUM OF ①, ② AND ③ MAY DIFFER FROM THE RATE OF REDUCTION RELATIVE TO A FISCAL YEAR.

Major efforts made in fiscal 2019

The commercial sector has continued to reduce CO_2 emissions through introducing energy-saving and high-efficiency equipment and operational improvements. It has also promoted the introduction of renewable energy, such as solar and wind power, in the telecommunications, franchise chain, foreign trade, real estate, and telecommunication services industries (Table 3).

Operational improvements include the promotion of BEMS in the chain store, telecommunications, life insurance, foreign trade and real estate industries. Such actions, along with working practice reform and the consolidation and reduction of office space promoted in many industries as a result of the COVID-19 have contributed to reducing CO_2 emissions.

Particularly in the ICT field, with the further utilization of big data, increased communications traffic is expected to increase electric power use. Under these circumstances, the telecommunications industry has taken measures to reduce electric power use, for example, introducing communication equipment (ICT devices, IP devices)

and the efficient construction and operation of facilities (simplified network facilities, high-efficiency wireless base station, energy saving measures at data centers). As a result, energy consumption (electric power use) in fiscal 2019 has only slightly increased from the previous fiscal year.

Table 3. Major efforts made in the commercial sector in fiscal 2019

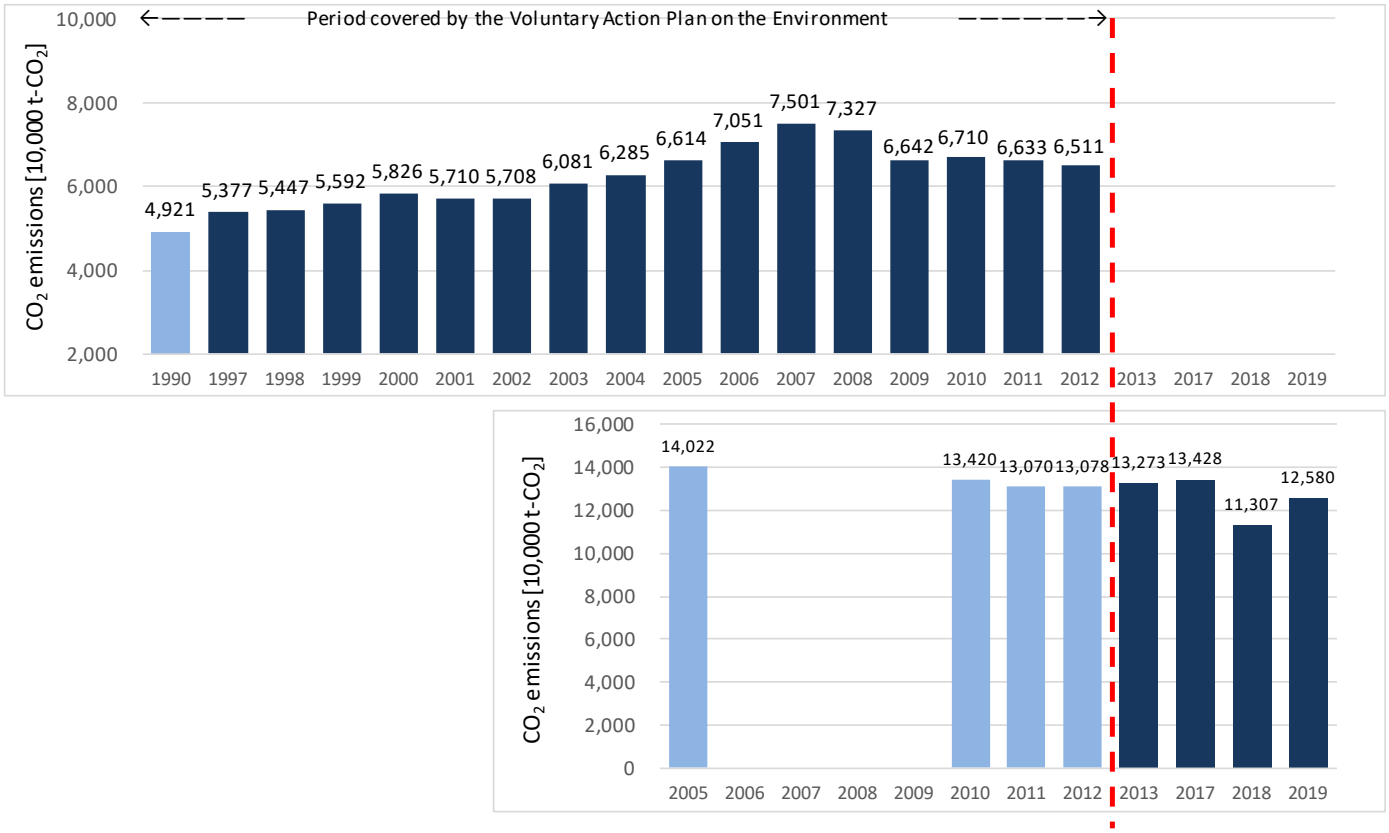
Introduction of energy-saving high-efficiency facilities	
・ High-efficiency wireless base station equipment ・ Connection of ICT devices and IP devices to DC power sources ・ High-efficiency HVAC systems ・ High energy efficiency power sources ・ High-efficiency transformers ・ LED lighting	・ Low emission vehicles ・ Enhanced heat insulation (exterior air barriers, high performance insulating window glass, sun-shielding films) ・ Tenant building renovation ・ Construction of business locations meeting ZEB Ready standards ・ Replacing corporate vehicles with HV
Improvement of operations	
・ BEMS (Building Energy Management System) ・ Promotion of remote work ・ Moving corporate headquarters to energy-saving buildings, consolidation and reduction of office space	・ Energy-saving operation of lighting and HVAC equipment ・ Acquisition and operation of environmental management system ・ Improved work management
Fuel conversion	
・ Solar and wind power generation	

⑤Transportation sector

CO_2 emission trends

In fiscal 2019, the 12 participating industries of the transportation sector collectively emitted 125.80 million t-CO_2 of CO_2 (after electric power distribution) (13.8% below fiscal 2005 levels, 5.2% below fiscal 2013 levels and 11.3% above previous year levels), increasing on a year over year basis (Figure 8).

Figure 8. CO_2 emissions in the transportation sector (after electric power distribution, final count)



NOTES:

- The period before and including fiscal 2012 was covered by the Keidanren Voluntary Action Plan on the Environment, and was succeeded by Keidanren's Commitment to a Low Carbon Society, which has covered the period from fiscal 2013. The figures for fiscal 2005-2012 under Keidanren's Commitment to a Low Carbon Society are provided for reference. Figures for fiscal 2005 do not include data for the Association of Japanese Private Railways and the East Japan Railway Company. Values differ greatly between figures under the Keidanren Voluntary Action Plan on the Environment and those under the Keidanren's Commitment to a Low Carbon Society mainly due to increased number of participating industries reporting CO_2 emissions.
- With the implementation of Keidanren's Commitment to a Low Carbon Society, calculation methods were renewed for emission coefficients for electric power (from generation-end emission coefficients to receiving-end emission coefficients) and for some industrial boundaries.
- Emissions from flights and shipping to and from overseas destinations are included for the Japanese Shipowners' Association and a part of the Scheduled Airlines Association of Japan

Factor analysis

An analysis of the causes that led to changes in CO_2 emissions (after electric power distribution) in the transportation sector in fiscal 2019 (Figure 9) revealed that while CO_2 emissions increased due to "① change in economic activity" and "③ change in energy consumed per unit of economic activity" increased on a year over year basis (+8.8% and +2.7%, respectively), whereas CO_2 emissions due to "② change in CO_2 emission factor" decreased slightly (-0.2%), amounting to an overall increase in CO_2 emissions (+11.3%). CO_2 emission reductions due to "② change in CO_2 emission factor" is small compared to other sectors because the transportation sector comprises mainly industries that use fuels other than electric power.

Relative to fiscal 2013, CO_2 emissions due to "① change in economic activity" decreased (-7.8%) while CO_2 emissions due to "③ change in energy consumed per unit of economic activity" increased (+3.8%), amounting to an overall decrease in CO_2 emissions (-5.2%).

Relative to fiscal 2005, CO_2 emissions increased due to "② change in CO2 emission factor" increased (+1.9%) but CO_2 emissions decreased due to "③ change in energy consumed per unit of economic activity" decreased (-16.0%), and as a result overall CO_2 emissions were reduced (-13.8%).

Compared to the previous fiscal year, CO_2 emissions increased due to "① change in economic activity" and "③ change in energy consumed per unit of economic activity" increased on a year over year basis (+8.8% and +2.7%, respectively). An expansion of the economic activities covered by the follow-up survey in the overseas shipping industry affected "① change in economic activity"[6]. Increased CO_2 emissions due to "③ change in energy consumed per unit of economic activity" can be mainly attributed to continued flight operations in the aviation industry despite the drop in paid ton-kilometers[7] (volume of production activity) affected by economic fluctuations and US-China trade frictions, as well as aggravated transport efficiency due to reduced maritime freight movement and thus reduced ship load factors against the backdrop of global economic stagnation.

For reference, an analysis of factors of change from the previous fiscal year, excluding the overseas shipping industry, revealed that while CO_2 emissions due to "① change in economic activity" increased (+0.6%), CO_2 emissions due to "② change in

[6] In the overseas shipping industry, the fiscal 2019 follow-up excluded container ships, thus reducing emission in the transportation sector. Container ships were once again included in the fiscal 2020 follow-up, thus increasing emissions.

[7] Aircraft payload (cargo and passengers) multiplied by flight distance. This index is used in the aviation industry to indicate volumes of production activity.

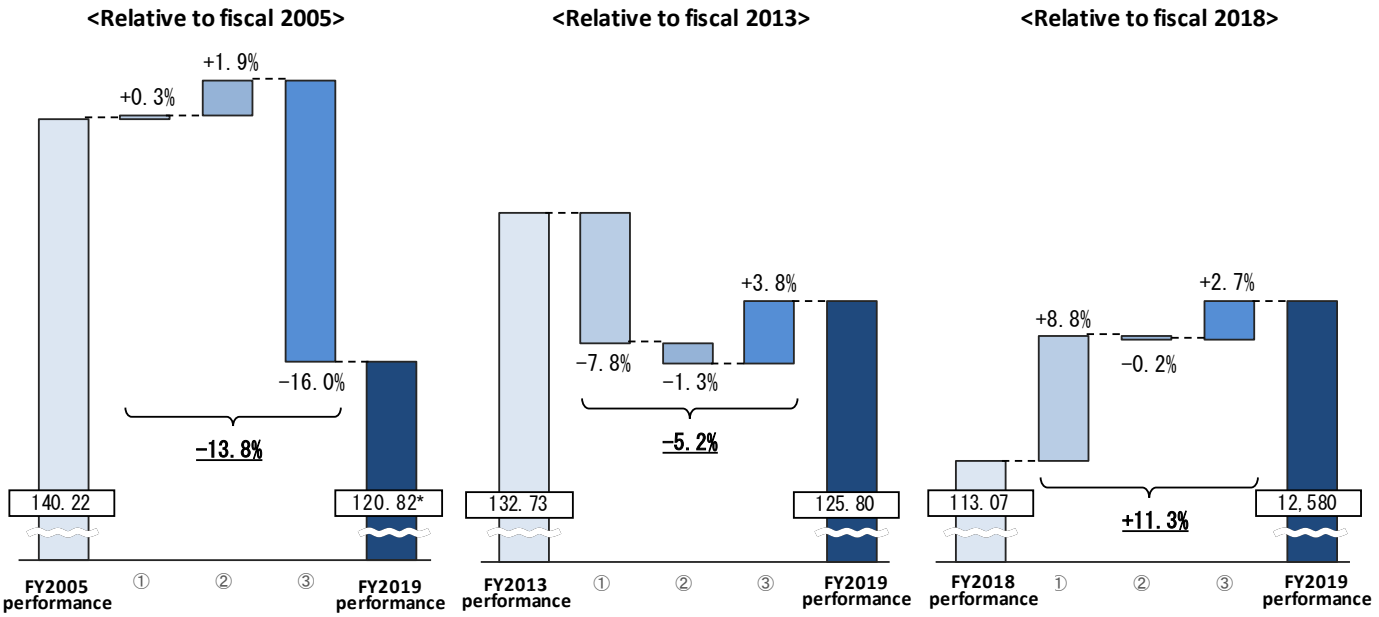
CO2 emission factor" and "③ change in energy consumed per unit of economic activity" decreased (-0.3% and -0.6%, respectively), reducing overall CO_2 emissions (-0.3%). Therefore, it is clear that factors contributing to the change in CO_2 emissions were greatly affected by the expansion of emission sources in the overseas shipping industry covered by the follow-up.

Furthermore, relative to fiscal 2013, excluding the overseas shipping industry, CO_2 emissions due to "① change in economic activity" increased (+7.0%), whereas CO_2 emissions due to "② change in CO2 emission factor" and "③ change in energy consumed per unit of economic activity" decreased (-2.0% and -1.3%, respectively). The deployment and updating of energy-efficient ships, aircrafts, cargo vehicles, and rolling stock, as well as continued efficient operations and driving leading to energy savings greatly affected CO_2 emissions due to "③ change in energy consumed per unit of economic activity."

Figure 9. Factors of change in CO_2 emissions (after electric power distribution, final count)

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

(Mt−CO_2)



NOTE: FIGURES HAVE BEEN ROUNDED OFF; AND THEREFORE, THE SUM OF ①, ② AND ③ MAY DIFFER FROM THE RATE OF REDUCTION RELATIVE TO A FISCAL YEAR.

* FIGURES FOR FISCAL 2005 DO NOT INCLUDE DATA FOR THE ASSOCIATION OF JAPANESE PRIVATE RAILWAYS COMPANY AND THE EAST JAPAN RAILWAY COMPANY.

Major efforts made in fiscal 2019

A major measure taken by the transportation sector is the introduction and operation of high-efficiency vessels, vehicles, aircrafts, and railroad rolling stock promoted in each industry (Table 4).

The overseas shipping industry is engaged in emission reductions in terms of both facilities and operations, including the adoption of high combustion efficiency engines and low frictional resistance design when building new vessels, and utilizing navigation support systems and conducting slow navigation on flights. The domestic shipping industry also contributed to CO_2 emission reductions by making energy saving improvements to the vessel and equipment when scrapping and rebuilding older ships.

The trucking industry has reduced CO_2 emissions by offering subsidies for the adoption of environment-friendly vehicles, such as CNG and hybrid vehicles, and for the installation of devices, such as air heaters and battery powered air conditioning devices

to support efforts to refrain from vehicle idling

Furthermore, the railway industry is installing LED lights and high-efficiency large-scale HVAC systems on platforms, concourses and rolling stock centers, as well as introducing energy-efficient rolling stocks with regeneration brakes that recover electric power from kinetic energy when decelerating and VVVF inverters that reduce electric power loss.

Table 4. Major efforts made in the transportation sector in fiscal 2019

Introduction and operation of high-efficiency international and domestic vessels	
・ Low frictional resistance design, coating and devices ・ High combustion efficiency engines ・ Effective use of waste heat ・ Cleansing vessels, coating, propeller polishing ・ Improvements in combustion efficiency of main engines	・ Turning off pumps not in use when in harbor ・ Utilization of weather routing and navigating systems ・ Slow navigation ・ Optimization of fuel oil and ballast water
Introduction and operation of high-efficiency trucks	
・ CNG vehicles, hybrid vehicles	・ Devices to support efforts to refrain from vehicle idling
Introduction and operation of high-efficiency aircrafts	
・ New aircraft models with high fuel-efficiency	
Introduction and operation of high-efficiency rolling stock	
・ Energy-efficient rolling stock with regeneration brakes and VVVF inverters ・ Large high-efficiency HVAC facilities	・ Renewal of interior lighting, station platform and concourse lighting to LED

(2) Probability of achieving 2020 target and rate of progress

A survey on the rate of progress made and the probability of successfully achieving Phase I (fiscal 2020) targets (Table 5) revealed that 45 industries of the 62 participating industries find that they will be able to meet their targets.

In view of the progress made to date, 47 industries had already achieved their targets in fiscal 2019. These industries have achieved their targets before the target year not only by deploying energy-saving facilities and high-efficiency equipment but also by making various efforts, including pursuing higher efficiency in their operations through energy recovery, fuel conversion from heavy oil to natural gas and shifting to renewable energy.

Furthermore, industries that achieved their targets have renewed their targets. In the interim review in fiscal 2016, 7 industries renewed their targets, and in follow-ups after the interim review (fiscal 2017-2019), 8 more industries renewed their targets to higher levels. This fiscal year, no industries made revisions to their targets, but 2 industries are currently considering new targets. A number of industries are faced with higher energy intensity as a result of reduced production activity, with one industry reconsidering its assumptions, which had greatly deviated from the assumptions made when the original target was set (the range of production assumed for BAU).

On the other hand, with the target year of Phase I (fiscal 2020) approaching, 3 industries responded that they were “unlikely to achieve target” in the recent follow-up survey. Several other industries also demonstrated a small rate of progress toward achieving their targets.

Industries where the rate of progress dropped drastically from follow-up results of the previous year reported that they faced difficulties in achieving their energy intensity-based targets as energy-intensive high value-added products were expected to account for larger shares of future domestic production due to the increased offshoring of their customers and growing general-purpose product import, and energy efficiency would thus be lowered.

Industries which have already achieved their targets have also reported that with the economic slowdown, their energy intensity-based targets would be difficult to achieve, as while they expected decreased orders in fiscal 2020, a given amount of energy consumption is required regardless of production volumes. We must carefully observe how the impact of COVID-19 will affect whether or not targets can be achieved in 2020, when reduced production activities driven by the COVID-19 pandemic become

evident.

Industries that are unlikely to achieve their targets reported that they planned to review their targets to reflect the changes in the product mix that have occurred since the original targets were set up. These industries believe they will be able to achieve their updated targets.

Industries that have yet to achieve their targets will be required to account for their underachievement.

Many industries that have already achieved their targets did not renew their targets because with the target year nearing, there would be limited time to run the PDCA cycle and because they needed to assess the impacts of the COVID-19 pandemic. These industries continue their efforts to reduce emissions in the medium to long term without weakening their reduction efforts and by reviewing and looking into the details of their 2030 target.

Table 5. Probability of Phase I (fiscal 2020) target achievement and rate of progress in fiscal 2019

Believes target can be achieved	Industrial	★Japan Aluminium Association	(108%)	Brewers Association of Japan	(231%)
		★Japan Federation of Printing Industries	(101%)	Japan Mining Industry Association	(164%)
		☆Limestone Association of Japan	(186%)	Japan Lime Association	(147%)
		☆Japan Petroleum Development Association	(92%)	Japan Industrial Vehicles Association	(122%)
		★Japanese Electric Wire & Cable Makers' Association	(121%)	Japan Rubber Manufacturers Association	(120%)
			(120%)	Japan Soft Drink Association	(120%)
		★Japan Sanitary Equipment Industry Association	(426%)	Japan Bearing Industrial Association	(114%)
		Japan Cement Association	(391%)	Japan Auto Parts Industries Association	(106%)
		Shipbuilders' Association of Japan & Cooperative Association of Japan Shipbuilders (top: hour-based; bottom: ton-based)	(309%)	Japan Federation of Construction Contractors	(101%)
		Japan Chemical Industry Association	(307%)	Federation of Pharmaceutical Manufacturers' Associations of Japan	(93%)
		Liaison Group of Japanese Electrical and Electronics Industries for Global Warming	(300%)	Japan Federation of Housing Organizations	-
		Japan Paper Association	(274%)		
	Energy Conversion	☆The Japan Gas Association	(102%)	Electric Power Council for a Low Carbon Society	(133%)
	Commercial	☆Telecommunications Carriers Association	(95%)	Life Insurance Association of Japan	(218%)
		★Japan Foreign Trade Council	(195%)	Japan Hotel Association	(162%)
		Telecom Services Association	(727%)	Japan LP Gas Association	(149%)
		Japan Securities Dealers Association	(344%)	Real Estate Companies Association of Japan	(122%)
		Japan Department Stores Association	(278%)		
		Japan Bankers Association	(278%)	Japan Association of Refrigerated Warehouses	(110%)
		General Insurance Association of Japan	(259%)	Japan Building Owners and Managers Association	(107%)
				Japan Chain Stores Association	(105%)
	Transportation	＊Japanese Shipowners' Association	(154%)	Association of Japanese Private Railways	(100%)
		Shikoku Railway Company	(121%)	All Japan Freight Forwarders Association	(91%)
		East Japan Railway Company	(116%)	Scheduled Airlines Association of Japan	(84%)
Making maximum efforts to achieve target	Industrial	☆Japan Automobile Manufacturers Association/ Japan Auto-Body Industries Association	(117%)	Japan Machine Tool Builders' Association	(331%)
		★Flat Glass Manufacturers Association of Japan	(67%)	Japan Association of Rolling Stock Industries	(106%)
	Energy Conversion	Petroleum Association of Japan	(130%)		
	Commercial	★Japan Franchise Association	(154%)		
	Transportation	Japan Federation of Coastal Shipping Associations	(59%)	Japan Trucking Association	(30%)
Unlikely to achieve target		☆＊Japan Dairy Industry Association	(-52%)	Flour Millers Association	-
		★Japan Copper and Brass Association	(-118%)		

☆: INDUSTRIES THAT RENEWED THEIR TARGETS IN THE FISCAL 2016 INTERIM REVIEW

★: INDUSTRIES THAT RENEWED THEIR TARGETS AFTER THE INTERIM REVIEW (FISCAL 2017, 2018, 2019)

＊: INDUSTRIES THAT INTEND TO RENEW THEIR TARGETS (INCLUDING WHETHER OR NOT THERE IS A NEED TO RENEW THEIR TARGETS)

*For industries that have renewed targets, the rate of progress against new targets are provided.

*The Japan Iron and Steel Federation (rate of progress: 110%) has reported that it is difficult to evaluate the probability of target achievement. (Affected by COVID-19, production levels in fiscal 2020 were significantly low and operations were intermittent with some major shutdowns of blast furnaces, thus causing a substantial deviation from the range of production volume and operational environment assumed when determining the BAU currently used; and therefore, it has become inappropriate to evaluate the rate of progress made toward targets relevant to BAU.

- 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(%)
- The table does not include West Japan Railway Company, Central Japan Railway Company, Kyushu Railway Company and Japan Freight Railway Company.

(3) Status of reviewing 2030 target and rate of progress

Participating industries continue to pursue the targets they have individually set up for Phase II (fiscal 2030).

In terms of rate of progress, 26 industries have already achieved their Phase II (fiscal 2030) targets. Most industries that have achieved their goals have renewed their targets to higher levels. In addition to the 22 industries that renewed their targets in the previous fiscal year or earlier, 2 industries renewed their targets in the fiscal 2020 follow-up and 5 industries reported that they were in the process of considering new targets (Table 6).

Industries that have overachieved their goals but have nevertheless kept their original targets with no plans for reconsideration reported that they were vulnerable to market conditions and found it difficult to make forecasts through 2030 and that they were still uncertain about how production activities and energy consumption would be impacted in the context of the new lifestyles emerging amid increased teleworking and working practice reform induced by COVID-19.

In order to ensure that the Commitment is effective, there is a need to continue to pursue the PDCA cycle to implement effective measures and improvements, and conduct analysis and demonstrate accountability.

Table 6. Status of review of Phase II (fiscal 2030) targets and rate of progress in fiscal 2019

※Industries with renewed targets	Industrial	◎ Brewers Association of Japan	(75%)	★ Limestone Association of Japan	(139%)
		◎ Liaison Group of Japanese Electrical and Electronics Industries for Global Warming	(70%)	★ Japan Machine Tool Builders' Association	(136%)
				★ Japan Cement Association	(133%)
		☆ Japan Automobile Manufacturers Association / Japan Auto-Bodies Industries Association	(109%)	★ The Japan Society of Industrial Machinery Manufacturers	(120%)
		☆ Flour Millers Association	(75%)	★ Japan Industrial Vehicles Association	(112%)
		☆ Japan Petroleum Development Association	(55%)	★ Japan Sanitary Equipment Industry Association	(109%)
				★ Japanese Electric Wire & Cable Makers' Association	(107%)
				★ Japan Mining Industry Association	(95%)
				★ Japan Aluminium Association	(90%)
				★ Japan Paper Association	(82%)
				★ Japan Federation of Printing Industries	(77%)
				★ Federation of Pharmaceutical Manufacturers' Associations of Japan	(66%)
				★ Flat Glass Manufacturers Association of Japan	(53%)
				★ Japan Chemical Industry Association	(49%)
				(top: BAU; bottom: absolute amount)	(88%)
				★ Japan Copper and Brass Association	(-79%)
	Energy conversion	☆ The Japan Gas Association	(103%)		
	Commercial	☆ Telecommunications Carriers Association	(48%)	★ Japan Foreign Trade Council	(84%)
				★ Japan Franchise Association	(67%)
Considering renewal of target	Industrial	The Japan Iron and Steel Federation	(37%)	Japan Rubber Manufacturers Association	(86%)
		Japan Dairy Industry Association	(108%)		
	Commercial	Telecom Services Association	(363%)		
	Transportation	Japanese Shipowners' Association	(103%)		

☆: INDUSTRIES THAT RENEWED THEIR TARGETS IN THE FISCAL 2016 INTERIM REVIEW

★: INDUSTRIES THAT RENEWED THEIR TARGETS AFTER THE INTERIM REVIEW (FISCAL 2017, 2018, 2019)

◎: INDUSTRIES THAT RENEWED THEIR TARGETS IN THE FISCAL 2020 FOLLOW-UP

※FOR INDUSTRIES THAT HAVE RENEWED TARGETS, THE RATE OF PROGRESS AGAINST NEW TARGETS ARE PROVIDED. SOME INDUSTRIES PLAN TO VERIFY THE APPROPRIATENESS OF THEIR TARGETS BASED ON THE ACHIEVEMENT STATUS OF PHASE I (FISCAL 2020) TARGETS.

(4) Emissions reduction efforts made at corporate headquarters and other offices and in logistics

Industries in sectors other than the commercial sector have also taken measures such as deploying high-efficiency HVAC equipment and LED lighting, for energy conservation and reduction of carbon emissions. Industries developed their own electric power consumption targets for offices and continue to make efforts to be in line with the target. Industries reported contributing to CO_2 emission reductions as a result of working practice reform, including promoting teleworking, improving operational efficiency, and converting to a paperless office, which led to less electric power consumption in the office and reduced waste incineration. As in the previous follow-up, some industries reported that they had introduced rooftop solar power generation at their business establishment or utilized waste heat by installing a cogeneration system.

In logistics, various measures are being taken not only in the transportation sector but also in other sectors. Industries reported the promotion of a modal shift, employing larger vehicles and ships and streamlining logistics through joint delivery of products with other companies, utilizing IT in shipping and delivery, proactive introduction of fuel-efficient vehicles (electric vehicles, electric forklifts, hybrid vehicle, fuel cell vehicles) and fuel conversion.

These efforts have contributed to reducing CO_2 emissions from corporate headquarters and other offices, as well as from logistics in many industries.

(5) Status of carbon credit utilization

A survey on the use of carbon credits revealed that no industry had utilized credits to meet industry-specific targets, but that some industries were considering the utilization of credits in the next fiscal year or further in the future if they encountered difficulties in achieving Phase I (fiscal 2020) targets.

On the other hand, some individual companies reported that they had acquired credits under J-CREDIT and JCM or had purchased Green Certificates, Green Heat Certificates, or non-fossil certificates.

(6) Status of deployment of renewable energy[8], energy recovery and utilization

①Renewable energy

Industries and companies are deploying renewable energy in order to achieve a

[8] "Renewable energy" is defined in this section as: photovoltaic power, wind power, hydropower,

low carbon society.

Acknowledging that renewable energy which is non-fossil-fuel source can contribute to decarbonization, Keidanren calls for the creation of an appropriate business environment that fulfills three requirements, namely, lower costs, stable supply, and sustainable business, with a view to turning renewables into a major electricity source, in the April 2019 proposal "Rebuilding Japan's Electricity System"[9]. Furthermore, some electric power users seeking to improve the environmental soundness of their business operations, including joining international initiatives on climate change countermeasures[10], have embarked on deploying and developing renewable energy, thus reducing carbon emissions from the energy that they use.

In fiscal 2019, total renewable electric power at transmission and receiving end (including FIT-certified electric power sources) amounted to 149.1 billion kWh, accounting for approximately 18% of total electric power at transmission and receiving end. Around half of this amount was generated by the electric power industry, with 96% hydropower, 2.4% geothermal power, 1.3% biomass, 0.4% solar power and 0.2% wind power.

Many industries other than the electric power industry are engaged in generating electric power from renewable energy, including mainly solar power, hydropower and biomass, but also geothermal energy, for self-use.

The pulp and paper industry has reduced the share of fossil fuels in its energy structure from 58.6% in fiscal 2005 to 45.7% in fiscal 2019, increasing the ratio of renewable energy, mainly biomass, from 37.2% to 43.4%, as a result of energy conversion efforts.

In the cement industry, some factories use wood biomass as an alternative to fossil fuels at their onsite power generation facilities, seeking to improve their energy intensity.

The rubber industry reported domestic cases of plants operating on 100% renewable electric power (RE100 plants).

In order to turn renewables into a major electricity source, it is also important to make efforts for the development and practical application of technologies. Participating industries promote the massive deployment of renewable energy and technology development for efficient energy use through developing technologies to lower the

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geothermal power, solar heat, atmospheric heat and other heat and biomass found in nature (Source: Act on Sophisticated Methods of Energy Supply Structures and Ordinance (Cabinet Order 222 of 2009))

[9] Keidanren "Rebuilding Japan's Electricity System -Electricity Policy to Realize Society 5.0" (April 2019) http://www.keidanren.or.jp/en/policy/2019/031.html

[10] For example, CDP (formerly, Carbon Disclosure Project), RE100, and SBT (Science Based Targets)

generation cost of highly efficient and highly reliable solar power generation and demonstrating energy management systems utilizing solar power and storage batteries; implementing demonstration projects for floating offshore wind power generation systems and conducting research and development on submarine direct current transmission systems; and building a business model for a hydrogen system using renewable energy and conducting research and development for a major demonstration project.

②Energy recovery and utilization

Industries are also making efforts to reduce fuel consumption by recovering and utilizing waste heat and by-product gases that are generated during manufacturing or fuel use (Table 7).

The iron and steel industry supplies steam extracted from a power generation plant owned by a manufacturer to a brewing company as a heat source, thus reducing energy use by 30% compared with the brewery individually using a separate boiler.

In the cement industry, waste heat power generation accounted for 11.4% of electric power consumption in fiscal 2019, thus contributing greatly to CO_2 emission reduction.

Furthermore, the gas industry reported using waste heat from neighboring waste treatment plants and power generation plants and other industries reported introducing binary cycle power generation utilizing heat recovered from steam.

Table 7. Examples of renewable energy and energy recovery and utilization

Renewable energy	
・ Installation of solar power generation systems in factories, warehouses, offices etc. ・ Biomass power generation (wood biomass, black liquor, wood refuse), geothermal power generation ・ Hydropower generation and wind power generation at corporate establishments	・ Purchasing renewable electric power ・ Promoting the massive deployment of renewable energy (various research and technology development, demonstration) ・ Development of technologies for efficient energy use
Energy recovery and utilization	
・ Power generation using waste heat, byproduct gases, recovered steam, etc. ・ Binary cycle power generation ・ Use of waste as an alternative energy source	・ Utilization of waste heat from boilers as a heat source for HVAC ・ Use of waste heat from waste treatment plants and power generation plants ・ Steam and hot water recovery from waste heat in a cogeneration system

(7) Coverage of current survey against total domestic emissions[11]

The coverage ratio of CO_2 emissions in fiscal 2019, calculated for each sector in the current follow-up survey against total domestic sectoral CO_2 emissions in fiscal 2019 (preliminary figures) was 81% for the industrial sector, 88% for the energy conversion sector (before electric power distribution), 8% for the commercial sector, and 31% for the transportation sector. The industrial and energy conversion sectors have maintained a relatively high level of coverage.

[11] It should be noted that the figures in National Institute for Environmental Studies "Fiscal 2019 GHG Emissions Data of Japan (preliminary figures)," the source of total domestic emissions by sector in fiscal 2019 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. Coverage for the transportation sector was calculated based on domestic CO_2 emissions excluding overseas departures and arrivals.

Pillar 2: Strengthening cooperation with other interested groups

In order to achieve society-wide CO_2 emission reductions, it is important that CO_2 emissions are reduced not only from individual corporate business operations but also through collaborative efforts with various actors, including consumers, customer companies, employees, local residents, central and local governments and educational institutions. Participating industries contribute to society-wide CO_2 emission reductions across the entire product and service life cycle by developing and providing low carbon energy-saving products and services. Furthermore, various industries have come to supply renewable energy.

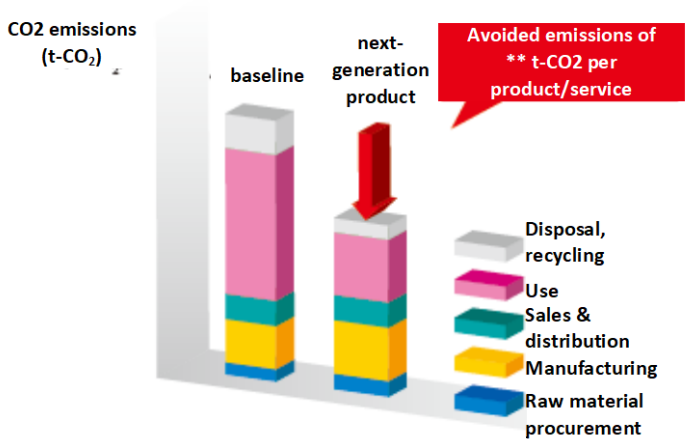
Furthermore, the business community reaches out to the residential sector, the users of products and services, and to public campaigns by providing information on environmental performance and burden, offering consulting services on energy saving, and promoting eco-drive campaigns in order to raise public awareness and knowledge of global warming prevention and fostering public campaigns.

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

Focusing on CO_2 emissions from product and service life cycles, it is important to reduce total emissions, including not only those from product manufacturing and provision, but also those from procuring raw materials and distribution, using products and disposal and recycling.

For example, even if a high-performance energy efficient product emits more CO_2 than conventional products during manufacturing due to the increased complexity of the manufacturing process, substantial reductions of CO_2 emissions from the high-performance product itself can reduce overall CO_2 emissions in terms of the entire product life cycle. Furthermore, if the product can be recycled after use, we can reduce the input of new resources, and thus contribute to reducing CO_2 emissions (Figure 10).

Figure 10. Life cycle CO_2 emission reductions



SOURCE: COMPILED BASED ON KEIDANREN "CONTRIBUTING TO AVOIDED EMISSIONS THROUGH THE GLOBAL VALUE CHAIN - A NEW APPROACH TO CLIMATE CHANGE MEASURES BY PRIVATE ACTORS -."

Such reductions are possible in services, as well as products. For example, the utilization of ICT service solutions allows people to work from home or remotely on the go, enabling flexible workstyles that are not constrained by time or location. This has contributed to society-wide emission reductions, including reduced use of electric power during work or reduced travels, in addition to increased work efficiency.

Participating industries have quantified their actual and expected emission reductions[12]. For example, the electrical and electronics industry has formulated a methodology for calculating avoided CO_2 emissions resulting from improved efficiency and replacement with low carbon technologies in the areas of power generation, household appliances, industrial equipment, and IT products and solutions. Avoided emissions in these areas both in Japan and overseas were collectively calculated to be 20.58 million t-CO_2 in fiscal 2019 alone, and a total of 377.21 million t-CO_2 based on the number of years that each product is assumed to be in use or operation. The iron and steel industry has compiled calculations of CO_2 emissions avoided in the product use stage when conventional steel is replaced with high-function steel. Total avoided CO_2 emissions in Japan and overseas attributable to representative high-function steel[13] manufactured during fiscal 1990 through fiscal 2019 were calculated to be 31.94 million t-CO_2 in fiscal 2019. The chemical industry estimates avoided CO_2 emissions attributable

[12] Focusing on emission reductions along entire value chains, Keidanren published "Contributing to Avoided Emissions through the Global Value Chain - A New Approach to Climate Change Measures by Private Actors -."to raise awareness of efforts made by industries and companies. http://www.keidanren.or.jp/en/policy/2018/102.html

[13] High tensile strength steel for automobiles, high tensile strength steel for ships, steel pipes for boilers, grain-oriented electrical steel sheets, stainless steel sheets

to residential thermal insulation material that increase the airtightness and thermal insulation properties of a home to be 75.80 million t-CO_2. Furthermore, the electric power industry is engaged in efforts to achieve the Government's goal of "introducing smart meters in all households and factories in the early 2020s" from the viewpoint of efficiency improvements in electric power use, as well as peak power control in households and factories. Many industries other than the electric power industry have become increasingly engaged in domestic sales of renewable electric power generated under the FIT scheme, in addition to increasing self-consumption of electric power generated from renewable energy, mainly solar power, hydropower and biomass.

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

Achieving the fiscal 2030 target of reducing greenhouse gas emissions by 40% will, of course, require the wise use of the aforementioned products and services on the part of users, but it is also important for citizens to reflect upon their consciousness, actions and decisions, and change their lifestyles.

Participating industries and companies encourage employees and their families to promote environmental household account books, "eco-driving," and the "No My Car" campaign (discouraging the use of private passenger cars), collaborate with communities, local governments and educational institutions and engage in public relations and educational activities. Furthermore, some industries reported that they participated in the "COOL CHOICE" campaign or implemented environmental awareness-raising campaigns (Table 8).

Table 8. Examples of efforts leading to emission reductions in the residential sector

Promotion among employees and their families	
・Implementation of environmental household account books ・Introduction of e-learning, hosting in-house seminars ・ "Jisa Biz (staggered working hours)" and off-peak commuting	・Air conditioning temperature control, turning off unnecessary lights ・In-house "eco-point" program ・Eco-drive
Collaboration with local communities and governments and educational institutions	
・Supporting local elementary, junior high and high schools in environmental education (welcoming site visits to factories)	・Participation in local government-led "eco-challenge" activities
Participation in public campaigns	
・Participation in "COOL CHOICE," "Lights Down Campaign," "Fun to Share," "Eco-action 21" ・Implementation of "Cool Biz" and "Warm Biz" campaigns	・Promotion of intermodal transportation (park & ride, rail & rental car) ・Purchasing environment-friendly products (green procurement)

(3) Fostering and conserving forest sinks

Dealing with global warming also calls for measures to foster and conserve forest sinks. In the fiscal 2019 follow-up, industries reported on their involvement in forest and Satoyama (village forest) conservation activities and tree-planting activities in areas close to business locations and on private land.

In addition to these activities, from the perspective of buyers of a product, green procurement (purchase) standards have been established; and therefore, by purchasing products that meet the provisions of the Act on Promoting Green Procurement or products bearing environmental labels ("ecomark", etc.), the business community contributes to the appropriate use of forest sinks.

More industries have become engaged in forest sink conservation and fostering activities through their business operations. For example, the flat glass industry has requested wooden packaging suppliers to acquire FSC (Forest Stewardship Council) CoC (Chain of Custody) certification to confirm the use of FCS-certified raw materials across the entire supply chain. The dairy and hotel industries have also adopted raw materials certified under various certification schemes, including those of FSC, PEFC, the Rainforest Alliance, and RSPO.

Pillar 3: Promoting contribution at the international level

Needless to say, global warming countermeasures call for domestic greenhouse gas emission reductions. Given increased CO_2 emissions expected as a result of increased energy use especially in emerging and developing economies, the Japanese business community needs to promote emission reductions on a global scale.

Since product and service value chains are spread across the world, it is important to take emission reduction measures that consider global value chains from upstream (raw material procurement) to downstream (use, disposal and recycling)[14].

In the fiscal 2020 follow-up, industries reported that they were contributing to emission reductions on a global scale by reducing CO_2 emissions through the introduction of low carbon energy-saving products, such as electric vehicles, and by providing and transferring Japan's excellent low-carbon, decarbonization, and energy-saving technologies through promoting low carbon energy-saving electric power generation projects that utilize technologies and knowhow fostered in domestic business operations, electric power generation from renewable energy, and energy recovery (Table 9).

Mostly in the electric power and gas industries and in the trade industry, there were many reports of companies taking part in electric power generation projects using renewable energy in various parts of the world. There is increased activity in providing financial support to such undertakings; and therefore, the number of banks engaged in lending and project financing for overseas renewable energy development projects nearly doubled from the previous fiscal year.

The rubber industry reported success in powering four plants in Spain with 100% renewable electricity (RE100 plants). The industrial vehicle industry reported a case of achieving zero CO_2 emissions at a European factory by switching to local biomass and steam, replacing LPG with biomass, and promoting energy savings in daily operations, in addition to powering the factory with 100% renewable electricity.

The industrial machinery industry reported the use of grants from a public interest incorporated foundation to promote projects for power generation utilizing used tires in Indonesia and the introduction of a waste-to-energy plant using municipal solid wastes in Vietnam.

The iron and steel industry reported the hosting of a meeting on energy conservation and environmental technologies among experts from Japan and China,

[14] The Government's Long-term Strategy also includes the approach of avoided emissions through the global value chain (GVC).

conducting ISO14404 (international standard specifying calculation methods of carbon dioxide emission intensity from iron and steel production)-based energy saving diagnosis at steel plants in India, and hosting a workshop for ASEAN countries to introduce how to use ISO14404 and energy-saving technologies.

Some of these efforts include quantifying avoided CO_2 emissions, as done in estimating reductions under “Pillar 2: Strengthening cooperation with other interested groups.” Reductions are expected to increase across the entire global value chain as companies visualize the advantages of their products and services by quantifying avoided emissions, thus accelerating the transfer of low-carbon energy-saving technologies.

Some issues, including determining a baseline for calculation and how to calculate reductions overlapping among industries when a target product covers several industries or companies. With an aim to solve these issues and to improve the transparency of the basis for calculation and approach taken, the Ministry of Economics, Trade and Industry published the “Guidelines for Quantifying GHG emission reductions of goods or services through Global Value Chain” (March 2018) to be referred to when explaining calculations to other parties.

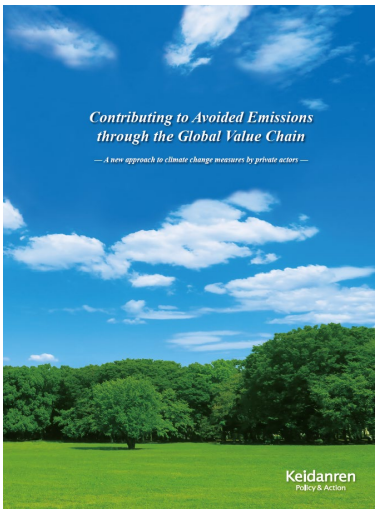
Participating industries have also played a leading role in international system design. For example, the electrical and electronics industry proposed a quantification method for life cycle emissions and avoided emissions at IEC (International Electrotechnical Commission) and assumed a coordinating role. The Telecommunications Carriers Association has lead the international standardization of the methodology for environmental impact assessment of information and communication technologies at the ITU-T (International Telecommunication Union Telecommunication Standardization Sector). Such efforts help globally spread the concept of quantifying avoided emissions and leads to the proper evaluation of the efforts made by Japan’s business community.

Keidanren has revised the concept book “Contributing to Avoided Emissions through the Global Value Chain - A New Approach to Climate Change Measures by Private Actors -” published in fiscal 2018 to encourage emission reductions across the global value chain (Figure 11). While this is not equivalent to the PDCA cycle under the Commitment, it serves to promote the deployment of low carbon energy-saving technologies by sharing concepts and case studies with various stakeholders.

Table 9. Examples of overseas contribution to avoided emissions

Avoiding emissions through overseas transfer of Japanese technologies and knowhow
・ Caustic soda production technologies using ion-exchange membrane, Non-phosgene polycarbonate production process, synthetic rubber for eco tire (Japan Chemical Industry Association) ・ Hydropower generation at corporate mines (Japan Mining Industry Association) ・ Aluminum recycling (Japan Aluminium Association) ・ Electric power generation technologies utilizing waste heat (Flat Glass Manufacturers Association of Japan) ・ CO_2 recovery from coal-fired thermal power plants and EOR (Japan Petroleum Development Association) ・ Solar, wind, geothermal and hydro power generation projects (Electric Power Council for a Low Carbon Society) ・ Solar and wind power generation projects (The Japan Gas Association) ・ IPP (independent power producer) business using renewable energy (Japan Foreign Trade Council) ・ Lending and project financing for renewable energy development projects (Japan Bankers Association) ・ RE100 plant (Japan Rubber Manufacturers Association) ・ Zero CO_2 emission plant (Japan Industrial Vehicles Association) ・ Power generation utilizing used tires, waste-to-energy plant using municipal solid wastes (Japan Society of Industrial Machinery Manufacturers)
Avoiding emissions through overseas diffusion of Japan's advanced low-carbon products and services
・ Cooperation in energy-saving and environmental fields, including transferring and deploying energy-saving technologies (The Japan Iron and Steel Foundation) ・ Lightweight paper (Japan Paper Association) ・ High efficiency thermal power generation and renewable power generation technologies, IT products, solutions (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention) ・ Next-generation vehicles (Japan Automobile Manufacturers Association) ・ Energy-saving ships (Shipbuilders' Association of Japan & Cooperative Association of Japan Shipbuilders) ・ Permanent magnet synchronous motors (PMSM) for railway vehicles (Japan Association of Rolling Stock Industries)

Figure 11. Concept book: "Contributing to Avoided Emissions through the Global Value Chain - A New Approach to Climate Change Measures by Private Actors -"



Full text can be found on the Keidanren website:

http://www.keidanren.or.jp/en/policy/vape/gvc2018.pdf

Pillar 4: Development of innovative technologies

As set out in the concept of "realizing 'a virtuous cycle of environment and growth' towards the vision with business-led disruptive innovation" under the Long-term Strategy, substantial greenhouse gas emission reductions in the medium to long-term cannot be achieved along the lines of conventional practices but require the creation of completely new innovations. Participating industries are developing innovative technologies that will lead to substantial greenhouse gas emission reductions, with a view to their practical use and wide deployment (Figure 11).

Creating new innovations require research and development over the medium to long term, and it is thus often difficult for private companies to make commitments. Collaboration with various actors, including the government and research institutions, is important in carrying out such research and development; and therefore, many industries promote projects led by NEDO (New Energy and Industrial Technology Development Organization).

The iron and steel industry is advancing as a first step in technology development for the commercial use of COURSE50, which aims to collectively reduce CO_2 emissions by approximately 30% by means of using hydrogen for iron ore reduction and CO_2 capture and storage, the development of basic technologies for scaling up COURSE50 at test facilities combining a test furnace with a chemical absorption facility. Other industries are engaged in the development of other technologies: the chemical industry is developing a manufacturing process for basic chemicals using carbon dioxide as raw material; the electrical and electronics industry is reducing costs in high-performance high-reliance solar power generation; the electric wire and cable industry is developing high-temperature superconductive cables; the Japan Petroleum Development Association is engaging in carbon capture and storage (CCS); the copper and brass industry is developing heteronano-structure super high strength copper alloys; the electric power industry is developing innovative low-carbon coal-powered thermal power generation technologies with an aim to achieve both high efficiency coal-powered power generation and significant reductions in CO_2 emissions by combining integrated coal gasification fuel cell hybrid power plants with CCS technologies; the gas industry is developing methanation technologies to form methane by electrolyzing steam and carbon dioxide; and the overseas shipping industry promotes the Wind Challenger Project. Industries are engaged in medium- to long-term development efforts in collaboration with the government to realize these goals.

Table 10. 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) ・Green chemistry technologies (The Federation of Pharmaceutical Manufacturers' Associations of Japan) ・High-efficiency printing machines (Japan Federation of Printing Industries) ・Fuel cell industrial vehicles (Japan Industrial Vehicles Association) ・Smart energy networks (The Japan Gas Association) ・5G (Telecommunications Carriers Association)
2020 and beyond	・Biofuels (Japan Paper Association) ・Net Zero Energy Houses (ZEH) (Japan Federation of Housing Organizations) ・Magnetostrictive torque sensors (Japan Bearing Industrial Association) ・Shipbuilding utilizing IoT (Shipbuilders' Association of Japan & Cooperative Association of Japan Shipbuilders) ・Designing Five-axis machining centers made from CFRP (carbon fiber reinforced plastics) (Japan Machine Tool Builders' Association) ・Fuel-cell hybrid railway cars (Japan Association of Rolling Stock Industries) ・High-efficiency petroleum refining technologies based on Petroleomics (Petroleum Association of Japan) ・LNG bunkering technologies (The Japan Gas Association) ・Digital coherent signal processor technologies, high-speed optical communication networks (Telecommunications Carriers Association) ・Alternative aviation fuels (Scheduled Airlines Association of Japan) ・Storage battery-powered railcars (East Japan Railway Company)
2030 and beyond	・COURSE50, ferro coke (The Japan Iron and Steel Federation) ・Manufacturing processes for carbon dioxide-based basic chemical, development of innovative catalytic processes for organosilicon functional materials, manufacturing processes of chemicals derived from inedible plants (Japan Chemical Industry Association)) ・Innovative cement production process (Japan Cement Association) ・Innovative heat exchange/heat control technologies (Japan Aluminium Association) ・High-temperature superconductive cables (The Japanese Electric Wire & Cable Makers' Association) ・Increasing the intensity of materials using heteronano structures (Japan Copper and Brass Association)

Controlling non-CO_2 greenhouse gas emissions

Global warming countermeasures involve emission reductions of not only CO_2, but also of other greenhouse gases[15].

HCFCs and HFCs, which bear high warming potential and thus impose a large impact on global warming, are used as refrigerants in freezers and HVAC equipment. The production and consumption of HCFCs have been controlled globally based on the Montreal Protocol on Substances that Deplete the Ozone Layer (hereinafter, "Montreal Protocol"), the amendment (Kigali Amendment) to which came into effect in January 2019, obligating signatory nations to reduce production and consumption volumes of HFCs. In accordance with the Amendment, domestic production and consumption of HFCs will be reduced in phases; and therefore, the development of green refrigerants, including refrigerants with low GWP (Global Warming Potential) and fluorocarbon-free refrigerants is essential.

Participating industries are endeavoring to improve the recovery rate of existing refrigerants upon disposal, as well as to develop technologies to reduce emissions and put new technologies into practical use (Table 12).

Many industries are taking measures to prevent leakage during inspections and implement scheduled updates of equipment based on the Fluorocarbons Emissions Control Act, which became effective in April 2020. The Japan Society of Industrial Machinery Manufacturers, and other industries, such as the beer, sanitary equipment, convenience store, and hotel industries, reported efforts to install fluorocarbon-free refrigerators and freezer in factories and stores.

[15] Methane (CH4), nitrous oxide (N20), sulfur hexafluoride (SF6), and fluorinated gases (HCFC, HFC, PFC, etc.)

Table 12. Major efforts to reduce non-CO_2 greenhouse gas emissions

- Replacement of fluorinated refrigerants used in refrigerators and freezers with fluorocarbon-free refrigerants (The Japan Society of Industrial Machinery Manufacturers, Japan Sanitary Equipment Industry Association, Japan Franchise Association, Japan Hotel Association)
- Promotion of HFC-free factories, deployment of low-GWP refrigerants (HFO refrigerants) (Brewers Association of Japan)
- Greenhouse gas emission reductions achieved by destroying fluorinated gases (Japan Cement Association)
- Prevention of leakage upon the installation, inspection, and repair of equipment, recovery and reuse (Japanese Electric Wire & Cable Makers' Association, Limestone Association of Japan, Flour Millers Association, Japan Sanitary Equipment Industry Association, Japan Association of Rolling Stock Industries, The Electric Power Council for a Low Carbon Society, Telecommunications Carriers Association, Japan Association of Refrigerated Warehouses, Japan LP Gas Association, Japan Hotel Association, Shikoku Railway Company)

Conclusion

The recent follow-up of the Keidanren Commitment to a Low Carbon Society ("Commitment") revealed that during the six years from fiscal 2013 through fiscal 2019, the four sectors had made steady progress in reducing emissions, collectively reducing CO_2 emissions by a total of approximately 10.7% (industrial sector: -10.9%; energy conversion sector: -14.1%[16]; commercial sector: -32.3%; transportation sector -5.2%) (Figure E).

With the year 2020, the target year of the Commitment's Phase I, approaching, the follow-up results of performance in fiscal 2019 herein indicated that many industries had already achieved their fiscal 2020 targets or were making firm progress toward achieving them. As of fiscal 2019, we could not observe any industries whose progress was significantly impacted by COVID-19, but many industries are unsure about how they will be affected by COVID-19 in fiscal 2020, and it is important that they continue their efforts toward achieving their targets. Continued efforts are also called for with a view to fiscal 2030 (Phase II) targets, in order to contribute to the achievement of Japan's medium-term (2030) target.

In order to achieve drastic greenhouse gas emission reductions on the global scale with a view to achieving a decarbonized society, or "Society 5.0 with Carbon Neutral," it is essential to mobilize wisdom from different countries to create disruptive innovations under the collective efforts of both public and private sectors, as well as to gain cooperation from the international society and to engage various actors in taking action.

Under these circumstances, the Japanese business community will continue through its efforts under the Commitment not only to reduce emissions from domestic business operations but also to collaborate with various actors to achieve carbon neutral on a global scale across the global value chain and accelerate activities to create innovation.

In addition, since October 2018, Keidanren has called on its member companies and organizations to formulate a "Long-term Vision" of global warming countermeasures. As of the end of February 2021, 129 companies and organizations have formulated and announced their long-term vision of global warming countermeasures. Furthermore, in June 2020, Keidanren launched a new initiative called "Challenge Zero[17]" joined by 181 companies and organizations that are taking proactive measures.

Through these efforts, Keidanren is determined to continue to fulfill its role in achieving a "virtuous cycle of environment and economy" by promoting proactive corporate efforts that look ahead to achieving "Society 5.0 with Carbon Neutral".

[16] Calculated based on CO_2 emissions after electric power distribution (reference value)
[17] https://www.challenge-zero.jp/

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	2017	2018	2019	Relative to FY2005	Relative to FY2013	Relative to previous FY
The Japan Iron and Steel Federation	CO2 emissions (actual emissions) ☆		20,231	18,847	16,805	18,917	18,631	18,989	19,442	19,174	18,426	18,279	18,128	17,724	17,268	-8.4%	-11.2%	-2.6%
	CO2 emissions (post-adjustment)		20,231	18,847	16,647	18,720	18,522	18,714	19,440	19,162	18,408	18,264	18,121	17,722	17,261	-8.4%	-11.2%	-2.6%
	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	0.93	0.93	0.94	4.4%	1.5%	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	0.93	0.93	0.94	4.3%	1.5%	1.6%
	Energy consumption		6,372	5,902	5,261	5,933	5,776	5,813	5,926	5,847	5,628	5,609	5,561	5,486	5,340	-9.5%	-9.9%	-2.7%
	Energy consumption intensity index		1.00	0.90	0.92	0.91	0.92	0.92	0.90	0.90	0.91	0.90	0.90	0.91	0.92	3.1%	3.0%	1.6%
	Production activity index		1.00	1.03	0.90	1.03	0.98	0.99	1.04	1.02	0.97	0.97	0.97	0.95	0.91	-12.2%	-12.5%	-4.1%
Japan Chemical Industry Association	CO2 emissions (actual emissions) ☆		3,395	6,869	6,238	6,441	6,365	6,276	6,378	6,283	6,150	5,984	6,037	5,864	5,784	-15.8%	-9.3%	-1.4%
	CO2 emissions (post-adjustment)		3,395	6,869	6,070	6,252	6,265	6,025	6,378	6,281	6,141	5,978	6,034	5,870	5,784	-15.8%	-9.3%	-1.5%
	CO2 emission intensity index (actual emissions)	Base year: FY2005		1.00	1.00	1.00	1.04	1.07	1.04	1.05	1.01	1.00	0.96	0.94	0.93	-6.5%	-10.3%	-0.7%
	CO2 emission intensity index (post-adjustment)			1.00	0.98	0.97	1.03	1.03	1.04	1.05	1.01	1.00	0.96	0.94	0.93	-6.5%	-10.3%	-0.8%
	CO2 emission intensity index (actual emissions)	Base year: FY2013							1.00	1.01	0.97	0.96	0.92	0.90	0.90		-10.3%	-0.7%
	CO2 emission intensity index (post-adjustment)								1.00	1.01	0.97	0.96	0.92	0.90	0.90		-10.3%	-0.8%
	Energy consumption		1,442	2,929	2,690	2,799	2,645	2,541	2,570	2,543	2,526	2,476	2,532	2,495	2,476	-15.5%	-3.6%	-0.8%
	Energy consumption intensity index	Base year: FY2005		1.00	1.01	1.02	1.02	1.02	0.98	1.00	0.97	0.97	0.95	0.94	0.94	-6.1%	-4.7%	0.0%
	Production activity index			1.00	0.91	0.93	0.89	0.85	0.89	0.87	0.89	0.87	0.91	0.91	0.90	-9.9%	1.1%	-0.7%
	Energy consumption intensity index	Base year: FY2013							1.00	1.01	0.99	0.98	0.96	0.95	0.95		-4.6%	-0.1%
	Production activity index								1.00	0.98	0.99	0.98	1.03	1.02	1.01		1.0%	-0.6%
Japan Paper Association	CO2 emissions (actual emissions) ☆		2,582	2,519	1,984	1,911	1,895	1,867	1,880	1,813	1,791	1,805	1,791	1,742	1,658	-34.2%	-11.8%	-4.9%
	CO2 emissions (post-adjustment)		2,582	2,519	1,949	1,873	1,875	1,821	1,880	1,813	1,789	1,804	1,790	1,743	1,658	-34.2%	-11.8%	-4.9%
	CO2 emission intensity index (actual emissions)	Base year: FY2005	1.14	1.00	0.91	0.86	0.89	0.89	0.87	0.84	0.84	0.84	0.83	0.82	0.81	-18.6%	-5.9%	-0.7%
	CO2 emission intensity index (post-adjustment)		1.14	1.00	0.89	0.84	0.88	0.87	0.87	0.84	0.84	0.84	0.83	0.82	0.81	-18.6%	-5.9%	-0.7%
	Energy consumption		967	899	708	689	660	632	632	612	602	606	605	593	567	-36.9%	-10.3%	-4.3%
	Energy consumption intensity index	Base year: FY2005	1.19	1.00	0.91	0.87	0.86	0.85	0.82	0.80	0.79	0.79	0.78	0.78	0.78	-21.9%	-4.3%	-0.1%
	Production activity index		0.90	1.00	0.87	0.88	0.85	0.83	0.86	0.85	0.85	0.85	0.86	0.84	0.81	-19.2%	-6.3%	-4.2%
Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention *3	CO2 emissions (actual emissions)		1,111	1,813	1,675	1,660	1,804	1,343	1,297	1,336	1,350	1,405	1,444	1,335	1,299	-28.3%	0.2%	-2.7%
	CO2 emissions (post-adjustment)		1,111	1,813	1,480	1,461	1,704	1,169	1,297	1,334	1,344	1,400	1,441	1,340	1,299	-28.3%	0.2%	-3.0%
	Energy consumption		645	994	963	956	875	597	571	601	625	666	708	691	695	-30.1%	21.7%	0.6%
	Energy consmuption intensity index (reference value)	Base year: FY2012						1.00	0.93	0.89	0.91	0.88	0.91	0.90	0.94		1.8%	5.2%
	Energy consumption intensity target index ☆							1.00	0.93	0.89	0.89	0.87	0.80	0.75	0.77		-17.3%	2.1%
	Production activity index							1.00	1.03	1.13	1.15	1.26	1.30	1.29	1.23		19.5%	-4.4%
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	1,732	1,685	1,614	-26.2%	-10.7%	-4.2%
	CO2 emissions (post-adjustment)		2,762	2,185	1,744	1,650	1,704	1,749	1,806	1,774	1,718	1,696	1,732	1,686	1,614	-26.2%	-10.7%	-4.3%
	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	0.97	0.94	0.94	-5.8%	-4.1%	-0.8%
	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	0.97	0.95	0.94	-5.8%	-4.1%	-0.8%
	Energy consumption		874	656	525	499	510	523	541	532	515	510	522	512	491	-25.1%	-9.2%	-4.0%
	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	0.97	0.95	0.95	-4.5%	-2.5%	-0.6%
	Production activity index		1.67	1.32	1.04	1.00	1.03	1.06	1.11	1.09	1.06	1.06	1.08	1.07	1.04	-21.6%	-6.8%	-3.5%
Japan Automobile Manufacturers Association, Inc. / Japan Auto-Body Industries Association, Inc.	CO2 emissions (actual emissions) ☆		990	802	588	616	652	738	747	716	666	671	661	623	583	-27.4%	-22.0%	-6.4%
	CO2 emissions (post-adjustment)		990	802	542	566	626	667	747	715	663	669	661	624	583	-27.4%	-22.0%	-6.6%
	CO2 emission intensity index (actual emissions)	Base year: FY1990	1.00	0.76	0.69	0.69	0.71	0.77	0.70	0.66	0.59	0.60	0.56	0.53	0.50	-34.0%	-29.1%	-4.9%
	CO2 emission intensity index (post-adjustment)		1.00	0.76	0.64	0.63	0.69	0.70	0.70	0.66	0.59	0.60	0.56	0.53	0.50	-34.0%	-29.1%	-5.1%
	Energy consumption		496	398	317	332	313	332	333	324	308	317	321	314	300	-24.5%	-9.9%	-4.2%
	Energy consumption intensity index	Base year: FY1990	1.00	0.75	0.75	0.74	0.68	0.69	0.63	0.60	0.55	0.56	0.54	0.53	0.51	-31.4%	-18.1%	-2.6%
	Production activity index		1.00	1.07	0.86	0.91	0.92	0.97	1.07	1.10	1.13	1.13	1.19	1.20	1.18	10.0%	10.0%	-1.6%
Japan Auto Parts Industries Association	CO2 emissions (actual emissions)		764	745	548	599	680	757	771	745	689	700	700	648	619	-16.9%	-19.7%	-4.6%
	CO2 emissions (post-adjustment)		764	745	497	542	648	671	771	744	686	698	699	650	619	-16.9%	-19.7%	-4.8%
	CO2 emission intensity index (actual emissions) ☆		1.48	1.15	0.86	0.87	0.96	1.03	1.02	1.01	0.97	0.97	0.93	0.85	0.85	-26.3%	-16.9%	0.0%
	CO2 emission intensity index (post-adjustment)		1.48	1.15	0.78	0.79	0.92	0.92	1.02	1.01	0.96	0.96	0.93	0.85	0.85	-26.3%	-16.9%	-0.3%
	Energy consumption		401	384	299	327	323	333	337	334	316	329	338	329	323	-15.9%	-4.1%	-1.9%
	Energy consumption intensity index		1.54	1.18	0.93	0.94	0.91	0.90	0.89	0.90	0.88	0.90	0.89	0.86	0.88	-25.4%	-0.7%	2.8%
	Production activity index		0.66	0.82	0.81	0.87	0.90	0.93	0.96	0.93	0.90	0.92	0.96	0.97	0.92	12.7%	-3.4%	-4.5%
Japan Mining Industry Association	CO2 emissions (actual emissions)		411	396	377	374	408	443	449	441	405	369	362	340	331	-16.4%	-26.4%	-2.8%
	CO2 emissions (post-adjustment)		411	396	352	349	394	406	449	441	404	368	361	341	331	-16.4%	-26.4%	-3.0%
	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	0.78	0.72	0.71	-15.3%	-24.0%	-0.9%
	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	0.78	0.72	0.71	-15.3%	-24.0%	-1.1%
	Energy consumption		170	161	161	161	159	162	163	163	154	144	144	142	141	-12.8%	-13.7%	-1.3%
	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	0.75	0.73	0.73	-11.6%	-10.9%	0.7%
	Production activity index		1.00	1.14	1.13	1.15	1.09	1.17	1.16	1.20	1.16	1.14	1.13	1.15	1.13	-1.4%	-3.1%	-2.0%
Japan Federation of Construction Contractors	CO2 emissions (actual emissions)		249	532	462	316	398	402	411	438	431	421	412	429	445	-16.4%	8.3%	3.6%
	CO2 emissions (post-adjustment)		249	532	450	315	391	387	411	438	431	420	412	430	445	-16.4%	8.3%	3.6%
	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	3.04	3.02	2.96	-10.7%	-5.0%	-2.1%
	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	3.04	3.03	2.96	-10.7%	-5.0%	-2.2%
	Energy consumption		160	229	193	121	162	157	159	170	168	166	164	174	183	-20.0%	15.6%	5.5%
	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	1.88	1.91	1.90	-14.5%	1.5%	-0.3%
	Production activity index		1.00	0.64	0.55	0.48	0.48	0.49	0.53	0.56	0.56	0.55	0.55	0.57	0.60	-6.3%	13.9%	5.9%
Japan Federation of Housing Organizations	CO2 emissions (actual emissions)		487	326	235	240	245	262	260	240	239	242	228	211	198	-39.1%	-23.7%	-5.8%
	CO2 emissions (post-adjustment)		487	326	235	240	245	262	260	240	239	242	228	211	198	-39.1%	-23.7%	-5.8%
	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	0.83	0.76	0.75	-11.2%	-8.9%	-1.3%
	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	0.83	0.76	0.75	-11.2%	-8.9%	-1.3%
	Energy consumption		184	125	90	92	94	101	100	92	92	93	89	87	82	-34.1%	-17.5%	-4.8%
	Energy consumption intensity index		1.00	0.86	0.97	0.91	0.91	0.93	0.84	0.91	0.89	0.86	0.86	0.83	0.82	-3.8%	-1.5%	-0.3%
	Production activity index		1.00	0.79	0.50	0.55	0.56	0.59	0.65	0.55	0.56	0.59	0.56	0.57	0.54	-31.5%	-16.3%	-4.5%

Industry	(*2) (☆:target adopted by the industry)	Notes	1990	2005	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Relative to FY2005	Relative to FY2013	Relative to previous FY
Lime Manufacture Association	CO2 emissions (actual emissions) ☆		357	308	244	268	234	227	246	246	223	225	227	223	210	−31.8%	−14.8%	−5.8%
	CO2 emissions (post-adjustment)		357	308	241	265	232	223	246	246	223	225	227	223	210	−31.8%	−14.8%	−5.8%
	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	0.73	0.71	0.71	−17.4%	−8.3%	0.0%
	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	0.73	0.71	0.71	−17.4%	−8.3%	−0.1%
	Energy consumption		123	106	87	96	83	79	84	84	76	78	80	80	75	−28.7%	−10.7%	−5.7%
	Energy consumption intensity index		1.00	0.86	0.81	0.79	0.76	0.77	0.77	0.77	0.75	0.74	0.75	0.74	0.74	−13.6%	−3.9%	0.1%
	Production activity index		1.00	1.00	0.88	0.99	0.88	0.84	0.89	0.89	0.83	0.85	0.87	0.88	0.82	−17.4%	−7.1%	−5.8%
The Japan Rubber Manufacturers Association*4	CO2 emissions (actual emissions)			213	169	180	181	170	170	168	161	158	155	151	141	−33.9%	−16.9%	−6.8%
	CO2 emissions (post-adjustment)			237	183	192	218	207	222	215	203	196	190	182	169	−28.7%	−24.1%	−7.1%
	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	0.93	0.90	0.86	0.82	−18.0%	−8.9%	−4.9%
	CO2 emission intensity index (post-adjustment)			1.00	0.96	0.89	0.99	1.01	1.06	1.05	1.06	1.04	0.99	0.93	0.88	−11.5%	−16.8%	−5.2%
	Energy consumption			113	98	105	105	100	99	97	94	92	90	90	86	−23.3%	−12.5%	−3.8%
	Energy consumption intensity index	Baae year: FY2005		1.00	1.09	1.01	1.00	1.03	0.99	1.00	1.03	1.02	0.99	0.97	0.95	−4.8%	−4.1%	−1.8%
	Production activity index			1.00	0.80	0.92	0.93	0.86	0.88	0.87	0.81	0.80	0.81	0.82	0.81	−19.4%	−8.8%	−2.1%
The Federation of Pharmaceutical Manufacturers' Associations of Japan	CO2 emissions (actual emissions) ☆		158	238	205	206	229	251	262	253	248	249	240	224	219	−8.1%	−16.6%	−2.2%
	CO2 emissions (post-adjustment)		158	238	191	191	220	228	262	253	247	248	240	224	219	−8.1%	−16.6%	−2.5%
	CO2 emission intensity index (actual emissions)	Base year: FY2005	1.06	1.00	0.78	0.77	0.81	0.87	0.85	0.83	0.81	0.83	0.79	0.74	0.72	−27.7%	−15.1%	−2.7%
	CO2 emission intensity index (post-adjustment)		1.06	1.00	0.73	0.71	0.78	0.79	0.85	0.83	0.81	0.82	0.79	0.75	0.72	−27.7%	−15.1%	−3.0%
	Energy consumption		75	115	108	110	109	113	117	115	115	118	116	112	112	−2.3%	−4.1%	−0.1%
	Energy consumption intensity index	Base year: FY2005	1.05	1.00	0.86	0.84	0.80	0.81	0.79	0.78	0.78	0.81	0.79	0.77	0.77	−23.1%	−2.3%	−0.6%
	Production activity index		0.63	1.00	1.10	1.13	1.19	1.21	1.29	1.27	1.28	1.27	1.27	1.26	1.27	27.0%	−1.8%	0.5%
Japan Aluminum Association	CO2 emissions (actual emissions)		156	168	133	138	145	148	146	149	145	145	142	134	126	−24.9%	−13.6%	−5.4%
	CO2 emissions (post-adjustment)		156	168	124	129	140	136	146	149	144	145	142	134	126	−24.9%	−13.6%	−5.6%
	CO2 emission intensity index (actual emissions)		1.04	1.00	0.92	0.88	0.98	1.05	1.05	0.99	0.97	0.98	0.96	0.96	0.97	−3.4%	−7.8%	0.2%
	CO2 emission intensity index (post-adjustment)		1.04	1.00	0.86	0.82	0.95	0.96	1.05	0.99	0.96	0.97	0.96	0.97	0.97	−3.4%	−7.8%	0.0%
	Energy consumption		77	81	69	73	69	67	66	68	67	69	69	67	64	−20.6%	−2.6%	−3.7%
	Energy consumption intensity index ☆		1.07	1.00	1.00	0.96	0.97	0.99	0.98	0.94	0.94	0.96	0.97	1.00	1.02	2.1%	3.8%	2.0%
	Production activity index		0.89	1.00	0.86	0.94	0.88	0.84	0.83	0.90	0.89	0.89	0.88	0.82	0.78	−22.2%	−6.2%	−5.6%
Japan Federation of Printing Industries	CO2 emissions (actual emissions) ☆			137	128	129	147	152	149	143	139	134	122	112	105	−23.6%	−30.0%	−6.3%
	CO2 emissions (post-adjustment)			137	116	117	141	134	149	143	138	134	122	112	105	−23.6%	−30.0%	−6.6%
	Energy consumption			74	72	72	72	68	66	65	65	64	60	57	55	−25.3%	−16.8%	−3.6%
Flat Glass Manufacturers Association of Japan	CO2 emissions (actual emissions) ☆		181	134	110	115	117	113	117	110	106	106	109	110	111	−17.1%	−4.9%	1.6%
	CO2 emissions (post-adjustment)		181	134	107	113	115	109	117	110	106	106	109	110	111	−17.1%	−4.9%	1.5%
	CO2 emission intensity index (actual emissions)	Base year: FY2005	0.97	1.00	1.12	1.01	1.07	0.97	0.91	0.91	0.85	0.87	0.87	0.85	0.90	−10.5%	−1.7%	4.9%
	CO2 emission intensity index (post-adjustment)		0.97	1.00	1.09	0.98	1.05	0.94	0.91	0.91	0.85	0.87	0.87	0.85	0.90	−10.5%	−1.7%	4.8%
	Energy consumption		73	52	44	46	45	43	44	42	42	42	44	45	45	−14.7%	1.1%	0.4%
	Energy consumption intensity index	Base year: FY2005	1.00	1.00	1.15	1.04	1.06	0.95	0.88	0.89	0.85	0.89	0.89	0.89	0.92	−7.9%	4.6%	3.7%
	Production activity index		1.38	1.00	0.73	0.85	0.82	0.87	0.96	0.90	0.93	0.90	0.94	0.96	0.93	−7.4%	−3.3%	−3.2%
Japan Soft Drink Association	CO2 emissions (actual emissions)		47	103	103	104	110	117	122	116	115	114	111	118	116	13.2%	−4.8%	−1.3%
	CO2 emissions (post-adjustment)		47	103	99	99	107	110	122	116	115	114	111	118	116	13.2%	−4.8%	−1.5%
	CO2 emission intensity index (actual emissions) ☆	Base year: FY1990	1.00	1.13	1.04	0.98	1.00	1.04	0.99	0.95	0.91	0.88	0.83	0.85	0.79	−30.1%	−20.3%	−6.8%
	CO2 emission intensity index (post-adjustment)		1.00	1.13	0.99	0.93	0.97	0.97	0.99	0.95	0.91	0.88	0.83	0.85	0.79	−30.1%	−20.3%	−6.9%
	Energy consumption		21	48	53	54	53	54	57	54	55	55	55	60	60	24.4%	6.2%	0.5%
	Energy consumption intensity index	Base year: FY1990	1.00	1.20	1.19	1.13	1.08	1.08	1.03	1.00	0.98	0.96	0.92	0.97	0.92	−23.2%	−11.0%	−5.1%
	Production activity index		1.00	1.92	2.11	2.25	2.34	2.39	2.60	2.59	2.69	2.75	2.83	2.93	3.11	62.1%	19.4%	5.9%
Japan Dairy Industry Association	CO2 emissions (actual emissions)		86	112	110	110	114	121	120	116	116	112	104	98	96	−14.5%	−19.9%	−1.8%
	CO2 emissions (post-adjustment)		86	112	105	104	112	113	120	115	116	112	104	98	96	−14.5%	−19.9%	−2.0%
	CO2 emission intensity index (actual emissions)	Base year: FY2013	0.80	0.95	0.98	0.97	0.98	1.01	1.00	0.96	0.96	0.93	0.94	0.91	0.91	−4.6%	−9.4%	0.0%
	CO2 emission intensity index (post-adjustment)		0.80	0.95	0.93	0.92	0.96	0.95	1.00	0.96	0.96	0.93	0.94	0.91	0.91	−4.6%	−9.4%	−0.2%
	Energy consumption		41	51	54	54	52	53	52	51	53	52	49	48	48	−7.1%	−8.2%	0.7%
	Energy consumption intensity index ☆	Base year: FY2013	0.87	1.00	1.09	1.09	1.03	1.02	1.00	0.98	1.00	0.99	1.02	1.01	1.04	3.7%	3.8%	2.5%
	Production activity index		0.90	0.99	0.94	0.95	0.97	1.00	1.00	1.01	1.01	1.00	0.92	0.90	0.88	−10.4%	−11.5%	−1.8%
The Japanese Electric Wire & Cable Makers' Association	CO2 emissions (actual emissions)		109	91	78	82	94	99	96	92	88	86	83	78	72	−21.6%	−25.4%	−8.4%
	CO2 emissions (post-adjustment)		109	91	69	72	89	86	96	91	88	85	82	79	72	−21.6%	−25.4%	−8.7%
(metal (copper/aluminnum) cable)	CO2 emission intensity index (actual emissions)		0.94	1.00	1.03	1.08	1.21	1.28	1.22	1.15	1.14	1.14	1.07	0.97	0.88	−11.5%	−27.4%	−8.8%
(metal (copper/aluminnum) cable)	CO2 emission intensity index (post-adjustment)	Base year: FY2005	0.94	1.00	0.91	0.95	1.14	1.12	1.22	1.15	1.14	1.13	1.07	0.97	0.88	−11.5%	−27.4%	−9.2%
(optical fiber cable)	CO2 emission intensity index (actual emissions)		3.76	1.00	0.84	0.90	0.99	0.98	1.04	0.92	0.83	0.79	0.73	0.75	0.82	−17.6%	−20.7%	10.5%
(optical fiber cable)	CO2 emission intensity index (post-adjustment)		3.76	1.00	0.73	0.78	0.93	0.84	1.04	0.91	0.83	0.78	0.73	0.75	0.82	−17.6%	−20.7%	10.0%
	Energy consumption ☆		64	50	45	47	45	43	42	41	40	40	40	40	38	−24.1%	−8.6%	−5.1%
(metal (copper/aluminnum) cable)	Energy consumption intensity index		1.00	1.00	1.07	1.12	1.06	1.03	0.97	0.93	0.95	0.97	0.95	0.91	0.86	−14.4%	−11.4%	−5.6%
(optical fiber cable)	Energy consumption intensity index	Base year: FY2005	4.20	1.00	0.85	0.91	0.83	0.75	0.78	0.71	0.67	0.65	0.63	0.68	0.78	−22.2%	−0.6%	14.6%
(metal (copper/aluminnum) cable)	Production activity index		1.37	1.00	0.78	0.78	0.79	0.78	0.81	0.82	0.79	0.77	0.78	0.81	0.82	−18.0%	1.8%	1.2%
(optical fiber cable)	Production activity index		0.07	1.00	1.64	1.53	1.74	1.89	1.66	1.71	1.92	1.98	2.05	2.05	1.64	63.8%	−1.1%	−20.2%
The Japan Bearing Industrial Association	CO2 emissions (actual emissions)			73	58	70	83	83	85	84	79	78	79	74	68	−7.4%	−20.0%	−8.7%
	CO2 emissions (post-adjustment)			73	51	62	78	73	85	84	79	78	78	74	68	−7.4%	−20.0%	−9.1%
	CO2 emission intensity index (actual emissions)			0.98	0.97	0.90	1.04	1.14	1.14	1.05	1.04	1.02	0.93	0.87	0.87	−11.5%	−23.4%	0.2%
	CO2 emission intensity index (post-adjustment)	Base year: FY1997		0.98	0.86	0.79	0.98	1.00	1.14	1.05	1.04	1.02	0.93	0.87	0.87	−11.5%	−23.4%	−0.2%
	CO2 emission intensity index (fixity coefficient) ☆			0.88	0.87	0.80	0.79	0.79	0.79	0.75	0.76	0.77	0.72	0.71	0.74	−15.7%	−6.8%	3.4%
	Energy consumption			40	33	40	40	37	37	37	36	37	38	38	36	−10.4%	−3.0%	−5.8%
	Energy consumption intensity index	Base year: FY1997		0.86	0.88	0.81	0.80	0.80	0.79	0.75	0.76	0.76	0.72	0.71	0.73	−14.3%	−7.0%	3.4%
	Production activity index			1.32	1.06	1.39	1.42	1.29	1.32	1.41	1.35	1.37	1.50	1.51	1.38	4.5%	4.4%	−8.9%

Industry	(*2) (☆:target adopted by the industry)	Notes	1990	2005	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Relative to FY2005	Relative to FY2013	Relative to previous FY
The Japan Society of Industrial Machinery Manufacturers	CO2 emissions (actual emissions)			58	44	48	57	58	55	58	55	54	53	50	49	−16.0%	−12.0%	−3.4%
	CO2 emissions (post-adjustment)			58	40	43	54	51	55	58	55	54	53	50	49	−16.0%	−12.0%	−3.7%
	Energy consumption			31	25	27	27	26	24	26	25	25	26	26	25	−17.4%	5.7%	−0.6%
	Production activity index	Base year: FY2013		1.01	1.01	1.00	1.06	1.03	1.00	1.06	1.15	1.07	1.12	1.18	1.15	13.6%	14.8%	−3.1%
Japan Petroleum Development Association *5	CO2 emissions (actual emissions) ☆		16	22	27	25	23	25	25	22	22	21	20	23	21	−4.8%	−16.6%	−8.1%
	CO2 emissions (post-adjustment)		13	26	30	26	27	24	23	24	25	22	22	21	20	−20.6%	−11.4%	−3.7%
	CO2 emission intensity index (actual emissions) ☆	Base year: FY2005	1.27	1.00	1.08	1.06	0.99	1.15	1.26	1.18	1.18	1.13	1.04	1.35	1.31	30.8%	4.0%	−3.1%
	CO2 emission intensity index (post-adjustment)		0.87	1.00	1.03	0.98	1.00	0.96	0.99	1.14	1.21	1.03	0.96	1.08	1.09	9.1%	10.5%	1.5%
	Energy consumption		6	9	10	10	10	10	11	9	9	10	10	9	9	3.6%	−16.8%	−1.0%
	Energy consumption intensity index	Base year: FY2005	1.26	1.00	1.07	1.07	1.12	1.23	1.37	1.28	1.33	1.34	1.27	1.37	1.42	42.5%	3.7%	4.4%
	Production activity index		0.57	1.00	1.14	1.06	1.05	0.99	0.91	0.84	0.82	0.84	0.87	0.77	0.73	−27.3%	−19.8%	−5.1%
Japan Copper and Brass Association	CO2 emissions (actual emissions)			43	39	41	44	47	48	46	42	45	40	38	38	−10.3%	−19.9%	1.5%
	CO2 emissions (post-adjustment)			43	35	37	42	42	48	46	42	45	40	38	38	−10.3%	−19.9%	1.2%
	CO2 emission intensity index (actual emissions)	Base year: FY2005		1.00	1.10	1.05	1.20	1.34	1.28	1.21	1.24	1.21	1.22	1.12	1.27	26.9%	−1.0%	13.5%
	CO2 emission intensity index (post-adjustment)			1.00	0.99	0.95	1.15	1.19	1.28	1.21	1.23	1.21	1.22	1.12	1.27	26.9%	−1.0%	13.1%
	Energy consumption			23	22	23	22	21	21	21	20	21	20	19	20	−13.0%	−5.6%	4.6%
	Energy consumption intensity index ☆	Base year: FY2005		1.00	1.13	1.09	1.08	1.11	1.06	1.01	1.06	1.06	1.10	1.05	1.23	23.1%	16.6%	16.8%
	Production activity index			1.00	0.83	0.93	0.87	0.82	0.87	0.89	0.81	0.88	0.77	0.79	0.71	−29.3%	−19.1%	−10.5%
Brewers Association of Japan	CO2 emissions (actual emissions) ☆		117	90	60	57	53	52	49	48	47	47	46	45	44	−51.2%	−10.5%	−2.4%
	CO2 emissions (post-adjustment)		117	90	60	57	53	52	49	48	47	47	46	45	44	−51.2%	−10.5%	−2.4%
	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	0.47	0.47	0.47	−40.6%	−3.0%	0.2%
	CO2 emission intensity index (post-adjustment)		1.00	0.79	0.56	0.54	0.51	0.50	0.49	0.48	0.47	0.47	0.47	0.47	0.47	−40.6%	−3.0%	0.2%
	Energy consumption		56	43	0	32	29	28	26	26	26	25	25	24	23	−46.9%	−12.3%	−3.7%
	Energy consumption intensity index		1.00	0.79	0.00	0.63	0.60	0.57	0.54	0.54	0.53	0.53	0.53	0.52	0.51	−35.4%	−4.9%	−1.1%
	Production activity index		1.00	0.98	0.92	0.90	0.88	0.88	0.87	0.86	0.86	0.85	0.83	0.82	0.80	−17.8%	−7.8%	−2.6%
The Shipbuilders' Association of Japan and the Cooperative Association of Japan Shipbuilders (hours)	CO2 emissions (actual emissions)							68	65	69	69	71	65	59	54		−17.6%	−10.0%
	CO2 emissions (post-adjustment)							59	65	69	69	70	65	60	54		−17.6%	−10.3%
	CO2 emission intensity index (actual emissions) ☆							1.00	1.06	1.12	1.00	1.01	0.99	0.91	0.81		−23.5%	−11.1%
(hours)	CO2 emission intensity index (post-adjustment)							1.00	1.21	1.28	1.15	1.15	1.13	1.04	0.93		−23.5%	−11.4%
(quantity at completion)	CO2 emission intensity index (actual emissions) ☆							1.00	1.17	1.27	1.26	1.38	1.28	1.02	0.84		−27.6%	−17.3%
(quantity at completion)	CO2 emission intensity index (post-adjustment)							1.00	1.34	1.46	1.44	1.58	1.47	1.17	0.97		−27.6%	−17.6%
	Energy consumption							29	28	30	31	32	31	30	28		1.2%	−6.1%
(hours)	Energy consumption intensity index							1.00	1.04	1.13	1.04	1.08	1.10	1.06	0.98		−6.1%	−7.3%
(quantity at completion)	Energy consumption intensity index							1.00	1.15	1.28	1.31	1.48	1.43	1.19	1.02		−11.1%	−13.8%
(hours)	Production activity index							1.00	0.91	0.92	1.02	1.03	0.97	0.97	0.98		7.7%	1.2%
(quantity at completion)	Production activity index							1.00	0.83	0.81	0.81	0.75	0.75	0.86	0.94		13.8%	8.9%
Limestone Association of Japan	CO2 emissions (actual emissions) ☆			25	20	21	24	27	28	28	27	27	26	26	26	2.3%	−9.8%	−1.5%
	CO2 emissions (post-adjustment)			25	19	20	23	25	28	28	27	27	26	26	26	2.3%	−9.8%	−1.7%
	CO2 emission intensity index (actual emissions)	Base year: FY2010		0.98	0.99	1.00	1.12	1.19	1.19	1.19	1.19	1.19	1.15	1.11	1.13	15.8%	−5.4%	1.7%
	CO2 emission intensity index (post-adjustment)			1.06	0.99	1.00	1.17	1.17	1.30	1.30	1.30	1.29	1.25	1.21	1.23	15.8%	−5.4%	1.4%
	Energy consumption			12	10	11	11	11	12	12	12	11	12	12	12	−2.2%	2.6%	0.6%
	Energy consumption intensity index	Base year: FY2010		0.95	0.99	1.00	0.99	0.99	0.98	0.99	1.01	1.03	1.02	1.02	1.05	10.8%	7.6%	3.8%
	Production activity index			1.20	0.97	1.00	1.01	1.06	1.11	1.10	1.07	1.05	1.07	1.09	1.06	−11.7%	−4.7%	−3.1%
Japan Machine Tool Builders Association	CO2 emissions (actual emissions)		25	27	20	26	32	35	36	37	36	33	34	33	30	12.0%	−16.4%	−7.3%
	CO2 emissions (post-adjustment)		25	27	17	23	30	31	36	37	35	33	34	33	30	12.4%	−16.1%	−7.3%
	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	0.93	0.80	0.89	6.5%	−32.1%	10.9%
	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	0.93	0.81	0.90	6.9%	−31.8%	10.9%
	Energy consumption		15	15	11	15	15	15	15	16	16	15	16	17	15	5.2%	−0.2%	−7.3%
	Energy consumption intensity index ☆		1.00	0.78	1.36	1.05	0.94	0.91	0.96	0.85	0.81	0.84	0.77	0.70	0.78	0.0%	−18.9%	10.9%
	Production activity index		1.00	1.29	0.56	0.95	1.10	1.14	1.10	1.31	1.36	1.26	1.44	1.62	1.36	5.2%	23.1%	−16.4%
Japan Sanitary Equipment Industry Association	CO2 emissions (actual emissions) ☆		50	36	26	24	28	26	26	23	20	20	20	20	20	−45.9%	−23.2%	−2.7%
	CO2 emissions (post-adjustment)		50	36	25	22	27	24	26	23	20	20	20	20	20	−45.9%	−23.2%	−2.9%
	CO2 emission intensity index (actual emissions)	Base year: FY1990	1.00	0.69	0.57	0.45	0.52	0.48	0.43	0.39	0.34	0.32	0.33	0.33	0.31	−54.4%	−26.3%	−3.5%
	CO2 emission intensity index (post-adjustment)		1.00	0.69	0.54	0.42	0.50	0.44	0.43	0.39	0.34	0.32	0.33	0.33	0.31	−54.4%	−26.3%	−3.7%
	Energy consumption		23	17	13	12	13	12	12	11	9	9	10	10	10	−40.3%	−11.6%	−0.4%
	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	0.35	0.35	0.35	−49.7%	−15.1%	−1.2%
	Production activity index		1.00	1.07	0.92	1.07	1.08	1.10	1.22	1.20	1.18	1.22	1.19	1.26	1.27	18.8%	4.2%	0.8%
Flour Millers Association	CO2 emissions (actual emissions)		19	23	22	23	28	31	30	30	29	28	27	24	23	−0.9%	−23.8%	−3.4%
	CO2 emissions (post-adjustment)		19	23	19	20	26	26	30	30	29	28	27	24	23	−0.9%	−23.8%	−3.8%
	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	0.87	0.79	0.76	−0.8%	−23.8%	−3.4%
	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	0.86	0.79	0.76	−0.8%	−23.8%	−3.8%
	Energy consumption		12	13	13	14	14	13	13	13	13	13	13	12	12	−7.0%	−5.1%	0.0%
	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	0.97	0.95	0.95	−7.0%	−5.1%	0.0%
	Production activity index		0.86	1.00	0.98	1.01	1.01	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	0.0%	0.0%	0.0%
Japan Industrial Vehicles Association	CO2 emissions (actual emissions) ☆		7	7	4	5	6	6	5	5	4	4	4	4	4	−47.2%	−23.0%	−6.5%
	CO2 emissions (post-adjustment)		7	7	4	4	6	5	5	5	4	4	4	4	4	−47.2%	−23.0%	−6.7%
	CO2 emission intensity index (actual emissions)	Base year: FY2005	0.85	1.00	1.18	0.96	1.03	1.12	0.90	0.85	0.80	0.81	0.76	0.67	0.69	−31.4%	−24.1%	2.0%
	CO2 emission intensity index (post-adjustment)		0.85	1.00	1.09	0.88	0.99	1.00	0.90	0.85	0.80	0.81	0.76	0.67	0.69	−31.4%	−24.1%	1.7%
	Energy consumption		3	4	2	3	3	3	2	2	2	2	2	2	2	−46.6%	−8.8%	−3.8%
	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	0.74	0.71	0.66	0.69	−30.6%	−10.2%	5.0%
	Production activity index		1.11	1.00	0.54	0.73	0.81	0.77	0.76	0.79	0.79	0.76	0.80	0.84	0.77	−23.1%	1.5%	−8.3%

Industry	(*2) (☆:target adopted by the industry)	Notes	1990	2005	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Relative to FY2005	Relative to FY2013	Relative to previous FY
Japan Association of Rolling Stock Industries	CO2 emissions (actual emissions) ☆		5	4	4	4	4	4	4	4	3	3	4	3	3	−17.1%	−15.9%	−2.8%
	CO2 emissions (post-adjustment)		5	4	3	3	3	3	4	4	3	3	4	3	3	−17.1%	−15.9%	−3.1%
	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	0.45	0.33	0.33	−39.9%	−33.7%	0.2%
	CO2 emission intensity index (post-adjustment)		1.00	0.56	0.38	0.42	0.52	0.54	0.50	0.51	0.44	0.49	0.45	0.33	0.33	−39.9%	−33.7%	−0.2%
	Energy consumption		3	2	2	2	2	2	2	2	2	2	2	2	2	−20.3%	0.9%	0.1%
	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	0.40	0.31	0.32	−42.2%	−20.5%	3.2%
	Production activity index		1.00	1.43	1.80	1.59	1.44	1.27	1.56	1.53	1.69	1.50	1.68	2.04	1.98	37.9%	26.9%	−3.0%
Emissions from industrial processes *6	CO2 emissions		6,024	5,080	4,147	4,243	4,205	4,233	4,428	4,392	4,205	4,202	4,244	4,229	4,086	−19.6%	−7.7%	−3.4%
Revisions *4	CO2 emissions (actual emissions)			23	24	25	43	53	52	48	43	39	35	30	28			
	CO2 emissions (post-adjustment)																	
Total *6	CO2 emissions (actual emissions)		40,338	42,052	36,445	38,679	38,790	38,990	39,807	39,248	37,888	37,571	37,482	36,506	35,486	−15.7%	−10.9%	−2.8%
	CO2 emissions (post-adjustment)		40,334	42,055	35,652	37,810	38,325	37,864	39,802	39,228	37,845	37,538	37,466	36,523	35,478	−15.8%	−10.9%	−2.9%
	Energy consumption		12,303	13,576	11,979	12,752	12,335	12,019	12,160	12,039	11,742	11,729	11,788	11,620	11,378	−16.4%	−6.4%	−2.1%

*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 Societyare 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 suminclusing relevant industries and the total is provided as "Revisions".
*5 CO_2 emissions of the Japan Petroleum Development Association included dissipated gas from mining facilities.
*6 Emissions from industrial processes refer to CO_2 emissions from manufacturing processes that are not energy-oriented.
*7 The rate of change from fiscal 2005 to fiscal 2018 is calculated except for industries with no data for fiscal 2005.

Calculation method

Period covered: April 1, 2019 – March 31, 2020
Scope of calculation: Participating industries under the Keidanren Commitment to a Low Carbon Society and Commitment to a Low Carbon Society (62 industries)
CO_2 emissions: Σ [(annual consumption of fuel oil, gas, heat) × energy-specific calorific coefficient *1 × energy-specific carbon emission coefficient *1 × CO_2 conversion factor *2] +(annual electric power consumption within industry-specific boundaries) × CO_2conversion factor *3

*1 Source: Agency for Natural Resources and Energy "General Energy Statistics" However, the standard state of gases was redefined in "General Energy Statistics fiscal 2013 preliminary figures" (published on November 14, 2014); and therefore, the old calorific figures are used for natural gas and city gas, in order to maintain the continuity of the data and scheme. For some fuels, industries use coefficients calculated using their own data.
*2 Source: National Institute for Environmental Studies, Japan, "Japan's greenhouse gas emission report." For some fuels, industries use coefficients calculated using their own data.
*3 Source: Electric Power Council for a Low Carbon Society.

The CO_2 emission factor for electric power use (emission coefficient for electricity) used to calculate total CO_2 emissions in fiscal 2019 is a preliminary value . (*)
Basic emission coefficient (emission coefficient for actual emissions): 4.44 t-CO2/10,000kWh; post-adjustment emission coefficient: 4.44 t-CO2/10,000kWh

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	2017	2018	2019	Relative to FY2005	Relative to FY2013	Relative to previous FY
The Electric Power Council for a Low Carbon Society *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	41,100	37,000	34,400	−7.8%	−30.4%	−7.0%
	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	41,100	37,200	34,500	−7.5%	−30.0%	−7.3%
	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	1.19	1.10	1.06	+4.8%	−21.9%	−3.8%
	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	1.19	1.11	1.06	+5.1%	−21.6%	−4.0%
	Energy consumption intensity index		0.94	0.94	0.94	0.94	0.95	0.92	0.92	0.92	0.92	0.91	0.90	0.90	0.90	0.89	0.88	0.90	−5.4%	−1.9%	+1.4%
	Production activity index		1.25	1.28	1.27	1.31	1.34	1.33	1.40	1.33	1.32	1.32	1.29	1.26	1.27	1.26	1.22	1.18	−12.0%	−10.8%	−3.4%
Petroleum Association of Japan	CO2 emissions (actual emissions)		4,062	4,032	4,075	4,054	4,154	3,960	4,004	3,785	3,820	4,033	3,824	3,834	3,845	3,809	3,682	3,440	−17.2%	−14.7%	−6.6%
	CO2 emissions (post-adjustment)		4,062	4,032	4,075	4,054	4,154	3,945	3,987	3,776	3,796	4,033	3,823	3,833	3,844	3,808	3,682	3,440	−17.2%	−14.7%	−6.6%
	CO2 emission intensity index (actual emissions)	Base year: FY1990	1.04	1.04	1.03	1.02	1.00	1.00	1.00	1.00	1.00	1.01	1.00	0.98	0.98	0.98	0.99	0.97	−2.6%	−3.7%	−1.6%
	CO2 emission intensity index (post-adjustment)		1.05	1.05	1.04	1.03	1.00	1.00	1.00	1.00	1.00	1.01	1.00	0.99	0.99	0.98	0.99	0.97	−2.6%	−3.7%	−1.6%
	Energy consumption		1,656	1,651	1,666	1,666	1,713	1,633	1,650	1,555	1,575	1,651	1,563	1,573	1,589	1,569	1,503	1,425	−16.8%	−13.7%	−5.2%
	Energy consumption intensity index	Base year: FY1990	1.03	1.03	1.02	1.02	1.00	1.00	1.00	0.99	1.00	1.00	0.99	0.98	0.98	0.98	0.98	0.98	−2.1%	−2.6%	−0.1%
	Production activity index		0.98	0.98	1.00	1.00	1.05	1.00	1.02	0.96	0.96	1.01	0.97	0.99	0.99	0.98	0.94	0.89	−15.0%	−11.4%	−5.1%
The Japan Gas Association *3	CO2 emissions (actual emissions)		73	66	59	54	47	34	34	38	40	46	48	45	46	45	42	40	−15.2%	−12.7%	−6.2%
	CO2 emissions (post-adjustment)		73	66	59	54	47	32	31	36	36	46	48	44	46	45	43	40	−15.2%	−12.7%	−6.5%
	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	0.12	0.12	0.12	−28.0%	−8.4%	−2.2%
	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	0.12	0.12	0.12	−28.0%	−8.4%	−2.5%
	Energy consumption		38	34	30	28	25	19	19	19	18	21	22	21	22	22	22	22	−12.1%	+4.2%	−1.6%
	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	0.12	0.13	0.13	−25.3%	+9.3%	+2.6%
	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	2.72	2.57	2.47	+17.7%	−4.7%	−4.1%
Emissions from industrial processes *4	CO2 emissions		233	220	229	225	214	222	214	213	190	189	200	196	190	203	185	188	−12.3%	−0.6%	+1.3%
Total (Emissions before electric power distribution)	CO2 emissions (actual emissions)		35,368	38,318	40,462	40,533	41,715	40,317	42,452	48,636	53,450	53,667	51,071	48,475	47,281	45,157	40,910	38,067	−8.7%	−29.1%	−6.9%
	CO2 emissions (post-adjustment)		35,368	38,318	40,462	40,533	41,715	34,998	36,733	45,625	45,722	53,567	50,971	48,174	47,080	45,157	41,110	38,167	−8.5%	−28.7%	−7.2%
	Energy consumption		19,348	19,671	19,528	20,233	20,731	19,940	21,021	19,932	19,773	19,740	18,919	18,665	18,624	18,383	17,672	17,259	−16.7%	−12.6%	−2.3%

*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, the base year is fiscal 1990.
*2 Because the Electric Power Council for a Low Carbon Society was established in fiscal 2015, the data for fiscal years through fiscal 2006 represent only the Federation of Electric Power Companies, and the data for fiscal 2007 - 2014 include 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 Action Plan on the Environment. The calculated CO2 emissions differ from the figures dervied using the marignal adjustment metho d (cogeneration) that the Japan Gas Association has adopted as target 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	2017	2018	2019	Relative to FY2013	Relative to previous FY
Japan Chain Stores Association	CO2 emissions (actual emissions)		646	668	692	783	540	496	395	284	220	209	206	−61.9%	−1.3%
	CO2 emissions (post-adjustment)		552	569	646	662	540	495	393	283	220	209	206	−61.9%	−1.7%
	Energy consumption		156	162	136	138	95	90	231	161	130	143	130	+36.7%	−8.9%
Telecommunications Carriers Association	CO2 emissions (actual emissions)		453	427	532	576	571	566	555	522	502	479	463	−18.8%	−3.2%
	CO2 emissions (post-adjustment)		387	364	497	487	571	565	552	520	501	481	463	−18.8%	−3.6%
	Energy consumption		273	257	260	251	246	251	254	247	247	251	252	+2.5%	+0.5%
	Energy consumption intensity index ☆	Base year: FY2013		2.38	1.92	1.47	1.00	0.77	0.53	0.35	0.30	0.25	0.21	−78.5%	−13.2%
	Production activity index			0.44	0.55	0.69	1.00	1.33	1.97	2.86	3.30	4.12	4.77	+376.6%	+15.8%
Japan Franchise Association	CO2 emissions (actual emissions)			297	364	422	438	459	451	449	431	400	376	−14.2%	−6.0%
	CO2 emissions (post-adjustment)			253	340	357	438	458	449	447	430	401	376	−14.2%	−6.4%
	Energy consumption			179	178	184	189	203	207	212	212	210	205	+8.2%	−2.4%
Japan Department Store Association	CO2 emissions (actual emissions)		171	157	178	194	190	172	160	152	134	119	113	−40.4%	−5.0%
	CO2 emissions (post-adjustment)		151	138	168	169	190	172	159	152	134	119	113	−40.4%	−5.3%
	CO2 emission intensity index (actual emissions)		0.87	0.85	0.94	1.01	1.00	0.92	0.84	0.81	0.76	0.70	0.67	−33.1%	−4.6%
	CO2 emission intensity index (post-adjustment)		0.77	0.75	0.88	0.88	1.00	0.92	0.84	0.81	0.76	0.70	0.67	−33.1%	−4.9%
	Energy consumption		99	91	87	86	83	77	74	72	65	61	60	−28.0%	−2.1%
	Energy consumption intensity index ☆	Base year: FY2013	1.16	1.12	1.04	1.02	1.00	0.94	0.89	0.88	0.85	0.82	0.81	−19.1%	−1.7%
	Production activity index		1.03	0.97	1.00	1.01	1.00	0.99	1.00	0.98	0.92	0.89	0.89	−11.0%	−0.4%
Japan Association of Refrigerated Warehouses	CO2 emissions (actual emissions)		76	80	90	106	106	103	98	96	90	85	83	−22.3%	−3.3%
	CO2 emissions (post-adjustment)		65	68	84	90	106	103	98	95	90	86	83	−22.3%	−3.7%
	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	1.00	0.92	0.89	−25.9%	−2.9%
	CO2 emission intensity index (post-adjustment)		0.76	0.78	1.01	1.03	1.20	1.15	1.09	1.05	1.00	0.92	0.89	−25.9%	−3.3%
	Energy consumption		46	48	44	46	46	46	45	45	45	45	45	−1.9%	+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	0.77	0.75	0.75	−6.5%	+0.8%
	Production activity index		1.39	1.40	1.35	1.40	1.43	1.45	1.45	1.45	1.45	1.50	1.49	+4.9%	−0.4%
Japanese Bankers Association	CO2 emissions (actual emissions)		121	122	130	141	139	134	127	120	112	100	92	−34.3%	−8.4%
	CO2 emissions (post-adjustment)		104	104	122	119	139	134	126	119	112	100	92	−34.3%	−8.8%
	Energy consumption		73	73	64	62	60	59	58	57	55	52	50	−17.0%	−4.9%
	Electric power consumption intensity (power consumption / total floor area) ☆	Base year: FY2009	1.00	0.99	0.86	0.84	0.83	0.82	0.80	0.78	0.76	0.74	0.71	−14.8%	−3.6%
The Life Insurance Association of Japan	CO2 emissions (actual emissions)		104	101	108	116	111	102	96	85	80	72	67	−39.7%	−7.8%
	CO2 emissions (post-adjustment)		90	88	102	99	111	102	96	85	80	73	67	−39.7%	−8.2%
	Energy consumption		61	60	53	51	48	45	44	40	39	38	36	−25.0%	−4.2%
	Production activity index	Base year: FY2009	1.00	0.96	0.97	0.94	0.91	0.89	0.89	0.88	0.86	0.85	0.85	−7.3%	−0.8%
Japan Foreign Trade Council, Inc.	CO2 emissions (actual emissions)		5	5	5	6	5	5	4	4	4	3	3	−41.0%	−5.8%
	CO2 emissions (post-adjustment)		4	5	5	5	5	5	4	4	4	3	3	−41.0%	−6.2%
	Energy consumption		3	3	3	2	2	2	2	2	2	2	2	−26.5%	−2.4%
	Electric power consumption intensity (power consumption poer unit floor area in entire company) ☆	Base year: FY2013	1.23	1.26	1.06	1.02	1.00	0.97	0.94	0.90	0.89	0.87	0.87	−13.2%	+0.2%
The General Insurance Association of Japan	CO2 emissions (actual emissions)		26	26	27	29	29	27	25	24	21	20	18	−36.4%	−8.9%
	CO2 emissions (post-adjustment)		23	22	26	25	29	27	25	24	21	20	18	−36.4%	−9.3%
	Energy consumption		16	15	13	13	12	12	11	11	11	10	10	−21.0%	−5.7%
	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	0.82	0.83	0.73	−14.2%	−12.4%
	Production activity index		1.00	0.98	0.98	0.97	0.95	0.91	0.89	0.87	0.84	0.83	0.89	−6.2%	+7.5%
Japan LP Gas Association	CO2 emissions (actual emissions)		2	2	3	3	3	3	3	3	3	2	2	−23.3%	−3.8%
	CO2 emissions (post-adjustment)		2	2	3	3	3	3	3	3	3	2	2	−23.3%	−4.2%
	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	1.35	1.18	1.13	−23.5%	−4.4%
	CO2 emission intensity index (post-adjustment)		1.00	1.00	1.30	1.41	1.73	1.64	1.69	1.59	1.58	1.39	1.32	−23.5%	−4.8%
	Energy consumption ☆		1	1	1	1	1	1	1	1	1	1	1	−3.3%	−0.1%
	Energy consumption intensity index	Base year: FY2010	1.00	1.00	0.97	1.03	1.06	1.03	1.10	1.07	1.10	1.03	1.02	−3.5%	−0.7%
	Production activity index		0.99	1.00	1.02	0.94	0.88	0.89	0.82	0.86	0.84	0.88	0.88	+0.3%	+0.6%
The Real Estate Companies Association of Japan	CO2 emission intensity index (actual emissions)	Base year: FY2005	0.76	0.75	0.84	0.85	1.00	0.93	0.87	0.86	0.86	0.78	0.71	−29.2%	−10.1%
	CO2 emission intensity index (post-adjustment)		0.87	0.86	0.89	0.97	1.00	0.94	0.87	0.87	0.86	0.78	0.70	−29.4%	−9.9%
	Energy consumption intensity index ☆		0.89	0.88	0.79	0.79	0.79	0.76	0.75	0.74	0.76	0.73	0.70	−12.5%	−5.0%
Japan Building Owners and Managers Association	Energy consumption [MJ/m2 year]		2,019				1,833	1,743	1,722	1,754	1,722	1,709	1,696	−7.5%	−0.7%
	Energy consumption intensity index		1.00				0.91	0.86	0.85	0.87	0.85	0.85	0.84	−7.5%	−0.7%
Japan Securities Dealers Association	CO2 emissions (actual emissions)		19	19	19	20	19	18	17	16	15	13	12	−37.4%	−9.6%
	CO2 emissions (post-adjustment)		16	16	18	17	19	18	17	16	15	13	12	−37.4%	−10.0%
	Energy consumption		12	11	9	9	8	8	8	8	7	7	7	−21.0%	−6.2%
	Electric power consumption per unit floor area ☆	[kWh/㎡]	241	243	203	195	189	185	180	174	170	165	159	−16.2%	−3.6%
Japan Hotel Association	CO2 emissions (actual emissions)			55	58	62	62	59	56	54	52	49	46	−25.8%	−6.7%
	CO2 emissions (post-adjustment)			50	55	56	62	59	56	54	52	49	46	−25.8%	−7.0%
	Energy consumption			34	31	31	31	30	29	29	29	28	27	−12.3%	−4.2%
	Energy consumption intensity index ☆	Base year: FY2010		1.00	0.95	0.94	0.91	0.88	0.86	0.85	0.86	0.83	0.84	−7.9%	+0.6%
	Production activity index			1.00	0.99	1.02	1.03	1.04	1.05	1.05	1.05	1.04	1.00	−3.8%	−4.4%
Telecom Services Association	CO2 emissions (actual emissions)						102	96	90	90	81	77	81	−20.9%	+5.1%
	CO2 emissions (post-adjustment)						102	96	89	89	81	77	81	−20.6%	+5.1%
	Energy consumption						44	43	41	42	40	40	42	−3.9%	+5.1%
	Energy consumption intensity index ☆	Base year: FY2013					1.00	0.97	0.94	0.96	0.91	0.90	0.91	−8.7%	+0.9%
	Production activity index						1.00	0.99	1.00	1.00	1.00	1.01	1.05	+5.3%	+4.1%
Japan Internet Providers Association	CO2 emissions (actual emissions)								6	5	8	6	6		−2.7%
	CO2 emissions (post-adjustment)								6	5	8	6	6		−3.1%
	Energy consumption								3	3	4	3	3		+1.0%
	Energy consumption intensity index ☆	Base year: FY2015							1.00	0.83	1.30	0.93	0.92		−0.4%
Revisions	CO2 emissions (actual emissions)														
	CO2 emissions (post-adjustment)														
	Energy consumption														
Total *1	CO2 emissions (actual emissions)		1,625	1,958	2,208	2,459	2,315	2,242	2,083	1,904	1,753	1,635	1,567	−32.3%	−4.1%
	CO2 emissions (post-adjustment)		1,395	1,678	2,065	2,088	2,315	2,238	2,072	1,897	1,749	1,641	1,567	−32.3%	−4.5%
	Energy consumption		740	934	879	875	867	867	1,009	929	887	892	870	+0.3%	−2.5%

*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, 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	2017	2018	2019	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	5,402	3,266	4,563	−18.1%	−17.6%	+39.7%
	CO2 emissions (post-adjustment)		5,574	5,751	5,769	5,673	5,499	5,539	5,417	5,215	5,258	5,402	3,266	4,563	−18.1%	−17.6%	+39.7%
	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	0.61	0.63	0.69	−21.0%	+12.5%	+9.5%
	CO2 emission intensity index (post-adjustment)		0.88	0.82	0.83	0.77	0.73	0.62	0.57	0.59	0.61	0.61	0.63	0.69	−21.0%	+12.5%	+9.5%
	Energy consumption		2,012	2,076	2,083	2,048	1,986	1,931	1,889	1,821	1,836	1,887	1,140	1,594	−20.8%	−17.4%	+39.8%
	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	0.59	0.61	0.67	−23.5%	+12.8%	+9.5%
	Production activity index		1.65	1.81	1.79	1.91	1.95	2.33	2.48	2.28	2.22	2.31	1.34	1.71	+3.6%	−26.8%	+27.7%
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	4,087	4,104	4,044	−14.3%	−0.9%	−1.5%
	CO2 emissions (post-adjustment)		4,720	4,470	4,337	4,161	4,101	4,079	4,100	4,091	4,068	4,087	4,104	4,044	−14.3%	−0.9%	−1.5%
	CO2 emission intensity index (actual emissions) ☆	Base year: 1996	1.00	0.94	0.83	0.84	0.94	0.91	0.94	0.96	0.93	0.93	0.93	0.90	−10.3%	−1.7%	−3.5%
	CO2 emission intensity index (post-adjustment)		1.00	0.94	0.83	0.84	0.94	0.91	0.94	0.96	0.93	0.93	0.93	0.90	−10.3%	−1.7%	−3.5%
	Energy consumption		1,776	1,682	1,632	1,566	1,543	1,527	1,534	1,531	1,523	1,530	1,536	1,514	−14.8%	−0.9%	−1.5%
	Energy consumption intensity index	Base year: 1996	1.00	0.94	0.83	0.84	0.94	0.91	0.93	0.96	0.93	0.92	0.93	0.89	−10.7%	−1.7%	−3.5%
	Production activity index		1.00	1.01	1.11	1.05	0.92	0.95	0.93	0.90	0.93	0.93	0.93	0.95	−4.5%	+0.8%	+2.1%
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	2,388	2,445	2,508	−6.0%	+26.8%	+2.6%
	CO2 emissions (post-adjustment)		2,667	2,106	1,901	1,753	1,884	1,979	2,086	2,218	2,305	2,388	2,445	2,508	−6.0%	+26.8%	+2.6%
	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	0.79	0.85	0.87	−12.7%	−0.8%	+3.0%
	CO2 emission intensity index (post-adjustment)		1.00	0.93	0.88	0.88	0.89	0.88	0.84	0.85	0.82	0.79	0.85	0.87	−12.7%	−0.8%	+3.0%
	Energy consumption		1,026	810	731	674	724	748	789	839	872	903	925	949	−7.5%	+26.8%	+2.6%
	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	0.78	0.83	0.86	−14.1%	−0.8%	+3.0%
	Production activity index		1.00	0.85	0.81	0.74	0.79	0.84	0.93	0.98	1.06	1.13	1.08	1.08	+7.7%	+27.8%	−0.4%
Japan Federation of Coastal Shipping Associations	CO2 emissions (actual emissions) ☆		789	655	704	686	704	722	726	704	713	703	707	700	−11.3%	−3.1%	−1.0%
	CO2 emissions (post-adjustment)		789	655	704	686	704	722	726	704	713	703	707	700	−11.3%	−3.1%	−1.0%
	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	1.09	1.10	1.15	+10.7%	+5.6%	+4.6%
	CO2 emission intensity index (post-adjustment)		1.04	1.09	1.09	1.10	1.11	1.09	1.11	1.09	1.11	1.09	1.10	1.15	+10.7%	+5.6%	+4.6%
	Energy consumption		288	239	256	250	256	255	256	249	252	248	250	248	−14.1%	−2.9%	−0.9%
	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	1.05	1.07	1.12	+7.2%	+5.7%	+4.7%
	Production activity index		0.88	0.70	0.75	0.73	0.74	0.77	0.76	0.75	0.75	0.75	0.75	0.71	−19.9%	−8.2%	−5.3%
The Association of Japanese Private Railways	CO2 emissions (actual emissions)				216	258	289	286	274	263	257	246	227	216		−24.6%	−4.9%
	CO2 emissions (post-adjustment)				184	240	244	286	274	261	256	245	228	216		−24.6%	−5.3%
	Energy consumption				130	126	126	123	121	120	121	121	119	117		−4.8%	−1.2%
	Energy consumption intensity index	Base year: FY2010			1.00	0.98	0.97	0.94	0.93	0.92	0.92	0.92	0.90	0.88		−6.6%	−1.7%
	Production activity index				1.00	0.99	1.00	1.00	1.01	1.01	1.01	1.01	1.02	1.02		+1.9%	+0.5%
East Japan Railway Company	CO2 emissions (actual emissions)	Base year: FY2013		282	241	202	234	234	224	216	220	215	209	201		−14.1%	−3.8%
	CO2 emissions (post-adjustment)			254	215	188	233	215	223	216	218	212	206	199		−7.4%	−3.4%
	Energy consumption ☆	100 million MJ		536	527	517	523	517	511	508	502	506	495	480		−7.2%	−3.0%
	Energy consumption intensity index	(Shinkansen)		2.64	2.71	2.60	2.62	2.49	2.51	2.45	2.44	2.44	2.41	2.39		−4.0%	−0.8%
	Production activity index	(Shinkansen)		0.90	0.87	0.89	0.97	1.00	1.04	1.12	1.13	1.15	1.18	1.16		+16.0%	−1.7%
	Energy consumption intensity index	(Conventional Lines)		1.62	1.65	1.61	1.63	1.59	1.55	1.50	1.49	1.50	1.50	1.49		−6.3%	−0.7%
	Production activity index	(Conventional Lines)		1.02	1.00	0.99	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00		+0.0%	+0.0%
Shikoku Railway Company	CO2 emissions (actual emissions)		8	8	7	7	8	8	8	8	8	7	7	7	−17.3%	−13.6%	+0.3%
	CO2 emissions (post-adjustment)		8	7	7	7	7	8	8	8	8	7	7	7	−17.3%	−13.6%	+0.2%
	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	1.05	1.01	0.95	−10.0%	−16.8%	−6.1%
	CO2 emission intensity index (post-adjustment)		1.11	0.98	1.00	1.07	1.11	1.20	1.17	1.15	1.13	1.10	1.06	1.00	−10.0%	−16.8%	−6.3%
	Energy consumption ☆		4	3	3	3	3	3	3	3	3	3	3	3	−18.3%	−4.8%	+1.6%
	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	0.98	0.96	0.92	−11.0%	−8.3%	−4.9%
	Production activity index		1.07	1.06	1.00	0.96	0.95	0.95	0.93	0.95	0.95	0.95	0.92	0.98	−8.1%	+3.8%	+6.8%
All Japan Freight Forwarders Association	CO2 emissions (actual emissions) ☆	Base year: FY2009	14	13	13	13	13	13	13	13	12	12	12	12	−14.6%	−7.0%	−2.0%
	CO2 emissions (post-adjustment)		14	13	13	13	13	13	13	13	12	12	12	12	−14.6%	−7.0%	−2.0%
	Production activity index		1.13	1.00	1.01	0.96	1.01	1.06	1.06	1.09	1.08	1.10	1.00	1.02	−9.7%	−3.5%	+2.5%
Revisions *2	CO2 emissions (actual emissions)		249	238	233	318	347	414	404	394	382	367	331	329	+31.9%	−20.5%	−0.7%
	CO2 emissions (post-adjustment)		249	205	201	298	296	414	403	392	380	367	332	329	+31.9%	−20.5%	−1.1%
Total *3	CO2 emissions (actual emissions)		14,022	13,521	13,420	13,070	13,078	13,273	13,252	13,121	13,223	13,428	11,307	12,580	−13.8%	−5.2%	+11.3%
	CO2 emissions (post-adjustment)		14,022	13,460	13,330	13,019	12,982	13,254	13,250	13,117	13,219	13,423	11,307	12,578	−13.8%	−5.1%	+11.2%
	Energy consumption		5,219	5,456	5,471	5,310	5,286	5,256	5,255	5,223	5,259	5,348	4,610	5,051	−15.5%	−3.9%	+9.6%

*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, the base year is fiscal 1990.
*2 The total value of closed participant companies (West Japan Railway Company, Central Japan Railway Company, Kyushu Railway Company, Japan Freight Railway Company) lists it in Revisions.
*3 The rate of change from fiscal 2005 to fiscal 2018 is calculated except for industries with no data for fiscal 2005.