

(Provisional Translation)

Plan for Global Warming Countermeasures

October 22, 2021
Cabinet Decision

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Introduction

The Plan for Global Warming Countermeasures (hereinafter referred to as the “Plan”) is formulated in accordance with paragraph (1) of Article 8 of the Act on the Promotion of Global Warming Countermeasures (Act No. 117 of 1998) and the Action Policy on Global Warming Countermeasures Based on the Paris Agreement (as determined by the Global Warming Prevention Headquarters on December 22, 2015).

The issue of climate change is an urgent challenge that is unavoidable for each and every one of us and all living creatures on this planet. Rising average temperatures, the melting of snow and ice and rising sea levels have already been discerned worldwide. In Japan as well, rising average temperatures¹, heavy rainfall, damage caused by typhoons and other storms², and the impact on crops³ and ecosystems⁴ have been observed. While it is not easy to clarify the relationship between individual meteorological disasters and global warming, numerical modelling based on observations predicts that the risk of heavy rainfall and heat waves will increase as global warming progresses.⁵ Climate change is also affecting the natural world and human society across all continents and the oceans of the world. It is said that continuous emissions of greenhouse gases will increase the likelihood of serious, widespread, and irreversible impacts for people and ecosystems. This awareness has also been voiced by the future generations who is expected to be at the focal point of society at the midpoint of this century.⁶ This future generations have also expressed the need for system change based on climate justice across regions, genders, and generations⁷ Against the backdrop of a growing sense of crisis over the intensification of meteorological disasters, local governments that aspire to achieve net zero emissions of carbon dioxide by 2050—the “zero-carbon cities”—numbered a mere four as of September 2019 but have grown in number at an accelerating pace to number 464 as of the end of September 2021. The total population of the expressed local governments, excluding overlaps between prefectures and municipalities, is calculated to be over 110 million.

In the corporate and financial sector, the Paris Agreement, combined with the ESG finance movement and other factors, has led to a global trend to incorporate

¹ The rate of increase from the start of the collection of statistics in 1898 to 2020 is 1.26 degrees centigrade per 100 years. (*Annual surface temperature anomalies from 1898 to 2020 in Japan*, Japan Meteorological Agency)

² *Climate Change Impact Assessment Report* (Summary) (published by the Ministry of the Environment, December 2020)

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ February 26, 2021. Hearing at a joint meeting (third) of the Subcommittee on Medium- to Long-term Climate Change Countermeasures (Global Environment Committee, Central Environment Council) and the Working Group on the Study of Global Warming Countermeasures (Global Environment Subcommittee, Subcommittee on Industrial Technology and the Environment, Industrial Structure Council)

⁷ February 26, 2021. Hearing at a joint meeting (third) of the Subcommittee on Medium- to Long-term Climate Change Countermeasures (Global Environment Committee, Central Environment Council) and the Working Group on the Study of Global Warming Countermeasures (Global Environment Subcommittee, Subcommittee on Industrial Technology and the Environment, Industrial Structure Council)

decarbonization into corporate management (decarbonization management). In addition, the movement to select supply chain partners around the world with the aim of decarbonization is also accelerating. As climate change issues, such as the intensification of damage caused by natural disasters, are becoming a risk to corporate sustainability,⁸ companies are increasingly engaging in management to avoid risks and seize opportunities through decarbonization. Amidst the need to pursue various forms of social change in order to achieve sustainable development goals (SDGs) and address other global issues, it has become obvious that efforts to, in particular, reduce greenhouse gas emissions to net zero and otherwise contribute to worldwide net zero will become the key focus of competition. We need to realize a *virtuous cycle of the economy and the environment* by changing conventional thinking and proactively implementing countermeasures to bring about changes to industrial structures and socioeconomic changes that can then lead to the next major growth. It is also important to pursue global warming countermeasures from the standpoint of such industrial policies, such that we, as a nation, will need to, as much as possible, provide a specific vision, outline high-level targets, and create an environment to help the private sector take up challenges.

As set forth in Article 1 of the Act on Promotion of Global Warming Countermeasures, the prevention of global warming by way of stabilizing the concentration of greenhouse gases in the atmosphere at a level that will not cause dangerous anthropogenic interference with the climate system is a challenge common to all humanity. With mitigation and adaptation constituting twin prongs of climate change countermeasures, the government will steadily promote climate change countermeasures with a view to achieving GHG net zero by 2050 based on the Act on the Promotion of Global Warming Countermeasures, the Plan, the Climate Change Adaptation Act (Act No. 50 of 2018), and the Climate Change Adaptation Plan (Cabinet decision made on October 22, 2021) as formulated based on the same statute.

(IPCC report findings)

When discussing the issue of climate change, it is essential to organize the scientific findings. In this connection, the Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in order to evaluate scientific, technological, and socioeconomic information related to climate change and enable the obtained knowledge and findings to be widely available to policymakers and the general public. The IPCC published its *Fifth Assessment Report* (AR5) from 2013 to 2014.

The following contents were included in the AR5⁹:

8 Climate Change Impact Assessment Report (Summary) (published by the Ministry of the Environment, December 2020)

9 IPCC 2013: “Summary for Policymakers” in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change; IPCC 2014:

- Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.
- Anthropogenic greenhouse gas emissions are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.
- In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans.
- Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions.
- Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation¹⁰, can limit climate change risks.
- Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond.
- Relative to 1850–1900, global surface temperature change for the end of the 21st century (2081–2100) is projected to likely exceed 2°C for scenarios without additional efforts to constrain emissions, but unlikely to exceed 2°C for a stringent mitigation scenario.
- There are multiple mitigation pathways that are likely to limit warming to below 2°C relative to pre-industrial levels. Scenarios which are likely to maintain warming below 2°C over the 21st century are characterized by 40 to 70% global anthropogenic GHG emissions reductions by 2050 compared to 2010, and emissions levels near zero or below in 2100.
- Delaying additional mitigation to 2030 will substantially increase the challenges associated with limiting warming over the 21st century to below 2°C relative to pre-industrial levels. It will require substantially higher rates of emissions reductions from 2030 to 2050; a much more rapid scale-up of low-carbon energy over this period; a larger reliance on CDR¹¹ in the long term; and higher transitional and long-term economic impacts.
- Adaptation and mitigation are complementary strategies for reducing and

Climate Change 2014: Synthesis Report. Contribution of Working Group I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

¹⁰ In Box SPM.2 in the contribution of Working Group II for the IPCC Fifth Assessment Report, adaptation is defined as “The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.”

¹¹ Carbon dioxide removal (CDR) technology is a set of technologies designed to directly eliminate carbon dioxide from the atmosphere by (1) increasing the amount of carbon that is absorbed by improving the existing natural actions of trees, soil, and other elements of the natural world and (2) removing carbon dioxide using chemical actions.

managing the risks of climate change. Substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, reduce the costs and challenges of mitigation in the longer term and contribute to climate-resilient pathways for sustainable development.

- Many adaptation and mitigation options can help address climate change, but no single option is sufficient by itself. Effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses that link adaptation and mitigation with other societal objectives.

In October 2018, the IPCC issued the *1.5°C Special Report* (the official title is *Global Warming of 1.5°C: an IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*). It was produced in response to the IPCC being called upon to prepare a special report summarizing differences in the impact between a 2°C increase in temperature and a 1.5°C increase in temperature and the emission pathways for limiting the increase in temperature to 1.5°C when it was pointed out that there was insufficient scientific knowledge on 1.5°C warming at the United Nations Framework Convention on Climate Change (hereinafter referred to as UNFCCC) the 21st Conference of the Parties (COP21), which adopted the Paris Agreement

This report contained the following¹²:

- Human activities are estimated to have caused approximately 1.0° C of global warming above pre-industrial levels as of 2017. Global warming is likely to reach 1.5° C between 2030 and 2052 if it continues to increase at the current rate.
- Climate models project robust differences in regional climate characteristics between present-day and global warming of 1.5°C, and between 1.5°C and 2°C.
- In model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO₂ emissions reach net zero around 2050. These pathways would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems.
- Climate change has already impacted on people, ecosystems, and livelihoods around the world.
- Limiting global warming to 1.5°C rather than 2°C or more will have obvious benefits.
- Limiting global warming to 1.5°C can be achieved in conjunction with global goals other than climate goals, such as achieving sustainable development and eradicating poverty

¹² IPCC 2018: “Summary for Policymakers” in *Global Warming of 1.5 °C: An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*; IPCC “Global Warming of 1.5°C Presentation” to the wrap-up of the Talanoa Dialogue preparatory phase (2018). This document was produced by the IPCC Secretariat to provide a brief overview of the *Special Report on Global Warming of 1.5°C* at COP24.

In addition, the contribution by Working Group I to the IPCC's *Sixth Assessment Report* in the form of a *Summary for Policymakers* was released in August 2021. The IPCC regularly releases reports summarizing the latest scientific findings, and this is the first report in eight years since the last AR5. In the future, this report is slated to be followed up with the release of a report on *Impacts, Adaptation, and Vulnerability* (Working Group II), *Mitigation of Climate Change* (Working Group III), and *Synthesis Report*.

The report provided the following findings (according to a provisional translation as of August 20, 2021, which is slated to be updated to a final translation based on the opinions of experts; the latest translation is expected to be posted to the official website of the Japan Meteorological Agency¹³ as needed)¹⁴:

- It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.
- Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since AR5.
- Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.
- Many changes in the climate system become larger in direct relation to increasing global warming. They include increases in the frequency and intensity of hot extremes, marine heatwaves, heavy precipitation, and in some regions, agricultural and ecological droughts; an increase in the proportion of intense tropical cyclones; and reductions in Arctic sea-ice, snow cover and permafrost.

(International movements and Japan's efforts with respect to targets and countermeasures by 2020)

In order to deal with climate change, the UNFCCC was adopted in May 1992 and entered into force in 1994. Japan became a signatory to the convention at the United Nations Conference on Environment and Development in June 1992 and concluded the convention in May 1993. The Kyoto Protocol, which committed advanced countries to legally binding reductions in greenhouse gas emissions, was adopted at COP3, which was held in Kyoto in December 1997 as the first step in achieving long-term, continuous reductions in emissions in order to achieve the ultimate goal as provided for in the UNFCCC. Japan concluded the Kyoto Protocol in 2002. In order

¹³ <https://www.data.jma.go.jp/cpdinfo/ipcc/ar6/index.html>

¹⁴ IPCC 2021: Summary for Policymakers. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*

to comply with the commitment to reduce greenhouse gas emissions in the first commitment period (FY2008 to FY2012) by 6% compared to the reference year (in principle, 1990), Japan formulated the Kyoto Protocol Target Achievement Plan (Cabinet decision made on March 28, 2008) based on the Act on Promotion of Global Warming Countermeasures and took comprehensive and systematic global warming countermeasures accordingly. Consequently, the five-year average of total emissions during the first commitment period was 1,278 million tCO_{2e} (CO₂ equivalent¹⁵; the same hereinafter) (1.4% increase compared to the reference)¹⁶ and 8.7% decrease compared to the reference year when forest and other carbon sinks and Kyoto Mechanism credits are taken into account, and Japan achieved the Kyoto Protocol target of 6% reduction compared to the reference year.

Greenhouse gas emission reduction targets for after the first commitment period under the Kyoto Protocol (which began in 2013) up to 2020 were continuously discussed at COP15, which was held in Copenhagen, Denmark, in December 2009, and at COP16, which was held in Cancun, Mexico, between November and December 2010. At COP16, the Cancun Agreement was adopted, recognizing the need to significantly reduce greenhouse gas emissions in order to keep the global average temperature increase to less than 2°C from the preindustrial level, and setting out, among other things, the reduction targets for Annex I countries (developed countries) and the reduction actions by non-Annex I countries (developing countries). The reduction targets and actions of both developed and developing countries came to be positioned within the same framework, and it brought us closer to a fair and effective framework that Japan aspired to have. However, challenges remained as this framework was not legally binding and there were clear differences in the responses by developed and developing countries.

At COP17, which was held in Durban, South Africa, between November and December 2011, it was determined that a legal framework applicable to all parties beginning in 2020 would be adopted by 2015. It also decided on the establishment of a second commitment period, whilst noting that Japan will not participate in the Kyoto Protocol's second commitment period after 2013.

While Japan's reduction target for FY2020 had been set to a decrease of 25% compared to FY1990, it was reviewed in response to changes in the situation Japan has faced, such as the Great East Japan Earthquake in March 2011. In light of the fact that our energy policy and energy mix, including how nuclear power should be utilized, are still under consideration, the target at this moment, which does not include the reduction effect of greenhouse gas emissions from nuclear power, was set to a decrease of 3.8% compared to FY2005 and was registered to the Secretariat of the UNFCCC in November 2013.

¹⁵ CO₂ equivalent: The volume of emissions for each greenhouse gas is multiplied by the global warming potential for that gas; the sum thereof is the CO₂ equivalent.

¹⁶ Based on FY2012 greenhouse gas emissions (final figure) (released on April 15, 2014). However, as the five-year total for forest removal exceeded the upper limit set for Japan (238.3 million tCO₂ over five years), the annual average of the upper limit was included.

(Actions based on the establishment of a post-2020 international framework and the submission of the Intended Nationally Determined Contribution)

Based on the agreement at COP 17, negotiations have been underway on a new post-2020 legal framework applicable to all parties, with the aim of adopting it at COP 21 in 2015. At COP19, which was held in Warsaw, Poland, in November 2013, all parties were invited to present the Intended Nationally Determined Contribution (hereinafter referred to as “INDC”, which would become a nationally determined contribution (NDC) unless the given party decides otherwise) for 2020 and beyond, well in advance of COP21 (by the first quarter of 2015 for countries capable of preparing such proposals).

For Japan’s INDC, a draft commitment to set our reduction target for FY2030 to a decrease of 26.0% compared to FY2013 (a decrease of 25.4% compared to FY2005) was determined at a meeting of the Global Warming Prevention Headquarters on July 17, 2015, and was submitted to the UNFCCC Secretariat on the same day.

At COP21, which was held in Paris, France, from November to December 2015, negotiations aimed at adopting a fair and effective post-2020 legal framework in which all countries would participate resulted in the adoption of the Paris Agreement.

The Paris Agreement includes the following points:

- Holding the increase in the global average temperature to well below 2°C above pre-industrial levels as a common global long-term goal, and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- All Parties, including major emitting countries, shall submit and update their nationally determined contributions every five years toward a global response to climate change.
- Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of nationally determined contributions.
- Each Party’s successive nationally determined contribution will represent a progression beyond the Party’s then current nationally determined contribution
- Each Party shall provide information and undergo review of its implementation in a common and flexible manner.
- The importance of utilizing market mechanisms, including the Joint Crediting Mechanism (hereinafter referred to as “JCM”), the conservation and enhancement, as appropriate, of removals and reservoirs of the greenhouse gases including forests.
- Parties are encouraged to take action to implement and support the existing framework for activities relating to reducing emissions from deforestation and forest degradation.
- Establishing the long-term global goal on adaptation and engaging each party’s adaptation planning processes and implementing of actions,
- Developed country Parties shall provide financial resources to assist developing country Parties. Other Parties are encouraged to provide or continue to provide such support voluntarily.
- The importance of innovation is recognized.
- A framework is established for taking stock of the implementation every five years.

(Entry into force of the Paris Agreement and negotiations on the implementation policies, etc.)

The Paris Agreement entered into force on 4 November, the year after its adoption, having met the entry into force requirements of 55 parties and their emissions exceeding 55% of the global total in October 2016, and Japan concluded the Paris Agreement on 8 November of the same year. At COP24, which was held in Katowice, Poland, in December 2018, an implementation guidance commonly applicable to all countries was adopted, without the bifurcation that might have seen a difference in initiatives to be implemented between developed and developing countries in line with the spirit of the Paris Agreement. This implementation guidance includes, among other matters, mitigation (information on post-2020 reduction targets and calculation method for assessing the achievement of targets), a transparency framework (for reporting of greenhouse gases emissions by each party and the state of progress with respect to reduction targets and the achievement of such targets, etc.), and the method by which the outlook for and results of financial support is to be reported.

On the other hand, Article 6 (market mechanisms and other matters) of the Paris Agreement was not agreed upon at COP25, which was held in Madrid, Spain, in December 2019 therefor continues to be discussed. While COP26 was slated to be held in Glasgow, the United Kingdom, in November 2020, the emergence of COVID-19 forced it to be postponed to 2021.

Under the Paris Agreement, the year 2020 is an important year in that NDCs, for which 2030 is the target year, are required to be communicated or updated. Japan also submitted its NDC in March 2020, stating, among other things, that it would pursue further efforts to reduce greenhouse gas emissions on a medium and long-term basis rather than keep its reduction to the level set forth in its INDC.

(Japan-U.S. climate partnership and the G7 Cornwall Summit)

At a Japan-US leaders' summit held on April 16, 2021, it was confirmed that Japan and the United States would take the lead in global decarbonization. The Japan-U.S. Climate Partnership on Ambition, Decarbonization, and Clean Energy was established to further strengthen cooperation in the area of implementation of the Paris Agreement, clean energy technologies and the transition to decarbonization in developing countries.

The G7 Climate and Environment Ministers' Meeting was held on May 20 and 21, 2021. This was the first-ever G7 meeting of environment ministers to be held with a name that explicitly referred to *climate*. G7 members affirmed their commitment to GHG net zero by 2050 and significantly strengthened 2030 targets consistent with GHG net zero, and called on all countries, especially other major emitters, to strengthen their NDCs.

At the G7 Cornwall Summit held in Cornwall, United Kingdom, from 11 to 13 June 2021, G7 leaders confirmed their commitments to efforts to achieve a net zero goal by 2050 at the latest as well as increased 2030 targets that each country had committed in line with the 2050 goal. In addition, they concurred on achieving an overwhelming decarbonized domestic power systems in the 2030s and phasing out new direct

government support for international carbon-intensive fossil fuel energy as soon as possible, with limited exceptions. Domestically, consistent with their Nationally Determined Contributions (NDCs) and net zero commitment, the G7 leaders concurred on rapidly scaling-up technologies and policies that further accelerate the transition away from unabated coal capacity. The G7 leaders also committed to an end to new direct government support for unabated international thermal coal power generation by the end of 2021. In addition, G7 leaders reaffirmed the collective developed country goal to jointly mobilise USD 100 billion per year for 2021-2025, and the G7 has also committed to increasing and improving their overall international public climate finance contributions over this period.

Chapter 1: Basic direction of the promotion of global warming countermeasures

Section 1: The direction Japan seeks to take in implementing its global warming countermeasures

Japan will take the initiative in implementing global warming countermeasures under arrangements of international collaboration based on scientific knowledge.

1. Medium and long-term strategic efforts for achieving GHG net zero by 2050

The Paris Agreement aims to reach global peaking of greenhouse gas emission as soon as possible and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century in order to achieve the long term goal to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C.

As indicated in the *1.5°C Special Report*, it is globally urgent that we recognize that there are meaningful differences in the impact that might occur between a 1.5°C increase and a 2°C increase in temperature and that we pursue efforts to limit the increases in the global average temperature to 1.5°C from the preindustrial levels.

Japan aims to reduce overall greenhouse gas emissions to zero by 2050, in other words, to realize net zero by 2050 in accordance with the notion that industrial structures and economic society can be transformed by proactively implementing global warming countermeasures that no longer act as a constraint on economic growth and that can instead lead to significant growth. The Act to Partially Amend the Act on the Promotion of Global Warming Countermeasures (Act No. 54 of 2021; the Amended Act on the Promotion of Global Warming Countermeasures), which was passed by the 204th session of the Diet, codified the goal of GHG net zero by 2050 into law. Accordingly, we will not just attain our medium-term targets but also work to enhance the continuity and predictability of policies for realizing a decarbonized society and accelerate actions, investments, and innovations for the sake of decarbonization.

In addition, we will aim to reduce greenhouse gases by 46% from FY2013 levels in FY2030 and continue to challenge ourselves to raise this figure to 50% in an ambitious manner consistent with our 2050 target. In order to give rise to a virtuous cycle for the economy and the environment and to grow strongly towards the achievement of our ambitious target for FY2030, we will promote as many actions as possible in all areas, such as thorough energy conservation, introduction of renewable energy sources to the maximum extent possible, and decarbonization of the public sector and regions. In the food, agriculture, forestry, and fisheries sectors, we aim to achieve both increased productivity and sustainability through innovations in accordance with the Green Food System Strategy (as determined by the Ministry of Agriculture, Forestry and Fisheries on May 12, 2021). Moreover, we will steadily implement cross-sectoral decarbonization and other such actions on national land and in our urban and regional spaces in accordance with the Green Challenge for Land, Infrastructure, Transport, and Tourism (as determined by the Ministry of Land, Infrastructure, Transport and Tourism on July 6, 2021). We will also create new industries and jobs by promoting a strategic shift to a

circular economy, which is needed for decarbonization, and nature-based solutions (NbS¹⁷). Japan will continue to take on challenges towards 2030 and 2050. The realization of GHG net zero by 2050 and a 46% reduction target by FY2030 will certainly not be easy, it is essential to position decarbonization as one of the main agendas in all socio-economic activities and to promote the transformation to a sustainable and resilient socio-economic system. We will promote growth-contributing policies centered around decarbonization in order to realize our targets.

2. Actions to reduce global greenhouse gas emissions

Japan will demonstrate international leadership in terms of spearheading global decarbonization. We will continue to expand cooperation based on ties of collaboration with partner countries on the basis of relationships of trust that have been built up to date, and promote the business-led international development of technologies and products that offer high levels of environmental performance by leveraging our technological strengths and making further improvements to the environment, such as by creating markets, developing human resources, and building systems in order to make maximum contributions to the efforts to reduce global emissions.

Section 2: Basic approach to global warming countermeasures

1. Improving the environment, the economy, and society on an integrated basis

In promoting global warming countermeasures, we will seek to promote countermeasures that will help improve the environment, the economy, and society on an integrated basis by harnessing local resources, technological innovations, and ingenuity and utilizing AI, the IoT, and other digital technologies in order to stimulate the Japanese economy, create jobs, solve issues plaguing local communities, and enable the achievement of SDGs.

Specifically, in order to promote economic development, the realization of high standards of living for citizens, the revitalization of communities, and reductions of greenhouse gas emissions while living in harmony with nature, we will boldly implement the thorough promotion of energy conservation, the adoption of renewable energy to the maximum extent possible, the further acceleration of technological development and social implementation, transformation of approaches to living and work, transition to a nature-friendly society by promoting circular economy including 3R (Reduce generation of waste and other materials, Reuse and Recycle of recyclable resources) + Renewable (biomass use, use of recycled materials, etc.) and long-term demonstration of ecosystem services such as carbon removal and storage by natural ecosystems, and aggressive business transformation towards decarbonization and support for labor mobility without associated unemployment, etc. The Paris Agreement stipulates that a “just transition of the workforce” is imperatives, such that it is also important to realize decent jobs and improve labor productivity. In addition, the existence of many companies rooted in local communities in Japan means that we will need to consider, in addition to the workforce, transitions of the local economies and

¹⁷ Nature-based solutions: Initiatives undertaken in an effort to resolves societal challenges by harnessing the functions of healthy natural ecosystems.

local companies in an integrated manner.

It is exceedingly important that the direction of integrated environmental, economic, and social improvement is shared by all actors, including citizens, the national government, local governments, and businesses, and that they cooperate and take actual action towards this materialization.

2. Green recovery from COVID-19

It is said that COVID-19 and other emerging infectious diseases are deeply connected to the loss of biodiversity, climate change, and other changes in the global environment¹⁸ and are forcing us to rethink the future of human activities and the way we coexist with nature. The G7 Cornwall Summit shared the recognition that “(t)he unprecedented and interdependent crises of climate change and biodiversity loss pose an existential threat to people, prosperity, security and nature.” Urgent and specific actions are needed to move towards global sustainability, further mitigate and adapt to climate change, and halt and reverse biodiversity loss and environmental degradation.

Around the world, green recovery efforts are being promoted to raise the level of ambition of climate change countermeasures and achieve a sustainable economy and society as these matters relate to economic recovery in the wake of COVID-19. The new crisis brought about by COVID-19 has substantially altered the global socioeconomic framework, such that climate change countermeasures will also need to be promoted as an integral part of the way we will respond to these changes. In recognizing that we stand at a significant crossroads at this time in history, we will need to achieve a transformation of the social system into one that is sustainable and resilient rather than return to the society that existed before the emergence of COVID-19. Based on the commitment of 2050 GHG net zero, we will accelerate the three pillars of transition to a decarbonized society, circular economy, and decentralized society, and redesign, in a forceful manner, the economy and society to be sustainable and resilient.

3. Transforming the awareness of all actors, changing their behaviors, and strengthening their coordination

The issue of global warming is strongly linked to socioeconomic activities, local communities, and the lives of people in general and will have a big impact on future generations, which means that the people, the national government, local governments, businesses, and other actors will all need to address this issue in a participatory and coordinated way.

To this end, knowledge of global warming, which is becoming increasingly serious, and information on what each individual should do and on the state of progress with respect to the implementation of global warming countermeasures should be proactively

¹⁸ In the *Workshop Report on Biodiversity and Pandemics of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (2020), the underlying causes of the pandemic are claimed to be the same global environmental changes that are causing biodiversity loss and climate change, examples of which include changes in land use, the expansion and intensification of agriculture, and the trade in and consumption of wildlife. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established in April 2012 as an intergovernmental organization that makes policy recommendations based on the results of research on biodiversity and ecosystem services carried out worldwide.

provided and shared as visibly as possible. We will train human resources and develop activities to communicate these ideas and put them into action so as to induce changes in awareness and behavior across all sectors and levels of the nation.

4. Contributing to the global greenhouse gas reductions by strengthening research and development and diffusing leading decarbonization technologies

In order to tackle the global challenge of climate change and bring about a decarbonized society, we must innovate in ways that are not an extension of the past. The realization of a decarbonized society requires that we correct the singular understanding that innovation means technology innovation only, and promote innovation for practical applications and diffusion with a view to promoting the social implementation of technologies, including by way of spreading existing superior technologies along with innovation entailing the creation of cutting-edge technologies. From this perspective, performance and efficiency are also important but so is innovation conceived through a consideration of needs and a conception of what our future society should look like since performance, no matter how advanced, cannot be demonstrated if a technology is not selected by users.

We will strengthen research and development work on innovative technologies that pertain to promising fields based on, among other documents, the Sixth Basic Plan for Science, Technology, and Innovation (Cabinet decision made on March 26, 2021) and the Innovative Strategy for Environmental Innovations (decision made by the Integrated Innovation Strategy Promotion Council on January 21, 2020). In addition, we will promote the diffusion of leading decarbonization technologies and the implementation of mitigation activities through the JCM and others.

5. Implementation of the Paris Agreement

In order to achieve the goals of the Paris Agreement, we will steadily implement the five-year cycle of the submission and updating of targets under the Paris Agreement, as well as the reporting and reviewing of tracking progress made in implementing and achieving targets. Furthermore, Japan will also proactively contribute to the establishment of detailed international rules of the Paris Agreement. We will also steadily respond to reports and reviews with respect to the state of initiatives as made by each country under the Paris Agreement.

6. Emphasizing the evaluation and review process (PDCA)

In order to constantly monitor and ensure the effectiveness of the Plan, the progress of the countermeasures taken by the government for each of the countermeasures will be tracked and checked annually after the Plan is formulated, by assessing the amount by which emissions have been reduced for each type of greenhouse gas and other pertinent categories, evaluation indicators for countermeasures, and other relevant indicators (hereinafter referred to as “measure evaluation indicators”) and flexibly review the Plan as required.

Chapter 2: Greenhouse gas emissions reduction and removal targets

Section 1: Greenhouse gas emissions reduction target in Japan

Japan aims to reduce greenhouse gas emissions by 46% in FY 2030, from FY2013 levels as medium-term goal. Furthermore, Japan will also continue to strenuous efforts in its challenge to meet the lofty goal of cutting its emission by 50%.

Section 2: State of greenhouse gas emissions in Japan

As shown in Figure 1, Japan has reduced greenhouse gas emissions for six consecutive years since 2014. Total greenhouse gas emissions¹⁹ in FY2019²⁰ are 1,212 million t-CO₂, which represents a 14.0% decrease compared to the total emissions in FY 2013 (1,408 million tons).

Factors contributing to the decrease in emissions compared to FY2013 include a decrease in energy consumption (e.g., energy conservation), and a decrease in electricity-derived CO₂ emissions due to the low-carbonization of electricity (e.g., increased introduction of renewable energy and restart of nuclear power plants).

Changes in the amount of CO₂ emissions (after allocation of power and heat) by sector in Japan are shown in Figure 2, while the breakdown by sector for FY 2019 is shown in Figure 3. In examining the data by sector, emissions from the industrial sector, transport sector, commercial and other sectors (including commerce, service, office, etc.), and residential sector are all on a downward trend (17.0% decrease compared to FY2013 in FY2019 (industrial sector), 8.2% decrease (transport sector), 18.8% decrease (commercial and other sectors), 23.3% decrease (residential sector)).

¹⁹ In this Plan, actual greenhouse gas emissions are the FY2019 greenhouse gas emissions (final figures) (published on April 13, 2021) unless otherwise stated.

²⁰ Figures for the HFCs, PFCs, SF₆ and NF₃ are calendar year values.

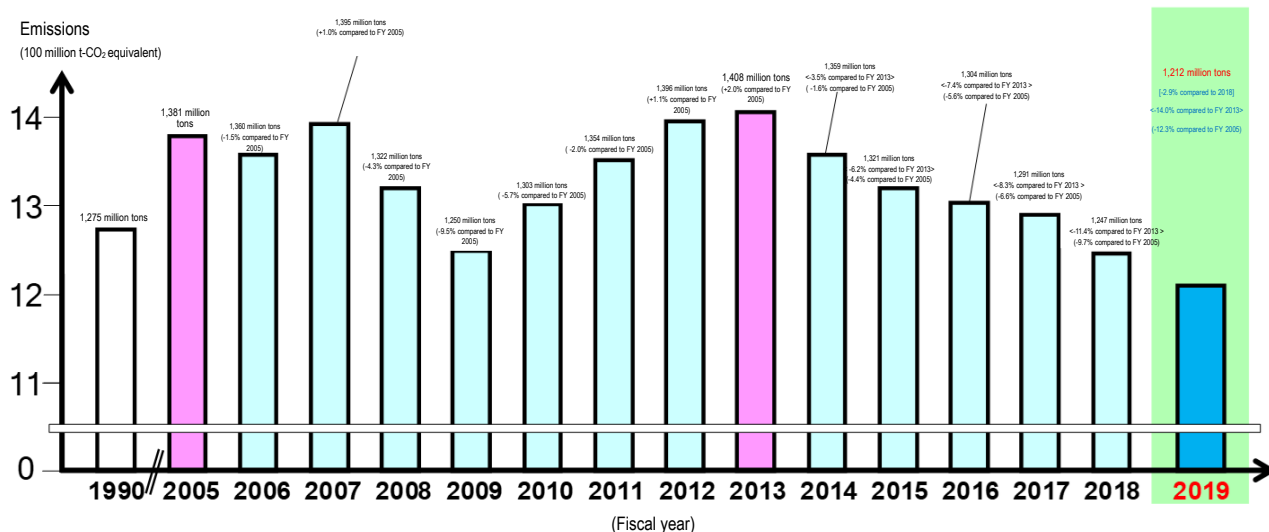


Figure 1: Changes in the greenhouse gas emissions in Japan

Reference: Based on greenhouse gas inventories

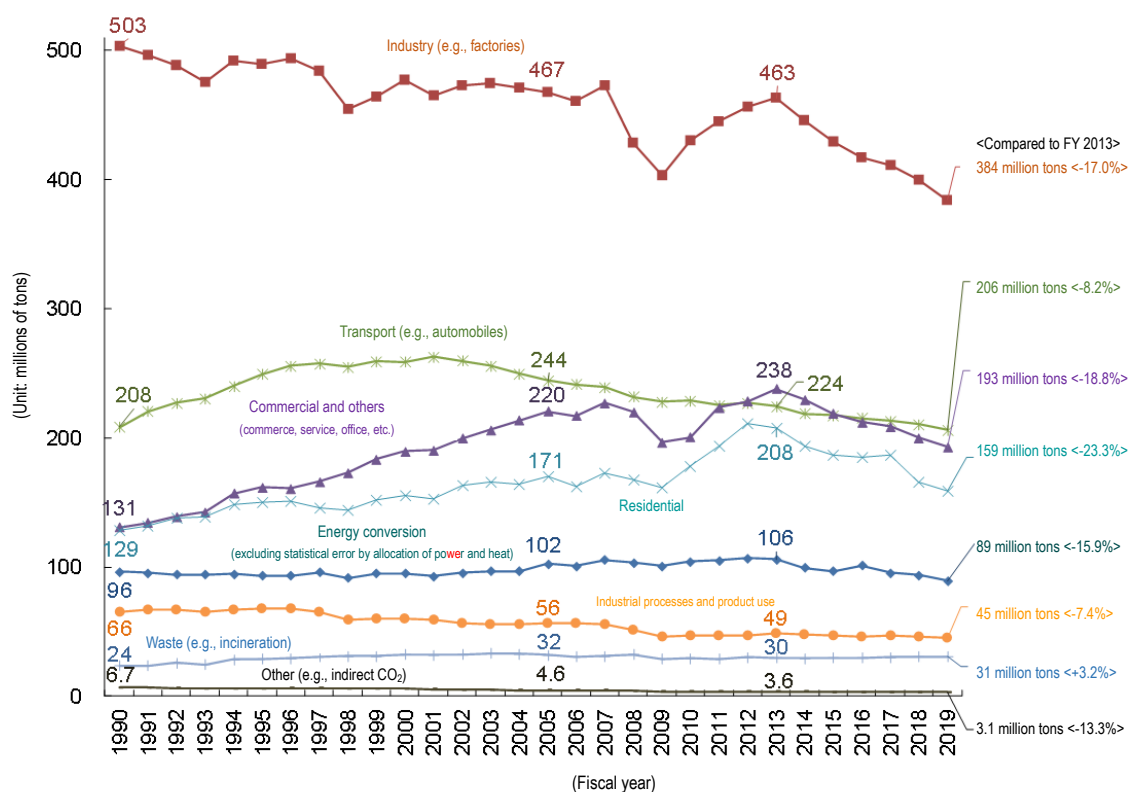


Figure 2: Changes in CO₂ emissions
(after allocation of power and heat) by sector in Japan

(Figures in brackets are percentage changes in FY2019 emissions from FY2013 emissions for each sector.)

Reference: Based on greenhouse gas inventories

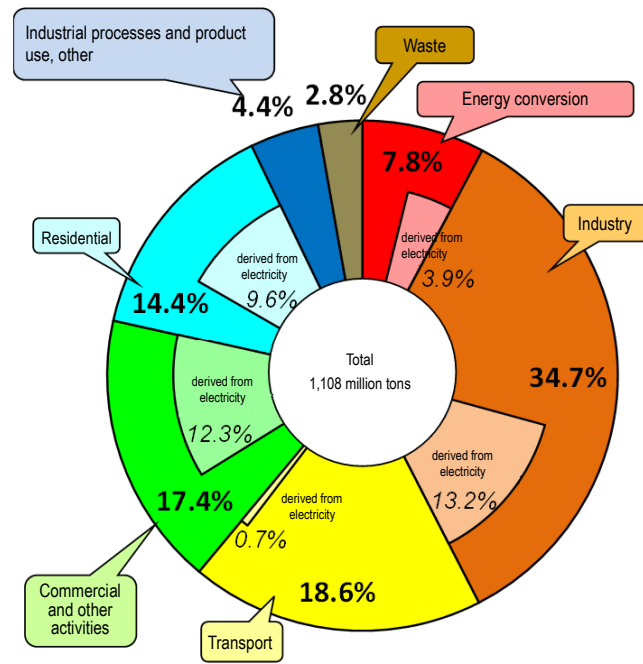


Figure 3: CO₂ emissions by sector in Japan (FY 2019)
Reference: Based on greenhouse gas inventories

Section 3: Targets for each greenhouse gas and other category

Targets of greenhouse gas emissions reduction and removals for each greenhouse gas and for other category are set as follows.

Table 1: Targets and estimates for each greenhouse gas and other category

(Unit: Million t-CO₂)

	Actual for FY 2013	Actual for FY 2019 (compared to FY 2013)	Targets and estimates for FY 2030 ²¹ (compared to FY 2013)
Greenhouse gas emissions and removals	1,408	1,166 ²² (▲17%)	760 (▲46% ²³)
Energy-related CO ₂	1,235	1,029 (▲17%)	677 (▲45%)
Industry	463	384 (▲17%)	289 (▲38%)
Commercial and others	238	193 (▲19%)	116 (▲51%)
Residential	208	159 (▲23%)	70 (▲66%)
Transport	224	206 (▲8%)	146 (▲35%)
Energy-conversion ²⁴	106	89.3 (▲16%)	56 (▲47%)
Non-energy-related CO ₂	82.3	79.2 (▲4%)	70.0 (▲15%)
Methane (CH ₄)	30.0	28.4 (▲5%)	26.7 (▲11%)
Nitrous oxide (N ₂ O)	21.4	19.8 (▲8%)	17.8 (▲17%)
Four gases incl. alternative CFC ²⁵	39.1	55.4 (+42%)	21.8 (▲44%)
Hydrofluorocarbons (HFCs)	32.1	49.7 (+55%)	14.5 (▲55%)
Perfluorocarbons (PFCs)	3.3	3.4 (+4%)	4.2 (+26%)
Sulfur hexafluoride (SF ₆)	2.1	2.0 (▲4%)	2.7 (+27%)
Nitrogen trifluoride (NF ₃)	1.6	0.26 (▲84%)	0.5 (▲70%)
Greenhouse gas removals	—	▲45.9	▲47.7
Joint Crediting Mechanism (JCM)	Japan aims to contribute to international emission reductions and removals at the level of a cumulative total of approximately 100 million t-CO ₂ by fiscal year 2030 through public-private collaborations. Japan will appropriately count the acquired credits to achieve its NDC.		

²¹ Figures of energy-related CO₂ are estimated values.

²² Gross greenhouse gas emissions minus removals by greenhouse gas removals.

²³ Japan will also continue to take on the challenge of raising this figure to 50%.

²⁴ Excluding statistical errors from power and heat allocation. For that reason, the total sum of the actual emissions by each sector is not equal to the emissions of energy-related CO₂.

²⁵ Figures of HFCs, PFCs, SF₆ and NF₃ are calendar year values.

1. Greenhouse gases

We hereby target carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃) for reduction and set emission reduction targets for FY2030 by greenhouse gas as follows.

(1) Energy-related CO₂

Energy-related CO₂, which accounts for more than 80% of Japan's greenhouse gas emissions, can be statistically divided into five sectors: industrial sector, commercial and other sectors, residential sector, transport sector, and energy-conversion sector, and the effects of countermeasures can also be seen for each of these sectors. Future emission projections for each of these sectors are outlined in Table 1. In Table 1, we have set estimates of what could be achieved if countermeasures on the supply side of energy achieved the desired results and countermeasures in each sector on the demand side of energy achieved the desired results, while Japan achieved a certain level of economic growth. For energy-related CO₂, a decrease of 45% compared to FY2013 (approximately 677 million t-CO₂) is set as the target for FY2030.

(2) Non-energy-related CO₂

For non-energy-related CO₂, a decrease of 15% compared to FY 2013 (approximately 70 million t-CO₂) is set as the target for FY2030.

(3) Methane

For methane, a decrease of 11% compared to FY 2013 (approximately 26.7 million t-CO₂) is set as the target for FY2030.

(4) Nitrous oxide

For nitrous oxide, a decrease of 17% compared to FY 2013 (approximately 17.8 million t-CO₂) is set as the target for FY2030.

(5) Fluorinated gases

For four gases, incl. alternative CFC (HFCs, PFCs, SF₆, and NF₃), a decrease of 44% compared to FY 2013 (approximately 21.8 million t-CO₂) is set as the target for FY2030.

2. Greenhouse gas removals

For forest removals, removal of approximately 38 million t-CO₂ is set as the target for FY2030. In addition, securing the removal of approximately 9.7 million t-CO₂ through the promotion of agricultural soil carbon removals countermeasures and urban greening, among other options, is set as the target for FY2030.

3. Joint Crediting Mechanism (JCM)

Japan will establish and implement the Joint Crediting Mechanism (JCM) in order to quantitatively evaluate Japanese contributions to greenhouse gas emission reductions and removals which are achieved through the diffusion of, among others, leading decarbonizing technologies, products, systems, services, and infrastructures as well as through the implementation of measures in developing countries and others; and to use such contributions to achieve Japan's NDC. By doing so, Japan aims to secure accumulated emission reductions and removals through public-private collaborations at the level of approximately 100 million t-CO₂ by FY2030.

Section 4: Targets for individual countermeasures

In order to achieve the targets by greenhouse gases and other classifications and the estimates for energy-related CO₂ emissions by sector in FY2030 as established in the previous section, for individual countermeasures with concrete numerical support, the following items are to be specified: a measure evaluation indicators in Japan as a whole, projections of emission reductions, national measures for promoting countermeasures, and examples of countermeasures expected to be implemented by local governments, which are presented in table format for each field and classification. (See Annexes 1-6).

Measure evaluation indicators for FY2030 are defined as targets for individual

countermeasures to achieve targets by greenhouse gases and the estimates for energy-related CO₂ emissions by sector. Measure evaluation indicators other than FY2030 is defined as a set of estimates to verify the state of progress toward FY 2030.

The estimated amount of greenhouse gas emission reductions (CO₂ equivalent) by implementing a certain countermeasure is calculated together with factors other than the effects of the relevant countermeasure. Assumptions for the calculations of the estimates as of the time the Plan is formulated are clarified to enable ex-post verification.

Section 5: The period of the Plan

The period of the Plan is from the date of the Cabinet decision on the Plan to the end of FY2030.

Chapter 3: Policies and measures to achieve targets

Section 1: Basic roles of the national government, local governments, businesses, and citizens

In the promotion of global warming countermeasures, the national government plays the following basic roles while local governments, businesses, and citizens are asked to play their respective roles as described below. By promoting countermeasures in close cooperation with each other based on an awareness of this division of roles, it is expected that synergistic effects beyond the effects of each actor's effort alone will be achieved.

1. Basic roles of the *national government*

(1) Comprehensive promotion of global warming countermeasures through the mobilization of various policy measures

The national government is responsible for forming an overall framework of Japan's global warming countermeasures and comprehensively implementing these global warming countermeasures through the promotion of the Plan. To this end, the government takes into account the fact that it is essential to review urban structures, socioeconomic activities, and lifestyles in order to reduce greenhouse gas emissions among other things, later actions will require more drastic reductions in the future, and the recent changes in public lifestyle and awareness triggered by the Great East Japan Earthquake and the nuclear power plant accident. In addition, various governmental organizations will also promote countermeasures by working to collaborate fully with one another in line with this overall framework by mobilizing a variety of policy approaches, including voluntary, regulatory, economic, and information-based approaches and environmental impact assessments.

It is important for the government to position decarbonization as one of its key challenges when it formulates and implements policies and projects to ensure that its policies as a whole are consistent with the realization of decarbonization.

Moreover, governmental organizations, even when implementing measures and formulating plans for which the addressing of global warming is not the primary objective, endeavor to contribute to efforts to reduce greenhouse gas emissions in line with the basic concept of the Plan.

(2) Taking the lead in implementing actions

The national government takes the lead in implementing measures for reducing greenhouse gas emissions and maintaining the removal of greenhouse gases in its own affairs and operations while it is focusing to promote the dissemination of measures throughout society.

(3) Encouraging actions to prevent global warming among all sections of the citizens

The national government provides knowledge concerning the issue of global warming to citizens, communicate information to citizens on the opportunities for growth that climate change presents, its impact on the economy including costs, and specific actions to solve this issue, and promote changes in awareness and behavior

among all sectors of the citizens.

In order to encourage all sectors of the citizens to voluntarily engage in global warming countermeasures, the national government conducts multilayered and continuous dissemination and awareness-raising projects and the provision of information to all sectors of the citizens in accordance with the Plan. Targets are set for each dissemination and awareness-raising project to develop more effective activities for the prevention of global warming through the implementation of the PDCA (plan-do-check-act) cycle. For this purpose, the relevant ministries and agencies will work in concert with one another to promote more effective dissemination and awareness-raising to the citizens in collaboration and co-operation with industry, labor, the education sector, local governments, climate change officers, the Japan Center for Climate Change Actions, private-sector organizations, and other diverse actors engaged in activities to prevent global warming. The national government will also endeavor to accumulate and share scientific knowledge on the issue of global warming in order to contribute to these actions to a greater extent.

In addition, the national government will set appropriate indicators and targets regarding the level of awareness and actions to prevent global warming and implement the PDCA cycle for more effective awareness-raising.

(4) Promotion of international cooperation on global warming countermeasures

It is crucial that all actions to resolve the issue of climate change be effectively and efficiently pursued through international cooperation, not just by one country. With this in mind, Japan will also proactively promote actions that will lead to emission reductions worldwide in order to achieve progress with respect to international global warming countermeasures.

(5) Observation and monitoring of the state of changes in the concentration of greenhouse gases in the atmosphere

With respect to observation and monitoring of climate change, we will strengthen our comprehensive observation and monitoring system for understanding greenhouse gases, climate change, and their impact in accordance with the GEO Strategic Plan 2016–2025 as approved at the Ministerial Summit of the Intergovernmental Group on Earth Observations (GEO) (Mexico City, November 2015) to serve as the successor to the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan as approved at the third Earth Observation Summit (2005), and the *Follow-Up Report on Japan's Earth Observation Implementation Policy for the Next Ten Years* (as formulated by the Earth Observation Promotion Subcommittee, Research Planning and Evaluation Subcommittee, Council for Science and Technology on August 28, 2020).

2. Basic roles of local governments

(1) Promotion of countermeasures in accordance with natural and social conditions in the local community

Local governments promote comprehensive and systematic policies for reducing

greenhouse gas emissions in accordance with the natural and social conditions of their respective regions. For example, the aim is to promote the use of renewable energy, promote thorough energy conservation, promote the development of decarbonized cities and regions, create a sound material-cycle society, provide relevant information to businesses and residents, and promote their activities.

The governments of prefectures, designated cities, core cities, and special ordinance cities, in accordance with the Plan, formulate and implement countermeasures for reducing greenhouse gas emissions and plans related to targets for their implementation in accordance with the natural and social conditions of their regions (hereinafter referred to as “the local government’s action plan for entire municipal jurisdictions”). In addition, other local governments are also likewise encouraged to formulate and implement their own local government’s action plan for entire municipal jurisdictions.

Moreover, in order to facilitate projects that integrate the use of renewable energy and local decarbonization efforts, as set forth in Article 2-6 of the Amended Act on the Promotion of Global Warming Countermeasures for regional decarbonization (hereinafter referred to as “regional decarbonization promotion project”), in the local government’s action plan for entire municipal jurisdictions, prefectures, where necessary, set forth standards for environmental consideration pertaining to the setting of promotion areas and municipalities endeavor to set forth and implement matters related to regional decarbonization promotion project.

(2) Measures concerning local governments’ own operations

Local governments should aim to serve as a role model for regional businesses and residents by taking their own actions. To this end, prefectures and municipalities formulate and implement a plan related to measures for reducing the amount of greenhouse gas emissions and maintaining and intensifying the absorption of greenhouse gas in connection with its own operations in accordance with the Plan (hereinafter referred to as “local government’s action plan for operations”).

(3) Matters that are especially expected for governments of prefectures

Governments of prefectures endeavor to engage in efforts to collect information on good practices undertaken by municipalities under their jurisdiction and promote their dissemination to other municipalities.

In addition, they endeavor to proactively implement measures to provide technical advice and support for human resource development to municipalities that are experiencing difficulties in formulating and revising action plans of local governments and taking measures based on these plans.

Moreover, governments of prefectures, as much as possible, set forth standards for environmental consideration as pertains to the setting of promotion areas in order to facilitate regional decarbonization promotion projects carried out by municipalities and provide other forms of assistance.

3. Basic roles of *businesses*

(1) Implementation of appropriate, effective, and efficient countermeasures in light of business activities

Businesses voluntarily and proactively carry out global warming countermeasures that are appropriate, effective, and efficient in light of their business activities across a wide range of fields while they comply with laws and regulations and exercise their own creativity and ingenuity. They set forth medium and long-term reduction targets and, to achieve them, in addition to thoroughly promote energy conservation, proactively introduce and use renewable energy based on RE100, etc.,²⁶ and systematically reduce emissions in their own operation and across their entire supply chains. In addition, they also promote measures to help develop CO₂-saving products, make the transition to the circular economy through 3R + Renewable etc., and reduce greenhouse gas emissions by other actors.

(2) Actions based on being a social presence

Businesses as members of society voluntarily formulate plans and inspect the status of their implementation on their own or in concert with others. In addition, they provide environmental education to their employees; work to reduce greenhouse gas emissions in collaboration with labor unions, consumer organizations, and community groups; and implement countermeasures designed to remove greenhouse gas emissions through the greening of their premises. Furthermore, they cooperate with national and local government to implement their policies.

(3) Reduction of environmental impact of providing products and services throughout their lifecycles

Businesses endeavor to identify the amount of greenhouse gas emissions throughout the supply chain and life cycle of their products and services, and provide products and services that contribute to reducing these environmental impacts, including through carbon offsets. In addition, they provide information related to the reduction of greenhouse gas emissions from their products and services.

4. Basic roles of *citizens*

(1) The proactive reduction of greenhouse gas emissions by citizens themselves

Recognizing that greenhouse gas emissions are largely determined by the state of societal systems and lifestyles and the behavior of individual citizens, citizens strive to proactively work on their own to change their current behavior patterns and change their behavior. To this end, it is important that each of us work to transform our lifestyles into those that are more comfortable, convenient, and sustainable.

Specifically, in addition to understand their own energy consumption and greenhouse gas emissions, citizens promote the shift to decarbonized lifestyles through actions such

²⁶ An international initiative that aims to have 100% of the electricity used by each company supplied by renewable energy sources.

as the following, which are familiar to each citizen; “COOL CHOICE”, which encourages people to make all sorts of smart choices that contribute to global warming countermeasures; choosing energy-efficient homes and buildings that are effectively designed to provide well-being benefit such as health consideration and comfort and implementing refurbishment for thermal insulation improvement; replacing with energy-saving and decarbonized products and use of services; promoting the diffusion of *zero-carbon driving* with the use of renewable energy-powered electric vehicles (EV), plug-in hybrid electric vehicles (PHEV), and fuel-cell vehicles (FCV); implementing “ECO DRIVE”; promoting the use of public transit and bicycles; introducing and utilizing renewable energy such as solar power for own consumption; selecting electricity sources with low carbon intensity and switching to decarbonized electricity contracts; and adopting “Cool Biz” and “Warm Biz” which also contribute to more diverse and flexible work styles.

(2) Participating in global warming prevention activities

Citizens further deepen their understanding of the issue of global warming and proactively participate and express their opinions in discussions on global warming countermeasures, as well as engage in the actions for global warming countermeasures in collaboration with various actors, such as the shift to decarbonized lifestyles (“COOL CHOICE”), promotion of the transition to the circular economy through 3R + Renewable etc., and greening campaigns such as forestation and urban greening.

Section 2: Global warming policies and measures

1. Policies and measures related to the reduction and removal of greenhouse gas emissions

(1) Policies and measures for reducing greenhouse gas emissions

(i) Energy-related CO₂

Table 2: Overview of policies and measures by sector related to energy-related CO₂

Industrial sector (e.g., manufacturing plants)	
◆ Promotion of voluntary effort by industry ○ Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society ◆ Promotion of decarbonization in corporate management ◆ Promotion of the introduction of facilities and equipment with high energy- saving performance ○ Promotion of the introduction of facilities and equipment with high energy- saving performance (across industries) ○ Promotion of the introduction of facilities and equipment with high energy- saving performance (iron and steel industry) ○ Promotion of the introduction of facilities and equipment with high energy- saving performance (chemical industry) ○ Promotion of the introduction of facilities and equipment with high energy- saving performance (pulp, paper, and paper product industry) ○ Promotion of the introduction of facilities and equipment with high energy- saving performance (construction work and use of special vehicles)	○ Promotion of the introduction of facilities and equipment with high energy- saving performance (greenhouse horticulture, agricultural machinery, and fisheries) ◆ Promotion of energy conservation initiatives through inter-industry collaboration ○ Promotion of energy conservation initiatives through inter-industry collaboration ◆ Electrification and fuel conversion ○ Promotion of fuel conversion ◆ Implementation of thorough energy management ○ Implementation of thorough energy management using FEMS ◆ Promotion of emissions reductions measures for small and medium businesses ◆ Creation of role models in factories and offices
Commercial and other sectors	
◆ Promotion of voluntary effort by industry ○ Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society ◆ Improvement of the energy efficiency of buildings ○ Improvement of the energy efficiency of buildings ◆ Promotion of the introduction of facilities and equipment with high energy- saving performance ○ Promotion of high-efficiency energy-saving equipment (commercial and other sectors) ○ Improvement of energy efficiency of equipment through Top Runner Programs (commercial and other sectors) ◆ Greening of Industry and Digital Devices ◆ Implementation of thorough energy management ○ Implementation of thorough energy management through the use of BEMS, and Energy Conservation diagnosis ◆ Promotion of sector coupling of electricity, heat, and mobility ◆ Promotion of emissions reductions measures for small and medium businesses	◆ Creation of role models in factories and offices ◆ Promotion of areal use of energy ○ Promotion of local production for local consumption and areal use of energy ◆ Other policies and measures ○ Decarbonization of urban areas through the improvement of the thermal environment by heat island control ○ Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and renewable energy measures in waterworks) ○ Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and energy creation measures in sewage systems) ○ Initiatives in waste treatment ◆ Transition to a decarbonized lifestyle ○ Transition to a decarbonized lifestyle ◆ Initiatives at Public Institutions
Residential sector	
◆ Transition to a decarbonized lifestyle ○ Transition to a decarbonized lifestyle ◆ Improvement of energy efficiency of housing ○ Improvement of energy efficiency of housing ◆ Promotion of the introduction of facilities and equipment with high energy- saving performance ○ Diffusion of high-efficiency energy-saving equipment (residential sector) ○ Diffusion of high-efficiency energy-saving equipment (energy-saving septic tanks)	○ Improvement of energy efficiency of equipment through Top Runner Programs (residential sector) ◆ Implementation of thorough energy management ○ Implementation of thorough energy management through the use of HEMS, smart meters, and smart home devices and the provision of energy-saving information ◆ Promotion of sector coupling of electricity, heat, and mobility ◆ Other policies and measures
Transport sector	
◆ Promotion of voluntary effort by industry ○ Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society ◆ Measures concerning vehicles ○ Diffusion of next- generation vehicles, improvement of fuel efficiency, etc. ◆ Road traffic flow measures ○ Road traffic flow measures (promotion of road traffic flow measures) ○ Road traffic flow measures (promotion of the maintenance of LED road lighting) ○ Road traffic flow measures (promotion of Intelligent Transport Systems (ITS) (centralized control of traffic lights)) ○ Road traffic flow measures (maintenance of traffic safety facilities (improvement and profile (hybrid) of traffic lights)) ○ Road traffic flow measures (maintenance of traffic safety facilities (promotion of the use of LED lights in signal lights)) ○ Road traffic flow measures (promotion of autonomous driving) ◆ Transition to a decarbonized lifestyle ○ Transition to a decarbonized lifestyle ◆ Greening of the vehicle transportation business by promoting the use of environmentally friendly vehicles etc. ○ Greening of the vehicle transportation business by promoting the use of environmentally friendly vehicles etc. ◆ Promotion of the use of public transportation and bicycles ○ Promotion of the use of public transportation and bicycles (promotion of the use of public transportation)	○ Promotion of the use of public transportation and bicycles (promotion of the use of bicycles) ◆ Countermeasures for railways, ships, and aviation ○ Decarbonization of the railways ○ Decarbonization of the shipping sector ○ Decarbonization of the aviation sector ◆ Promotion of decarbonized logistics systems ○ Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (improvement of efficiency of truck transportation) ○ Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (promotion of joint transportation and delivery) ○ Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to marine transportation) ○ Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to rail freight transportation) ○ Promotion of decarbonization of logistics facilities ○ Efforts at ports and harbors (reduction of the distance of land transportation of cargo through optimal selection of ports and harbors) ○ Efforts at ports and harbors (comprehensive decarbonization at ports and harbors) ◆ Other policies and measures ○ Utilization of the Special Zones for Structural Reform system related to global warming countermeasures ◆ Promotion of sector coupling of electricity, heat, and mobility
Energy conversion sector	
◆ Promotion of voluntary effort by industry ○ Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society ◆ Reduction of CO₂ emission intensity in power sectors ○ Reduction of CO₂ emission intensity in power sectors ◆ Maximum introduction of renewable energy ○ Maximum introduction of renewable energy [Renewable electricity generation]	◆ [Renewable heat energy] ○ Introduction of energy conservation and renewable energy in water supply and sewage ○ Initiatives in waste treatment ◆ [Maximum use of local renewable electricity, heat, and unused heat] ○ Promotion of local production for local consumption and areal use of energy ◆ Promotion of energy-saving measures in the petroleum product manufacturing sector ○ Promotion of the introduction of facilities and equipment with high energy-saving performance (petroleum product manufacturing sector)

Policies and measures by sector (industry, commercial/residential, transport, etc.)

A. Industrial sector (e.g., manufacturing plants)

CO₂ emissions in the industrial sector in FY 2019 were 384 million t-CO₂, a decrease of 17.0% compared to FY 2013. The promotion of energy efficiency and conservation, as well as the greenhouse gas emission reduction plans formulated by each industry as a successor to the voluntary action plan (hereinafter referred to as “Voluntary Action Plans” for these individual industry plans up to FY 2012) and the industry’s own greenhouse gas emission reduction plan after 2013 (refers to the greenhouse gas emissions reduction plan developed by individual sectors, including industrial, commercial and others, transport, and energy conversion sectors, that are members of Keidanren (Japan Business Federation) and that are not members of Keidanren) (hereinafter referred to as “Industry’s Action Plans for a Low-Carbon Society”²⁷), have been successful so far. Yet, it is important to continue to work on as this sector accounts for about 30% of Japan’s greenhouse gas emissions. For this reason, measures including the Industry’s Action Plans for a Low-Carbon Society will be steadily implemented, while contributing to the fight against global warming through cooperation among entities including consumers and customers, promotion of international contributions, and development of innovative technologies.

(a) Promotion of voluntary effort by industry

- Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society

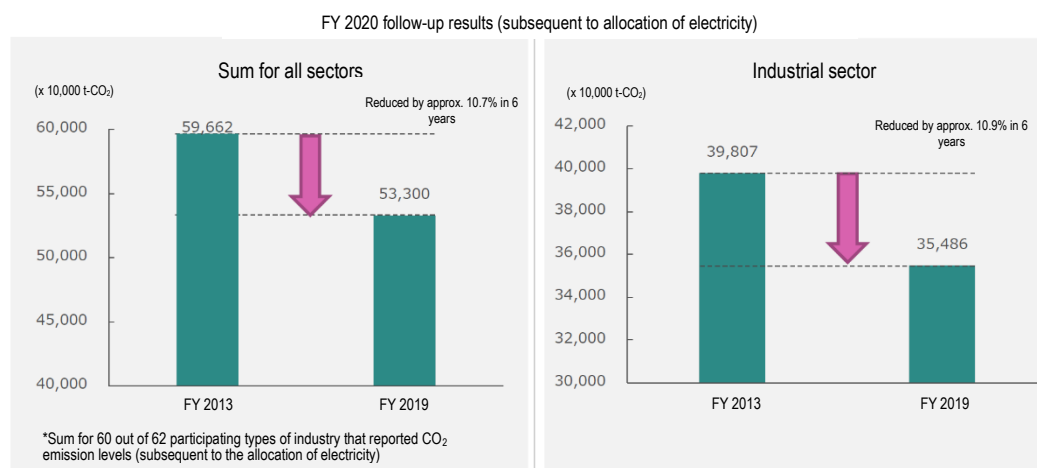


Figure 4: Total Emissions of Industries and Businesses Participating in the Industry’s Action Plans for a Low-Carbon Society - FY 2013–2019 Results

Keidanren and industries have been working to reduce emissions by formulating voluntary action plans and have achieved good results so far. Based on the results of the

²⁷ As the world’s interest and expectations for the realization of GHG net zero in 2050 increase further, Keidanren has newly positioned the realization of this goal as the most important goal to aim for in the future and has changed the Industry’s Action Plans for a Low-Carbon Society to the Carbon Neutrality Action Plan.

Industry's Action Plans for a Low-Carbon Society, which shows that greenhouse gas emissions have been steadily reduced in many industries while maintaining economic efficiency (Figure 4), the following measures will be implemented as the central role of measures in industry to steadily reduce emissions in order to achieve the reduction targets in this Plan. Voluntary efforts by businesses will also be continuously promoted.

CO₂ emissions from the industrial sector decreased by approximately 10.9% between FY 2013 and FY 2019, exceeding the 2030 reduction target (6.5%) as NDC for the industrial sector in March 2020.

Such a voluntary approach requires a certain level of government involvement in terms of transparency, credibility, and probability of achieving the target. Meanwhile, it has the advantages of allowing each entity to select more appropriate measures based on its originality and ingenuity and of providing incentives to work toward higher targets. It is thus extremely important that industries continue to employ these advantages and promote efforts to reduce greenhouse gas emissions. For this reason, while taking into account the advantages of leaving the goals and contents of the Industry's Action Plans for a Low-Carbon Society to the autonomy of the industry, in order to respond to social demands, the industry formulates and implements the plan while paying attention to the following points and review it from time to time based on periodic evaluations and verifications:

- i. For industries that have not yet formulated the Industry's Action Plans for a Low-Carbon Society, the number of industries that have formulated targets increased from 87 in FY 2013 to 114 in FY 2018 as a result of active consideration of formulating new targets not only by industries that participate in the voluntary action plan under the Kyoto Protocol Target Achievement Plan but also by industries that do not participate in the plan. Efforts will be continued to increase the coverage within the industry, including small and medium businesses.
- ii. In setting targets in the Industry's Action Plans for a Low-Carbon Society, CO₂ reduction targets are formulated based on the maximum introduction of the best economically available technology (BAT: Best Available Technology) from the perspective of reducing greenhouse gas emissions, proactive energy conservation efforts, etc. For the targets, it should be explained to the public that the targets are the maximum levels achievable by the industry. In order to be able to evaluate the severity of the target level and the degree of effort made by industry, it is important to collect data that will enable comparison of energy efficiency and CO₂ emissions between Japan and other countries. In addition, by clearly indicating BAT and best practices in advance, it will be possible to evaluate not only the achievement of the target level but also the efforts made in each industry. In addition, while respecting the voluntary targets, studies will be continued on the consistency with the government's FY 2030 targets, the setting of FY 2030 targets with an eye to the ideal state in 2050, and the unified presentation of the CO₂ emission reduction rate compared to FY 2013 as a common indicator. When new BATs become available for wide use due to the advancement of technology etc., the numerical targets will be flexibly raised and constantly reviewed.

- * For the target indicators, each industry makes independent judgment and mainly selects either energy consumption intensity, energy consumption, CO₂ emission intensity, carbon dioxide emission, or reduction from BAU (business as usual).²⁸ It is important to continue to examine how to set the target, including consistency with the government's FY 2030 target.
- iii. Under the Industry's Action Plans for a Low-Carbon Society, PDCA cycle will be promoted as before to ensure effectiveness, transparency, and reliability. In doing so, taking into account the fact that the plan for 2030 is a long-term initiative, various factors, such as changes in the structure of society and industry and progress in technological innovation, will be considered while clarifying the preconditions and ensuring transparency so that the 2030 target can be easily compared among industries.
- iv. In addition to the emission reduction targets (commitments) set out in (ii) above, the reduction of CO₂ emissions will be promoted throughout the supply chain by supplying decarbonized products and services in cooperation with related industries. Efforts will also be made to raise public awareness and improve the knowledge of global warming prevention.
- v. From the perspective of contributing to global warming countermeasures on a global scale, each industry will actively work on reducing emissions globally through overseas deployment of decarbonized products and services etc., transferring technology and know-how based on international rules to developing countries that are willing to implement measures to prevent global warming, and strengthening private sector based international collaborative activities. At the same time, contribution to reducing emissions through specific initiatives of the business fields of each industry will be presented.
- vi. Each industry will actively work on the development and practical application of innovative technologies to achieve GHG net zero by 2050 from a medium and long-term perspective that looks beyond 2030.
- vii. In addition, in order to disseminate easy-to-understand information on initiatives based on the Industry's Action Plans for a Low-Carbon Society to foreign countries and consumers, each industry will make international comparisons based on reliable data and actively disseminate such information to the public.
- viii. The effectiveness of the Plan will be examined in light of progress on GHG net zero by 2050 and 2030 reduction targets, and the survey design will be simplified to make it easier for industry to participate.

²⁸ "Reduction from BAU" refers to the amount of reduction in CO₂ emissions etc. to be achieved by maximizing the introduction of BAT etc. based on the assumed emissions (BAU emissions) in the target year when no additional measures are taken, in other words, when the technology level (basic unit) in a certain year is fixed.

Based on the perspectives of (i) to (viii) above, the government will conduct rigorous and periodic evaluation and verification by relevant councils of the initiatives to be implemented based on the Industry's Action Plans for a Low-Carbon Society and the Industry's Action Plans for a Low-Carbon Society for 2030 formulated by each industry sector, as well as the review of how to proceed with the Industry's Action Plans for a Low-Carbon Society.

In addition, the industry will contribute to CO₂ reductions in the residential and transport sectors by making materials and other products lighter and more functional, developing and providing energy-efficient decarbonized products and services, improving the efficiency of logistics through modal shifts and other means, and promoting the use of next-generation automobiles and public transportation.

(b) Promotion of decarbonization in corporate management

Since the conclusion of the Paris Agreement and with the background of the expansion of ESG finance, an increasing number of Japanese companies have taken climate change countermeasures as a management issue and are engaging in decarbonization management to decarbonize their businesses. For example, the number of Japanese companies that support the Task Force on Climate-related Financial Disclosures (TCFD) and those that set medium and long-term targets, such as Science Based Targets (SBT)²⁹ and RE100, is among the highest in the world.

The government will provide technical advice to companies on information disclosure, setting of reduction targets and planning, etc. in order to further promote decarbonized management, while taking into account trends in the financial aspects, including ESG finance. In calculating and reducing emissions, the calculation and reduction of emissions throughout the supply chain is promoted. The regional support system for decarbonization of small and medium businesses will also be strengthened. Furthermore, by promoting the visualization of greenhouse gas emissions during the life cycle of products and services, the environment in which decarbonized management is valued by consumers is developed.

(c) Promotion of the introduction of facilities and equipment with high energy-saving performance

In accordance with the Act on the Rational Use of Energy (Act No. 49 of 1979, hereinafter referred to as the “Energy Conservation Act”), thorough energy management and the introduction of energy-efficient facilities and equipment will be promoted in order to improve the energy intensity.

In addition, based on the periodic reports submitted in accordance with the Energy Conservation Act, the energy conservation status of businesses will be assessed, and businesses that are left behind will be given intensive guidance and advice, while leading businesses will be publicized and praised.

²⁹ An initiative that requires companies to set greenhouse gas emission reduction targets consistent with the levels required by the Paris Agreement (which aims to limit global temperature rise to well below 2°C above preindustrial levels, preferably to 1.5°C).

In addition, the benchmarking system, which sets high-energy efficiency and conservation targets for each industry and field and requires achievement of those targets, will be expanded to cover more fields. Also, the target values will be revised to encourage further energy efficiency and conservation efforts by businesses.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (across industries)

In the industrial sector, introduction of energy-efficient facilities and equipment will be promoted for major energy-consuming equipment used in a wide range of industries, including air conditioning, lighting, hot water supply, industrial furnaces, boilers, and cogeneration equipment.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (iron and steel industry)

As part of the introduction of latest technologies, the efficiency of power-consuming equipment, waste heat recovery equipment, power generation equipment, and coke ovens will be further improved, and the use of waste plastics and other materials that can be used as a substitute for coal in coke ovens will be expanded.

In addition to the existing technologies, innovative technologies will be developed for significant energy conservation and low carbon emission in the steelmaking process with the aim of putting these technologies into practical use by around 2030.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (chemical industry)

CO₂ emissions will be reduced by promoting the development and introduction of new innovative energy-saving technologies, as well as promoting the recovery of emitted energy and the rationalization of processes according to the characteristics of each process.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (cement and ceramic industry)

Energy consumption in the cement manufacturing process will be reduced by introducing equipment that can use thermal and electrical energy with high efficiency and by promoting the use of waste as a substitute for thermal energy. In addition, through the practical application and introduction of advanced process technology, energy conservation will be achieved in the cement and glass manufacturing processes while ensuring the same quality as conventional products.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (pulp, paper, and paper product industry)

In the used paper pulping process, the introduction of pulpers that can more efficiently mix used paper and water and dissociate the used paper than conventional types will be supported with the aim of reducing operational energy consumption.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (construction work and use of special vehicles)

In the short term, the goal is to reduce CO₂ emissions by promoting the use of construction machinery with superior fuel efficiency. In the long term, a certification system for innovative construction machinery (electric, hydrogen, biomass, etc.) based on a radical conversion from the diesel oil-fueled power source will be established, and its introduction and widespread use will be promoted in order to achieve GHG net zero. In addition, by promoting i-Construction and other such measures as the spread of construction using the information and communication technology (ICT) among small and medium-sized construction companies that carry out construction work for local governments, efficiency and labor saving in construction and maintenance will be further improved to cope with the declining number of skilled workers.

- Promotion of the introduction of facilities and equipment with high energy-saving performance (greenhouse horticulture, agricultural machinery, and fisheries)

As a measure to reduce greenhouse gas emissions from greenhouse horticulture, development and dissemination of efficient and low-cost energy utilization technologies (heat pumps, woody biomass heat, etc.) in greenhouse horticulture will be promoted. In addition, low CO₂ emissions in agricultural machineries and energy conservation on fishing vessels will be promoted, such as efficiency improvement through the introduction of LED fishing lights and energy-saving outboard engines. Another target is to establish technologies related to the electrification and hydrogenation of agricultural and forestry machinery and fishing vessels by 2040.

(d) Promotion of energy conservation initiatives through inter-industry collaboration

- Promotion of energy conservation initiatives through inter-industry collaboration

Further energy savings can be achieved through cooperation between multiple factories and businesses, such as energy sharing among multiple factories and businesses, including the use of unused heat disposed of at factories without being used. Thus, through the use of the coordinated energy efficiency and conservation planning system based on the Energy Conservation Act and other support measures, energy efficiency and conservation initiatives through such cooperation between multiple operators will be promoted.

(e) Electrification and fuel conversion

- Promotion of fuel conversion

In conjunction with efforts to decarbonize power sources, electrification in final energy consumption has the potential to reduce fossil fuel consumption in such industrial processes as heating and drying processes, although it is more difficult to apply in some sectors and processes. By increasing the controllability of the process, it is expected to not only reduce energy consumption but also provide added value to the production process, such as low-volume, high-mix production, and automation. In addition, the implementation of the demand response will be promoted to shift demand

by operating electricity-intensive production processes in a flexible manner. Initiatives toward electrification will be deepened with a focus on medium- to low-temperature heat.

Examples of fuel conversion include boilers with excellent environmental compatibility, industrial furnaces with excellent energy efficiency, natural gas cogeneration that achieves high-energy conservation through combined heat and power supply, fuel cells, and gas air conditioning that mitigates peaks in grid power supply and demand. Fuel conversion in high-temperature industrial heat, which is difficult to electrify and hydrogenate, will be promoted.

(f) Implementation of thorough energy management

○ Implementation of thorough energy management using FEMS

In the industrial sector, energy management is already advanced to some extent due to energy management obligations under the Energy Conservation Act. Yet, further energy conservation and CO₂ reduction will be achieved by promoting the introduction of factory energy management systems (FEMS) and other systems that utilize the IoT, making energy consumption visible and encouraging energy-saving initiatives based on objective data.

(g) Promotion of emission reduction measures for small and medium businesses

To strengthen energy conservation and emission reduction measures in small- and medium-scale businesses, measures will be implemented, such as publicity to raise awareness toward energy efficiency and conservation, reduction of energy consumption through energy efficiency diagnoses, implementation of detailed training courses for those in charge of energy management in companies, horizontal development of best practices for energy efficiency and conservation measures, etc. Meanwhile, support will be provided to introduce emission reduction equipment to small and medium-sized businesses with a focus on reducing emission intensity.

In addition, a platform to provide detailed support for energy conservation efforts by small and medium-sized businesses in a given region will be established through collaboration among regional organizations, financial institutions, chambers of commerce and industry, local governments, etc. This platform will cover a wide range of activities, from identifying small and medium-sized businesses engaged in energy conservation to following up on their efforts, including operational improvements and capital investment.

(h) Creation of role models in factories and workplaces

The packaged support covers the formulation of ambitious CO₂ reduction plans for factories and workplaces based on their CO₂ reduction potentials, and the installation of advanced equipment, electrification, fuel conversion, and operational improvements under the plan. Excellent examples will be published to be implemented horizontally.

B. Commercial and other sectors

CO₂ emissions from the commercial and other sectors in FY 2019 amounted to 193 million t-CO₂, a decrease of 18.8% compared to FY 2013. The decrease was mainly due to lower emissions from electricity consumption as a result of improved CO₂ emissions intensity of electricity and lower energy consumption as a result of improved energy consumption intensity due to energy conservation and other factors. On the other hand, in order to achieve the FY 2030 target, emissions from this sector have to be reduced by approximately 51% from the FY 2013 level. Thus, emissions will be reduced through measures to reduce greenhouse gas emissions under the Act on the Promotion of Global Warming Countermeasures, measures based on the Energy Conservation Act, and steady promotion of measures based on the Industry's Action Plans for a Low-Carbon Society.

In addition, energy consumption in commercial and other sectors can be reduced by improving the efficiency of equipment used in offices, disseminating energy efficient equipment, and optimizing its operation. Thus, further improvement of energy efficiency of equipment will be promoted, and thorough energy management will be ensured.

(a) Promotion of voluntary effort by industry (Described above)

- Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society (Described above)

(b) Improvement of the energy efficiency of buildings

- Improvement of the energy efficiency of buildings

While looking ahead to realize net zero building by 2050, we set the goal for all new buildings in 2030, which is to satisfy the ZEB³⁰ standard level of energy efficiency by maximizing use of technologies that are technically and economically available at present.³¹

In order to strengthen energy conservation measures for buildings, regulations under the Act on the Improvement of Energy Consumption Performance of Buildings (Law No. 53 of 2015, hereinafter referred to as the “Building Energy Efficiency Act”) will be reinforced as soon as possible. Specifically, Building Energy Efficiency Act will be amended by FY 2025 to require small-scale buildings to comply with energy conservation standards, which are currently not subject to the obligation to comply with such standards. In addition, the induction standards will be raised consistently, and energy conservation standards will be reinforced in stages by FY 2030 at the latest with

³⁰ ZEB (net zero energy building): A building that has achieved energy conservation of 50% or more and further reduced energy consumption through the introduction of renewable energy sources etc., depending on the amount of reduction: (1) ZEB (100% or more reduction), (2) nearly ZEB (75% to up to 100% reduction), and (3) ZEB Ready (no introduction of renewable energy). In addition, buildings that have reduced 30% to 40% or more of energy and that introduced technologies that were expected to conserve energy but have not been assessed at present in the energy conservation calculation program based on the Building Energy Efficiency Act and that are 10,000 m² or more in size are defined as (4) ZEB Oriented.

³¹ Reduction of primary energy consumption, excluding renewable energy, by 30% or 40% (20% for small buildings) from the current energy conservation standard value, depending on the use.

the aim of ensuring energy-saving performance at the level of the ZEB standards for new buildings built after FY 2030 onwards.

The Top Runner Program for equipment and building materials will be strengthened as well to improve the performance of equipment and building materials installed in buildings and to promote their widespread use. In doing so, the energy-saving performance of water heaters and other equipment will be improved with keeping in mind that equipment that uses diverse energy sources is necessary from the perspective of ensuring resilience.

In addition to strengthening regulations public buildings will be proactively renovated to improve energy-saving performance, and support for demonstrations and further expansion of ZEB will be provided. Furthermore, other energy conservation measures, including support for renovation and reconstruction of existing buildings and energy conservation performance labeling, will be comprehensively promoted.

(c) Promotion of the introduction of facilities and equipment with high energy-saving performance

- Promotion of high-efficiency energy-saving equipment (commercial and other sectors)

The development of energy conservation technologies is further accelerated while further promoting the spread of high-efficiency energy conservation devices in order to further improve the efficiency of individual devices and systems.

In order to achieve 100% diffusion of high-efficiency lighting, such as LEDs in stock by 2030, the Top Runner Program for lighting fixtures and bulbs was revised in FY 2019, and incandescent bulbs were newly added to the Top Runner Program. Further diffusion of high-efficient lighting will be promoted by requiring businesses to comply with the Top Runner Standard. In addition, the installation of energy-efficient commercial water heaters, such as heat pump water heaters and latent heat recovery water heaters, will be promoted.

Furthermore, energy efficiency of refrigeration and air-conditioning equipment will be improved by improving refrigerant management technology etc.

Also, information will be disseminated through leading decarbonization technologies (LD-Tech) and other means.

- Improvement of energy efficiency of equipment through Top Runner Programs (commercial and other sectors)

The Top Runner Program based on the Energy Conservation Act was established in FY 1998, and the number of target devices has been gradually expanded, covering 29 energy consumption devices as of FY 2020. In order to further improve the efficiency of individual equipment in the future, studies will be conducted to review the standards for target equipment for which the target year has been reached.

(d) Greening of Industry and Digital Devices

Regarding the utilization of power semiconductors and next-generation semiconductors, research and development will be promoted for the commercialization

of ultra-efficient next-generation power semiconductors (GaN, SiC, Ga₂O₃, etc.). Also, capital investment support will be provided for the necessary parts of the semiconductor supply chain in order to promote their introduction, thereby accelerating the commercialization and expansion of next-generation power semiconductors with energy savings of 50% or more by 2030. In addition, research, development, and demonstrations will be carried out to improve the energy efficiency of data centers and to improve the energy efficiency of the entire system by improving the efficiency of software development and processing. In the meantime, the energy efficiency of all new data centers will be improved by 30% or more, and the part of electricity used at data centers in Japan will be switched to renewable energies by 2030 by supporting capital investment to expand the manufacturing of energy-saving semiconductors and switching the electricity used at data centers in Japan to renewable energy. In addition to steadily implementing these initiatives, the necessary systems to realize GHG net zero will be examined, such as the system to promote energy conservation and CO₂ emission reductions that cover electrical machinery and information and telecommunications industries where electricity consumption is increasing.

(e) Implementation of thorough energy management

- Implementation of thorough energy management through the use of BEMS, and Energy Conservation diagnosis

In order to promote thorough energy management and CO₂ emissions reduction, a building energy management system (BEMS) that displays the energy usage status and supports optimal operation of lighting, air conditioning, and other equipment and facilities will be installed in about half of all buildings by 2030. In addition, more efficient energy management in buildings will be promoted by utilizing energy use data obtained from BEMS.

Eco-tuning, which involves appropriate operational improvements to equipment and systems, and enables reducing greenhouse gas emission while ensuring comfort and productivity in buildings, will be promoted.

Based on the results of visualization of energy consumption and energy conservation diagnosis etc., comprehensive services related to energy conservation will be provided. Also, the introduction of energy-saving equipment and facilities using businesses that warrant energy conservation effects (ESCO: Energy Service Company) and downsizing (optimization of equipment and facilities) will be promoted.

(f) Promotion of sector coupling of electricity, heat, and mobility

Considering that solar power systems generate electricity intensively during a certain time period, EVs, heat pump water heaters, fuel cells, cogeneration, etc. that provide demand-side flexibility will be introduced depending on the local characteristics. Also, the use of energy management systems (HEMS and BEMS) and ICT in homes and buildings will be promoted to adjust supply and demand in line with the amount of solar power generated (sector coupling of electricity, heat, and mobility).

In addition, while utilizing local renewable energy, the use of EV car sharing and the installation of EV/battery stations with replaceable batteries will be promoted to

improve the demand/supply adjustment function at the local level and decarbonize local transportation.

(g) Promotion of emission reduction measures for small and medium businesses (Described above)

(h) Creation of role models in factories and workplaces (Described above)

(i) Promotion of local production for local consumption and areal use of energy

○ Promotion of local production for local consumption and areal use of energy

Local energy production for local consumption and area use of energy are desirable from the perspective of *climate change x disaster prevention*, which effectively links climate change measures with disaster prevention and mitigation measures, since they lead to efficient energy use, regional revitalization, and reduced risk of power outages etc. in the event of a disaster. In order to utilize a combination of renewable energy and distributed energy resources, such as storage batteries and cogeneration in a region, the expectation is to construct a regional micro-grid using existing grid lines and a self-supporting and distributed energy system using self-owned lines and heat pipes etc. Seizing opportunities for urban development etc., the formulation of plans and the introduction of equipment and systems for the construction of such a system will be supported, and the facilitation of coordination among local governments and other related parties will be promoted. In addition, to promote true local production for local consumption, which contributes to strengthening regional resilience and revitalizing regional economies, honor will be given to outstanding businesses that coexist with the region and contribute to the construction of regional industrial infrastructure to encourage such activities.

(j) Transition to a decarbonized lifestyle (Described below)

○ Transition to a decarbonized lifestyle (Described below)

(k) Initiatives of public institutions (Described below)

(l) Other policies and measures

○ Decarbonization of urban areas through the improvement of the thermal environment by heat island control

Utilizing the knowledge gained from observations, surveys, and research on the urban heat island effect, especially in urban areas, heat island-related measures will be comprehensively developed, such as the reduction of artificial heat emissions, improvement of ground surface cover, improvement of urban structures, improvement of lifestyles, and adaptation measures to reduce the impact on human health, including

heat stroke, thereby promoting urban decarbonization through thermal environment improvements.

Urban CO₂ emissions will be reduced by decreasing anthropogenic heat emissions, such as air-conditioning equipment systems and vehicles, through the promotion of the use of higher efficiency energy-consuming equipment, low-carbon buildings and facilities, technological development and the spread of next-generation vehicles, promotion of measures on traffic flows, and promotion of the use of unused energy.

In addition, from the perspective of reducing evapotranspiration and preventing/improving high temperatures on the ground surface by an artificial ground surface cover, the ground surface cover of the entire region will be improved by securing green spaces through the development of urban parks, greening of public spaces and government facilities, greening of building sites through the use of greening area systems, and preservation of privately owned green areas and agricultural land.

Furthermore, while preserving green spaces in cities, the urban structure will be improved through the formation of water and green networks and the promotion of multiple nature-type river creations from the perspective of securing green spaces and wind paths from the water surface.

In addition, the promotion of “COOL CHOICE”, including “Cool Biz” and “Warm Biz” will encourage people to modify their lifestyles and achieve appropriate air-conditioning temperatures. Also, local governments and businesses are encouraged to implement heat stroke countermeasures and other adaptive measures according to the characteristics of their regions, city blocks, and businesses.

- Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and renewable energy measures in waterworks)
- Introduction of energy conservation and renewable energy in water supply and sewage systems (promotion of energy conservation and energy creation measures in sewage systems)

In waterworks, energy conservation will be promoted through the introduction of energy-saving and high-efficiency equipment, the introduction of energy-conservation facilities, such as inverter-controlled pumps, and the wide-area expansion, consolidation, and reallocation of facilities, as well as the introduction of renewable energy power generation facilities, such as small-scale hydroelectric and solar power generation.

In addition, as a long-term initiative, the potential for water supply facilities to contribute to the adjustment of electricity supply and demand will be pursued.

In sewage systems, the sophistication and efficiency of facility management will be promoted through digital transformation (DX), as well as the introduction of energy-saving equipment and renewable energy sources, such as solar power and sewage heat. Also, energy creation initiatives that effectively use sewage biomass, such as power generation from sewage sludge-derived solid fuel and digestion gas, will be promoted.

- Initiatives in waste treatment

While promoting the 3Rs + Renewable, which contributes to the reduction of greenhouse gas emissions, specific consideration will be given to the future development of a process plan to accelerate the transition to a circular economy, aiming

to establish the fifth Plan of the Basic Plan for Establishing a Material-Cycle Society (hereinafter referred to as the “Circulation Plan”) under the Basic Act on Establishing a Sound Material-Cycle Society (Act No. 110 of 2000, hereinafter referred to as the “Circulation Act”). On top of that, energy recovery, such as waste power generation and production of waste fuels at waste treatment facilities, will be further promoted. Greenhouse gas emissions generated by vehicles during waste collection and transportation will be reduced through the introduction of energy conservation measures at waste treatment and recycling facilities and EV waste collection vehicles.

(Systematic promotion of measures for inter-ministerial cooperation)

In order to more reliably achieve the FY 2030 reduction targets in the commercial and other sectors, such as thorough promotion of energy conservation, introduction of renewable energy, and energy conservation in buildings, the cooperation of relevant government agencies will be systematically promoted to more effectively and efficiently implement efforts in all areas.

C. Residential sector

CO₂ emissions in the household sector were 159 million t-CO₂ in FY 2019, a decrease of 23.3% from FY 2013. The decrease was mainly due to an improvement in the CO₂ emissions intensity of electricity and a decrease in energy consumption due to an improvement in the energy intensity realized by energy conservation and other factors. To achieve the FY 2030 target, emissions from this sector must be reduced by approximately 66% from the FY 2013 level. Since about two-thirds of CO₂ emissions from this sector come from electricity,³² decarbonization of the electricity sector (described below) is important to reduce emissions in the household sector. Energy-saving performance of homes will also be improved. In addition, citizens will be encouraged to view global warming with the sense of ownership, constantly review their lifestyles, use renewable energy, take energy-saving measures, and implement thorough energy management.

Also, energy consumption in the household sector can be reduced by improving and promoting the efficiency of equipment used in the home and optimizing its operation. For this reason, businesses will be encouraged to further improve the energy efficiency of their equipment. Meanwhile, the provision of accurate and appropriate information to the public on CO₂ emissions associated with the use of equipment will also be promoted.

(a) Transition to a decarbonized lifestyle (Described below)

- Transition to a decarbonized lifestyle (Described below)

³² In the FY 2019 greenhouse gas emissions (final data), the share of electricity-derived CO₂ emissions in the household sector’s energy-derived CO₂ emissions in FY 2019 was 66.5%.

(b) Improvement of energy efficiency of housing

○ Improvement of energy efficiency of housing

While looking ahead to realize net zero by 2050, we set the goal for all new houses in 2030, which is to satisfy the ZEH³³ standard level of energy efficiency³⁴ by maximizing use of technologies that are technically and economically available at present.

In order to strengthen energy conservation measures for houses, regulations under the Building Energy Efficiency Act will be reinforced as soon as possible. Specifically, Building Energy Efficiency Act will be amended by FY 2025 to require houses to comply with energy conservation standards, which are currently not subject to the obligation to comply with such standards. In addition, the induction standards and standards under the Top Runner Program for houses will be raised consistently, and the energy conservation standards will be reinforced in stages by FY 2030 at the latest with the aim of ensuring energy-saving performance at the level of the ZEH standards for new houses built from 2030 onwards.

The Top Runner Program for equipment and building materials will be strengthened as well to improve the performance of equipment and building materials installed in houses and to promote their widespread use. In doing so, the energy-saving performance of water heaters and other equipment will be improved with keeping in mind that equipment that uses diverse energy sources is necessary from the perspective of ensuring resilience. In addition, the performance labeling system for windows will be examined in order to effectively communicate the thermal insulation performance of windows to consumers and to promote the spread of windows with high thermal insulation performance.

In addition to strengthening regulations, support for demonstration and further expansion of ZEH will be provided. Furthermore, other energy conservation measures are comprehensively promoted, such as support for renovation and reconstruction of existing houses, developing and disseminating building materials and construction methods that are easily applicable to renovation and provide excellent energy-saving performance, and aiming to make energy-saving performance labelling in selling or renting new houses mandatory.

(c) Promotion of the introduction of facilities and equipment with high energy-saving performance

- Diffusion of high-efficiency energy-saving equipment (residential sector)
- Diffusion of high-efficiency energy-saving equipment (energy-saving septic tanks) (residential sector)

The development of energy conservation technologies is further accelerated while further promoting the spread of high-efficiency energy conservation devices in order to

³³ ZEH (net zero energy house): A house that has achieved energy conservation of 20% or more and further reduced energy consumption through the introduction of renewable energy sources etc., depending on the amount of reduction: (1) ZEH (100% or more reduction); (2) nearly ZEH (75% to up to 100% reduction); and (3) ZEH oriented (no use of renewable energy).

³⁴ Compliance with enhanced outer shell standards and a 20% reduction in primary energy consumption, excluding renewable energy from the current energy conservation standard values.

further improve the efficiency of individual devices and systems.

In order to achieve 100% diffusion of high-efficiency lighting, such as LEDs in the stock by 2030, the Top Runner Program for lighting fixtures and bulbs was revised in FY 2019, and incandescent bulbs, in addition to fluorescent lamps and LED lamps, were newly added to the Top Runner Program. The Top Runner Standard for water heaters, including heat pump water heaters and latent heat recovery water heaters, were also reviewed, and the target standard was raised. Further diffusion of high-efficient lighting and energy-efficient hot-water supply equipment will be promoted by requiring businesses to comply with the Top Runner Standard.

Fuel cells for residential use are a distributed energy source that can achieve a total energy efficiency of up to 90% or more by producing hydrogen from city gas or LP gas and chemically reacting the hydrogen with oxygen in the air to generate electricity, as well as effectively utilizing the heat generated during power generation. The use of fuel cells, including pure hydrogen fuel cells, will be further increased.

With regard to septic tanks, the spread of advanced energy-saving household septic tanks and the introduction of medium and large-sized septic tanks with high energy-saving performance will be promoted by guiding energy-saving measures in support for the installation of such septic tanks.

Also, information will be disseminated through LD-Tech and other means.

- Improvement of energy efficiency of equipment through Top Runner Programs (residential sector)

(d) Implementation of thorough energy management

- Implementation of thorough energy management through the use of HEMS, smart meters, and smart home devices and the provision of energy-saving information

In order to promote energy conservation and CO₂ emission reductions in the entire house, a home energy management system (HEMS) and smart home devices that display energy usage and promote optimal operation of air conditioning, lighting, and other equipment will be introduced to nearly all housing by 2030. In addition, the introduction of smart meters that can measure electricity consumption at home in more detail than before and promote visualization of electricity consumption through linkage with HEMS and other means will be promoted. In addition, more efficient energy management in housing will be promoted by utilizing energy usage data obtained from HEMS. Also, further energy conservation efforts in households will be encouraged by requesting energy retailers to provide information that would contribute to energy conservation of general consumers based on the Energy Conservation Act.

Based on the results of visualization of energy consumption through these initiatives, the use of energy-saving equipment and facilities using ESCOs, and other means will be promoted.

(e) Promotion of sector coupling of electricity, heat, and mobility (Described above)

(f) Other policies and measures

(Systematic promotion of measures for inter-ministerial cooperation)

In order to more reliably achieve the FY 2030 reduction targets in the household sector, such as thorough promotion of energy conservation, introduction of renewable energy, and energy conservation in housing, the cooperation of relevant government agencies will be systematically promoted to more effectively and efficiently implement efforts in all areas.

D. Transport sector

CO₂ emissions in the transport sector in FY 2019 were 206 million t-CO₂, a decrease of 8.2% compared to FY 2013. The main reasons for the decrease in emissions include the improved fuel efficiency of automobiles and a decrease in the volume of freight transport. To further steady the downward trend in emissions, comprehensive measures will be implemented, including automobile and road traffic streamlining measures, promotion of public transportation, and streamlining of logistics.

(a) Promotion of voluntary effort by industry (Described above)

- Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society (Described above)

(b) Measures concerning vehicles

- Diffusion of next- generation vehicles, improvement of fuel efficiency, etc.

The use and expansion of energy-efficient next-generation vehicles (EVs, FCVs, PHEVs, hybrid vehicles [HVs], etc.) will be promoted. For those vehicles that are currently in the early stages of introduction and face the issues of high costs, comprehensive measures, including such support measures as subsidy programs and tax incentives, will be taken to expand the use of electric vehicles and infrastructure and to strengthen technologies, supply chains, and value chains related to electric vehicles, including batteries. These efforts aim to increase the ratio of next-generation vehicles to new passenger car sales from 50% to 70% by 2030 and to increase the ratio of electric vehicles (EVs, FCVs, PHEVs, and HVs) to new passenger car sales to 100% by 2035.

Studies of the placement of EV charging facilities on roads and support for research on dynamic charging technology will also be conducted. Information signs will be installed on trunk roads and other roads in areas where EV charging facilities are scarce. At the same time, incentives will be given to electric vehicles for using highways in order to reduce emissions by guiding traffic from local roads to expressways and to increase the spread of electric vehicles.

To further expand the use of FCVs, support will be provided for the strategic installation of hydrogen stations and the development and introduction of stations with large-scale charging capacities. In addition, along with the development of technologies to reduce station-related costs, regulations will be rationalized, including the unification of regulations related to fuel cell vehicles.

With regard to the fuel efficiency standard of automobiles, fuel efficiency has been drastically improved with the fuel efficiency standard of the Top Runner Program. In March 2020, the Well to Wheel assessment set new fuel efficiency standards for passenger cars, which also cover EVs and PHEVs, with a target year of 2030. While working toward GHG net zero, there is a need to continue to work with both regulatory means and incentive measures. Technology-neutral fuel economy regulations will be used to effectively reduce CO₂ emissions by combining all available technologies.

To this end, automobile manufacturers will be encouraged to improve the fuel efficiency of new vehicles through the achievement of new fuel efficiency standards. In doing so, the operation of recommendations and announcements will be reviewed to strengthen enforcement for compliance with fuel efficiency standards. In addition, tax measures and other measures will be reviewed as necessary to further improve fuel efficiency. Also, technological development and social implementation will be promoted for cellulose nanofibers and modified lignin etc., which are expected to improve fuel efficiency by reducing the weight of automobile parts.

Biofuels are carbon neutral fuels made from plants, waste, and other materials, and appropriate supply of the biofuels will be accelerated.

(c) Road traffic flow measures

- Road traffic flow measures (promotion of road traffic flow measures)
- Road traffic flow measures (promotion of the maintenance of LED road lighting)
- Road traffic flow measures (promotion of Intelligent Transport Systems (ITS (centralized control of traffic lights))
- Road traffic flow measures (maintenance of traffic safety facilities (improvement and profile (hybrid) of traffic lights))
- Road traffic flow measures (maintenance of traffic safety facilities (promotion of the use of LED lights in signal lights))
- Road traffic flow measures (promotion of autonomous driving)

While recognizing the possibility that so-called induced and diverted traffic may occur as a result of road construction, the following measures will be implemented: the strengthening of arterial road networks, including ring roads that will contribute to reducing CO₂ emissions; specific countermeasures on bottlenecks of traffic congestion through scientific analysis of big data using ETC 2.0, for example; study of the introduction of a planar congestion management system, including tolling measures for traffic demand adjustment using ICT, AI, etc.; further energy savings and upgrading of road lighting; and installation of LED road lighting. In addition, studies will be conducted to promote the use of renewable energy sources, such as solar power generation, for the electricity required for road management with the aim of nationwide deployment.

Other measures to implement include the following: promotion of intelligent transport systems (ITS), such as centralized control of traffic lights; improvement of traffic lights, such as profiling; improvement of traffic safety facilities etc. that promote sustainable and green traffic, such as LED traffic signal lights; promotion of automated driving; and

measures concerning road traffic flow that contribute to reductions in CO₂ emissions.

(d) Transition to a decarbonized lifestyle (Described below)

- Transition to a decarbonized lifestyle (Described below)

(e) Greening of the vehicle transportation business by promoting the use of environmentally friendly vehicles etc.

- Greening of the vehicle transportation business by promoting the use of environmentally friendly vehicles etc.

To promote eco-driving of commercial vehicles, such as trucks, buses, and cabs, the Eco-Drive Management System (EMS) will be disseminated and promoted among transportation companies etc. In addition, publicity centered on the Eco-driving Promotion Liaison Committee of the four relevant ministries and agencies will be used to promote the spread of eco-driving.

Also, the spread of the Green Management Certification System, which certifies transportation companies that implement excellent environmental initiatives, such as improved fuel efficiency, will be promoted.

(f) Promotion of the use of public transportation and bicycles

- Promotion of the use of public transportation and bicycles (promotion of the use of public transportation)
- Promotion of the use of public transportation and bicycles (promotion of the use of bicycles)

In order to decarbonize the public transportation sector and create an environment that facilitates mobility without relying solely on private cars, the use of public transportation services will be promoted in cooperation with community development while further improving their convenience through the following measures: promotion of the development of Light Rail Transit (LRT³⁵), Bus Rapid Transit (BRT³⁶), EVs, and other low-carbon transportation systems; support for the creation of the Local Public Transportation Plans by local governments; support for the social implementation of Mobility as a Service (MaaS³⁷); promotion of compact plus networks; reorganization of regional transportation networks; promotion of barrier-free transportation; and strengthening of connections between various transport modes (modal connections) through public-private partnerships, such as through the development of transport nodes, such as station squares and bus terminals.

In addition, in order to promote the use of bicycles, in coordination with safety assurance measures, the environment that encourages the use of bicycles will be created,

³⁵ A next-generation tram system that is friendly to people and the environment and offers excellent features in terms of ease of boarding, punctuality, speed, transportation capacity, comfort, etc. with improved driving space, vehicle performance, etc.

³⁶ Bus rapid transit system utilizing dedicated lanes etc.

³⁷ A service that uses a smartphone app etc. to provide an optimal combination of multiple public transportation and other transportation services to meet the trip-by-trip transportation needs of each local resident or traveler, including search, reservation, and payment all at one time.

including support for the formulation of bicycle utilization promotion plans by local governments, development of bicycle traffic space networks, development of bicycle parking facilities, and promotion of shared bicycle use.

In addition, the environmental load will be reduced through reductions in automobile traffic and other measures by promoting proactive efforts by businesses, including commuter traffic management, and by promoting efforts to encourage behavioral changes in the public, including how they use their cars in daily life. The government will continue to promote the use of public transportation and the active use of bicycles in government activities.

The environment that facilitates mobility without relying solely on private cars will also be created in order to realize environmentally sustainable transport (EST).

(g) Countermeasures for railways, ships, and aviation

○ Decarbonization of the railways

In the railways sector, energy-efficient vehicles and advanced energy-saving equipment, such as lightweight vehicles and vehicles equipped with Variable Voltage Variable Frequency control (VVVF) equipment³⁸ have been introduced and will continuously be promoted further introduction. The development of hydrogen fuel-cell vehicles will also be promoted. At the same time, solar power generation using rail and track facilities will also be introduced.

○ Decarbonization of the shipping sector

In the shipping sector, in addition to promoting the spread of energy-saving and CO₂-saving ships through the energy-saving rating system for coastal ships, etc., technological development, demonstration, and introduction of ships that also contribute to modernization and the improvement of operational efficiency in coastal shipping by utilizing innovative energy-saving technologies and digital technologies, etc., including LNG-fueled ships, hydrogen-fueled ships, and EV ships, will be promoted. Also, it is aimed at being the first in the world to achieve commercial operation of zero-emission ships ahead of the existing target of 2028.

○ Decarbonization of the aviation sector

To decarbonize the aviation sector, the following initiatives will be promoted: (1) introduction of new technologies into aircraft and equipment, (2) improvement of flight operation by increasing the sophistication of air traffic control, (3) promotion of the introduction of sustainable aviation fuel (SAF), and (4) reduction of CO₂ emissions from airport facilities and airport vehicles. Also, measures to turn airports into renewable energy hubs will be examined and initiated, and public-private partnerships will be promoted.

³⁸ A vehicle equipped with a mechanism that efficiently controls motor speed without using electrical resistance.

(h) Promotion of decarbonized logistics systems

- Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (improvement of efficiency of truck transportation)
- Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (promotion of joint transportation and delivery)

Initiatives, such as joint transportation and delivery, will be promoted through cooperation between shippers requesting deliveries and logistics businesses undertaking deliveries. Global warming countermeasures will also be promoted by improving transport and loading efficiency, while greening the entire logistics system.

Therefore, energy management will continuously be promoted by shippers and carriers in accordance with the Energy Conservation Act. Also, based on the Act on Advancement of Integration and Streamlining of Distribution Business (Act No. 85 of 2005), initiatives will be implemented to streamline transport, such as the establishment of truck sales offices at distribution facilities for storage, cargo handling, and distribution processing, and the introduction of truck reservation reception systems to consolidate and rationalize delivery networks. At the same time, the decarbonization of logistics will be promoted by providing support for operations that provide truck transport with no waiting time, further promotion of modal shifts, container round use, and the promotion of consolidated transport and delivery initiatives in depopulated areas and cities. Furthermore, the Green Logistics Partnership Conference³⁹ will carry out the following activities in cooperation among shippers, logistics businesses, and other related parties: modal shifts, efficient truck transportation, and other initiatives to reduce the environmental impact of the logistics sector, improve logistics productivity, and create a sustainable logistics system. Awards will be given to businesses that have made outstanding achievements in the construction of green logistics to motivate them to take independent initiatives and to promote the spread and expansion of green logistics. Responding to the growing needs of shippers, consumers, and others for decarbonization of logistics services, initiatives will be promoted to utilize electric vehicles, such as for the electrification of intra-regional transportation and delivery and the development and dissemination of fuel cell trucks for long-distance transportation. In addition, to facilitate cooperation among shippers' companies, logistics businesses, and other related parties, the effectiveness of each initiative will be objectively evaluated using a unified method (guidelines) for calculating CO₂ emissions in the logistics sector that can be commonly used by these parties.

In addition, the rapid development of electronic commerce (EC) in recent years has led to an annual increase in the number of parcel deliveries handled, while the redelivery rate has just decreased to about 10%, partly due to an increase in time spent at home caused by the COVID-19 pandemic. The redelivery rate needs to be reduced continuously. Still, besides the perspective of increasing CO₂ emissions and the growing shortage of drivers, it is also necessary to promote non-contact and non-face-to-face methods of delivery to avoid the spread of COVID-19. Thus, efforts to reduce redelivery

³⁹ An organization that consists of member companies and organizations that are the shipper companies, logistics businesses, government, and other related fields and is operated with the cooperation of the Ministry of Economy, Trade and Industry; the Ministry of Land, Infrastructure, Transport and Tourism; and related organizations in order to promote voluntary efforts by the industry toward building green logistics.

will be promoted, such as the use of courier boxes, diversification of parcel receiving methods, including receiving at stations, convenience stores, etc., and the widespread and improved operation of porch delivery systems. Delivery efficiency will also be improved using tools, such as drones and automatic delivery robots. Especially in depopulated areas, demonstration projects will be conducted for social implementation of drone logistics. The possibility of using a delivery method with less environmental impact will be verified through the dissemination of the Guideline on Parcel Delivery using Drones Ver. 2.0 (June 25, 2021, Cabinet Secretariat, formulated by the Ministry of Land, Infrastructure, Transport and Tourism) to ensure its implementation in society in the near future.

In addition, the efficiency of logistics will be improved by promoting the spread of double-articulated trucks and other measures. Efficiency will also be enhanced by strengthening access on expressways, including direct connections to private facilities, supporting operation management using ETC 2.0, and speeding up administrative procedures for passage of oversize and overweight vehicles through promoting the use of a new passage system.

- Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to marine transportation)
- Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to rail freight transportation)

To promote the greening of the entire logistics system, the shift from automobile transportation to transportation by coastal shipping or rail, which emit less CO₂, will be promoted.

As part of this initiative, to increase the competitiveness of coastal shipping that takes on transport, transportation cost reduction and service improvement will be promoted through the development of domestic trade terminals for intermodal transportation, while spreading and promoting energy-efficient coastal vessels. Furthermore, a modal shift to coastal shipping will be promoted through the introduction of trailers that can be detached from truck cabs and the use of the Eco Ship Mark.

Similarly, to increase the competitiveness of rail freight transportation, transportation capacity will be increased, and transportation quality will be improved by devising new timetable settings and enhancing transportation equipment, such as block trains and temperature-controlled freight trains. In addition, modal shifts will be promoted by introducing new technologies that contribute to better efficiency, labor savings and safety improvement at freight stations, enhancing BCP for container platform expansion in preparation for alternative transportation in the event of disasters etc., and improving the convenience of freight by promoting the Eco Rail Mark etc.

The introduction of automated equipment and systems that utilize AI, IoT, and other digital technologies through collaboration among related businesses will also be promoted to improve transportation efficiency and energy conservation throughout the supply chain.

In addition, further efficiency improvements will be promoted in truck transportation. In doing so, the conversion from private trucks to commercial trucks and the use of larger vehicles and trailers, such as large CNG trucks, will be promoted. Loading efficiency will also be improved by eliminating congestion and securing return cargo.

○ Promotion of decarbonization of logistics facilities

The spread of zero-energy models for warehouses will be promoted by supporting projects that simultaneously introduce renewable energy equipment, such as solar power generation facilities, and equipment that contributes to unmanned or laborsaving operations including unmanned forklifts and carriers, in facilities such as logistics center, which are the core of logistics operations. The decarbonization of logistics facilities will also be promoted by converting to energy-efficient natural refrigerant equipment in refrigerated and frozen warehouses.

- Efforts at ports and harbors (reduction of the distance of land transportation of cargo through optimal selection of ports and harbors)
- Efforts at ports and harbors (comprehensive decarbonization of ports and harbors)

Ports and harbors are international logistics hubs through which 99.6% of Japan's imports and exports are routed. They are also industrial centers where many of Japan's industries, including power generation, steel, and chemicals, which account for about 60%⁴⁰ of the country's CO₂ emissions, are located. In such ports and harbors, "carbon neutral ports" will be constructed to reduce overall greenhouse gas emissions to zero through the development of a receiving environment that enables the import of large volumes of stable and inexpensive hydrogen and fuel ammonia, which are necessary to achieve GHG net zero, the upgrading of port functions to achieve decarbonization, and collaboration with industries in the coastal areas where there is a high concentration of ports with the goal of contributing to the realization of a decarbonized society.

Specific initiatives include the following: alleviation of traffic congestion in front of container gates through the establishment of a digital logistics system; promotion of the introduction of onshore power supply facilities for ships at berth; use of fuel cells for cargo handling machinery; introduction of stand-alone hydrogen power generation, including from the perspective of maintaining necessary functions during disasters and responding to power shortages; development of fuel supply systems for hydrogen, ammonia, and other fuels for fuel vessels; promotion of the introduction of renewable energy sources, such as offshore wind and solar power; creation, restoration, and conservation of blue carbon ecosystems (seaweed beds, tidal flats, etc.) as carbon dioxide removals; and a study on the establishment of a blue carbon offset credit scheme for seaweed beds, tidal flats, etc.

Also, by promoting the development of international marine container terminals, international logistics terminals, and domestic logistics bases that can handle intermodal transportation, marine transportation to the nearest port will be enabled, reducing the travel distance for truck transportation.

Other initiatives include the following: support for the introduction of energy-saving equipment, promotion of modal shift and transportation efficiency improvement by utilizing marine transportation related to venous logistics, creation of port green areas that contribute to CO₂ removals, and examination of the development of technologies to

⁴⁰ Total energy-related CO₂ emissions (before electricity and heat allocation) from the energy conversion sector (including oil and coal products) and steel and chemical industries (including petroleum and coal products) as a percentage of Japan's CO₂ emissions (FY 2019 results).

reduce CO₂ emissions at ports and harbors.

(i) Promotion of sector coupling of electricity, heat, and mobility (Described above)

(j) Other policies and measures

(Systematic promotion of measures for inter-ministerial cooperation)

- Utilization of the Special Zones for Structural Reform system related to global warming countermeasures

To achieve the FY 2030 reduction targets more reliably in the transport sector, including the decarbonization of each transport mode and the promotion of modal shifts, the relevant ministries and agencies will systematically promote cooperation and implement initiatives in all areas in a more effective and efficient manner. In addition, initiatives that take advantage of special regulatory measures under the Special Zones for Structural Reform system etc. will be promoted.

E. Energy conversion sector

CO₂ emissions in the energy conversion sector in FY 2019 were 89.3 million t-CO₂ (excluding statistical errors in electricity and heat distribution). This is 15.9% lower than in FY 2013 (after electricity and heat allocation). On the other hand, CO₂ emissions from power generation before electricity and heat allocation account for about 40% of Japan's energy-related CO₂ emissions.

The Strategic Energy Plan (Cabinet decision on October 22, 2021) sets the stable supply of energy as the priority with safety as a precondition. The plan also has as its basic perspective the provision of energy at low cost through improved economic efficiency and, at the same time, environmental compatibility. Various policy measures will be implemented to realize the energy supply and demand outlook for FY 2030, which was developed based on the above.

(a) Promotion of voluntary effort by industry (Described above)

- Steady Implementation, evaluation and verification of Industry's Action Plans for a Low- Carbon Society (Described above)

(b) Reduction of CO₂ emission intensity in power sectors

(Decarbonization of the electric power sector)

Under the energy policy principle of S + 3E (Safety, Energy security, Economic efficiency, and Environment) to decarbonize the electric power sector, the use of renewable energy as the main source of power will be thoroughly promoted, while working on renewable energies as the highest priority, aiming to realize their maximum utilization while reducing the burden on citizens and maintaining good relationships with local communities. Review of siting regulations, overcoming grid constraints, ensuring flexibility in the power system through the use of storage batteries, including

EVs etc., and demand response, and drastic reform of the electricity market system will be promoted.

Steady investment in the necessary power transmission and distribution networks and power sources, as well as the improvement of cost efficiency and true local production for local consumption, such as distributed energy systems, will also be encouraged.

Regarding nuclear energy, while reducing dependence on nuclear power as much as possible, nuclear power plants will be restarted with the highest priority on safety. At the same time, the establishment of a nuclear emergency preparedness system, including effective nuclear regulations and the securing of evacuation routes through road construction and other measures, will be steadily promoted. Research, development, and human resource development for the future will be conducted, including the pursuit of reactors with superior safety features.

For thermal power, CO₂ emissions from thermal power generation will be reduced in a consistent manner with the long-term goals of the Paris Agreement to achieve a decarbonized society. Therefore, by fading out inefficient coal-fired thermal power generation etc., Japan's dependence on thermal power generation will be reduced as much as possible on the basic premise of ensuring a stable supply. In addition, use of thermal power generation with a premise of using CCUS⁴¹/carbon recycling and the option of generating power using hydrogen or ammonia will also be pursued to the maximum extent.

○ Reduction of CO₂ emission intensity in power sectors

In July 2015, a voluntary framework for the electric power industry and a low-carbon society action plan involving major businesses (the goal is to achieve an emission factor of around 0.37 kg-CO₂/kWh, which is consistent with the national energy mix and CO₂ reduction targets at the time) was announced. In February 2016, the Electric Power Council for a Low Carbon Society was established and announced mechanisms and rules for individual companies to formulate their own reduction plans and PDCA cycles, including industry wide.

To encourage such voluntary initiatives, by implementing policy measures in accordance with the, the Energy Conservation Act and the Act on the Promotion of the Use of Non-fossil Energy Sources and the Effective Use of Fossil Energy Raw Materials by Energy Suppliers (Act No. 72 of 2009, hereinafter referred to as the “the Advancement Act”), the effectiveness of the efforts of the power industry as a whole will be ensured under the liberalization of the power industry.

Specific actions include the implementation of effective countermeasures to be consistent with the country's new CO₂ reduction targets and energy mix, including the following items, and continued study of future global warming countermeasures in the electric power sector.

⁴¹ Abbreviation for Carbon dioxide Capture, Utilization, and Storage. A technology for separating and capturing CO₂ contained in exhaust gases from thermal power plants, factories etc., and in the atmosphere, and effectively utilizing it as a resource in the manufacture of minerals, chemicals, and fuels, or storing it in stable underground formations.

<Voluntary framework>

- The review of emission factor targets that are consistent with national CO₂ reduction targets and the energy mix, and the improvement of the effectiveness and transparency of efforts by the electric power industry as a whole will be promoted. Also, the sincere commitment to achieving the stated targets will be encouraged.
- The national council (the Industrial Structure Council, Committee on Industrial Science and Technology Policy and Environment, Global Environment Subcommittee, and Resources and Energy Working Group) will also follow up on initiatives under the voluntary framework of the efforts of the electric power industry.

<Policy measures>

- In accordance with the Energy Conservation Act, power generators will be required to meet power generation efficiency standards for newly constructed power generation facilities on a per facility basis. In addition, the existing power generation facilities will be required to meet the efficiency standards for actual power generation on a per generator basis.
- Furthermore, to steadily fade out inefficient coal-fired thermal power generation by 2030, the benchmark target for power producers with coal-fired power generation facilities will require power generation efficiency (on a per utility basis) that is at the same level as state-of-the-art USC (ultra-supercritical) plants. In doing so, the introduction of technologies for decarbonization will be promoted by allowing a credit for co-firing of hydrogen, ammonia, etc. in the calculation of power generation efficiency.
- Based on the Upgrading Act, retail electric utilities will be required to ensure that the percentage of non-fossil power sources in the electricity they sell is above the standard level.
- Furthermore, with a view to 2030 and beyond, CCS⁴² will be addressed based on the Strategic Energy Plan, the Long-Term Strategy as a Growth Strategy Based on the Paris Agreement (Cabinet decision on October 22, 2021), and others.

In introducing power generation facilities, through competition, Japan should constantly promote the advancement of power generation technologies that contribute to the realization of decarbonization and maintain and improve Japan's technological superiority in the power generation business, which will lead to increased international competitiveness and the decarbonization of the world. Based on this concept, and taking into account future trends in the development of power generation technology, the adoption of BAT will be encouraged.

The effectiveness and transparency of the entire electric power industry will be ensured by addressing the above. In addition, the emission factor targets for the electric power industry will be reviewed to assess whether these initiatives continue to be effective and whether progress is being made to ensure that such targets are met.

The status of emissions and emission factors from the electric utility sector will be evaluated. If it is determined that it will be impossible to achieve the revised emission factor target, the enhancement of policies etc. will be considered with stable supply as a major premise.

⁴² Abbreviation for Carbon dioxide Capture and Storage.

(c) Maximum introduction of renewable energy

○ Maximum introduction of renewable energy

[Renewable electricity generation]

Renewable energies do not emit greenhouse gases in their generation, so their increased introduction is essential for global warming countermeasures in the energy conversion sector. They are also a promising, diverse, and important domestic energy source that can contribute to energy security because it can be produced domestically. Under the concept of S + 3E, the highest priority will be placed on renewable energy, and its maximum introduction will be encouraged while reducing the burden on the citizens and coexisting with local communities. Specific initiatives include the following:

(Appropriate operation and revision of the FIT system etc.)

The FIT system, based on the Act on Special Measures concerning the Procurement of Renewable Electricity by Electricity Utilities (Act No. 108 of 2011), is a measure to reduce the cost of renewable energies by allowing the purchase of renewable energy at a fixed price over a long period of time, increasing investment incentives, and promoting the spread of renewable energy. In the future, efforts to reduce costs by power generation businesses will be promoted by a bidding system and the setting of medium and long-term price targets. From FY 2022 onwards, the FIP system was introduced under which power producers sell electricity on the wholesale electricity trading market or in relative transactions, as with other power sources, and receive a certain premium calculated based on the market price. This would encourage the trading of electricity according to supply and demand conditions and market prices and promote the integration of renewable energy into the electricity market.

In order to continue to promote the maximum use of renewable energy while reducing the burden on the citizens, the FIT and FIP systems will be appropriately operated, and the systems will be appropriately revised as necessary.

(Expansion of use, development of business environment for long-term stable power generation, etc.)

In order to maximize the use of renewable electricity and achieve long-term stable use with the understanding of local communities and society, the business environment will be improved through the following initiatives: the development of rules for grid maintenance and grid operation, development of technologies for higher efficiency and lower cost of power generation facilities and advanced grid operation, rationalization of related regulations as necessary, and establishment of a business discipline for coexistence with the local community.

(Expansion of renewable energy in consumers and communities, etc.)

The use of solar power generation at factories, business establishments, housing, buildings, etc. will be promoted while facilitating proactive initiatives in the public sector, such as the installation of solar power generation systems in public buildings.

For houses and buildings, the goal is to have 60% of newly built houses equipped with solar power generation systems by 2030. In addition, efforts will be made to publicize and disseminate the PPA model⁴³ and other information to facilitate smooth introduction to such consumers. Also, laws, such as the Act on the Promotion of Global Warming Countermeasures, will be utilized to promote the introduction of community-based and community-friendly renewable energy that is environmentally friendly and beneficial to improve local resilience while ensuring the smooth formation of regional consensus.

Furthermore, the Ministry of the Environment will optimize the environmental impact assessment, considering the characteristics of offshore wind power generation, such as location and environmental impact, in cooperation with relevant government ministries and agencies, local governments, and stakeholders. At the same time, continued efforts will be made to improve the efficiency of onshore wind, as well as to accelerate the implementation of geothermal power generation which coexists with the local communities, through scientific survey. Unused hydroelectric energy shall be utilized, such as by installing power generation facilities in existing dams that are not being used for power generation and by examining the feasibility of improving dam operations using the latest weather forecasting technology.

[Renewable heat energy]

Focusing on renewable energy heat (solar heat, geothermal heat, snow and ice heat, hot spring heat, seawater heat, river heat, sewage heat, etc.), which is a highly local energy source, the use of biomass heat from sewage sludge, waste wood, and unused materials, and the use of unused heat, such as waste heat from waste treatment, will be promoted according to economic efficiency and regional characteristics. Meanwhile, the use of biofuels, hydrogen, and other decarbonized fuels that can partially replace petroleum products as fuel in the transport sector is also important. The aim is to expand the use of renewable energy heat by supporting the introduction of facilities that supply renewable energy heat and by demonstrating and building models for the effective use of various types of heat energy in the region.

- Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and renewable energy measures in waterworks) (Described above)
- Initiatives in waste treatment (Described above)

[Maximum use of local renewable electricity, heat, and unused heat]

⁴³ Power Purchase Agreement (PPA) model: A contract method whereby a power producer supplies electricity they generated to specific customers. An assumption here is a business model in which a business operator installs and operates a solar power generation system on the roof or site of a customer free of charge, and the customer purchases the electricity generated from the installed business operator and pays the PPA operator for its use. The initial cost of installing the solar power generation equipment may be zero, which is beneficial from the standpoint of reducing the burden on the customer. Yet, it should be noted that the cost of such equipment is paid for through electricity charges, which means that the customer would not have to pay the cost of the equipment.

- Promotion of local production for local consumption and areal use of energy (Described above)

(d) Promotion of energy-saving measures in the petroleum product manufacturing sector

- Promotion of the introduction of facilities and equipment with high energy-saving performance (petroleum product manufacturing sector)

Efforts by petroleum refiners to achieve energy reductions equivalent to 1 million kL of crude oil from BAU will be promoted by (1) effective use of heat, (2) introduction of advanced control and high-efficiency equipment, (3) improvement of power system operations, and (4) large-scale improvements and upgrades of processes based on the Action Plan for Achieving a Low-carbon Society in the petroleum product manufacturing sector.

(ii) Non-energy-related CO₂

Non-energy-related CO₂ emissions in Japan in FY 2019 were 79.2 million t-CO₂, a decrease of 3.8% compared to FY 2013. The following initiatives have been implemented so far: expansion of the use of blended cement, which emits less CO₂ in the production process; reduction of the generation of waste and other materials; promotion of the reuse and recycling of recyclable resources and products; effective use of wood, which can be reproduced as a raw material and biomass energy source and has a low environmental impact; and promotion of the use of biomass plastics. In the future, these countermeasures will be promoted or enhanced as follows to reduce emissions of non-energy related CO₂:

- Expansion of the use of blended cement

The production ratio and use of cement blended with blast furnace slag and other materials in clinker, an intermediate product of cement, will be expanded.

In addition, the use of blended cement will be increased by promoting the use of blended cement in public works projects undertaken by the national government etc. through the promotion of initiative use in accordance with the Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act No. 100 of 2000, hereinafter referred to as the “Act on Green Purchasing”).

- Diffusion of biomass plastics

Based on the Biomass Plastics Introduction Roadmap (formulated by the Ministry of the Environment; the Ministry of Economy, Trade and Industry; the Ministry of Agriculture, Forestry and Fisheries; and the Ministry of Education, Culture, Sports, Science and Technology in January 2021), the use of plastics made from biomass will be promoted on the assumption that it will become more sustainable. By doing this, CO₂ emissions from the incineration of waste plastics (carbon dioxide from petroleum-based carbon in waste plastics) will be reduced as they replace petroleum-based plastics.

○ Reduction of waste incineration

The 3R + Renewable activities will be promoted to achieve the target set forth in the Circulation Plan under the Circulation Act and the waste reduction target based on the Act on Waste Management and Public Cleansing (Act No. 137 of 1970, hereinafter referred to as the Waste Management Act). Also, the incineration of petroleum-based waste, such as waste plastic and waste oil will be reduced by conducting specific studies for the future development of a process plan to accelerate the transition to a circular economy with the aim of developing the Fifth Cycle Plan. Specific actions to reduce CO₂ emissions from waste incineration include the enforcement of separate collection at municipalities and introduction of charges for waste, implementation of measures in accordance with the Act on the Promotion of Resource Circulation for Plastics (Act No. 60 of 2021) and individual recycling acts, reduction of the waste generation through such measures as the recycling of waste oil, and promotion of recycling and reuse.

○ Transition to a decarbonized lifestyle (Described below)

(iii) Methane

Methane emissions in Japan in FY 2019 were 28.4 million t-CO₂, a decrease of 5.4% compared to FY 2013. Relevant countermeasures implemented so far included promoting the 3Rs of waste, upgrading combustion at waste incineration facilities by promoting the introduction of full continuous feed incinerators, improving management of farm fields, and improving livestock excrement disposal methods. These countermeasures will be continued to reduce methane emissions.

○ Measures to reduce greenhouse gas emissions related to agricultural soil (reduction of methane emissions in paddy fields)

Emissions of methane generated from rice cultivation (paddy fields) will be reduced by promoting the prolonged midseason drainage period, which reduces methane emissions as part of rice paddy water management based on the actual conditions of the region.

○ Reduction of final waste disposal

The 3R + Renewable activities will be promoted to achieve the target set forth in the Circulation Plan under the Circulation Act and the waste reduction target set forth in the Waste Management Act. Also, specific studies will be conducted for the future development of a process plan to accelerate the transition to a circular economy with the aim of developing the Fifth Circular Economy Plan. Specific measures to reduce methane emissions from landfilling waste include reevaluation of the disposal method by municipalities, thorough waste sorting, and strengthening the disposal system, which will directly reduce the landfilling of organic waste, such as food waste.

○ Adoption of semi-aerobic landfill structures in final waste disposal sites

A semi-aerobic landfill structure will be adopted when installing a final waste disposal site. This will reduce methane emissions from the biological decomposition of organic

waste, such as landfilled food waste, compared to an anaerobic landfill structure.

(iv) Nitrous oxide

Nitrous oxide emissions in Japan in FY 2019 were 19.8 million t-CO₂, a decrease of 7.5% compared to FY 2013. Measures have been implemented so far to reduce emissions in industrial processes and to upgrade combustion in waste and sewage sludge incineration facilities, for example, by promoting the introduction of fully continuous feed incinerators. These countermeasures will be continued to reduce emissions of nitrous oxide.

- Measures to reduce greenhouse gas emissions related to agricultural soil (reduction of nitrous oxide associated with fertilization)

Emissions of nitrous oxide generated by fertilization will be reduced by reducing the amount of fertilizer applied, separate application of fertilizer, and using slow-release fertilizers.

- Advancement of incineration at sewage sludge incineration facilities

Emissions of nitrous oxide from incineration of sewage sludge will be reduced by upgrading combustion at sewage sludge incineration facilities and promoting incinerators and sewage sludge solid fuel conversion facilities that emit less nitrous oxide.

(Reduction of general waste incineration etc.)

The 3R + Renewable activities will be promoted to achieve the target set forth in the Circulation Plan under the Circulation Act and the waste reduction target set forth in the Waste Management Act. Also, specific studies will be conducted for the future development of a process plan to accelerate the transition to a circular economy with the aim of developing the Fifth Cycle Plan. By doing this, the amount of waste incinerated at general waste incineration plants will be reduced. Also, emissions of nitrous oxide from waste incineration will be reduced by increasing the upgraded combustion at general waste incineration plants through the conversion to full continuous feed incinerators due to the wide-area waste disposal and by increasing the proportion of waste treated by continuous operation at general waste incineration plants.

(v) Fluorinated gases (HFCs, PFCs, SF₆, and NF₃)

The emission of fluorinated gases in Japan in FY 2019 was 55.4 million t-CO₂, an increase of 41.7% compared to FY 2013. In particular, emissions of HFCs have been on an increasing trend due to the ongoing conversion from CFCs and HCFCs to HFCs, mainly for the use of refrigerants in refrigeration and air-conditioning equipment. About 90% of HFCs emissions come from the refrigerants used in refrigeration and air-conditioning equipment. Leakage of HFCs during equipment use and uncollected HFCs at disposal contribute significantly to the emissions.

In response to the global increase in the use and emission of HFCs, an amendment

(the Kigali Amendment) was adopted in 2016 to add HFCs to the list of substances covered by the Montreal Protocol on Substances that Deplete the Ozone Layer. To fulfill the obligation to reduce the production and consumption of HFCs based on the Kigali Amendment, Japan amended the Act on the Protection of the Ozone Layer Through the Control of Specified Substances etc. and Other Measures (Act No. 53 of 1988) in 2018, regulating the production and import of HFCs and implementing other measures. By steadily fulfilling the obligations of the Kigali Amendment, the production and consumption of HFCs will be gradually reduced to 15% of the reference volume ratio (the 2011-2013 average + 15% of the reference volume of HCFCs) by 2036. It is also important to develop and promote alternative gases (green refrigerants) such as non-fluorocarbons and low GWP⁴⁴ products to further reduce the emissions of HFCs.

Japan has also implemented countermeasures throughout the entire lifecycle of fluorocarbons, from the manufacture of fluorocarbons and products to the use and disposal of products and the destruction and recycling of fluorocarbons, under the Act on Rational Use and Proper Management of Fluorocarbons (Act No. 64 of 2001, hereinafter referred to as the “Fluorocarbons Emissions Control Act”). In 2019, amendments were made to add a mechanism for the reliable recovery of fluorocarbons at the time of equipment disposal. As for refrigerants in refrigeration and air-conditioning equipment, it will take time to convert the market stock, and immediate action is necessary through appropriate application of the Fluorocarbons Emissions Control Act and other measures.

In addition, waste household air conditioners are subject to the Act on Recycling of Specified Household Equipment (Act No. 97 of 1998, hereinafter referred to as the “Home Appliance Recycling Act”), and the recovery of fluorocarbons from them are being promoted. However, the recovery rate⁴⁵ of waste household air conditioners is lower than that of other target products. Thus, it is expected that the recovery rate will increase in the future through countermeasures to improve the recovery rate, such as public awareness-raising etc.

Studies will be continued on the introduction of economical methods to reduce the emissions of fluorocarbons, considering that while there are possible effects, there are also issues to be addressed.

○ Fluorinated gases (HFCs, PFCs, SF₆, and NF₃)

(Promotion of non-fluorocarbons and low GWP products)

To reduce the environmental burden caused by fluorocarbons, gas manufacturers etc. (manufacturers and importers of fluorocarbons etc.) are encouraged to implement such measures as the substitution of fluorocarbons with non-CFC alternatives and recycling, including lowering the GWP of fluorocarbons that they handle and reducing their production volume etc.

⁴⁴ Global Warming Potential (GWP): The ratio of the effect of each greenhouse gas on global warming to that of carbon dioxide.

⁴⁵ Recovery rate of waste household air conditioners: The recovery rate of items subject to the Home Appliance Recycling Act is calculated as the number of units shipped in the denominator and the number of units properly collected and recycled (the number of units recycled by manufacturers etc., the number of units recycled by waste disposal licensed companies etc., and the number of units disposed as general waste by local public bodies) in the numerator.

In response to the Kigali Amendment, gas manufacturers etc. are requested to systematically reduce the amount of fluorocarbons they manufacture based on the outlook for the use of fluorocarbons established by the government in accordance with the Fluorocarbon Emissions Control Act.

Regarding refrigeration and air-conditioning equipment and other non-fluorocarbons, the following measures will be implemented to promote the accelerated and steady shift to non-fluorocarbons and low GWP products, taking into consideration that the equipment to be introduced will continue to be used for a certain period of time and taking into account future technological advances and market trends in Japan and overseas.

- i. Non-fluorocarbons and low GWP products are promoted as soon as possible through active use of systems, such as adding new products and revising targets in the designated product system, which requires manufacturers and importers to achieve the standard values in a certain target year for each appropriate product category based on the Fluorocarbon Emissions Control Act, while fully considering the actual situation of each product, etc.
- ii. To raise awareness of the greenhouse effect of fluorocarbons and to educate users and consumers about the introduction of non-fluorocarbons and low GWP products, the labeling of products that use fluorocarbons will be improved in a way that is easy for them to understand.
- iii. In addition to institutional measures, policies will be implemented to encourage product manufacturers and users to develop and introduce technologies to promote the spread of energy-saving natural refrigerant equipment, to train personnel to install and maintain equipment compatible with new refrigerant alternatives, to ensure the quality of the equipment installation and maintenance personnel, and public awareness-raising.

(Preventing leakage of fluorocarbons from the use of refrigeration and air-conditioning equipment for business use)

Based on the Fluorocarbon Emission Control Act, leakage of fluorocarbons will be prevented when commercial refrigeration and air-conditioning equipment is used in cooperation with prefectural governments through compliance with the criteria for management that stipulate equipment inspections etc., operation of the system for reporting and publishing the leakage amount of fluorocarbons calculation, and promotion of compliance with appropriate filling. In addition, active incorporation of IoT and digital technology, which has become applicable through technological innovation, into equipment inspections and other activities will be considered.

In addition, to prevent leakage during the use of refrigeration and air-conditioning equipment, it is important not only for product manufacturers and equipment users but also for equipment maintenance contractors to take action. Thus, efforts are underway to improve the technical level of maintenance and management of equipment for early detection of refrigerant leaks. Also, initiatives will be promoted to secure and train personnel with expertise in the practical management of refrigeration and air-conditioning equipment.

(Recovery and proper processing of fluorocarbons from refrigeration and air-conditioning equipment)

The recovery and proper processing of fluorocarbons from refrigeration and air-conditioning equipment will be promoted through reliable enforcement of the Fluorocarbons Emission Control Act and the Act on Recycling of End-of-Life Automobiles (Act No. 87 of 2002).

In particular, commercial refrigeration and air-conditioning equipment (excluding car air conditioners) accounts for approximately 70% of HFC emissions from refrigeration and air-conditioning equipment. In accordance with the Fluorocarbons Emission Control Act, a system that enables equipment disposers, dismantlers, waste/recycling companies, fluorocarbons filling and recovery companies, etc. to check each other will be thoroughly implemented, and the recovery rate will continue to be improved in cooperation with the prefectures.

In addition, in recovering fluorocarbons from refrigeration and air-conditioning equipment, technological verification will be conducted to increase the recovery rate per unit and further improve the recovery rate.

(Recovery and proper processing of fluorocarbons from the disposal of household air conditioners)

In addition, regarding fluorocarbons contained in the disposal of household air conditioners, the recovery rate of the disposal of household air conditioners will be improved, thereby promoting the recovery and proper processing of fluorocarbons by steadily enforcing the Home Appliance Recycling Act and public awareness-raising.

(Promotion of voluntary effort by industry)

Countermeasures implemented against fluorocarbons etc. in the industry's voluntary action plans etc. will be evaluated and verified. Also, measures will be implemented to support businesses' efforts to reduce emissions, such as subsidies for the introduction of equipment that contributes to emission reductions.

(2) Policies and measures to remove greenhouse gases

The emissions and removals through policies and measures for forest and other removals in FY 2019 was 45.9 million t-CO₂ (of which, 42.9 million t-CO₂ was absorbed through the policies and measure for forest removals and 3 million t-CO₂ by the promotion of agricultural land management, pastureland management, and urban greening among other measures). This is equivalent to 3.3% of the total greenhouse gas emissions (1,408 million t- CO₂) in FY 2013.

(i) Policies and measures for forest carbon sinks

Forests, which cover about 70% of Japan's land, play roles, including land conservation and recharging water resources. At the same time, they absorb and fix carbon dioxide in the atmosphere, contributing to the prevention of global warming as a removal for greenhouse gases. In addition to its long-term storage of carbon absorbed

by forests, wood is a material that consumes relatively less energy during manufacturing and other processes, and its use as an energy source helps reduce CO₂ emissions by replacing fossil fuels.

Removals by forest carbon sinks will be secured and enhanced in the medium and long term through initiatives, such as proper forest maintenance and conservation and lumber uses to achieve the targets for the fulfillment of the multifunctional role of forests and the targets for the supply and use of forest products stipulated in the Basic Plan for Forest and Forestry (Cabinet decision on June 15, 2021), which is expected to contribute to the greenhouse gas emission reduction target for FY 2030 (the target for removals by forest carbon sinks is approximately 38 million t-CO₂ [approximately 2.7% of total emissions in FY 2013]) and achieving GHG net zero in 2050. In order to achieve these targets, in addition to appropriate forest thinning, other measures, including increasing lumber use and ensuring the creation of young, fast-growing forests by reforesting elite trees, will be implemented by realizing cyclic use of forest resources which consists of harvesting, using, and planting. The following policies, including cross-cutting policies, will be comprehensively implemented with the cooperation of all actors, including local governments, forest owners, private businesses, and the citizens.

○ Policies and measures for forest carbon sinks

(Maintenance of healthy forests)

- i. Promotion of diverse forest management through appropriate thinning, reforestation after final cutting, cultivation of multi-layered forests, long rotation forest management etc.
- ii. Promotion of additional thinning and reforestation through further promotion of municipal initiatives based on the Act on Special Measures concerning Advancement of Implementation of Forest Thinning, etc. (Act No. 32 of 2008) etc.
- iii. Promotion of forest management etc. by public entities, utilizing the forest management system based on the Private Forest Management Entrustment Act (Act No. 35 of 2018) and the forest environment transfer tax.
- iv. The development of a road network that appropriately combines forest roads and forest service roads, while also taking into consideration the preservation of the natural environment.
- v. Promotion of mixed coniferous forests by harvesting trees according to natural conditions and introducing broadleaf trees etc.
- vi. Promotion of reforestation through labor-saving and low-cost afforestation by using drones and forestry equipment to transport seedlings, integrated logging and afforestation operations, low-density planting, and the use of elite trees and large seedlings to reduce the number of undercutting.
- vii. Efficient development and expansion of seed and seedling production of elite trees with excellent growth etc., and countermeasures against damage by wild birds and animals etc.
- viii. Securing reforestation etc. through proper operation of the logging and afforestation notification system etc.
- ix. Elimination of unplanted and unforested areas in backland water source forests etc. and rehabilitation of devastated *Satoyama* forests etc.

(Promotion of appropriate management and conservation of protection forest, natural parks and other areas)

- i. Appropriate operation of regulations under the protection forest system, planned allocation of protection forest, appropriate conservation management under the Protected Forest system for national forests, and promotion of measures to conserve and restore natural vegetation in cooperation with NPOs etc.
- ii. Systematic implementation of mountain control projects in areas with a high risk of mountain disasters and devastated forests.
- iii. Prevention of forest pests and diseases, as well as the damage caused by animals and implementation of forest fire prevention countermeasures.
- iv. Expansion of natural parks and nature conservation areas, proper operation of regulations and strengthening of conservation management within these areas.

(Fostering efficient and stable forestry management)

- i. Securing long-term sustainable forestry management by clarifying forest ownership and boundaries, consolidating forest operations, promoting long-term outsourcing of operations, establishing management rights under the forest management system, promotion of forest management projects by forest cooperatives systems, and preparation of forest management plans.
- ii. Development of new forestry through the reduction of afforestation costs and labor saving and lightening of forestry work through the development and diffusion of remotely and automatically operated machinery etc.
- iii. The development of forest resource information using laser surveying etc., the sharing and advanced use of forest-related information, including owner information, and the streamlining of lumber production, distribution, and management using ICT.
- iv. Introduction of a work system that properly combines road network maintenance and high-performance forestry machinery, effective use of such tools, and implementation of initiatives based on the Strategy for Research and Technology Development in Forest, Forestry, and Wood Industry (formulated by the Ministry of Agriculture, Forestry and Fisheries in December 2019).
- v. Promotion of initiatives to train and secure forest and forestry workers.

(Promotion of peoples' participation in forest management)

- i. Promotion of public awareness-raising of citizens participation in forestation through national tree-planting festivals and other nationwide greening events.
- ii. Promotion of support for forest maintenance and conservation activities, such as tree planting by a wide range of entities, including companies and NPOs, support for forest creation activities by companies etc., and promotion of green fundraising activities.
- iii. Promotion of improvement of skills and safety systems of forest volunteers and others
- iv. Promotion of education on the forest environment

- v. Promotion of forest conservation and management and use of forest resources through cooperation among local residents, forest owners, and others
- vi. Creation and promotion of forest service industries that comprehensively utilize forest space.
- vii. Promotion of ecosystem maintenance and restoration projects related to deer and other animals and green worker projects for the conservation of forest ecosystems in national parks etc.
- viii. Cultivation of public awareness of the fact that people's lives are supported by the rich forests, countryside, rivers, and oceans.

(Promotion of the use of wood and woody biomass)

- i. Promotion of the use of regional lumber for housing etc.
- ii. Further promotion of the use of lumber in urban areas through the conversion of public buildings and medium- to large-scale buildings wooden and woody, and the development and diffusion of products and technologies that contribute to this, such as CLT (orthogonal laminated plates) and wood fire-resistant materials based on the Act for Promotion of Use of Wood in Buildings to Contribute to the Realization of a Decarbonized Society (Act No. 36 of 2010, hereinafter referred to as "Wood Use Promotion Act").
- iii. Promotion of new utilization technologies for forest products, promotion of the spread of cellulose nanofibers derived from woody biomass, modified lignin, etc., and research, development, and practical application of new woody materials etc. that can replace plastics.
- iv. Establishment of a stable supply system for domestic lumber to meet demand, including the development of efficient lumber processing and distribution facilities.
- v. Promotion of power generation and heat utilization through the establishment of an efficient and low-cost collection and transportation system for woody biomass in a manner that guarantees the continued use of forest resources.
- vi. Promotion of the use of wood by disseminating the significance and effects of wood use, the "Kizukai Undo" (attention to wood use) initiative and "Mokuiku" (wood use education) activities and promote efforts such as networking among companies, in order to foster public understanding of wood use and also lead to ESG investment in companies that use wood sustainably.

(ii) Policies and measures to increase carbon removals in agricultural soils

○ Policies and measures to increase carbon removals in agricultural soils

It has been confirmed that carbon storage in cropland and grassland soils in Japan can be increased through the continuous application of organic matter, such as compost and green manure to the soil as part of soil preparation and the application of biochar. Thus, promoting these contributes to carbon sequestration in cropland and grassland soils.

(iii) Promotion of urban greening

○ Promotion of urban greening

Urban greening is the most familiar sink measure for people in their daily lives. Its promotion is not only effective as an actual sink measure, but also has a great effect on spreading awareness of the concept of global warming countermeasures.

Therefore, in accordance with the Green Policy Guidelines (decided by the Ministry of Construction on July 28, 1994), The Green Basic Plan formulated by municipalities, and other comprehensive plans for the conservation and creation of greenery by the national and local governments, the following initiatives will be actively promoted: the development of urban parks; greening of roads, rivers and erosion control structures, ports and harbors, sewage treatment facilities, public rental housing, and government facilities; and creation of new green spaces on the rooftops of buildings.

As part of this initiative, the meaning and benefits of urban greening will be widely publicized to all sectors of the public. At the same time, support will be actively provided to create new green areas, such as in urban areas using a variety different means and entities, such as urban greening, through the participation of a variety of entities, including citizens, businesses, and NPOs, and the use of a citizen greening certification system and multistory urban park system.

In addition, the development of a system for reporting and verifying the removals by urban greening etc., will continue to be systematically promoted.

(iv) Initiatives related to blue carbon and other removals

Blue carbon refers to CO₂-derived carbon that is removed and fixed by coastal and marine ecosystems, and its removals include seaweed beds and tidal flats in shallow waters. The calculation method of greenhouse gas removals and fixation by blue carbon has not been finalized, except for some parts. Thus, these calculation methods will be established. Also, relevant research will be carried out so that they can be added to the IPCC guidelines for greenhouse gas emissions and removals inventories. At the same time, effective seaweed bed and tidal flat conservation, creation, and restoration etc. will be promoted. In addition, the creation of new industries based on marine resources will be promoted through the development and innovation of new materials, such as functional foods and biomass plastics made from aquatic plants.

Research and development will be promoted to increase carbon dioxide removal efficiency and accelerate the growth of algae (algae production process technology) and to breed to increase the tolerance of algae. Through this, a large-scale demonstration will be conducted, and the cost will be reduced from the current range of 1,600 yen per liter to 100 yen per liter, which is equivalent to the cost of existing products, by around 2030, ahead of other countries, to achieve practical application.

The capacity of healthy ecosystems will be increased to remove carbon dioxide by promoting the conservation and restoration of forests, grasslands, peatland, and other wetlands, soils, coastal areas, and other ecosystems that fix a lot of carbon. Appropriate bird and animal management will be promoted, including damage control and population management to reduce damage caused by birds and animals that have a significant impact on forests and other ecosystems and to help ensure removals by healthy ecosystems. Furthermore, to increase the adaptive capacity of ecosystems to

climate change, stresses other than climate change (e.g., development, environmental pollution, overuse, invasion of non-native species, etc.) will be reduced in conjunction with the formation of ecosystem networks, which are pathways for organisms to move and disperse.

In addition, green infrastructure that utilizes the diverse functions of the natural environment and ecosystem-based approaches, such as forests (EbA⁴⁶ and Eco-DRR⁴⁷) can be used for adaptation of climate change such as disaster prevention and mitigation. Various benefits can also be expected, including mitigation of climate change through carbon storage; effective use of aboveground resources in *Satochi-Satoyama*; creation of diverse social, economic, and cultural reciprocity in local communities; and contribution to biodiversity conservation and sustainable use. These efforts, more comprehensively referred to as nature-based solutions (NbS), will be promoted in conjunction with the establishment of protected areas and other areas conducive to biodiversity conservation, as needed.

For CO₂-removing concrete, the aim is to achieve the same price as existing concrete (30 yen per kg) in 2030 as a cost target by expanding sales channels through public procurement. Thus, CO₂-concrete will be registered in the Ministry of Land, Infrastructure, Transport and Tourism's database on new technologies (NETIS) and will be widely publicized to local governments. Another aim is to expand public procurement by national and local governments by introducing the system at the 2025 Japan International Expo and other events.

2. Cross-cutting measures

(1) Cross-cutting measures for achieving the goals

(a) Activation of the J-credit Scheme

○ Activation of the J-credit Scheme

The J-credit Scheme, recognized as a reliable and high-quality credit system, is a necessary tool for achieving GHG net zero by 2050. While ensuring the continuity of the system even after FY 2030, in order to continue to actively promote emission reduction measures such as introducing energy-saving equipment and utilizing renewable energy by various domestic actors, as well as emission removal measures through appropriate forest management, we will also further accelerate the J-credit Scheme that certifies credits that can be used for carbon offsets and for increasing the added value of goods and services.

Specifically, in order to promote the generation of carbon removal credits that is increasingly important to achieve GHG net zero, we intend to scale up the generation of forest-based credits through forest management activities by encouraging forest owners and managers to use the system and by reviewing to streamline the monitoring process.

Additionally, in order to promote the crediting of the environmental value generated by the introduction of energy-saving/renewable energy equipment for individuals and small and medium-sized businesses, we will further promote the utilization of subsidized projects by the national government, as well as the integration of greenhouse

⁴⁶ Ecosystem-based Adaptation

⁴⁷ Ecosystem-based Disaster Risk Reduction

gas reduction activities such as adopting energy-saving equipment by different small and medium-sized businesses and individual into large projects led by manufacturers of energy-saving equipment, leasing companies, and trading companies. Furthermore, thorough considering the generation of credits using new technologies such as hydrogen, ammonia, and CCUS, we will increase its supply while ensuring the quality. In addition to scaling up the supply side in such a way, we will also expand the demand through offsets use by businesses, the national and local governments. Specifically, besides considering using it in the offset scheme of the international aviation industry (CORSIA), we will expand the demand by cooperating with local governments aiming to achieve zero carbon cities and a Circular and Ecological Economy. At the same time, while promoting the revision of certification targets within a range that ensures the reliability of the system, including revision and development of methodologies, in consideration of technological development and the business environment, we will continue to consider improving the system's environment by promoting digitalization to ensure convenience, linking to similar systems such as Non-Fossil Fuel Energy Certificates, and increasing activities to publicize the system. Furthermore, we will consider a framework for encouraging market-based voluntary trading focusing on carbon reduction values.

(b) Joint Crediting Mechanism (JCM)

○ Promotion of the Joint Crediting Mechanism (JCM)

Reducing emissions and removing GHG through the deployment of leading decarbonization technologies with a deep understanding of the needs of partner countries will contribute to the transition to a decarbonized society and a virtuous circle for the economy and environment, not only for partner countries but also for Japan.

For this reason, Japan will establish and implement the Joint Crediting Mechanism (JCM) in order to quantitatively evaluate contributions of Japan to greenhouse gas emission reductions and removals which are achieved through the diffusion of, among others, leading decarbonizing technologies, products, systems, services, and infrastructures as well as through the implementation of measures in developing countries and others, and in order to use such contributions to achieve Japan's NDC. By doing so, through public-private collaborations, Japan aims to secure accumulated emission reductions and removals at the level of approximately 100 million t-CO₂ by fiscal year 2030 through public-private partnerships. Japan will appropriately count the acquired credits to achieve its NDC.

We will continue to ensure proper operation of measurement, reporting, and verification (MRV) for the registration of JCM projects and credit issuance. We will also promote the system by strengthening city-to-city and regional cooperation, business-led international deployment with funding from different sources including the private sector, and diversifying and scaling-up projects to contribute to decarbonization in a multi-sided approach. Additionally, we will support the demonstration of technologies and the development of projects, through the appropriate operation of domestic systems, and the cooperation with related Japanese and international organizations such as the New Energy and Industrial Technology Development Organization (NEDO), Japan International Cooperation Agency (JICA), Japan Bank for International Cooperation

(JBIC), Nippon Export and Investment Insurance (NEXI), Asian Development Bank (ADB), World Bank (WB), United Nations Industrial Development Organization (UNIDO), and the Japan International Research Center for Agriculture, Forestry and Fisheries (JIRCAS). In addition, for the implementation of the JCM in Japan in line with the Paris Agreement and the related decisions, as well as the bilateral documents for the JCM and the rules and guidelines adopted by the Joint Committee established based on the said documents, the JCM Promotion and Utilization Council is established in the JCM implementing authorities. This Council carries out duties relating to the authorization of JCM credits as a Party to the Paris Agreement, the determination of a method to apply a corresponding adjustment to prevent double counting, and the revision of the Guidelines for the Implementation of the JCM.

(c) Transition to a decarbonized lifestyle (Described below)

- Transition to a decarbonized lifestyle (Described below)

(d) Creation of urban/regional structures and socioeconomic systems contributing to decarbonization

Since urban/regional structures and transportation systems will continue to affect CO₂ emissions over the medium and long-term through variations in traffic volume and commercial floor area, aiming to shift away from the conventional diffusion-type urban development, it is necessary to promote urban and regional development that contributes to decarbonization by making cities compact, rebuilding public transportation networks (Compact Plus Network), creating people-centered downtowns, improving the efficiency of the city's energy system and so on.

In order to do this, we will promote policies and projects based on the Integrated Urban and Regional Transport Strategy and create spaces that are *Comfortable and Walkable* by combining comfort improvement zones with the improved Pedestrian Convenience Road System (Hokomichi) and by making compact cities based on the Location Optimization Plan and low carbon city development plan. With regard to the decarbonization of each area in the city, we will also strongly promote the comprehensive efforts, including the area energy network, the maintaining urban parks and conservation and creation of green spaces that becomes greenhouse gas removals, the utilization of digital technologies, and support for environmental-friendly and high-quality urban development projects of private sector, as well as the social implementation of smart-city. We will also promote the introduction of renewable energy in urban parks.

As for action plans of local government and regional climate change adaptation plans, we will proceed with such efforts in coordination with city planning, the Location Optimization Plan, low carbon city development plan, agricultural promotion area development plans, and other policies. Additionally, we will enhance systems for enabling the deployment of facilities that contribute to the local production/local consumption of renewable energy, utilizing land of unknown owners. We will also promote the use of public transportation in coordination with land use policies and consider optimizing the floor area of stores and commercial premises. Along with this, we will promote energy-saving and CO₂ reduction in houses and buildings. As for

existing infrastructure such as public facilities including water and sewage treatment facilities, waste processing facilities, transportation infrastructure, and energy infrastructure, we will enhance their energy saving efficiency while turning them into regional energy centers, and at the same time, expanding and consolidating them, extending their lifespan, and improving their disaster prevention functions. On top of that, we will promote the social implementation of green infrastructure that makes the best use of the diverse features of the natural environment through public-private partnerships and cross-cutting collaboration.

Moreover, we will promote the development of leading-edge, low-carbon cities and regions including FutureCity and Environment Model City, as well as cross-expand the knowledge and know-how gained through them for nationwide application.

○ Decarbonization initiatives in national parks

Additionally, in national parks and hot spring areas, with full respect for the natural environment, we will create a virtuous cycle of nature conservation and utilization by enhancing the attractiveness and resilience of the region through promoting the creation of sustainable tourist sites that aim to decarbonize the demand side, such as the introduction of self-consumption renewable energy and energy-saving equipment to be used in accommodation and visitor facilities, the generation of heat and power using hot springs, and the decarbonization of mobility.

(Initiatives for the effective utilization of distributed energy resources)

To promote the use of distributed energy resources, it is necessary to further facilitate the role of aggregators who can bundle various distributed resources such as storage batteries, renewable energies, fuel cells, and cogeneration and appropriately trade them in the market. In addition to reducing demand (negative demand response) from large consumers such as factories, which currently represents the main business of aggregators, we will improve the market environment so that distributed energy resources can be reckoned as balancing power and supply power in the supply and demand adjustment market and the wholesale electricity market. Additionally, with an eye on the FIP scheme, we will promote demonstration of renewable energy aggregation projects, and promote the efforts to avoid output control of shifting power demand (positive demand response) and to alleviate grid congestion using distributed resources.

Additionally, storage batteries, which play a particularly important role among the distributed energy resources, present the problem that the cost of the power storage system remains high compared to other countries. In order to further reduce the costs, we set a target price of 70,000 yen/kWh for household power storage systems and 60,000 yen/kWh for commercial and industrial power storage systems for FY 2030, as a price level where investments can be recovered with the profits obtained from power storage systems, and use it as a price target for the introduction support by the government. Also, in consideration of the fact that the number of used vehicle storage batteries is expected to increase in the future, we promote the reuse of stationary storage batteries with high safety and performance reliability in order to reduce the burden on the environment. Through these measures, we spur the price reductions and promote their widespread use.

- Local production and consumption of energy and promotion of area energy network (Described above)
- Low carbon cities by improving the thermal environment through heat island countermeasures (Described above)

(2) Other related cross-cutting policies

(a) Realization of a hydrogen society

With an eye to future GHG net zero, hydrogen is expected to make various contributions, including zero emission power sources, decarbonization of the transportation and the industrial sectors, production of synthetic fuels and synthetic methane, and efficient use of renewable energies. The role is expected to expand even further in the future.

In order to achieve a hydrogen society where hydrogen is universally used in daily life and industrial activities, it is necessary to reduce hydrogen supply cost and create the demand across different fields in an integrated manner. To this end, we aim to reduce the hydrogen supply cost to 30 yen/Nm³ (CIF price⁴⁸) by 2030 and to 20 yen/Nm³ or less by 2050.

In order to reliably guarantee a vast and inexpensive hydrogen supply over the long term, it is important to simultaneously promote the use of inexpensive hydrogen produced overseas and to establish a hydrogen production base that uses domestic resources. Therefore, with the aim of international hydrogen supply chain and of commercializing hydrogen with water electrolysis equipment using surplus renewable energies and other energies, we will support scaling up of transportation and supply facilities including hydrogen carriers, as well as developing technologies for the upsizing and modularization of water electrolysis equipment.

In order to increase the hydrogen demand, it will be necessary to accelerate efforts in each sector where hydrogen is expected to play a role. In the transportation sector, in addition to supporting the introduction of FCVs and enhancing the strategic development of hydrogen stations, we will support the expansion of uses for trucks and ships, as well as the development of infrastructure for large-scale stations. In the power sector, we will support the technological development of combustors for mono-fuel combustion and the demonstration of actual power generation capabilities for large-scale combustors, as well as set up systems for the appropriate evaluation of the non-fossil fuel energy values. In the industrial sector, we will promote the development of innovative technologies for the large-scale conversion of manufacturing processes, such as hydrogen direct reduced iron, and will develop and demonstrate technologies for building large boilers suited to the combustion characteristics of hydrogen.

Additionally, we will establish a model for a hydrogen society that makes the best use of existing infrastructure as well as the supply and demand characteristics of the nearby geographical regions, demonstrate self-sustaining and distributed energy systems that utilize local resources such as renewable energies and other energies, with the aim of

⁴⁸ CIF (cost, insurance, and freight) price: Comprehensive price inclusive of goods' cost, freight charge, and freight insurance premium

expanding them nationwide.

As for hydrogen regulatory reforms, we have steadily implemented those aim at introducing fuel cell vehicles and hydrogen stations, and we will continue to steadily consider unifying regulations on fuel cell vehicles. In synchronization with the progress of social implementation of hydrogen in each sector in addition to the transportation sector, we will expand the scope of consideration and consider streamlining regulations with the premises of ensuring safety.

(b) Initiatives based on guidelines for controlling GHG emissions

As for guidelines for emission reductions based on the Act on Promotion of Global Warming Countermeasures, we will revise the menu of countermeasure including making decisions on decarbonization of energy based on technological trends such as BAT. We will also newly formulate and announce guidelines in the fields where those are yet undeveloped as soon as possible. Furthermore, with the goal of contributing to the decarbonization of individual lifestyles, we will expand the menu of the measures that should be implemented by businesses when manufacturing and providing products and services that are consumed in daily lives. We will also promote voluntary and proactive efforts by businesses to engage in environmentally friendly business activities, through offering various forms of assistances and information to implement the measures addressed in the guidelines.

(c) GHG emissions accounting, reporting, and disclosure program

From the standpoint of establishing the foundation of voluntary emission reduction efforts by having the emitters calculate their emissions and promoting and creating opportunities of voluntary efforts by the citizens and businesses through visualization of emission data as outlined in the Act on Promotion of Global Warming Countermeasures, businesses that emit more than a certain amount of greenhouse gases are obliged to calculate their own emissions and report them every year to the national government. The national government compiles and publishes them as a report. Based on the Amended Act on the Promotion of Global Warming Countermeasures, we will build an electronic reporting system that facilitates the convenience for reporting parties, and make the system a basis for reporting, so that we will speed up the collection and publication of information. At the same time, when disclosing the reported information, we will provide the information, including the information of each business facilities, in a highly convenient way using the relevant systems in order to improve the usability of information. And when doing so, we will also provide information on the precautions to interpret the information, including that simple comparisons between each business facilities might be insignificant.

Additionally, calculation rules will be reviewed based on the latest information, such as IPCC guidelines. We will also consider the factors including forest absorption due to forest management and the use of CCS etc. Moreover, to improve the usability of the reported information, we will encourage the active reporting of information on emission reducing efforts, in addition to emission data. We will also look into measures which evaluate the businesses actively engaging in decarbonization, considering their opinions, and stimulate their greenhouse gas emissions reduction.

(d) Promotion of environmental considerations in business activities

In order to reduce greenhouse gas emissions, we will appropriately incorporate the standpoint of environmental consideration into economic activities and promote investment and technological development in business activities.

More specifically, we will promote a cycle whereby businesses that are taking action on environment can reap benefits, by implementing following efforts: (1) the value of environmental consideration in products, services, and financial markets is widely appreciated and the public demands environmental consideration from businesses; (2) suppliers carry out environmentally friendly business activities and inform consumers of the them in easy-to-understand manner; and (3) the accurate delivery of such information to consumers allows consumers to reward environmentally friendly businesses, as well as their products and services, by evaluating and choosing them.

To this end, we will encourage businesses to voluntarily and proactively engage in environmentally friendly business activities based on guidelines such as those for reducing emissions.

Furthermore, based on the Act on the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc., and by Facilitating Access to Environmental Information and Other Measures (Act No. 77 of 2004), we will establish the conditions where environmentally friendly business activities and environmentally friendly products to be highly rated among society and the market by promoting the use of environmental information by businesses and the citizens through disclosing environmental data of businesses. To do so, we will promote efforts to improve the reliability and comparability of disclosed information throughout the supply chain.

Moreover, we will enhance the effectiveness of environmental management by promoting the deployment of environmental management systems incorporating a PDCA cycle, such as ISO 14001 and Eco-Action 21 for small and medium-sized businesses. At the same time, we will promote further environmental consideration in business activities by fostering the appropriate training of employees.

(e) Pro-Growth carbon pricing

Carbon pricing, a policy method that puts a price on CO₂ emitted from business activities and consumption activities, can be implemented through a variety of mechanisms. Those involve not only carbon tax and cap-and-trade emission trading system, but also non-fossil value trading market, credit trading such as the J-credit Scheme and JCM, and internal carbon pricing, through which companies voluntarily put a price on their CO₂ emissions for their investment decisions. Additionally, in some countries/regions such as the EU, Carbon Border Adjustment Mechanisms are being considered as a policy tool to adjust the price of imported goods from countries with insufficient climate policy.

Economic methods that harness market mechanisms such as carbon pricing should be implemented when they contribute to economic growth, especially to enhancing industrial competitiveness, spurring innovation, and promoting investment. In this regard, based on the order of Prime Minister Suga in December 2020, the Ministry of

the Environment and the Ministry of Economy, Trade and Industry are currently working together to consider a carbon pricing scheme which contributes to economic growth. We will continue expert and technical discussion to assess whether we can design a system that is in line with the purpose of our growth strategy. In that process, we will consider an appropriate timeline under the macroeconomic situation, climate policies, and the development of the alternative technologies for decarbonization, as well as international trends and the specific context of Japanese industries' efforts. We also take into account of an impact on the international competitiveness, which include an effect on capital investment and research and development in the business sector.

- Activation of the J-credit Scheme (Described above)
- Promotion of the Joint Crediting Mechanism (JCM) (Described above)

(Non-fossil fuel energy value trading market)

The Advancement Act sets the target ratio of procured non-fossil power sources in a company's retail electricity supply for retail electric power companies falling under the act. The non-fossil value trading market will improve the access environment of non-fossil power sources for retail electric power companies by clarifying the environmental value of electricity derived from non-fossil power sources and by making it tradeable in the form of non-fossil certificates. The procurement targets can be achieved by procuring non-fossil certificates through the relevant markets. Under the current system, the purchase of non-fossil certificates is limited to retail electric power companies, and consumers can procure carbon-free electricity by purchasing power menus with non-fossil certificates from retail power companies.

On the other hand, the declaration of GHG net zero by 2050 in October 2020 and the worldwide efforts to take the environment into consideration have led to a growing momentum toward renewable energy and decarbonization of electricity consumption throughout the life cycle of companies, particularly in the manufacturing industry. For this reason, in order to facilitate the procurement of carbon-free electricity for consumers, we will revise the entire trading market system of the non-fossil fuel energy value trading market while maintaining the procurement targets for retail power companies under the Advancement Act. This includes the creation of a globally suitable renewable energy value trading market, with the aim of making it more convenient by creating an environment that enables the direct purchase of certificates by customers and by significantly increasing the volume of tracked certificates that can be used for RE100.

(Carbon tax)

A carbon tax has an advantage that its impact on business activities is highly predictable since the price is fixed uniformly. On the other hand, the problems of carbon tax are the uncertainty of its effect on reducing emissions and its potential conflict with the goals of the growth strategy that encourages businesses' investment with their cash and deposits. We will continue an expert and technical discussion, taking into account the burden of the tax for climate change mitigation, which has already been introduced in Japan, as well as other energy taxes and FIT levies.

(Cap and trade emissions trading system)

Cap-and-trade emissions trading scheme, in which the government sets an upper limit on emissions from business activities, has an advantage that it reliably reduces the total amount of CO₂ emissions. On the other hand, we have not identified how to effectively allocate emissions consistent with the economic growth. We will continue to have an expert and technical discussion.

(Carbon border adjustment mechanisms)

While paying close attention to the policy developments in other countries, we will take the following actions in parallel with the discussion on the pro-growth carbon pricing.

- i. We will consider the action for carbon border adjustment mechanisms on the premise that they should be designed to be consistent with WTO rules, while paying close attention to the state of discussions in other countries.
- ii. Regarding the measurement of carbon emissions per product unit, we will take a leading role in formulating and applying international rules for reliable measurement and evaluation methods that are well balanced in terms of accuracy and feasibility (e.g., development of ISOs).
- iii. We will also work to ensure the transparency of relevant data held by each country.
- iv. We will evaluate the carbon costs embedded in the covered products in Japan and the countries that introduce carbon border adjustment mechanisms.
- v. Regarding the appropriateness of introducing carbon border adjustment mechanisms and the effective design of the system, we will cooperate with countries in the same position in terms of preventing carbon leakage and ensuring fair competition.

(f) Greening of the tax system and effective use of tax for global warming mitigation

Greening the tax system is one of the important policies for achieving net-zero by 2050. We will investigate and analyze comprehensively and systematically the environmental effects of environment-related tax systems, including the situation in other countries.

By using the revenue from the tax for climate change mitigation enforced since October 2012, we will steadily implement a wide range of policies to reduce energy-related CO₂ emissions, such as energy-saving, deploying renewable energy, and making fossil fuels cleaner and more efficient. Under the close cooperation between relevant ministries, we promote wise spending by focusing on cost-effective policies given the characteristics of each business.

(g) Promotion of sustainable finance

In order to realize the society envisioned in the Paris Agreement, it is necessary to further encourage private investment for companies engaging in climate change

countermeasures and innovation; therefore, the role of finance is becoming more important. Across the world, sustainable finance, in particular ESG finance, which incorporates environmental, social, and governance factors into investment and loan decisions from the standpoint of reducing investment risk and improving returns over the medium and long-term, is widespread. Furthermore, taking climate change risk into account in investment decisions is becoming the standard in the international financial markets. In Japan, also the scale of ESG investment has expanded significantly in recent years.

At the same time, demand for climate-related financial disclosures is increasing and Japan has the largest number of organizations supporting TCFD in the world. On the other hand, a movement is gaining ground, mostly in Europe, to introduce regulations on the labeling of financial products and to make sustainability disclosures mandatory. Additionally, it is becoming necessary for financial institutions to calculate the greenhouse gas emissions from their financial activities (Financed Emissions) and consider measures to reduce the emissions as they respond to climate change throughout their entire portfolios.

Japan will promote sustainable finance such as ESG finance in consideration on international trends, in order to attract domestic and international environment-related investment for businesses that contribute to global warming countermeasures to realize a decarbonized society.

More specifically, based on the Climate Innovation Finance Strategy 2020 (established by the Ministry of Economy, Trade and Industry on September 16, 2020), in collaboration with related ministries and agencies, we will integrally promote the shift to decarbonization (transition) including steady low-carbon efforts such as energy-saving, the finance to innovative technologies (innovation) for decarbonization, in addition to renewable energies and other energies (green). As for the green aspects, we will promote green finance, starting with green bonds, by establishing a system for issuing them and developing the market for them. Furthermore, with an eye toward the realization of a decarbonized society, regarding to transitional finance that finances greenhouse gas emissions reduction efforts aligned with a long-term strategy, we will promote investment in companies that are engaged in shifting to decarbonization (transition) and in innovation by developing a sectoral roadmap for emission-intensive industries where decarbonization cannot happen in a single step, and we will also support Asia's transition toward the realization of global GHG net zero, based on the Basic Guidelines on Climate Transition Finance (established on May 7, 2021 by the Financial Services Agency, the Ministry of Economy, Trade and Industry, and the Ministry of the Environment). In order to promote innovation, in September 2020, companies that have challenged themselves to boldly pursue innovation toward the realization of a carbon-free society have been hailed as Zero Emission Challenge Companies, and their efforts have been highlighted both in Japan and abroad. Besides continuing with this initiative, we will continue to help along the understanding of innovation in the markets by fostering dialogs between these companies and investors.

Additionally, active information disclosures by companies and constructive dialog based on such disclosures create the foundation of encouraging financing for efforts to improve corporate value through decarbonization. In Japan, a private-sector-led TCFD consortium was established in 2019, and it has since hosted the TCFD Summit, and it

has led the utilization and development of TCFD. Following the revision of the Corporate Governance Code in June 2021, we will encourage prime market-listed companies to enhance the quality and quantity of disclosures under the TCFD or equivalent international frameworks. Furthermore, Japan will actively participate in international discussions to establish a framework for sustainability-related disclosures at the International Financial Reporting Standards (IFRS) Foundation. Moreover, we will promote disclosure and dialogue and improve their quality by supporting guidance on TCFD and green investment, the development, revision, and deployment of the scenario analysis guides, and scenario analysis by companies and financial institutions.

From the standpoint of promoting regional decarbonization, the role of regional financing activities is important. In order to link the decarbonization of a region to a creation of a virtuous circle for economy and environment in the area, besides offering a clear nationwide vision, we will promote ESG regional financial efforts that emphasize the impact on the environment, economy, and society by advancing the creation of models for solving regional issues and the establishing businesses using regional resources by forward-looking regional financial institutions in cooperation with local governments.

Furthermore, we will promote actions to steer private investment towards efforts to reduce greenhouse gases by supporting investment in decarbonization projects where private funds are insufficient and by promoting investment in cutting-edge equipment through leasing methods.

Moreover, we will increase the momentum on ESG finance by hosting the ESG Finance High-Level Panel, a gathering of top executives from the financial and investment fields, and we will promote discussions to create a positive impact on the environment and society through finance.

3. Basic policies

(1) Establishing a domestic system for calculating and disclosing greenhouse gas emissions and removals based on the UN Framework Convention on Climate Change

To date, in order to calculate greenhouse gas emissions and removals based on the UN Framework Convention on Climate Change and the Kyoto Protocol, and to create an inventory of emissions and removals, and submit it to the UN Framework Convention on Climate Change Secretariat, we have set up and managed, in cooperation with related agencies, ministries, and the Ministry of the Environment in particular, a domestic system for calculating and disclosing emission and removals while working on inspections conducted by an expert inspection team dispatched in accordance with the UN Framework Convention on Climate Change and the Kyoto Protocol. While keeping an eye on the start of reporting under the Paris Agreement's Transparency Framework and observing how it is implemented across the entire world (Global Stock Take), we will continue to improve and further refine methods and processes for calculating emissions and removals.

Additionally, in order to more accurately understand actual emissions and better assess the methods for reviewing the implementation status of countermeasures, we will further refine the calculation of greenhouse gas emissions and removals by preparing

statistics of activities and by advancing research on the calculation of energy consumption intensity and greenhouse gas emission intensity, and on methods for measuring greenhouse gas emissions, as well as on methods for measuring and accounting CCU-related emissions and removals. More specifically, we will compile the necessary statistics to assess in detail the actual CO₂ emissions in the household sector.

We will also work on international evaluations and inspections and submit the National Communication and Biennial Report that are periodically requested based on UN Framework Convention on Climate Change and COP17 decisions.

On the other hand, when measuring, monitoring, and reporting removals (or emission) by removals, emission and removals are calculated and accounted based on IPCC guidelines and the supplementary methods guidance arising from the Kyoto Protocol. In order to improve the accuracy of the data, we will continuously compile information on the activities and land use changes required for MRV, as well as promote research on removal and emission mechanisms of greenhouse gas in forests.

(2) Technological development and social implementation of global warming countermeasures

The development and demonstration of technologies for coping with global warming are an effort to reduce greenhouse gas emissions significantly in the future by scaling up greenhouse gas emission reduction and by promoting reduction of the cost, as well as by deploying them to society at large. We will thoroughly pursue energy conservation and promote electrification and decarbonization of power (rapid diffusion of technologies for maximizing the introduction of renewable energy, use of nuclear power with the highest priority on safety, and the development of fusion technology) as outlined in the Science, Technology, and Innovation Basic Plan. We will also strongly promote cutting-edge innovations such as next-generation solar cells, CCUS/carbon recycling, methanation, and hydrogen. In doing so, in order to promote the introduction of technologies and its social implementation, we will promote the decarbonization of citizens' lifestyles, realize and expand zero-carbon cities, and foster public understanding of these, as well as consider the necessary systems and standards.

Additionally, based on the Environment Innovation Strategy, which aims to establish innovative technologies that will allow us to go “Beyond Zero” and reduce the accumulated CO₂ since the beginning of industrialization, we will strengthen the research and development of innovative technologies in promising fields. Furthermore, with regard to fields where we expect progress in realizing GHG net zero, we have formulated a “Green Growth Strategy in line with Carbon Neutrality by 2050” (formulated in collaboration with related ministries and agencies on June 18, 2021⁴⁹;

⁴⁹ “Relevant ministries and agencies” refer to the Cabinet Secretariat; the Ministry of Economy, Trade and Industry; the Cabinet Office; the Financial Services Agency; the Ministry of Internal Affairs and Communications; the Ministry of Foreign Affairs; the Ministry of Education, Culture, Sports, Science and Technology; the Ministry of Agriculture, Forestry and Fisheries; the Ministry of Land, Infrastructure, Transport and Tourism; and the Ministry of the Environment. As part of this strategy, the ministries and agencies listed above specify each part they are charged with. While the Cabinet Office is in charge of a wide range of parts, the Economic and Social Research Institute and the Science and Technology Innovation Promotion Secretariat are in charge of statistics, indicators, and innovative environmental innovation strategy-related areas.

hereinafter, “Green Growth Strategy”) that includes (1) time-specific goals; (2) research, development, and demonstration; (3) introduction of regulatory reform and standardization; and (4) international cooperation. Among the priority areas where policy effects are particularly significant and long-term continuous support is required to ensure social implementation, we will provide consistent support, ranging from research and development of innovative technologies to their social implementation, for companies that commit to specific goals and actions to achieve them, using the newly created Green Innovation Fund.

For example, we expected to promote research, development, demonstration, and the social implementation of technologies that switch energy supply sources by constructing of a large-scale hydrogen supply chain through increasing the size of transportation-related equipment that would reduce transportation costs, as well as technologies that increase the efficiency of energy consumption on the demand side such as next-generation storage batteries, which are an indispensable technology for accelerating the introduction of energy-efficient next-generation automobiles and renewable energy.

Furthermore, in order to achieve the Moonshot Research and Development Program 2050 target (of realizing sustainable resource circulation to recover the global environment and creating the industry of waste-free sustainable global food supply by exploiting unused biological resources), we will accelerate the required research and development, and clarify the road to its social implementation.

Additionally, we will steadily carry out basic research at universities and other institutions so as to constantly generate the seeds of innovative decarbonization technologies based on new ideas. We will also award those who have the ideas of innovations that contribute to the development of a decarbonized society and whose achievements are expected to be implemented in society. By doing so, we will promote efforts to accelerate the creation of innovations and its social implementation.

In order to accelerate the national and local government’s decarbonization actions, we will bring together the universities and similar institutes that have comprehensive knowledge and diverse networks and promote interdisciplinary research in order to translate academic research results into concrete policies and social implementation of technologies by national and local governments. In addition, we will establish a system for strengthening cooperation between universities, industry, academia and government, and further strengthen the function of universities as regional knowledge centers.

(3) Promoting climate change research and strengthening observation/monitoring systems

In order to promote global warming countermeasures from a long-term and global perspective, it is essential to continuously collect latest scientific knowledge domestically and internationally, and research, observation and monitoring of climate change are extremely important measures to form the basis. With regard to research related to global warming, based on efforts which have been made, we will promote elucidation of climate change mechanisms and the understanding the current state of global warming by improving projection accuracy, as well as developing necessary technology, evaluating the impact of global warming on the environment, society, and economy, reducing greenhouse gas emissions, and integrating adaptation measures strategically and intensively in the spirit of international cooperation.

As for observation and monitoring of climate change, we will strengthen the comprehensive observation and monitoring system to understand greenhouse gases, climate change and their impacts based on documents such as the “GEO Strategic Plan 2016-2025: Implementing GEOSS” approved at the GEO Ministerial Summit (November 2015, Mexico City) as a subsequent plan of the “GEOSS ten-year Implementation Plan” approved at the 3rd Earth Observation Summit (2005), and the “Follow-up Report on the Implementation Policy of Japan’s Earth Observation for the Next 10 Years.”

In particular, we will strengthen comprehensive atmospheric observations using aircraft, ships, and in-situ observations in Asia and Oceania, establishment of an ecosystem monitoring system at terrestrial carbon circulation observation bases in Asia, maintaining the network for observing CO₂ in the ocean, monitoring the global warming impact in areas vulnerable to climate change such as cryosphere and coastal areas, and the foundation of the Data Integration and Analysis System (DIAS) to promote the use of global environmental big data such as observational and socioeconomic data. In particular, global warming affects the Arctic region the most, such as rapid sea-ice retreat, and it has become a global issue that affects non-Arctic countries including Japan. Therefore, we will enhance scientific knowledge in the Arctic Circle where there has been no observational data, by deploying an Arctic research vessel to serve as an international research platform in the Arctic Circle. Additionally, the geostationary meteorological satellites *Himawari* 8 and 9, which became operational in July 2015, will observe and monitor the global environment by observing the sea surface temperature, the distribution of sea ice, the fine particles in the atmosphere, and so on.

Furthermore, Japan has leading technologies for observing greenhouse gases from space using the greenhouse gas observation satellites *Ibuki* (GOSAT), launched in January 2009, the world’s first dedicated greenhouse gas observation satellite, and *Ibuki* No. 2 (GOSAT-2), launched in October 2018. Thanks to GOSAT’s observational data, we are now able to estimate methane emissions for each country that emits the gas more than a certain level. The observational outcome with such strength will contribute to refining climate change forecasts and will provide a highly transparent infrastructure for monitoring efforts to reduce greenhouse gases in Japan and the world. Moreover, in recent years, we have also conducted research to estimate the emissions in large cities.

Japan aims to achieve GHG net zero by 2050 by reducing greenhouse gas emissions to net zero. As part of these efforts, we will develop and launch the third greenhouse gas/water circulation observation satellite (GOSAT-GW) in 2023 to promote the actions of each country and to measure the emission reduction. Furthermore, with an eye on the future, we will continue to study the concept of an international greenhouse gases observation mission. Regarding GOSAT-GW, we will continue the mission of GOSAT-2, and it will enable us to assess the CO₂ emissions in metropolitan areas or large-scale emission sources, and verify the effects of JCM. We will refine MRV technology in a such way and support advancement of JCM projects. Also, in order to promote climate change countermeasures such as observing and monitoring of global environment and disaster risk reduction, we conduct research on the latest technologies for the next *Himawari*, and consider its development, launch, and operation, with the aim of operating it by Japanese fiscal year 2029.

By supporting international joint research network activities related to global

warming, we will share information, knowledge, and experience in the Asia-Pacific region and contribute to the promotion of a regional decarbonization.

Section 3 Efforts by public institutions

○ Proactive actions by the national government

The government, in conformity with the National Government Action Plan based on the Act on the Promotion of Global Warming Countermeasures, and the action plans of each ministry and agency based on the government action plan, will proactively take the lead in maximizing the use of renewable energies, constructing and managing buildings, purchasing and using goods and services, and participating in other administrative work and projects.

In particular, the following will be promoted.

<Maximum and effective use of renewable energies, construction and management of buildings>

- Maximum introduction of solar power generation in government-owned buildings and lands
- Implementation of ZEB in new buildings (aim to achieve ZEB Ready on average)
- Improvement of heat insulation, implementation of planned energy-saving upgrade, promotion of wood use in government buildings, energy-saving assessment, and utilization of BEMS.
- In-depth consideration of how to decarbonize equipment that uses fuel, with an eye on GHG net zero by 2050

<Purchase/use of goods and services>

- Introduction of electric vehicles
- Introduction of LED lights
- Priority procurement of renewable energy
- Proactive adoption of equipment with high energy-saving performance
- Utilization of recycled products such as recycled paper and wood
- Purchase and use of products and services that contribute to reducing the environmental burden, including the aspect of their life cycle.

<Other administrative work and projects>

- Implementation of 3R + Renewable for waste
- Ensuring work-life balance by reduction of overtime and telework

The National Government Action Plan (approved by the Cabinet on October 22, 2021) aims to reduce the total direct and indirect emissions from the government's

administrative work and projects by 50% by FY2030 compared to FY 2013, through the steady implementation of the measures included in the plan.

Progress of the National Government Action Plan will be evaluated and verified by the Central Environment Council, and then checked by the Executive Committee of the Global Warming Prevention Headquarters on a yearly basis, and the inspection results will be published. From the standpoint of ensuring transparency and promoting a proactive actions, evaluation and verification by the Central Environment Council will be carried out with the participation of each ministry and agency. In addition, when inspection results are published, the progress of each effort will be evaluated by comparing various indicators stipulated in the National Government Action Plan, such as the total greenhouse gas emissions, with target and past results, and by comparing schedules and progress at organization units in a cross-cutting way. The results will be disclosed together.

In addition, regarding the above-mentioned administrative work and projects, the national government will enforce contracts that take into account greenhouse gas emissions reduction (hereinafter referred to as “green contracts”), focusing on the seven areas of electric power, automobiles, ships, ESCO, building design, building maintenance, and industrial waste in accordance with the Act on Promotion of Contracts of the State and Other Entities, Which Show Consideration for Reduction of Emissions of Greenhouse Gases, etc. (Act No. 56 of 2007, hereinafter referred to as the “Green Contract Act”) as well as on the basic policy stipulated in the act. The government will more reliably achieve the goals set forth in the National Government Action Plan and strive to further reduce emissions.

For national government buildings, we will continue to promote the use of life cycle energy management (LCEM) methods for air-conditioning equipment, as well as the thorough implementation of appropriate management and visualization of energy consumption. This includes maintaining government facilities to reduce the environmental burden and to preserve the surrounding environment. In addition, in order to promote a shift in demand towards environmental goods, such as products contributing to greenhouse gas emissions reduction, including carbon offsets, the national government will take the initiative in procuring environmental goods in accordance with the Act on Promoting Green Procurement. Moreover, we will endeavor to use wood in government buildings in accordance with “Wood Use Promotion Act”.

○ Proactive actions by local governments and promotion by the national government

In line with this plan, the local governments will formulate and implement their own local government’s action plan for operations concerning their own operations. By taking initiatives, they should aim to become a model for local businesses and residents.

The department in charge participates and takes responsibility to promote the effective and continuous reduction of greenhouse gas emissions from all operations in principle, through building and operating a PDCA cycle.

In formulating the plans, while referring to the manual for formulating and implementing local action plans of local government compiled by the national government, the following points should be noted.

<Main items to be specified in local government's action plan for operations>

- i. Basic matters such as the period of implementation of the plan
- ii. Quantitative targets for total greenhouse gas emissions
- iii. Specific action items and its goals
 - In local governments, aside from energy consumption in government buildings, a significant proportion of greenhouse gas emissions are from waste treatment projects, water and sewage projects, public transportation, public schools, public hospitals, and so on. For this reason, all of the administrative activities specified in the Local Autonomy Act (Act No. 67 of 1947) fall under the plan.
 - In addition, for projects that are outsourced or implemented under the designated manager system and equivalent systems, trustees are requested to implement measures for reducing greenhouse gas emissions to the extent possible.
 - As for specific measures, the following initiatives should be implemented in a proactive way in accordance with the measures implemented by the national government based on the National Government Action Plan: maximizing the introduction of solar power generation in buildings and lands owned by local governments, proactive implementation of ZEB for buildings, implementation of planned energy-saving renovation, introduction of electric vehicles/LED light, renewable energy through contracts with retail power companies with a low CO₂ emission intensities as outlined in the Green Contract Act, as well as the procurement of products and services that contribute to reducing the environmental burden.
- iv. Systems and procedures for promoting, inspecting, evaluating, and publishing action plans
 - The implementation status of the plan is to be inspected and evaluated periodically, and the results are to be published once a year.
 - When publishing the inspection/evaluation results, in addition to the total amount of greenhouse gas emissions, the progress status of each action items, as well as the progress status of each facility or organization, are to be regularly compared with target and values in the past and made published as much detail as possible.
 - Based on the inspection and evaluation results, the plan will be revised as necessary, and the various operational mechanisms to implement the plan will be revised accordingly.

In order to promote such efforts, the national government will compile manuals for formulating and implementing action plans of local government. In addition, in cooperation with prefectural governments, the government will develop the necessary information infrastructure for the systems to support the management and the formulation of action plans of local government, tools/inventory to estimate greenhouse gas emission at regional levels, collecting and sharing of case studies, and training for local government staff. Along with these, the government will also support the

development of facilities and the introduction of equipment related to renewable energy and energy-saving. Moreover, the government will compile the results announced by local government and publish them in list form.

In addition, local governments endeavor to promote the Green Contract by making policies for the promotion of the contract, focusing on the seven areas of electric power, automobiles, ships, ESCO, building design, building maintenance, and industrial waste outlined in the Green Contract Act.

Furthermore, efforts for green purchases should be made by creating policies to promote the procurement of environmental goods in accordance with the Act on Promoting Green Procurement and procuring goods based on such policies. Moreover, efforts should be made to use wood in public buildings in accordance with the Act for Promotion of Use of Wood in Public Buildings.

(Promotion of initiative of public institutions other than national and local governments)

It is important that not only the national and local governments but also public organizations such as independent administrative agencies take initiative. Therefore, the national and local governments provide information on effective global warming countermeasures in accordance with their characteristics to independent administrative agencies and other public institutions. This facilitates the independent administrative agencies and other public institution to take the lead in formulating plans and take proactive actions to reduce greenhouse gas emissions from their office work and projects, in accordance with the National Government Action Plan and action plans of local government. The national government monitors the status of these initiatives as regularly as possible.

Moreover, independent administrative agencies, special public corporations, national university corporations, and similar bodies should make Green Contract and strive to reduce greenhouse gas emissions.

Section 4 Basic matters regarding measures to be implemented by local governments

- Promotion of initiatives based on the local government's action plan for entire municipal jurisdictions

Local governments promote policies to reduce greenhouse gas emissions according to the natural and social conditions of their regions. In particular, while ensuring the collaboration and cooperation with local businesses and residents in conjunction with the promotion of comprehensive management of public facilities and community development, local governments aim to maximize the introduction and use of renewable energies and untapped energies (hereinafter referred to as “renewable energies and other energies”) and also aim to promote thorough energy savings. Additionally, they strive to create cities and regions that contribute to decarbonization while tackling various regional problems and to promote the formation of a sound material-cycle society. In promoting such policies, local governments promote sustainable community development using local resources in coordination with different regions based on the concept of a Circular and Ecological Economy as set forth in the fifth Basic Environmental Plan (Cabinet decision on April 17, 2018).

1. Taking the initiative in reducing greenhouse gas emissions through the PDCA cycle

Prefectures and municipalities must take the lead in curbing their own greenhouse gas emissions. When doing so, as a general rule, a PDCA system for initiatives to control greenhouse gas emissions targeting all administrative work and projects should be established and operated.

In particular, it will be necessary to constantly and comprehensively grasp the emission status of energy-related CO₂ emissions (type and amount of energy used, operating status of equipment using the energy, etc.), as well as actively pursue opportunities to introduce and utilize renewable energies and other energies and to save energy. Based on the results of such efforts, necessary operational improvements and cost-effective capital investment should be considered.

Furthermore, with regard to the equipment used for business, efforts must be made to select equipment that contributes to the reduction of greenhouse gas emissions in consideration of advances in technological progress based on the guidelines for emission reduction. In particular, prefectures and designated cities should actively consider introducing BAT.

Moreover, equipment used for business should be used in a way that reduces the amount of greenhouse gas emissions to the extent possible.

2. Maximizing the introduction and the use of renewable energies and other energies and promoting energy saving

Prefectures and municipalities cooperate with each other to promote regional decarbonization through the use of renewable energies available locally toward the goal of reaching GHG net zero by 2050. More specifically, based on the Amended Act on the Promotion of Global Warming Countermeasures, they set goals regarding the implementation of policies like those promoting the use of locally available renewable energies and take advantage of the local government's action plan councils to create

regional agreements. At the same time, they promote renewable energies by striving to include in their local government's action plan for entire municipal jurisdictions that can promote regional decarbonization promotion projects (hereinafter referred to as "promotion areas"), as well as initiatives that contribute to the regional environmental conservation and regional economic and social development required for the projects.

When prefectures and municipalities set implementation targets for policies related to the promotion of renewable energy use, they should set such goals based on the natural and social conditions of the region while maximizing the potential of the region's renewable energies. Additionally, in order to promote such efforts by municipalities, the national government too publicizes information on the potential of renewable energy for each municipality, as well its introduction status, and also provides tools for analyzing the effects of renewable energies on the regional economic cycle. Moreover, while paying attention to the efficiency of data acquisition and the impact on market competition, local governments consider mechanisms for assessing the amount of electricity and gas used in the region and for better estimating the amount of emissions in the region.

Additionally, when a municipality sets up a promotion area, from the standpoint of maximizing the potential of renewable energies in the municipality and in consideration of the implementation goals for policies related to the promotion of renewable energy use set by each local government, it should consider a wide range of places in the area where the introduction of renewable energy can be promoted. For example, in the case of solar power generation, it should include public facilities, public idle land, roofs of houses and buildings, deteriorated agricultural land where farming is not possible, waste disposal sites, reservoirs, and other virtually unused land; for onshore wind power generation, it should base its decision on wind conditions above a certain level; for geothermal power generation, it should consider an area's geothermal potential. On top of that, municipal policies such as large-scale recruiting of businesses within the promotion area are also effective. On the other hand, in consideration of the various problems related to renewable energy, such as deterioration of the landscape, adverse effects on wildlife, destruction of ecosystems, generation of noise, impact on hot spring resources, landslides, and impact on radars, it is also necessary to consider how to best preserve the environment based on the region's natural and social conditions, the originally envisioned land use, national security, and other public interests. It is therefore important for the national government to provide environmental information and for prefectures to formulate environmental consideration policies when setting up promotion areas. Additionally, in consideration of risks such as landslides, municipalities should take into consideration relevant laws and regulations when setting up promotion areas and avoid areas with the high risk of landslides.

Furthermore, when setting a promotion area in a facility or area that has an administrator, it will be necessary to coordinate with such administrator in advance so as not to interfere with the management of the facility or area. However, it has to be noted that, even if a promotion area has been set up, it is not guaranteed that industrialization will follow and that establishing a business outside of the area is not uniformly prohibited.

Prefectures and municipalities should build regional consensus regarding promotion areas, including the consensus of residents and related local governments, by utilizing

to local government's action plan councils before establishing plans for regional decarbonization promotion projects. When establishing and operating a regional council, in addition to fostering understanding on the part of local residents, care should be taken to ensure that the councils function effectively as regional consensus building entities so as to ensure the understanding and cooperation of related administrative agencies (for example, the Regional Environmental Office, the Regional Bureaus of Economy, Trade and Industry, the Regional Development Bureau, the Regional Agricultural Administration Offices, the Regional Forest Office, the Ministry of Defense / Self-Defense Forces, etc.) and related businesses (for example, agricultural, fishing operators and their organizations, agricultural council members, existing users including hot spring companies, those involved in regional finance, energy-related businesses such as general power transmission and distribution businesses, renewable energy power generation businesses, nature conservation organizations, tourist operators).

Municipalities cooperate in terms of administrative procedures to smooth the path to projects that conform to the local government's action plan for entire municipal jurisdictions. Additionally, the national and prefectural governments endeavor to facilitate administrative procedures and provide the necessary information, advice, and other assistance to municipalities in conjunction with energy policies in order to facilitate the projects.

In addition to the above, the operation of the local government's action plan for entire municipal jurisdictions, including matters related to regional decarbonization promotion projects, should be carried out in accordance with the manuals for formulating and implementing action plans of local government established by the national government. If farming and forestry land is to be included in the promotion area, it should be done in accordance with the basic policy of the Act on Promoting the Generation of Electricity from Renewable Energy Sources Harmonized with Sound Development of Agriculture, Forestry and Fisheries (Law No. 81 of 2013) and the standards specified in the Ordinance of the Ministry of Agriculture, Forestry and Fisheries of Article 5, Paragraph 5, of the same law. It should be noted that it is also necessary to comply with requirements for the certification of the business plan under the Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities.

In promoting the use of renewable and other energy sources, it is important to build a stable and efficient supply and demand system. In particular, with regard to biomass energy, securing cooperation from various stakeholders, from procuring resources to securing demanders, could be challenging. Prefectural governments and municipalities are expected to play a leading role in ensuring such cooperation. It is also expected that introducing distributed energy systems combined with promoting urban development that makes cities more compact and the reorganization of public facilities will promote efficient energy use.

Additionally, prefectures and municipalities are expected to actively consider and introduce tax measures, such as introducing fixed asset tax exemptions for renewable energy facilities and financial measures, such as investing in renewable energy business in collaboration with regional financial institutions in order to reduce costs and promote investment in renewable energy projects.

Additionally, the ingenuity of the private sector will make it possible to turn whole-area decarbonization into a business. For example, business entities such as new regional electric power operators promoting decarbonization by utilizing regional renewable energies could play a role. For this reason, local governments support the creation of business entities independently promoting decarbonization in the region according to the actual conditions of the region.

Moreover, with regards to equipment used for business, local governments promote the introduction of BAT based on guidelines on emission reduction, appropriate operational improvement, active consultation of energy-saving diagnoses, introduction of cogeneration, maintenance of energy management systems, etc. Cities with a particularly high greenhouse gas emission level, such as prefectures, designated cities, core cities, special cities/areas, the establishment and operation of the GHG emissions reporting program and the global warming plan document system will help businesses work to promote reductions in greenhouse gas emissions.

Moreover, it will also be necessary to induce residents to try and reduce greenhouse gas emissions by promoting the use of public transportation, the use of services and products (including wood products) with lower greenhouse gas emissions, the diffusion of next-generation automobiles, promotion of eco-driving, financial support for energy-saving housing, and promotion of “COOL CHOICE”.

3. Promotion of urban/regional development that contributes to decarbonization as a response to various regional issues

In promoting global warming countermeasures in a region, it is necessary to concentrate urban structures and to comprehensively and systematically work on urban and regional development that contributes to decarbonization in order to prevent the freezing (lock in) of the socioeconomic structure into a rigid pattern of high greenhouse gas emissions. Furthermore, in order to smoothly promote such efforts and allow results to take root, it is effective and important to consider how to respond to various regional challenges, such as regional revitalization and biodiversity conservation, while at the same time using regional resources including renewable energy. Since the use of renewable energy in a region will reduce the risk of power outages in the event of a disaster due to regional distributed power sources, renewable energy is desirable from the dual perspective of effectively promoting climate change countermeasures and preventing or mitigating disasters.

For this reason, regarding measures related to the reduction of greenhouse gas emissions, such as in city planning, location optimization plans, low carbon town planning, agricultural promotion area development plans, forest plans, comprehensive plans, comprehensive management plans for public facilities, regional public transportation plans, and so on, consideration will be given to reducing greenhouse gas emissions in cooperation with the action plan of local government while striving to harmonize results with the achievement of the objectives of the measures. Examples of strongly expected initiatives that are to be implemented mainly by local governments range from area-wide efforts such as the introduction of regional energy management systems (CEMS) and regional heating in business-centered districts and industrial parks, urban compactification, reconstruction of public transportation networks, creation of *comfortable and walkable* spaces, construction of smart communities, and the social

implementation of green infrastructure to broad-based initiatives for reducing emissions through the utilization of Eco-DRR and avoiding the installation of artificial structures.

Additionally, in order to promote the understanding and cooperation of businesses and residents regarding such efforts, it is important to promote the development of human resources and networks that participate in community development and encourage various actors to play a leading role in decarbonization. For this reason, community-based policies including teaching and raising awareness for environmental education and area management, such as supporting the activities of private organizations, are expected to be promoted.

4. Cross-boundary coordination/cooperation of local governments

As local governments make use of the Regional Energy and Global Warming Mitigation Councils while cooperating with national and regional center for climate change actions and Regional Councils on Global Warming Countermeasures, information and know-how related to global warming countermeasures between prefectures and municipalities will be actively shared, and it is strongly expected that efforts by various actors will be promoted.

Additionally, the promotion of joint examinations and the implementation of measures and projects contributing to global warming countermeasures by means of wide-area cooperation and collaboration with other local governments are expected to further enhance and diversify initiatives, as well as make them more efficient. Examples of various forms of cooperation that are conceivable include the sharing of knowledge on measures and policies considered to be effective by public governments with similar natural and social conditions and the implementation of joint projects; coordination and linking of measures and policies in metropolitan areas formed by a central city of considerable scale surrounded by neighboring cities, towns, and villages; implementation of joint energy projects between mountainous area rich in renewable energy resources and urban areas with abundant financial power; and more. As for action plans of local government, since having multiple local governments work together to jointly formulate and implement measures for emission reductions in offices and businesses may help reduce greenhouse gas emissions more effectively, it is desirable that action plans of local government are formulated jointly according to the actual conditions of the regions involved.

Moreover, the promotion of urban development aiming at decarbonization overseas and at sharing information on advanced initiatives and technologies through international city-to-city cooperation based on sister city relationships and other corporation agreements with overseas local governments is expected to contribute to the reduction of greenhouse gas emissions worldwide.

Section 5 Efforts expected of businesses with particularly high emissions

Businesses with considerably high total greenhouse gas emissions are expected to formulate plans that include quantitative targets for emission reduction measures to promote effective individual or collective countermeasure across different greenhouse gasses, sources, and reduction measures.

Although the details of the plans are left to the autonomy of the businesses, it is expected for them to note the following points to ensure the best possible results.

- In particular, businesses should strive to reduce emissions by improving energy and carbon intensity and analyzing performance, as well as sourcing low-carbon electricity.
- Businesses should strive to set targets based on an international comparison of emission intensities, taking into account the characteristics of each industrial sector and assuming that the best available technology (BAT) will be implemented when new equipment is installed or upgraded, and then explain to the public that this is the maximum feasible target level.
- To the extent possible, businesses should include in their plans, measures that contribute to the reduction of greenhouse gas emissions by other entities, such as measures to reduce greenhouse gas emissions that are implemented jointly with other entities in the supply chain, the development of products with low greenhouse gas emissions, and the reduction of waste. And a quantitative assessment of the contribution to emission reductions in other sectors, such as commercial and other, residential and transport, should be carried out.
- Businesses that have drawn up plans should strive to publish the plans and the progress of the measures implemented in accordance with the plans.
- Businesses should strive to improve the transparency and credibility of their plans through objective evaluations by relevant government councils and third-party organizations. And based on such evaluations, they should strive to work to improve the feasibility of plan implementation.

Section 6 Transition to a decarbonized lifestyle

- Transition to a decarbonized lifestyle (Promoting understanding and behavioral change among individual citizens)

Households account for about 20% of Japan's production-based greenhouse gas emissions, which are mainly due to energy consumption at home, such as heating and cooling, hot water supply and the use of household appliances, while households account for about 60%⁵⁰ of Japan's consumption-based greenhouse gas emissions (carbon footprint), according to some reports. To achieve the FY2030 target and realize a decarbonized society, every citizen needs to take action to combat global warming.

We will provide citizens with reliable information on the critical situation of global warming, its impact on society and global warming countermeasures, based on the latest scientific findings presented by the IPCC Assessment Report and the Assessment Report on Climate Change Impacts in Japan, in a form that is easy to understand and adapted to different generations and lifestyles, in order to change the awareness of global warming and spread awareness of the crisis.

More specifically, the constant and repeated dissemination of information through a wide variety of media and with different methods and tools conveying the fact that 1) unless we strengthen measures against global warming, the present climate crisis undermining the survival of humankind and all living things will have serious and widespread irreversible effects on people and ecosystems in the future, and that 2) the global warming countermeasures required of each individual to create a carbon-free society contribute to a more comfortable and healthier lifestyle will lead to a better understanding of global warming issues and to the voluntary practice of global warming countermeasures.

Relevant ministries and agencies will work together to promote “COOL CHOICE” in cooperation with industry, labor, local governments, NPOs, etc., which will promote all wise choices that lead to global warming countermeasures, such as choosing energy-saving and decarbonized products, services, and lifestyles, by building public understanding and momentum for cooperation in global warming countermeasures and stimulating consumer behavior. And we will promote positive and voluntary behavioral change among citizens, using behavioral economics insights such as nudges and that promote the transformation to a socio-economic system suitable for a decarbonized society and the development of lifestyle innovations, including the creation and expansion of markets for decarbonized products and services.

We will provide effective information through a variety of approaches and tools, including detailed outreach by influential and communicative people in various fields, the use of nudges to help people make better voluntary choices, and active use of the internet and social media to raise public awareness, gain their sympathy and make the issue personal, and that we link this to voluntary action and positive choices by individual citizens for global warming countermeasures, then we will decarbonize the lifestyles of local residents based on local issues and needs.

⁵⁰ “Environmental Load Intensity Data Book by Input-Output Table” (provided by the National Institute for Environmental Studies) by Keisuke Nansai; Carbon Footprint of Japanese Health Care Services From 2011 to 2015 by Keisuke Nansai, Jacob Fry, Arunima Malik, Wataru Takayanagi, and Naoki Kondo; and estimates by the Institute for Global Environmental Strategies (IGES) from the Ministry of Internal Affairs and Communications: “2015 Input-Output Table.”

In addition, in order to hear the voices of young people, who will be responsible for the future, the government will set up a forum to receive the opinions of the youth generation, leading to a virtuous circle of reflecting the views of the youth generation in policies, including the state of the socio-economy based on decarbonization, and raising their awareness of the issues involved and promoting climate actions.

(Promoting Environmental Education and Education for Sustainable Development [ESD])

To solve the problem of global warming, it is extremely important that each citizen takes action in his or her daily life, and a change in lifestyle is necessary. To promote this, it is not enough to simply impart knowledge, but it is important to provide learning support to help learners understand the current situation of global warming and its relationship to human activities, and to take action themselves to address the problem, starting with those in their immediate environment.

With regard to Japan's proposed Education for Sustainable Development (ESD), the new international framework "ESD for 2030", which indicates that ESD contributes to the achievement of all the goals of the SDGs through fostering creation of sustainable societies, was adopted at the UN General Assembly in December 2019 and was launched in earnest at the "UNESCO 2021 World Conference on Education for Sustainable Development" in May 2021. In Japan, the Ministry of Environment and the Ministry of Education, Culture, Sports, Science and Technology took the lead in formulating the "Implementation Plan for Education for Sustainable Development in Japan" in May 2021 to promote ESD with a whole-of-government approach, taking into account the principles of "ESD for 2030".

We formulated "Implementation Plan for Education for Sustainable Development in Japan" with considering global trends. And in line with the plan, we will clarify the policy position of environmental education, and promote specific measures for the development of learning environments, including learning opportunities and places, the training of leaders, and the promotion of activities focusing on youth and local communities, with the cooperation of various stakeholders, including educational institutions, local governments, NPOs and NGOs, businesses, research institutions, local residents and individuals.

Against this background, the government will implement the following actions to contribute to a deeper understanding and behavior change of every citizen and to promote environmental education.

- I. Relevant Japanese ministries and agencies will cooperate in the "COOL CHOICE" movement and promote the following actions at home and in the office in cooperation with relevant industries and businesses. In particular, ministries and agencies will communicate the economic benefits and costs of energy conservation, as well as the comfort and health benefits, especially in areas that account for a large proportion of CO₂ emissions from lifestyles such as housing and mobility, and will also promote the increased use of renewable energy generation and decarbonized electricity.
 - Switching to energy-saving and decarbonized products, including LED lighting,

energy-saving appliances, and building new net zero energy house (ZEH), retrofitting insulation in existing houses.

- Installing renewable energy systems at home and changing electricity contracts to choose and switch to low-carbon or decarbonized electricity.
 - Deployment of “Zero Carbon Drive” campaign to promote the use of renewable electricity and electric vehicles (EV), plug-in hybrid vehicles (PHEV), and fuel cell vehicles (FCV).
 - Decarbonizing mobility and transport, i.e., promoting walking, cycling and using public transport according to local conditions, introducing eco-driving, car sharing, using teleworking and various online services, reducing redelivery and all this.
 - Switching to a decarbonized lifestyle and work style by taking actions in the immediate environment, i.e., switching to sustainable fashion, adopting “Cool Biz” and “Warm Biz” which can contribute to diverse and flexible work styles, local production and consumption of seasonal food which can contribute to reducing CO₂ emissions from food production and transport, household efforts to reduce food loss and waste, and choosing decarbonized products and services.
- II. The government will implement various measures according to local conditions to promote environmental awareness and behavior change among local residents, including support in terms of human resources, technical information and funding (See Section 7 for details).
- III. More citizens will be involved in the implementation of specific actions through the leadership and communication of messages by influential ambassadors in various fields. In addition, relevant ministries and agencies will work together to organize and share the latest information to ensure that these ambassadors can improve their ability to disseminate information and enable them to disseminate information effectively and continuously. (See Section 7 for details).
- IV. The government will personalize and feedback the information with using AI and IoT to collect and analyze energy use and carbon emissions, and provide economic incentives based on the amount of environmentally friendly behavior, to encourage voluntary decarbonized behavior change. (See Section 7 for details).
- V. The government will create and effectively deliver content or educational materials that meet needs and appeal to a wide range of people, in alignment with the other actions above.
- VI. The government will promote home eco-diagnosis, which suggests countermeasures for CO₂ emission reduction tailored to individual lifestyles by visualizing the energy consumption status in each household and the CO₂ emission reduction through individual decarbonization measures.
- VII. The government will hold events or launch campaigns to achieve a decarbonized society in cooperation with businesses and industry groups.
- VIII. The government will strengthen cooperation with the Japan Center for Climate Change Actions (JCCCA), the Regional Center for Climate Change Action, the climate change officers, the Regional Councils on Global Warming Countermeasures, and other organizations and businesses to promote global warming countermeasures.
- IX. The government will train leaders and their candidates to deliver environmental

- education in schools or in the field.
- X. The government will plan to train and secure instructors to conduct environmental education using the registered services of human resource certification under the Act on Promotion of Environmental Conservation Activities through Environmental Education (Act No. 130 of 2003).
 - XI. The government will promote the use of Certification of Place for Nature-Based Experiences under the Act on the Promotion of Environmental Conservation Activities through Environmental Education to help learners understand through the five senses.
 - XII. The government will organize and sponsor awards such as the National Youth Environmental Activity Presentation Contest and the Green Blue Education Forum Contest to encourage hands-on activities and promote best practices.
 - XIII. The government will revitalize the efforts of UNESCO Associated Schools* as a base for the promotion of ESD, including environmental education. (* UNESCO Associated Schools practice peace and international cooperation to realize the ideals of UNESCO, which are approved by UNESCO headquarters and join the UNESCO Associated Schools Network.)
 - XIV. The government will operate and maintain the ESD promotion network to support environmental education enforcement officers.
 - XV. Using Environmental Partnership Offices (EPOs), the government will encourage the establishment of regional joint action and support bodies to implement environmental conservation activities.
 - XVI. The government will organize and provide information on environmental products, and promote green purchasing by businesses and citizens.
 - XVII. The government will promote efforts to offset CO₂ emissions through the use of J-Credits and encourage the widespread use of products and services that offset their CO₂ emissions.
 - XVIII. The government will promote actions to achieve a decarbonized society with harmonious contacts between people and nature by experiencing forests, countryside, rivers and sea on “Yama no Hi (Mountain Day)”, a national holiday.
 - XIX. Promote public awareness-raising of forest creation with public participation through national tree planting events such as National Tree Planting Festival.
 - XX. The government will promote forest conservation and improvement, such as afforestation carried out by various entities, including companies and NPOs, and tree planting supported by companies and the activities of the Green Fund.
 - XXI. The government will promote the “Kizukai Undo” (attention to wood use) initiative to promote wood use and foster public understanding of the excellence and significance of wood use.
 - XXII. (1) Based on discussions at the Consumer Education Promotion Council, information on practical examples and teaching materials related to the creation of a consumer civil society will be provided on the “Aiming to Create a Consumer Civil Society” website to promote the concept of participation in the creation of a consumer civil society; (2) Based on the report of the Study Group on Ethical Consumption, the government will hold public awareness-raising events in cooperation with relevant government ministries and agencies with the aim of creating a sustainable society. Through such activities, we will encourage consumer

behavior, such as preference for consumption patterns that contribute to global warming countermeasures.

- XXIII. To reduce “food loss and waste”, i.e., food that is fit for consumption but is thrown away for various reasons, the government will promote actions such as raising consumer awareness and reviewing business practices, coordinated by relevant government ministries and agencies.

Section 7 Promoting regional decarbonization to contribute to regional revitalization leading to attractive and high-quality regions (Regional Decarbonization Roadmap)

Regional decarbonization could be an opportunity to solve local issues and lead to attractive and high-quality regions as a growth strategy, making the most of regional strengths in an age of decarbonization combined with economic competition. Regional decarbonization is also leading the nationwide transition to decarbonization from the ground up, as decarbonizing livelihoods can be tackled on a person-by-person basis with the technology available today, and local public infrastructure, structures and energy supply infrastructure with long lifetimes will take longer to decarbonize and need to be advanced now.

To this end, the Council for National and Local Decarbonization held from December 2020 to June 2021 developed the Regional Decarbonization Roadmap (decided by the Council for National and Local Decarbonization on June 9, 2021) and which sets out a process and concrete measures, with a particular focus on actions and measures to be concentrated by 2030.

Based on this roadmap, relevant ministries and agencies will work together in all areas and mobilize all decarbonization-based measures in the next five years as a concentrated period to trigger a “Decarbonizing domino effect” in which regional decarbonization spreads to other regions, starting from those with high willingness and feasibility.

1. Creation of decarbonization leading areas

Local governments, local businesses and financial institutions will take the lead, with the active support of the national government, to promote the creation of decarbonization leading areas with the understanding of a wide range of residents. By 2025, at least 100 areas will pave the way for the implementation of the following decarbonization measures, and by 2030, CO₂ emissions from electricity consumption in the consumer sectors (residential, commercial and others) will be net zero or negative, and other greenhouse gas emissions will be reduced to the level of Japan’s FY2030 reduction target, thereby contributing to regional decarbonization (improving the quality of life of residents by solving regional problems) and improving the attractiveness and quality of regions in various regions, such as rural villages, remote islands and urban districts, and spreading it throughout the country. The government will work with policy programs in various areas, such as the “Strategy for Sustainable Food Systems (Strategy MIDORI)”, which aims to achieve both improved productivity and sustainability of the food, agriculture, forestry and fisheries industries through innovation; the “MLIT Green Challenge”, which strategically promotes cross-sectoral decarbonization and other measures to realize a green society at national, urban and regional levels; and the “Green Growth Strategy”, and with regional development promoted by relevant ministries and agencies, to simultaneously address multiple issues such as the creation of a digital society, disaster prevention and mitigation, and national land resilience (e.g. smart city, super city, biomass industrial city, SDGs future city, compact plus network, walkable space formation, decentralized energy infrastructure project, use of 3D city model(PLATEAU)).

- Additional introduction of renewable energy by maximizing renewable energy

potential

- Promotion of energy savings in homes and buildings, introduction of renewable energy and use of EVs/PHEVs/FCVs that can be used as storage batteries
- Use of renewable heat, waste heat and carbon neutral fuels
- Decarbonization actions, including the use of digital technologies in line with regional characteristics
- Advanced resource cycling (transition to a circular economy)
- Supply and use of net zero electricity, heat and fuel
- Measures to remove carbon dioxide by using natural resources in the region

2. Nationwide implementation of priority countermeasures as a basis for decarbonization (horizontal development of local innovations)

To achieve the FY2030 target and GHG net zero by 2050, it is necessary to promote emission reduction measures not only in the decarbonization leading areas, but also throughout the country, with local governments, businesses and residents taking the lead. To this end, it is essential that all policies and measures are approached from a decarbonization implemented in all regions in all parts of the country, with the national government also actively supporting the horizontal development of local actions with local creativity and ingenuity.

- Introduction of solar power generation for private consumption, such as rooftop solar power generation.
- Encouraging the siting of renewable energy sources that are locally symbiotic and beneficial to the local community
- Encourage thorough energy conservation and procurement of electricity from renewable energy sources in public facilities and other commercial buildings and encourage them to convert to ZEBs when they are renewed or renovated
- Improving the energy saving performance of houses and buildings
- Dissemination of zero carbon drives
- Improving resource recycling (transition to a circular economy)
- Decarbonizing urban development through compact plus networks
- Improving the productivity and sustainability of the food, agriculture, forestry and fisheries industries

3. Basic policies to support the creation of decarbonization leading areas and the national implementation of priority countermeasures

(1) Building local implementation systems and establishing mechanisms for active support from the national government

Regional decarbonization can be achieved by involving all local actors. A local implementation system will be established in each region with local governments, financial institutions and key enterprises at its core, and various regional enterprises and public institutions will participate in this system to plan projects and policies that lead

to solutions to regional problems, using their own infrastructure human networks and know-how, and making use of regional strengths.

The national government will actively support regional actions in terms of human resources, information, technology, and finance.

(Human Resources)

The local government personnel dispatch framework will be used to strengthen the dispatch of personnel with knowledge and experience in energy, finance and other fields as needed. The Local Government Human Resources Support Scheme will also be used to send specialized personnel in the green sector. Strengthen training programs for heads and officials of local government.

(Information and Technology)

The national government will expand the functions of the Renewable Energy Potential System (REPOS) and strengthen training and dissemination of information on its use for local communities; disseminate information in an easy-to-understand way, e.g., by visualizing on a map the decarbonization leading areas and the status of implementation of priority policies; and establish a network to enable local governments and businesses to share knowledge and problems.

(Financing)

To provide intensive and targeted support to local governments with ambitious decarbonization projects, the national government will fundamentally review the financial support mechanism and establish a system to provide continuous and comprehensive support over multiple years. Supports will be provided in an effective manner, taking into account the characteristics of the project, including the use of financial instruments such as equity participation to further support the attraction of private investment.

From the perspective of promoting sustainable finance, including ESG finance, the national government will provide supports for the formation of regional ESG finance projects and the establishment of a framework to simultaneously achieve a regional decarbonization transition and economic revitalization through cooperation between a wide range of actors, including local governments, regional enterprises and regional financial institutions, promote the understanding and disclosure of risks and opportunities related to climate change and other ESG factors through support of TCFD scenario analysis, and facilitate market communication. In addition, the project will support the revitalization of the local economy and the decarbonization transition in the region by supporting the formation of ESG finance deals and the establishment of systems. Provide effective, continuous, and comprehensive support, including through the use of financial instruments such as equity participation.

In active support of the national government, Local Branch Offices of the national government (Regional Agricultural Administration Offices, Regional Forest Office, Regional Bureaus of Economy, Trade and Industry, Regional Development Bureau, District Transport Bureau, Regional Environmental Office, etc.), which are close to the

regional implementation system, will work in horizontal cooperation to carefully identify the strength, challenges and needs of each region and provide support in a flexible manner. They will share information on the support tools and examples of support achievements of their respective branches and departments, and work together to disseminate information and encourage local governments and other stakeholders.

For complex actions involving multiple actors and sectors, the support tools of each branch will be combined. Moreover, in the creation of the decarbonization leading areas, a contract system will be ensured in each branch, where local government can consult with their counterparts, and consultations and project progress will be shared and handled in cooperation between branches.

(2) Lifestyle innovation through green x digital

To make it easier for the citizens to choose decarbonization behaviors, the visualization of carbon emissions will be promoted using digital technologies, including blockchain, to facilitate the understanding and certification of the environmental value of products and services. Based on the visualized information, a point system, nudges, ambassadors, and others will encourage people to voluntarily choose decarbonization behaviors, such as choosing products and services that contribute to decarbonization.

(Visualization of greenhouse gas emissions of products and services)

By 2030, the life cycle of CO₂ emissions of products and services by companies should be visualized in an objective form, based, for example, on calorie labeling for food, and this information should be incorporated into product packaging, IC tags, electronic receipts, and more so as to foster communication between producers, sellers, and consumers and to assist with inventory and sales management in combination with location information and purchase history.

(Expanding the use of carbon reduction points and nudges)

The government will encourage the exchange of good practice and cooperation between regions and companies to link up with voluntary reductions by companies (RE100, SBT, etc.), the distribution of J-credits and other environmental values, and the extension of measures to award points for the purchase of decarbonized products and services, travels; and provide supports to promote the addition of points to various points services issued by companies for environmentally friendly behavior and to extend nationally a system whereby local governments and regional enterprises issue points that can be used in the region for environmentally friendly behavior. It will also clarify the necessary conditions for treating electricity generated in the region from renewable energy sources as a quid pro quo for Hometown Tax payments and support the efforts of local governments. In addition, based on the results of the analysis of individual energy consumption and the implementation of environmentally friendly lifestyles suitable for each individual, to make people aware of the importance of their own lifestyle and to promote the use of nudges by providing incentives in conjunction with the points system mentioned above. As such lifestyle innovations will further increase the use of digital technologies, the national government will promote digital

decarbonization, for example by locating data centers that use renewable energy.

(Disseminating and developing decarbonization awareness and behavior change)

The national government will organize decarbonization actions and their benefits for people's lives as "Zero Carbon Action". Influencers in various fields and students with a high interest in decarbonization will become decarbonization ambassadors and take the lead in implementing decarbonization actions and disseminate them in various forms, to increase empathy and interest in decarbonization and link it to people's own actions.

(3) Innovating rules that guide whole society towards decarbonization

In promoting the development of renewable energy and the renovation of homes, buildings, and infrastructures, which take time to introduce and involve various actors, institutional reforms and other measures will ensure effectiveness in addition to support measures.

(Promoting renewable energy in harmony with and for the benefit of local communities using the Act on Promotion of Global Warming Countermeasures)

From the perspective of maximizing the potential of untapped renewable energy in the region, such as photovoltaic power generation, renewable energy promotion areas ("positive zoning") should be set, which will also contribute to improving the predictability of businesses, based on numerical targets for the introduction of renewable energy. The national government and local governments will work together with measures that contribute to the preservation of the appropriate regional environment and the resolution of regional economic and social issues. The national government will put forward basic ideas to serve as a reference for local governments in the establishment of promotion areas in FY2021.

In the promotion areas, renewable energy projects will be promoted in combination with primary industries, such as agrivoltaics, effective use of wasteland and unused public land, construction by local enterprises, return of profits from renewable energy projects to the local community, such as investment by local financial institutions, provision of electricity during disasters, and other measures that contribute to the local economy, stimulate the economy and contribute to disaster prevention in harmony with the local community. Renewable energy projects that also contribute to solving regional problems will be promoted with using cost-effective and efficient methods, such as commercialization by combining several suitable sites, joint purchase of equipment and facilities, and rooftop solar power generation for home use with zero up-front costs. The national government will provide tools to help understand the renewable energy potential, economic benefits of the project, CO₂ emissions in the area and promote the development of project plans, systems, consensus building.

(Promoting wind power generation by optimizing the environmental impact assessment scheme)

The Ministry of the Environment will optimize the environmental impact assessment,

considering the characteristics of offshore wind power generation, such as location and environmental impacts, in cooperation with relevant ministries and agencies, local governments, stakeholders. At the same time, continued efforts will be made to improve the efficiency of onshore wind. In addition, the national government will improve environmental information in the marine area, such as birds' habitats, and will study methods of environmental conservation measures suited to the characteristics of offshore wind power generation, including overseas cases, to promote the introduction of offshore wind power generation.

(Accelerating the development of geothermal power generation in harmony with local communities by conducting scientific studies)

Scientific data and studies will be conducted to allay the fear of hot spring businesses, associated with the development of geothermal power generation (data collection and study: detailed study of the natural environment including heat source exploration, study of geothermal power generation for local production for local consumption and local benefit, and monitoring of hot spring water).

The “Geothermal Development Acceleration Plan” (announced by the Ministry of Environment on 27 April 2021), which includes these efforts, aims to shorten the lead time for geothermal development from more than 10 years to 8 years by 2 years, and to double the number of geothermal power generation facilities (including those located outside of natural park areas) nationwide by 2030 from the current 60 facilities.

(Institutional measures to strengthen countermeasures in the housing and building sectors)

Based on the study by the Study Group on Energy Measures for Housing and Buildings toward a Decarbonized Society, the government will establish a roadmap for strengthening measures, such as requiring compliance with energy efficiency standards, including for residential buildings, expanding the use of ZEH and ZEB, and strengthening countermeasures for existing building stock, and implement the roadmap.

In accordance with the “Wood Use Promotion Act”, to promote the use of wood in public buildings, medium and large-sized buildings and others, the government will operate, “the Agreement System on promoting the Use of Wood in Buildings”; promote the use of wood in public buildings and interiors, as a model for the use of local wood; promote the development and dissemination of products and technologies such as CLT (Cross Laminated Timber) and timber elements with fire resistance; rationalize building standards; develop wooden buildings with leading design and construction technologies; consolidate and centralize information on design support for non-residential, mid-rise and high-rise wooden buildings; and train designers or architects.

Section 8: Promoting greenhouse gas emission reductions overseas, ensuring international partnership and promoting international cooperation

International action is fundamental to solving the problems caused by climate change, and it is extremely important that all measures be taken effectively and efficiently through international cooperation rather than on a country-by-country basis. In this regard, Japan will proactively take measures that lead to global emission reductions in order to promote international measures to combat global warming.

1. Implementation of the Paris Agreement

Including major emitting countries, global warming countermeasures need to be taken by all countries.

Therefore, Japan will consistently submit updated Nationally Determined Contributions (NDCs) to the UNFCCC Secretariat every five years and report and review progress towards the target in accordance with the provisions of the Paris Agreement. In this context, Japan will provide the latest scientific data and knowledge from the Greenhouse gases Observing SATellite (GOSAT) series and the Advanced Land Observing Satellite-2 (ALOS-2, “DAICHI-2”) to assist each country in implementing and achieving its target. In addition, Japan will continue to contribute to the development of the Paris Rulebook. Japan will also continue to contribute to the international reviews and the Climate Technology Centre and Network (CTCN) with commitment and cooperation.

2. Japan’s contribution to the overseas emission reduction

To combat climate change, it is essential to reduce greenhouse gas emission not only domestically but also globally.

Japan will take the lead in global decarbonization as we are expected to contribute to the deployment of environmental infrastructure systems towards GHG net zero, as called for in the Paris Agreement.

In the future, building on the trust established, Japan will promote cooperation with partner countries and the business-driven international deployment of high environmental performance technologies and products, thereby contributing as much as possible to the global reduction of emissions with Japan’s advanced technologies and by further improving the environment through market creation, human resource development, the establishment of institutional platforms and financial support. In this regard, the government will promote “Decarbonization Transition Policy-Guided Infrastructure Export Support”, which will support partner countries in developing policies for decarbonization, including proposing all options that can contribute to reducing CO₂ emissions and the long-term strategy for achieving the goals set out in the Paris Agreement, based on a deep understanding of partner countries’ needs. In this context, Japan will promote the further development of environmental infrastructure overseas through the JCM in accordance with the “MOEJ Initiative for Decarbonized Infrastructure” formulated by the Ministry of Environment of Japan on 15 June 2021 with the aim of achieving a cumulative GHG emission reductions and removals at the level of approximately 100 million t-CO₂ through public-private collaborations.

The Cleaner Energy Future Initiative for ASEAN (CEFIA) was launched at the ASEAN+3 Energy Ministerial Meeting in 2019. Japan will facilitate cooperation between the public and private sectors in the deployment of low-carbon technologies in the energy sector and the establishment of related frameworks, and promote transition financing through measures such as CEFIA. In addition, the government will create opportunities for matching companies and support access to financing for individual projects, with public-private partnerships, through the “Japan Platform for Redesign: Sustainable Infrastructure (JPRSI)”.

Japan will engage in joint development and demonstration with overseas companies and seize overseas market opportunities to create opportunities for further innovation and “co-innovation”, and also promote domestic emission reduction towards GHG net zero with their achievement.

(1) Formulating policies and establishing mechanisms in partner countries

Promoting emission reductions through the introduction of high environmental performance technologies and products in partner countries requires the formulation of policies and mechanisms for their implementation, frameworks for their proper assessment and improved transparency, while sharing a high level of ambition with partner countries. To this end, Japan will contribute to raising their ambition and strengthening their efforts towards decarbonization by strengthening its involvement in their policies, supporting the formulation of long-term strategies using the Asia-Pacific Integrated Model (AIM), supporting the revision of NDCs, and helping the private sector to establish mechanisms and improve their implementation capacity, as well as providing policy recommendations to partner countries. In addition, to promote self-sustaining actions and efforts in the partner country, Japan will provide cooperation to develop the necessary organizations and human resources to enable various actors in the partner country to address the issue sustainably as their own agenda.

(2) Joint Crediting Mechanism (JCM) (Described above)

(3) Leadership in international rulemaking

Japan will take the lead in international rulemaking, such as the formulation of international standards, to promote the diffusion of decarbonization technologies and products around the world.

For example, in order to accelerate energy conservation on a global scale, Japan will develop data to promote the “visualization” of the energy consumption efficiency of industries in each country and region and promote international standardization of evaluation methods such as the energy consumption evaluation of steel, the energy-saving performance of green building materials, and the general measurement of greenhouse gas emissions.

With regard to the JCM, which Japan has taken the lead in establishing, we will ensure environmental integrity and avoid double counting consistent with international rules, including the Paris Agreement. Based on the experience of the JCM, Japan will lead

international discussions on Article 6 of the Paris Agreement (market mechanisms) and contribute to the establishment of appropriate international rules for the use of the market mechanisms and improvements of the rules through its implementation.

In addition, as a major shipping and shipbuilding country, Japan will contribute to the achievement of globally agreed GHG reduction targets for the international shipping sector at the International Maritime Organization (IMO) and the decarbonization of international shipping by promoting technology development in Japan and leading the formulation of an international framework at the IMO. Moreover, Japan will contribute to the reduction of emissions from international aviation by leading discussions on reducing CO₂ emissions at the International Civil Aviation Organization (ICAO).

(4) Fostering urban actions

Multi-sectoral cooperation, led by local governments and relevant urban actors engaged in activities directly related to the community, is a highly effective approach to building a global decarbonized society. In the future, opportunities for dialogue through multi-stakeholder conferences will be further developed to increase the number of cities actively involved in city-to-city cooperation and to increase the opportunities for these actors to proactively participate in solving urban issues. This will contribute to expanding the circle of the “Decarbonizing domino effect” around the world by spreading advanced urban actions in Japan as a model for the realization of “Zero Carbon Cities” around the world, in cooperation with the national government and local governments in the Council for National and Local Decarbonization.

(5) Overseas development of energy infrastructure that contributes to reducing carbon emissions

In order to truly balance the two major global challenges of improving global energy access and achieving a decarbonized society, it is essential to realize the innovations needed to decarbonize fossil fuels, such as CCUS and carbon recycling, in addition to renewable energy, hydrogen etc. Japan will contribute to the world by taking a leading role in the development and dissemination of technologies for this purpose and the sharing of knowledge through international cooperation.

At the same time, Japan will present all options that contribute to reducing CO₂ emissions in response to the needs of partner countries and actively work to disseminate the results of its innovations with a view to achieving a decarbonized society.

With this in mind, Japan will promote the export of energy infrastructure abroad in order to contribute to the global reduction of carbon dioxide emissions in a manner consistent with the long-term objectives of the Paris Agreement. In particular, with regard to renewable energy, we will promote the use of renewable energy adapted to the conditions of the partner country, taking into account the growing demand for renewable energy in the world; and support the introduction and distribution of renewable hydrogen, thereby contributing to increasing the potential for the introduction of renewable energy in the respective countries.

In line with the G7 Leaders’ Communiqué agreed at the G7 Summit in Cornwall in June 2021, Japan ends new direct government support for unabated international thermal coal power generation by the end of 2021, including through Official Development

Assistance, export finance, investment, and financial and trade promotion support.

(6) International deployment of green refrigerant technologies and products

Few countries that have taken countermeasures to address the entire life cycle of fluorocarbons in the world, and Japan's knowledge of measures against fluorocarbons is useful to developing countries and others. Japan will continue to support financial and technical cooperation through its contribution to the Multilateral Fund for the Implementation of the Montreal Protocol, raise international awareness of the importance of fluorocarbons management through the Initiative on Fluorocarbons Life Cycle Management (IFL), share specific knowledge with administrators and others in developing countries, and conduct activities aimed at establishing a mechanism to prevent the release of fluorocarbons into the atmosphere in each country through continuous training.

To implement model projects for the recovery and destruction of fluorocarbons in developing countries where such systems have not yet been developed, using the project to promote the recovery and destruction of fluorocarbons substitutes using JCM, and to contribute to the establishment of such systems in these countries.

(7) International development of climate actions in agriculture, forestry, and fisheries

Greenhouse gas emissions from agriculture, forestry and other land-use sectors account for about a quarter of total anthropogenic emissions worldwide and have a high potential for emission reduction, especially in developing countries. Therefore, through the JCM and cooperation with international organizations, Japan will promote our excellent decarbonization technologies in agriculture, forestry, and fisheries overseas, including technologies for carbon sequestration in agricultural soils, combating deforestation and forest degradation, promoting afforestation activities and sustainable wood use, thereby contributing to the reduction of greenhouse gas emissions globally.

(8) Effective use of public funds and increased mobilization of private funds

In terms of finance, Japan will work to expand finance for climate change support (climate finance), not limited to Official Development Assistance (ODA), Other Official Flow (OOF) and others. In order to contribute to drastic global emission reductions, Japan will work towards the implementation of the "Actions for Cool Earth (ACE 2.0)" dual contribution measures, consisting of support for developing countries and innovation, announced in connection with the COP21 Summit in 2015, and will also work towards its implementation. In addition, at the G7 Summit in Cornwall in June 2021, it was announced that Japan would provide assistance in climate finance which amounts to 6.5 trillion yen from public and private sources over the five years from 2021 to 2025. We will continue to deliver climate finance in good faith, as required under the Paris Agreement.

In the overseas deployment of infrastructure under the "2025 Policy Program for Promotion of Overseas Infrastructure Systems", Japan will promote decarbonization through measures based on sectoral action plans and by understanding decarbonization

efforts at each stage of projects in key sectors.

In the implementation of JICA's ODA projects, greenhouse gas emissions and emission reductions will be assessed in accordance with the "JICA Guidelines for Environmental and Social Considerations". In addition, Japan will actively participate in the effective and efficient management of the Green Climate Fund (GCF) and the Global Environment Facility (GEF), improve access to financial resources in partner countries and promote understanding of the financial mechanism and project cycle, etc., while build networks with implementing agencies so that Japanese and partner country companies can participate in GCF and GEF projects and create co-innovation.

In addition, Japan will work with the World Bank, the Asian Development Bank and others to promote the use of global private finance for the formulation of decarbonization projects in partner countries.

And we will encourage private sector investment by using these public finances effectively as leverage and by using risk mitigation finance and green bonds, such as samurai bonds.

(9) Measures to reducing emissions from deforestation and forest degradation

As measures to address greenhouse gas emissions from deforestation and forest degradation caused by agricultural land expansion, fuel extraction and illegal logging have become urgent issues, Japan will actively promote the reduction of emissions from deforestation and forest degradation in developing countries, including forest conservation, sustainable forest management and enhancement of forest carbon stocks (REDD+), through initiatives such as JCM-REDD+, and contribute to ensuring emission reduction and sequestration in the forest sector. We will support sustainable forest management in developing countries and contribute to reducing deforestation through data services such as the "JICA-JAXA Forest Early Warning System in the Tropics (JJ-FAST)", which monitors the status of deforestation and forest transformation in 77 countries around the world using the satellite "DAICHI-2" and provides the data free of charge.

In addition, Japan will promote international cooperation on the distribution and utilization of legally harvested wood products according to the "Act on Promoting the Distribution and Use of Legally Harvested Wood and Wood Products (Act No. 48 of 2016)", while support efforts to promote sustainable forest management through the International Tropical Timber Organization (ITTO).

3. Policies coordinated with other countries and international organizations

To solve the problem of global warming, it is important to reduce greenhouse gas emissions in developed countries, including Japan, but it is also an urgent task to reduce or control emissions in emerging and developing countries, where emissions are increasing, and to cope with the effects of climate change. From this perspective, Japan has been actively supporting developing countries, particularly through the steady implementation of the "Actions for a Cool Earth (ACE 2.0)" contribution measure announced in conjunction with COP21. In the recent G7 Summit in Cornwall, G7 leaders reaffirmed the collective developed country goal to jointly mobilise USD 100

billion per year from public and private sources through 2025, and Japan would provide the same high level of assistance over the five years from 2021 to 2025 as in the period up to 2020, which amounts to a total of JPY 6.5 trillion in public and private sources, including further enhancement of assistance for adaption.

Japan will also continue to make effective use of the GCF, to which it has so far decided to contribute up to USD 3 billion. With regard to bilateral environmental cooperation, Japan will further promote environmental cooperation based on our accumulated experience, knowledge, lessons learned and countermeasure technologies, including the conclusion of memoranda of understanding on environmental cooperation and the dispatch of experts, mainly in the Asia-Pacific region.

The government will also conduct environmental cooperation proactively through regional policy framework, including the Tripartite Environment Ministers Meeting among Japan, Korea and China (TEMM), ASEAN+3 Environment Ministers Meeting and East Asia Summit Environment Ministers Meeting (EAS EMM).

In addition, international networking across regional and other boundaries and multi-stakeholder collaboration involving international organizations are essential to reducing greenhouse gas emissions globally. As part of this effort, we will organize the Innovation for Cool Earth Forum (ICEF), which will bring together industry, national governments and academia from around the world to accelerate innovation to help solve the problems caused by global warming.

Regarding short-lived climate pollutants such as methane and black carbon, the Climate and Air Cleanup Coalition for the Reduction of Short-Lived Climate Pollutants (CCAC) was launched in February 2012 at the initiative of the United States and others. As a member country, Japan will actively contribute to measures to reduce short-lived climate pollutants (SLCPs).

In addition, Japan will actively promote international public opinion on climate change issues through multilateral discussions at the G7 and G20 summits and domestic implementation of agreed points, and will continue to promote cooperation with international organizations, such as examining measures to combat global warming at the Organization for Economic Cooperation and Development (OECD), increasing the deployment of renewable energy and promoting the use of hydrogen through the International Renewable Energy Agency (IRENA), contributing to the reduction of emissions from international transport through ICAO and IMO, and using the opportunity of the Post-2020 Global Biodiversity Framework under the Convention on Biological Diversity to create synergies between climate action and biodiversity conservation.

Chapter 4 For the promotion of sustained actions to global warming

Section 1 Progress management of the Plan for Global Warming Countermeasures

It is necessary for the government to provide specific outlook as much as possible, set a high goal and create environment where private businesses can take on a challenge easily based on the concept that proactive climate change measures will bring about transformation of an industrial structure and socio-economy, leading to the next higher growth.

Japan aims to reduce its greenhouse gas emissions by 46% in FY2030 from its FY2013 levels, setting an ambitious target which is aligned with the long-term goal of achieving net-zero by 2050. Furthermore, Japan will also continue to take on the challenge of raising this figure to 50%. Realizing GHG net zero by 2050 and cutting emissions by 46% in FY2030 is certainly not an easy task. It is therefore essential to position decarbonization as one of the main issues in all socio-economic activities and to bring forward the transformation into sustainable and resilient socio-economic systems. For those targets to be achieved, Japan will promote policies contributing to growth by holding decarbonization as its pillar. From these perspectives, the government will conduct the progress management of the Plan for Global Warming Countermeasures as follows.

1. Methodology of progress management

The Global Warming Prevention Headquarters will conduct strict annual reviews the achievement status of targets by Greenhouse gas and other classifications, relevant indicators and the progress of individual countermeasures and policies, while also taking into account periodic evaluations and reviews by the relevant councils, etc. As it is necessary to have an up-to-date picture of the situation for accurate review, the relevant government ministries and agencies will work to expedite the calculation of actual figures and others required for reviewing indicators to evaluate the progress in implementing countermeasures.

Specifically, actual figures of all the measure evaluation indicators for the fiscal year before the review (actual figures for two fiscal years prior for those for which it is difficult to provide actual figures for the previous fiscal year), as well as the forecast of each measure evaluation indicators after the fiscal year of the progress review to FY 2030 (forecasts in each fiscal year as long as data is available), will be presented at the Global Warming Prevention Headquarters or the Executives Meeting of the Headquarters once every year, and in addition, the implementation status of policies in the previous fiscal year that supports the forecasts of the measure evaluation indicators and the details of ongoing policies in the current fiscal year, along with countermeasures that are going to be implemented in the next fiscal year or after, including a draft budget, a tax reform plan, bills, etc. will be clearly presented as well.

Based on the above, by administering evaluations on each section of measures and policies and identifying sections whose progress is delayed, the government conducts examinations on, among others, how to improve progress in the identified sections. In so doing, the government considers not only the enhancement of measures and policies that are already included in the Plan for Global Warming Countermeasures but also the

introduction of new measures and policies. In inspecting the progress, the government will closely examine the relation between the evaluation indicators of individual countermeasures and the emission reductions that are the effect of the measure in question, as well as the cost performance of the countermeasure as needed basis. For the areas where evaluation methodology like countermeasures evaluation indexes has not been fully established yet at this point, such as countermeasures that lead to the transformation of a socioeconomic system, the government will establish proper methodology as early as possible.

Furthermore, the evidence of the estimated emission reductions by each countermeasure and the results of progress reviews will be released via the Internet and others so that the public can access to the details of countermeasures and progress appropriately.

In addition to these annual reviews of progress, the targets and policies specified in the Plan in consideration of Greenhouse gas emissions and removals and other circumstances shall be examined at least every three years, taking account of the results of reviewing reports submitted by the Japanese Government to the Secretariat of UNFCCC, including the GHG Inventory for every fiscal year, Biennial Report and National Communication. Then the Plan shall be revised as needed based on the results of the examination, and the revision shall be decided by the Cabinet.

For the revision, the provisions including the quinquennial cycle of submitting and updating targets according to the agreement in the Paris Agreement and COP 21 shall be followed. In the future, the status of actions will be reported internationally for review according to the transparency mechanisms under the Paris Agreement.

2. Overview of methodology for quantitative evaluation and review

(1) Evaluation methodology regarding targets by greenhouse gas and other categories

(i) Evaluation methodology regarding the targets of greenhouse gas emissions

Greenhouse gas emissions are, in principle, broken down into factors as the product of “activity”, such as production, Industrial Production Index, the number of households, floor space and transport, and “Greenhouse gas emissions per activity”.

In the evaluation of the Plan, in principle, the forecasts of emissions and removals will be evaluated by breaking them down into factors of activity and Greenhouse gas emissions per activity. If necessary, evaluation by breakdown into factors further will be made.

Based on the evaluation result, targets by greenhouse gas emissions and other classifications, relevant indexes, the progress of individual countermeasures, each countermeasure, indicators to evaluate the progress in implementing countermeasures for the relevant countermeasures, estimated emission reductions, roles of each entity and policies for promoting countermeasures, etc. will be revised as needed for achieving medium-term targets.

A. Forecast of energy-related CO₂ emissions

The forecast of energy-related CO₂ emissions can be, in principle, broken down into three factors as follows.

- i) “Activity” such as production, Industrial Production Index, the number of households, floor space and transport,
- ii) “Energy consumption per unit of activity” such as automobile fuel efficiency, and
- iii) “CO₂ emissions per unit of energy by energy type” such as petrol, coal and electricity.

The evaluation of the forecast of the emissions will be made comprehensively in consideration of those factors, taking account of changes in the economic conditions in Japan from the time of developing the Plan to the time of reviewing the Plan and the impact of these changes, changes in the actual figures of various indexes used as a premise of calculating the effects of countermeasures, progress of countermeasures in the demand and supply sides as well as their effects and impacts, etc.

B. Forecast of non-energy-related CO₂ emissions, methane and nitrous oxide

For the sector of industrial processes, the amounts of the emissions will be estimated for each emission classification based on the estimates of the production volume manufactured, the consumption of raw materials, etc. For the waste sector, the amount of incineration in the future, the amount of landfill, etc. by waste type will be estimated in consideration of related policies, which will be multiplied by the emission factor.

In addition to the above, the forecasts of the emissions will be evaluated by estimating the amounts of future emissions separately for each of non-energy-related CO₂, methane and nitrous oxide, taking account of the amount of fuel consumption, livestock numbers, the area of rice paddies, etc.

C. Forecast of the emissions of fluorinated gases

Fluorinated gases are substances alternative to ozone-depleting substances, widely used in various industrial, residential, commercial, and transport sector. The forecast of the amounts of the emissions will be evaluated considering the progress of phasing down alternative CFC according to the Kigali Amendment, emissions performance and trends of industrial sectors based on their voluntary action plans, the status of development of alternative substances and technologies, intensity and emission reductions by use, and the effects of countermeasures such as improvement in recovery rates, in addition to estimating activity levels.

(ii) Evaluation methodology regarding the utilization of removals

The amounts of removals after FY 2013 are evaluated by estimation based on the latest scientific knowledge of removals every fiscal year from areas by naturally regenerated forest for which measures for protection and preservation have been taken, such as properly cultivated forests and conservation forests, areas of forest practices, areas of planting tall trees in communal and public facilities, areas of farmland, the amount of use of organic matter for agricultural soil, meteorological data including temperature and the amount of rainfall, etc.

(2) Evaluation methodology regarding JCM and other international contributions

For JCM, not only the emission reductions and removals achieved, and credits obtained by Japan but also the implementation status of the scheme, including the number of projects registered, the number of MRV methodologies adopted as well as the details of technologies, and contribution to sustainable development, will be captured for comprehensive evaluation.

In addition to JCM, active efforts of industries are important as international contributions. From the perspective of encouraging such efforts, the status will be captured as quantitatively as possible.

(3) Evaluation methodology regarding the greenhouse gas emissions and removals

For countermeasures for the greenhouse gas emission reductions, which are to be taken in the Plan, indexes to be evaluated will be established for each countermeasure. When they are evaluated, it will be ensured that the evaluation is based on such indexes.

And in order for each countermeasure to produce effect, not only the government's policies but active commitment of entities involved in the countermeasure is imperative. From the perspective of promoting such commitment, the status of the commitment of the relevant entities for each of the countermeasures set in the Plan should be captured as quantitatively as possible.

For the estimated greenhouse gas emission reductions (in CO₂ equivalent) by countermeasures, ex-post verification should be made available by clarifying the premise of calculation at the time of developing the Plan.

Section 2 Evaluation methodology regarding the initiatives by citizens and each entity and technological development

1. Evaluation methodology of the initiatives by citizens and each entity

For the transition to a decarbonized lifestyle, understanding and cooperation of each individual citizen and each entity are indispensable.

As the effects of emission reductions by the initiatives implemented by each entity can be seen consequently as the effect of greenhouse gas emission reductions, the progress of initiatives for which quantitative evaluation is allowed, such as the dissemination of energy saving devices, shall be reviewed using proper countermeasure evaluation indexes, etc., based on the “Effect Calculation Guidebook for Global Warming Countermeasure Projects” and others.

In addition, the possibility of acceleration of the shift to a decarbonized society caused by socioeconomic transformation that may occur in the future, including declining birthrate and an aging population, digitalization, development of circular and sharing economy and work-style reform, will be analyzed.

For initiatives regarding human behaviors and use of goods, such as change of mind and behavioral transformation among citizens through dissemination and awareness-raising, education activities, etc. and transformation in a lifestyle and a workstyle, quantitative evaluation of related countermeasures will be conducted by grasping the importance of global warming countermeasures and the level of understanding and practice of each individual citizen and each entity through the use of questionnaire surveys and others, while securing continuity and seriality, in order to lead to enhancing policies through the PDCA cycle.

2. Evaluation methodology regarding research and development and technical development

The effects of the research and development as well as technical development of environmental and energy technologies, such as energy-saving technology, are expected to be embodied along with the effects of other policies, in the context of countermeasures for greenhouse gas emission reductions.

Therefore, from the perspective of implementing more proper evaluation of policies, the effects of enhancing the research and development and technical development of environment and energy technologies will be evaluated in an integrated manner in the context of countermeasures for greenhouse gas emission reductions, not quantitatively in an independent manner, and proper follow-ups will be conducted.

Section 3 Development of a promotion system

It is important to develop a systematic promotion system so that each entity can promote countermeasures continuously for building a sustainable decarbonized society.

In the government, led by the Global Warming Prevention Headquarters headed by the Prime Minister with all Cabinet Ministers as its members and the Executive Meeting of the Global Warming Prevention Headquarters, which is a meeting of director-general of the ministries, the relevant ministries and agencies shall work in close cooperation with each other. In doing so, opinions of experts and others shall be listened to appropriately and in a timely manner in relevant councils, and cooperation with relevant organizations shall be sought.

In the regions, the Regional Energy and Global Warming Mitigation Councils set in each regional block will be utilized in cooperation with local governments and the Regional Councils on Global Warming Countermeasures, etc. in order to back up regional efforts for global warming prevention with collaboration among the relevant ministries and agencies.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures			
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction
01. Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society							
Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low-Carbon Society	● Japan Business Federation, various industries: Contributing to countermeasures against warming by making efforts to reduce emissions, including improving energy intensity, through steady implementation of the Action Plans for a Low-Carbon Society, and through cooperation among actors, international contributions, and technology, including innovative technological development ● Various industries: ・ Formulation of new plans by industries that have not yet formulated them ・ Continuous improvements to implementation plans through the plan-do-check-act (PDCA) cycle, and formulation of plans for 2030	Encouragement of the following through evaluation and verification by the government: ・ Formulation of new plans by industries that have not yet formulated them ・ Strict evaluation and verification by the government	-	See the list below regarding target indicators and levels for each industry (Keidanren has revised its Industry’s Action Plans for a Low-Carbon Society into Carbon Neutrality Action Plan and is promoting the strengthening of autonomous efforts by industry. This information will be updated as autonomous targets are revised in the future.)			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Measure evaluation indicator, and results of countermeasures							
Countermeasures by Sector (industrial, commercial and residential, transport, etc.)										
A. Industry sector (manufacturing etc.)										
(a) Promotion of voluntary effort by industry										
○ Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society (Industry sector)										
	Industry under Ministry of Finance									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Brewers Association of Japan	CO ₂ emissions	BAU	-54,000 t-CO ₂	-13%	CO ₂ emissions	2013 (FY)	-26%	-14%	54.6
	Japan Tobacco Inc.	CO ₂ emissions	2009 (FY)	-20%	-9%	CO ₂ emissions	2015 (FY)	-32%	-	95.0
	Industry under Ministry of Health, Labor and Welfare									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The Federation of Pharmaceutical Manufacturers’ Associations of Japan	CO ₂ emissions	2005 (FY)	-23.0%	-17%	CO ₂ emissions	2013 (FY)	-25%	+0%	262.3
	Industry under Ministry of Fisheries, Forestry and Agriculture									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Japan Starch & Sweeteners Industry Association	CO ₂ emissions intensity	2005 (FY)	-3.0%	-3%	CO ₂ emissions intensity	2005 (FY)	-5%	-3%	105.1
	Japan Dairy Industry Association	Energy intensity	2013 (FY)	Annual '-1%	+0%	CO ₂ emissions	2013 (FY)	-15%	+0%	119.5
	Japan Soft Drink Association	CO ₂ emissions intensity	1990 (FY)	-10.0%	-1%	CO ₂ emissions intensity	2012 (FY)	-18%	+2%	122.0
	Japan Baking Industry Association	CO ₂ emissions intensity	2013 (FY)	Annual '-1%	+0%	CO ₂ emissions intensity	2013 (FY)	Annual '-1%	+0%	108.5
	Japan Canners Association	Energy intensity	2009 (FY)	Annual average '-1%	-5%	Energy intensity	2009 (FY)	Annual average '-1%	-5%	75.5
	Japan Beet Sugar Association	Energy intensity	2010 (FY)	-15.0%	-15%	Energy intensity	2010 (FY)	-15%	-15%	63.8
	Japan Oilseed Processors Association	CO ₂ emissions intensity	2013 (FY)	-6.5%	+0%	CO ₂ emissions intensity	2013 (FY)	-6.5%	+0%	55.7
		CO ₂ emissions	2013 (FY)	-6.5%	+0%	CO ₂ emissions	2013 (FY)	-6.5%	+0%	
	All Nippon Kashi Association	CO ₂ emissions	2013 (FY)	-7.0%	+0%	CO ₂ emissions	2013 (FY)	-17.0%	+0%	97.4
		CO ₂ emissions intensity	2013 (FY)	-7.0%	+0%	CO ₂ emissions intensity	2013 (FY)	-17.0%	+0%	
	Japan Sugar Refiners’ Association	CO ₂ emissions	1990 (FY)	-33.0%	-33%	CO ₂ emissions	1990 (FY)	-33.0%	-33%	39.0
	Japan Frozen Food Association	Energy intensity	2013 (FY)	-6.8%	+0%	Energy intensity	2013 (FY)	-15.7%	+0%	43.7
	Japan Ham & Sausage Processors Cooperative Association	Energy intensity	2011 (FY)	-9.0%	-6%	Energy intensity	2011 (FY)	-17.0%	-6%	56.9
	Flour Millers Association	CO ₂ emissions intensity	1990 (FY)	-16.5%	+39%	CO ₂ emissions intensity	2013 (FY)	-32.1%	+0%	30.5
	All Japan Coffee Association	CO ₂ emissions intensity	2005 (FY)	-15.0%	-33%	CO ₂ emissions intensity	2005 (FY)	-25.0%	-33%	11.8
	Japan Soy-sauce Association	CO ₂ emissions	1990 (FY)	-18.0%	-5%	CO ₂ emissions	1990 (FY)	-23.0%	-5%	19.8

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Measure evaluation indicator, and results of countermeasures								
	Japan Convenience Foods Industry Association		CO ₂ emissions intensity	1990 (FY)	-30.0%	-21%	CO ₂ emissions intensity	1990 (FY)	-21.0%	-21%	23.4
	Nihon Hamburg & Hamburger Association		Energy intensity	2013 (FY)	-5.0%	+0%	Energy intensity	2013 (FY)	Annual average '1%	+0%	11.0
	Japan Association of Mayonnaise and Dressings		CO ₂ emissions	2012 (FY)	-8.7%	+1%	CO ₂ emissions	2012 (FY)	-21.7%	+1%	6.2
			CO ₂ emissions intensity	2012 (FY)	-4.8%	-1%	CO ₂ emissions intensity	2012 (FY)	-17.9%	-1%	
	Japan Rice Millers Association		Energy intensity	2005 (FY)	-10.0%	-3%	Energy intensity	2005 (FY)	-12.0%	-3%	7.0
Industry under Ministry of Economy, Trade and Industry											
			Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The The Japan Iron and Steel Federation		CO ₂ emissions	BAU	-5,000,000 t-CO ₂ ('-3,000,000 t-CO ₂ + actual plastic wastes)	+0.3%	CO ₂ emissions	BAU	-9,000,000 t-CO ₂	+0.3%	19,441
	Japan Chemical Industry Association		CO ₂ emissions	BAU	-1,500,000 t-CO ₂	-2%	CO ₂ emissions	BAU	-6,500,000 t-CO ₂	+0%	6,378
			CO ₂ emissions				2013 (FY)	-6,790,000 t-CO ₂ ('-10.7%)	+0%		
	Japan Paper Association		CO ₂ emissions	BAU	-1,390,000 t-CO ₂	-14%	CO ₂ emissions	BAU	-4,660,000 t-CO ₂	-13.6%	1,880
	Japan Cement Association		Energy intensity	2010 (FY)	-1.1%	- 0.8%	Energy intensity	2010 (FY)	-3.6%	-0.8%	1,806
	Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention		Energy intensity improvement rate	2012 (FY)	-7.7%	- 7.0%	Energy intensity improvement rate	2012 (FY)	-33.3%	- 7.0%	1,302
	Japan Auto Parts Industries Association		CO ₂ emissions intensity	2007 (FY)	-13%	-13%	CO ₂ emissions intensity	2007 (FY)	-20%	-13%	768.1
	Japan Automobile Manufacturers Association / Japan Auto- Body Industries Association		CO ₂ emissions	1990 (FY)	-35.0%	-25%	CO ₂ emissions	1990 (FY)	-38.0%	-25%	747.3
	Japan Mining Industry Association		CO ₂ emissions intensity	1990 (FY)	-15%	-13%	CO ₂ emissions intensity	1990 (FY)	-26%	-13%	448.9
	Lime Manufacture Association		CO ₂ emissions	BAU	-1,500,000 t-CO ₂	-7.4%	CO ₂ emissions	BAU	-1,200,000 t-CO ₂	-7%	246.5
	The Japan Rubber Manufacturers Association		CO ₂ emissions intensity	2005 (FY)	-15%	-10%	CO ₂ emissions intensity	2005 (FY)	-21%	-10%	169.7
	Japan Textile Finishers' Association		CO ₂ emissions	1990 (FY)	-78.0%	-69%	CO ₂ emissions	1990 (FY)	-81.0%	-69%	116.5
	Japan Aluminum Association		Energy intensity	BAU	-1.0 GJ	-4%	Energy intensity	BAU	-1.2GJ	-4%	146.2
	Japan Federation of Printing Industries		CO ₂ emissions	2010 (FY)	-24.0%	-9%	CO ₂ emissions	2010 (FY)	-31.0%	-9%	148.4
	Flat Glass Manufacturers Association of Japan		CO ₂ emissions	2005 (FY)	-25.5%	-13%	CO ₂ emissions	2005 (FY)	-32%	-13%	117.1
	Japan Glass Bottle Association		CO ₂ emissions	2012 (FY)	-10.2%	+4%	CO ₂ emissions	2012 (FY)	-18.4%	+4%	89.4
			Energy consumption	2012 (FY)	-12.7%	-1%	Energy consumption	2012 (FY)	-20.7%	-1%	
	The Japanese Electric Wire & Cable Makers' Association		Energy consumption	2005 (FY)	20	-17%	Energy consumption	2005 (FY)	-23.0%	-17%	96.1
	Japan Bearing Industry Association		CO ₂ emissions intensity	1997 (FY)	-23.0%	-21%	CO ₂ emissions intensity	1997 (FY)	-28.0%	-21%	84.6
	The Japan Society of Industrial Machinery Manufacturers		Energy intensity	FY 2008-2012 five-year average	-7.7%	-6%	CO ₂ emissions	2013 (FY)	-10.0%	+0%	55.1
	Japan Copper and Brass Association		Energy intensity	BAU	-4%	+0%	Energy intensity	BAU	-6.0%	+0%	47.6
	Japan Construction Equipment Manufacturers Association		Energy intensity	FY 2008-2012 five-year average	-8%	-16%	Energy intensity	2013 (FY)	-17%	+0%	50.3
	Limestone Association of Japan		CO ₂ emissions	BAU	-4,400 t -CO ₂	-1%	CO ₂ emissions	BAU	-5,900 t -CO ₂	-1%	28.4
	Japan Sanitary Equipment Industry Association		CO ₂ emissions	1990 (FY)	50	-48%	CO ₂ emissions	1990 (FY)	-55.0%	-48%	25.7
	Japan Machine Tool Builders' Association		Energy intensity	FY 2008-2012 five-year average	-7.7%	-4%	Energy intensity	FY 2008-2012 five-year average	-16.5%	-4%	36.3
	Japan Petroleum Development Association		CO ₂ emissions	2005 (FY)	-5%	+14%	CO ₂ emissions	2013 (FY)	-5%	+0%	25.4
	Japan Prefabricated Construction Suppliers & Manufacturers Association		CO ₂ emissions intensity	2010 (FY)	-10.0%	-2%	CO ₂ emissions intensity	2010 (FY)	-10.0%	-2%	16.3
	Japan Industrial Vehicles Association		CO ₂ emissions	2005 (FY)	-37.5%	-41%	CO ₂ emissions	2005 (FY)	-41.0%	-41%	4.8
	Japan Carbon Association		CO ₂ emissions intensity	2010 (FY)	-4.0%	-	CO ₂ emissions intensity	2010 (FY)	-5.0%	-	-
Industry under Ministry of Land, Infrastructure, Transport and Tourism											
			Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The Shipbuilders' Association of Japan/The Cooperative Association of Japan Shipbuilders		CO ₂ emissions intensity	2012 (FY)	-5%		CO ₂ emissions	2013 (FY)	-6.5%	+0%	65.1

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Measure evaluation indicator, and results of countermeasures							
	Japan Ship Machinery and Equipment Association	Energy intensity	1990 (FY)	-27.0%	-30%	Energy intensity	1990 (FY)	-30.0%	-30%	8.5
	Japan Marine Industry Association	CO ₂ emissions	2010 (FY)	Annual '-1%	-19%	CO ₂ emissions	2010 (FY)	-14%	-19%	2.5
	Japan Association of Rolling Stock Industries	CO ₂ emissions	1990 (FY)	-33%	-22%	CO ₂ emissions	1990 (FY)	-35%	-22%	3.6
	Japan Federation of Construction Contractors	CO ₂ emissions intensity	1990 (FY)	-20.0%	-18%	CO ₂ emissions intensity	1990 (FY)	-25.0%	-18%	411.3
	Japan Federation of Housing Organizations	CO ₂ emissions at construction stage (Entire life cycle)	1990 (FY)	-50% (158,100,000 t-CO ₂)	-52% (+33%)	Environmental performance of newly constructed residences	—	ZEH realised on average for new construction	-	260(22,183)

Countermeasures by Sector (industrial, commercial and residential, transport, etc.)

B. Commercial and others

(a) Promotion of voluntary effort by industry

○ Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society (commercial and other sectors)□

	Industry under Financial Services Agency									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Japanese Bankers Association	Energy intensity	2009 (FY)	-10.5%	-17%	Energy intensity	2009 (FY)	-19.0%	-17%	139.0
	The Life Insurance Association of Japan	Energy intensity	2009 (FY)	-10.5%	-13%	CO ₂ emissions intensity	2013 (FY)	-40.0%	-3%	110.7
	The General Insurance Association of Japan	Energy intensity	2009 (FY)	-10.5%	-15%	Energy intensity	2009 (FY)	-14.8%	-15%	27.0
	The National Association of Shinkin Banks	Energy consumption	2009 (FY)	-10.5%	-11%	Energy consumption	2009 (FY)	-19.0%	-11%	32.1
	Community Bank Shinyo Kumiai	Energy consumption	2006 (FY)	-10%	-11%	Energy consumption	2009 (FY)	-18%	-9%	-
	Japan Securities Dealers Association	Energy intensity	2009 (FY)	-10%	-22%	Energy intensity	2009 (FY)	-20%	-22%	19.4
	Industry under Ministry of Internal Affairs andCommunications									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Telecommunications Carriers Association	Energy intensity	2013 (FY)	-80%	+0%	Energy intensity	2013 (FY)	-90%	+0%	570.6
	Telecom Services Association	Energy intensity	2013 (FY)	-1%	+0%	Energy intensity	2013 (FY)	-2%	+0%	102.1
	The Japan Commercial Broadcasters Association	CO ₂ emissions intensity	2012 (FY)	-8%	-6%	CO ₂ emissions intensity	2012 (FY)	-10%	-6%	24.5
	Japan Broadcasting Corporation	CO ₂ emissions intensity	2011 (FY)	-15%	-8%	CO ₂ emissions intensity	2011 (FY)	-15%	-8%	21.1
	Japan Cable and Telecommunications Association	Energy intensity	2016 (FY)	-1% or more	-	Energy intensity	2020 (FY)	-1% or more	-	-
	Japan Satellite Broadcasting Association	Energy intensity	2010 (FY)	-13%	-4%	Energy intensity	2010 (FY)	-15.0%	-4%	1.0
	Japan Internet Providers Association	Energy intensity	2015 (FY)	-1%	-	Energy intensity	2015 (FY)	-1.0%	-	-
	Industry under Ministry of Education, Culture, Sports,Science and Technology									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The Federation of All Japan Private Schools' Associations	CO ₂ emissions	2015 (FY)	Annual '-1%	-	-	-	-	-	-
	Industry under Ministry of Health, Labor and Welfare									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Japan Medical Association / Council of 4 Hospitals	-	-	-	-	CO ₂ emissions intensity	2006 (FY)	-25%	-18%	917.0
	Japanese Consumers Co-operative Union	CO ₂ emissions	2005 (FY)	-15%	-9%	CO ₂ emissions	2013 (FY)	-40%	-	-
	Industry under Ministry of Fisheries, Forestry and Agriculture									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	Japan Processed Foods Wholesalers Association	Energy intensity	2011 (FY)	-5%	+2%	Energy intensity	2011 (FY)	-5%	+2%	29.1

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Measure evaluation indicator, and results of countermeasures									
Countermeasures by Sector (industrial, commercial and residential, transport, etc.) D. Transport sector initiatives (a) Promotion of voluntary effort by industry	Japan Foodservice Association		Energy intensity	2013 (FY)	-6.8%	+0%	Energy intensity	2013 (FY)	-15.7%	+0%	720.9	
	Industry under Ministry of Economy, Trade and Industry											
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)		
	Japan Chain Stores Association	Energy intensity	1996 (FY)	-24.0%	-24%	Energy intensity	1996 (FY)	-24%	-24%	540.0		
	Japan Franchise Association	Energy intensity	2013 (FY)	-7.0%	+0%	Energy intensity	2013 (FY)	-16%	+0%	437.9		
	Japan Council of Shopping Centers	Energy intensity	2005 (FY)	-13.0%	-30%	Energy intensity	2005 (FY)	-23%	-30%	331.7		
	Japan Department Stores Association	Energy intensity	2013 (FY)	-7.0%	+0%	Energy intensity	2013 (FY)	-15.7%	+0%	190.5		
	Ote Kaden Ryutsu Kyoukai (home appliances retail)	Energy intensity	2006 (FY)	-48.3%	-41%	Energy intensity	2006 (FY)	-49.1%	-41%	81.1		
	Japan DIY・HC Association	Energy intensity	2004 (FY)	-15.0%	-52%	Energy intensity	2013 (FY)	-17%	-12%	48.7		
	Japan Information Technology Services Industry Association	(Office) Energy intensity	2006 (FY)	-2%	-11%	(Office) Energy intensity	2006 (FY)	-37.7%	-11%	20.6		
		(Data center) Energy intensity	2006 (FY)	-5.5%	-8%	(Data center) Energy intensity	2006 (FY)	-7.8%	-8%	64.3		
	Japan Association of Chain Drug Stores	Energy intensity	2013 (FY)	-19.0%	0%	Energy intensity	2013 (FY)	-26.0%	0%	132.5		
	Japan Foreign Trade Council, Inc.	Energy intensity	2013 (FY)	-6.8%	+0%	Energy intensity	2013 (FY)	-15.7%	+0%	5.4		
	Japan LP Gas Association	Energy consumption	2010 (FY)	-5.0%	-5%	Energy consumption	2010 (FY)	-9.0%	-5%	3.1		
	Japan Leasing Association	Energy intensity	2013 (FY)	-5%	+0%	Energy intensity	2013 (FY)	-5%	+0%	0.9		
	Industry under Ministry of Land, Infrastructure, Transport and Tourism											
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)		
	The Japan Warehousing Association Inc.	Energy intensity	1990 (FY)	-16%	-15%	Energy intensity	1990 (FY)	-20.0%	-15%	119.0		
	Japan Association of Refrigerated Warehouses	Energy intensity	1990 (FY)	-15%	-12%	Energy intensity	1990 (FY)	-20%	-12%	106.4		
	Japan Hotel Association	Energy intensity	2010 (FY)	-10%	-9%	Energy intensity	2010 (FY)	-15%	-9%	61.8		
	Japan Ryokan & Hotel Association	Energy intensity	2016 (FY)	-0%	-	Energy intensity	2016 (FY)	-10.0%	-	-		
	Japan Automobile Service Promotion Association	CO ₂ emissions	2007 (FY)	-10%	-8%	CO ₂ emissions	2007 (FY)	-15%	-8%	415.5		
	The Real Estate Companies Association of Japan	Energy intensity	2005 (FY)	-25%	-21%	Energy intensity	2005 (FY)	-30%	-21%	-		
	Japan Building Owners and Managers Association	Energy intensity	2009 (FY)	-15.0%	-9%	Energy intensity	2009 (FY)	-20.0%	-9%	-		
	Industry under Ministry of the Environment											
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)		
	Japan Federation of Industrial Waste Management and Recycling Associations	CO ₂ emissions	2010 (FY)	-0%	+5%	CO ₂ emissions	2010 (FY)	-10.0%	+5%	499.7		
	The Japan Newspaper Publishers & Editors Association	Energy consumption	2005 (FY)	-13%	-5%	Energy intensity	2013 (FY)	Annual average -1%	-	53.7		
	Zenkoku Pet Kyoukai (pet retail)	CO ₂ emissions intensity	2012 (FY)	-0%	+28%	CO ₂ emissions intensity	2012 (FY)	-0.0%	+28%	0.54		
	Industry under National Police Agency											
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)		
	All Japan Pachinko Association	CO ₂ emissions	2007 (FY)	-18.0%	-15%	CO ₂ emissions	2007 (FY)	-22%	-15%	502.0		
	Japan Amusement Industry Association	CO ₂ emissions	2012 (FY)	-8.9%	-7%	CO ₂ emissions	2012 (FY)	-16.6%	-7%	25.3		

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Measure evaluation indicator, and results of countermeasures							
○ Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society (transport sector)										
	Industry under Ministry of Land, Infrastructure, Transport and Tourism									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The Japanese Shipowners' Association	CO ₂ emissions intensity	1990 (FY)	-20%		CO ₂ emissions intensity	1990 (FY)	-30%	-38.4%	5,539
	Japan Trucking Association	CO ₂ emissions intensity	2005 (FY)	-22%	-8.7%	CO ₂ emissions intensity	2005 (FY)	-31%	-8.7%	4,079
	The Scheduled Airlines Association of Japan	CO ₂ emissions intensity	2005 (FY)	-21%	-14.6%	CO ₂ emissions intensity	2012 (FY)	-16%	-3.9%	1,979
	Japan Federation of Coastal Shipping Associations	CO ₂ emissions	1990 (FY)	-31%	-15.9%	CO ₂ emissions	1990 (FY)	-34%	-15.9%	722.1
	Japan Passengerboat Association	CO ₂ emissions intensity	1990 (FY)	-6%	-0.9%	CO ₂ emissions intensity	2012 (FY)	-3.6%	-1.4%	361.3
	Japan Federation of Hire-Taxi Associations	CO ₂ emissions	2010 (FY)	-20.0%	-11.6%	CO ₂ emissions	2010 (FY)	-25.0%	-11.6%	338.3
	Nihon Bus Association	CO ₂ emissions intensity	2010 (FY)	-6%	+1.8%	CO ₂ emissions intensity	2015 (FY)	-6%	-	375.7
	Japan Private Railway Association	Energy intensity	2010 (FY)	-5.7%	-4.2%	Energy intensity	2010 (FY)	-5.7%	-4.2%	286.0
	East Japan Railway Company	Energy consumption	2013 (FY)	-6.2%	+0.0%	Energy consumption	2013 (FY)	-40%	+0.0%	215.0
	West Japan Railway Company	Energy consumption	2010 (FY)	-3.0%	-2.7%	Energy consumption	2010 (FY)	-2.0%	-2.7%	185.4
	Central Japan Railway Company	Energy intensity	1995 (FY)	-25.0%	-25.6%	Energy intensity	1995 (FY)	-25.0%	-25.6%	-
	Japan Harbor Transportation Association	CO ₂ emissions intensity	2005 (FY)	-12.0%	-10.1%	CO ₂ emissions intensity	2005 (FY)	-20.0%	-10.1%	39.0
	Japan Freight Railway Company	Energy intensity	2013 (FY)	-7.0%	+0.0%	Energy intensity	2013 (FY)	-15.0%	+0.0%	64.9
	Kyushu Railway Company	Energy intensity	2011 (FY)	-2.5%	-0.8%	Energy intensity	2011 (FY)	-2.5%	-0.8%	47.1
	Hokkaido Railway Company	Energy intensity	1995 (FY)	-14.0%	-13.9%	Energy intensity	2013 (FY)	-7.0%	+0.0%	32.1
	All Japan Freight Forwarders Association	CO ₂ emissions	2009 (FY)	-11%	-3.0%	CO ₂ emissions	2009 (FY)	-20%	-3.0%	12.9
Shikoku Railway Company	Energy consumption	2010 (FY)	-8.0%	-5.4%	Energy consumption	2010 (FY)	-8.0%	-5.4%	8.0	
Countermeasures by Sector (industrial, commercial and residential, transport, etc.)										
E. Energy-conversion sector initiatives										
(a) Promotion of voluntary effort by industry										
○ Steady Implementation, evaluation and verification of Industry’s Action Plans for a Low- Carbon Society (energy conversion sector)										
	Industry under Ministry of Economy, Trade and Industry									
		Target indicator	Base year/BAU	FY 2020 target level	FY 2020 target FY 2013 results (base year/BAU)	Target indicator	Base year/BAU	FY 2030 target level	FY 2030 target FY 2013 results (base year/BAU)	FY 2013 CO ₂ emissions (10,000 t-CO ₂)
	The Electric Power Council for a Low Carbon Society	CO ₂ emissions	BAU	-7,000,000 t-CO ₂		-	CO ₂ emissions	BAU	-11,000,000 t-CO ₂	-
		-	-	-	-	CO ₂ emissions intensity	-	Approx. 0.37kg-CO ₂ /kWh	53%	
	Petroleum Association of Japan	Energy reductions	BAU	-530,000 KL	56%	Energy reductions	BAU	-1,000,000 KL	30%	4,033
	The The Japan Gas Association	CO ₂ emissions intensity	1990 (FY)	-89%	-91%	CO ₂ emissions intensity	1990 (FY)	-88%	-91%	45.6
Energy intensity		1990 (FY)	-86%	-89%	Energy intensity	1990 (FY)	-84%	-89%		

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
02. Promotion of the introduction of facilities and equipment with high energy- saving performance (across industries)											
Introduction of high-efficiency air conditioning	• Manufacturers: Technological development, production, and cost reductions for high-efficiency air conditioning • Businesses: Introduction of high-efficiency air conditioning	• Promotion of the spread through the Top Runner Program • Support for introduction of high-efficiency air conditioning	Support for introduction of high-efficiency air conditioning and public awareness-raising	Average APF/COP (electrical system, fuel system)		(10^4 kL)		(10^4 t-CO2)		• Units sold, efficiency, and operation time of industrial air-conditioning (electric: air-conditioning packages, chilling units, turbo chillers; fuel-powered: gas heat pumps, removals chillers) • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Calculated based on the Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) • Fuel (city gas) emission factor: 2.0 t-CO2/kL • Energy saving from Introduction of high-efficiency air conditioning represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.	
				2013 (FY)	4.8 1.5	2013 (FY)	1	2013 (FY)	5		
				2025 (FY)	6.4 1.8	2025 (FY)	20	2025 (FY)	86		
				2030 (FY)	6.4 1.9	2030 (FY)	29	2030 (FY)	69		
				Cumulative installed capacity (1000 kW)		(10^4 kL)		(10^4 t-CO2)			
Introduction of industrial heat pump	• Manufacturers: Technological development, production, and cost reductions for high-efficiency industrial heat pumps • Businesses: Introduction of high-efficiency industrial heat pumps	• Regulation under the Act on the Rational Use of Energy • Support for introduction of high-efficiency industrial heat pumps	Support for introduction of high-efficiency industrial heat pumps and public awareness-raising	Cumulative installed capacity (1000 kW)		(10^4 kL)		(10^4 t-CO2)		• Full-time usage rate: 94.5% • Secondary energy conversion coefficient: 3.6 MJ/kWh • Conversion coefficient to crude oil equivalent: 0.0258 kL/thousand MJ • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Calculated based on the Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) • Fuel (city gas) emission factor: 51.4 t-CO2/million MJ • Energy saving from Introduction of industrial heat pumps represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.	
				2013 (FY)	11	2013 (FY)	0.2	2013 (FY)	0.2		
				2025 (FY)	824	2025 (FY)	43	2025 (FY)	66		
				2030 (FY)	1,673	2030 (FY)	87.9	2030 (FY)	161		
				Cumulative installed capacity (1000 kW)		(10^4 kL)		(10^4 t-CO2)			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
02. Promotion of the introduction of facilities and equipment with high energy- saving performance (across industries)										
Introduction of cogeneration	・ Manufacturers: Technological and product development toward less costly and more efficient cogeneration ・ Vendors etc.: Providing information for businesses, supporting efficient use of cogeneration ・ Businesses: Proactive introduction and efficient use of cogeneration	・ Regulation under the Act on the Rational Use of Energy ・ Support for introduction of cogeneration ・ Support for efficient use of cogeneration (e.g., promotion of areal use)	Support for introduction of cogeneration and public awareness-raising	Cumulative installed capacity of co-generation (10^4 kW)		(10^4 kL)		(10^4 t-CO ₂)		・ Expected energy saving (Expected emission reduction) from electric power and heat generated from cogeneration are calculated by subtracting fuel consumption (CO ₂ emissions) from cogeneration from fuel consumption (CO ₂ emissions) from grid electricity and boilers. ・ FY 2030 figures are calculated based on estimates in projections of energy demand and supply for FY 2030. ・ Cogeneration adoption volumes in FY 2020 are calculated through linear approximation from the figures from FY 2013 through FY 2030. ・ emission intensity for grid electricity assume thermoelectric power sources * *FY 2013 average emission factor for thermoelectric power: 0.65 kg-CO ₂ /kWh (Source: Calculated based on the Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) FY 2030 average emission factor for thermoelectric power: 0.60 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) ・ Emission intensity for boilers are based on a weighted average of fuel types used ・ Energy saving from Introduction of cogeneration represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.
				2013 (FY)	1,004	2013 (FY)	12	2013 (FY)	41	
				2025 (FY)	1,230	2025 (FY)	146.7	2025 (FY)	694.2	
				2030 (FY)	1,336	2030 (FY)	212.1	2030 (FY)	1,061	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
03. Promotion of the introduction of facilities and equipment with high energy- saving performance (iron and steel industry)										
Improvement of efficiency of main electricity demand facilities	・ Businesses: promotion of the spread such as upgrading to high-efficiency electricity demand facilities ・ Businesses: Technological development related to saving energy in electricity demand facilities	・ Support for technological development related to saving energy in electricity demand facilities ・ Support for introduction of electricity demand facilities with high energy saving performance	—	Rate of widespread use (%)		(10^4 kL)		(10^4 t-CO ₂)		・ These figures assume electricity savings in FY 2030 of 5% vs. power consumption in FY 2012 for the following three equipment types: oxygen plants, blowers, and compressed-air equipment (The Japan Iron and Steel Federation). ・ Crude oil thermal conversion coefficient: 0.0258 kL/GJ (source: Article 4 of the Act on Rationalizing Energy Use [Act No. 74 of 1979]); electricity conversion coefficient (heat generated during consumption): 3.6 MJ/kWh (source: total energy statistics) ・ Energy saving from efficiency improvements in main electric-powered equipment represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	▲4	2013 (FY)	▲0.2	2013 (FY)	▲0.4	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	100	2030 (FY)	5	2030 (FY)	10	
Expansion of chemical recycle of waste plastics at steel mills	・ Businesses: Effective use of waste plastics and other materials collected under The Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (No. 112 of 1995) ・ Businesses: Technological development related to chemical recycle of waste plastics etc. at steel mills	・ Support for technological development related to chemical recycle of plastic wastes etc. at steel mills ・ Smooth operation of The Law for Promotion of Sorted Collection and Recycling of Containers and Packaging	Increasing volumes of container and packaging plastics collected by local governments under The Law for Promotion of Sorted Collection and Recycling of Containers and Packaging	Amount of processed waste plastic (10^4 t)		(10^4 kL)		(10^4 t-CO ₂)		・ Waste plastics used in FY 2012: 420,000 t (source: The Japan Iron and Steel Federation) ・ The volume used is expected to increase to 1 million t in FY 2020 and FY 2030 ・ However, this assumes an increase in volumes of plastics processed in the iron and steel industry through means such as revisions to the current collection system for plastic containers and packaging subject to Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging. Evaluation indicators etc. will need to be revised in accordance with the results of joint discussions between the Industrial Structure Council and the Central Environment Council. ・ Crude oil thermal conversion coefficient: 0.0258 kL/GJ (source: Article 4 of the Act on Rationalizing Energy Use) ・ Energy saving from expanding chemical recycling of plastic wastes at steel mills represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	40	2013 (FY)	▲2	2013 (FY)	▲7	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	100	2030 (FY)	49	2030 (FY)	212	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving		Expected emission reduction	Assumptions of expected energy saving and expected emission reduction		
03. Promotion of the introduction of facilities and equipment with high energy- saving performance (iron and steel industry)										
Enhancement of energy saving facilities	· Businesses: Technological development related to enhancement of energy saving facilities · Businesses: Upgrading energy saving facilities	Supporting introduction of energy saving facilities	—	Rate of widespread use (%)		(10^4 kL)		(10^4 t-CO2)		· It is assumed that pressure recovery power generation at peak blast-furnace pressure (TRT), sensible heat recovery in coke oven (CDQ), equipment for recovery of heat emitted by sintering, and equipment for recovery of heat emitted by converters will achieve FY2005 Top Runner efficiency levels by FY 2030, with the exception of some equipment. · Conversion coefficient to crude oil equivalent: 0.0258 kL/GJ (Article 4 of the Act on Rationalizing Energy Use) · Secondary conversion coefficient (heat generated during consumption): 3.6 MJ/kWh (source: total energy statistics) · Steam thermal conversion coefficient: 3.27 GJ/t (source: total energy statistics) · Energy saving from enhancement of energy saving equipment represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	TRT 91 CDQ 86 Steam recovery 83	2013 (FY)	0.5	2013 (FY)	0.9	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	TRT 100 CDQ 100 Steam recovery 100	2030 (FY)	34	2030 (FY)	65	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
03. Promotion of the introduction of facilities and equipment with high energy- saving performance (iron and steel industry)										
Introduction of innovative pig iron making process (ferro coke)	• Businesses: Technological development related to innovative pig iron making process • Businesses: Introduction of workflows using innovative pig iron making process	• Suppor for technological development related to innovative pig iron making process • Support for introduction of workflows using innovative pig iron making process	—	Number of introduced facilities (units)		(10^4 kL)		(10^4 t-CO ₂)		• Evaluation indicator: energy saving per unit (Crude oil equivalent) = approx. 39,000 kL/unit * The CO ₂ emission reduction at steelworks from development of this technology can be realized through increasing the speed of reduction reactions inside blast furnaces, lowering temperatures, and lowering the reducing-agent ratio, through use of an innovative coke-alternative reducing-agent (ferrocake). The increase in energy purchased (e.g., electricity) in such a case, since energy recovered also will decrease, is taken into consideration as well. • Energy saving from Introduction of innovative pig-iron processes (ferrocake) represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	0	2013 (FY)	0	2013 (FY)	0	
				2025 (FY)	-	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	5	2030 (FY)	19	2030 (FY)	82	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
03. Promotion of the introduction of facilities and equipment with high energy- saving performance (iron and steel industry)										
Introduction of environmentally harmonious ironmaking processes	・ Businesses: Technological development related to environmentally harmonious ironmaking processes ・ Businesses: Introduction of workflows using environmentally harmonious ironmaking processes	・ Support for technological development related to environmentally harmonious ironmaking processes ・ Support for introduction of equipment related to environmentally harmonious ironmaking processes	—	Number of introduced facilities (units)	(10^4 kL)	(10^4 t-CO2)	・ Energy saving per unit of evaluation indicator = 54,000 kL ・ CO2 emission reduction per unit of evaluation indicator = 54,000 (kL) / 0.0258 (kL/GJ) / 1,000 (TJ/GJ) × 51.2 (t-CO2/TJ) = 107,000 t-CO2 * The target COT-reduction effects at steel mills from this technological development are approximately 10% from technologies to increase hydrogen included in the high-temperature gas byproducts produced during production of coke and processing iron ore using this hydrogen as a substitute for some coke and approximately 20% from new CO2 separation and recovery technologies using unused waste heat inside steel mills. * Projected volumes of energy saving are the results of efforts such as efficiency improvements in process reactions inside blast furnaces through use of hydrogen in iron or processing. Accordingly, the projected volumes of energy saving and projected CO2 emission reduction of this technology do not match. * Expected emission reduction for FY 2030 are 1.78 million t-CO2 when reductions from sources such as CO2 separation and recovery technologies are included. ・ Conversion coefficient to crude oil equivalent: 0.0258 kL/GJ (Article 4 of the Act on Rationalizing Energy Use) ・ Fuel (LNG) emission factor: 51.2 t-CO2/TJ (List of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) ・ Energy saving from Introduction of eco-friendly steelmaking processes represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.			
				2013 (FY)	0	2013 (FY)		0	2013 (FY)	0
				2025 (FY)	-	2025 (FY)		—	2025 (FY)	—
				2030 (FY)	1	2030 (FY)		5	2030 (FY)	11

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
04. Promotion of the introduction of facilities and equipment with high energy- saving performance (chemical industry)											
Introduction of energy saving process technologies in chemistry	saving energy through recovery of an emitted energy technologies, improved efficiency of facilities and equipment and machinery, rationalization of processes, etc.	Support for introduction of facilities and equipment by businesses	—	—		(10^4 kL)		(10^4 t-CO2)		• Crude oil emission factor: 2.7 t-CO2/kL • Energy saving from Introduction of energy saving technologies in chemicals represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.	
				2013 (FY)	—	2013 (FY)	16.9	2013 (FY)	45.6		
				2025 (FY)	—	2025 (FY)	—	2025 (FY)	—		
				2030 (FY)	—	2030 (FY)	144.1	2030 (FY)	389.1		
Introduction of carbon dioxide utilization technologies	Businesses: Development and introduction of energy saving technologies	• Support for development of carbon dioxide utilization technologies • Support for introduction of facilities and equipment by businesses	—	Introduced amount (10^4 t)		(10^4 kL)		(10^4 t-CO2)		• Energy saving from Introduction of technologies for converting CO2 to raw materials represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.	
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—		
				2025 (FY)	0.64	2025 (FY)	0.06	2025 (FY)	0.16		
				2030 (FY)	64	2030 (FY)	6.4	2030 (FY)	17.3		

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
05. Promotion of the introduction of facilities and equipment with high energy- saving performance (cement and ceramic industry)										
Conventional energy saving technology	Businesses: introduction of facilities and equipment capable of efficiently utilizing thermal energy and electrical energy	Support for introduction of facilities and equipment by businesses	—	Energy intensity reduction (MJ/t-cem)		(10^4 kL)		(10^4 t-CO2)		• Evaluation indicator: Reduction in energy intensity energy saving effect per unit of subject equipment (waste-heat power generation, vertical slag mills, vertical coal mills, high-efficiency coolers) multiplied by the number of units adopted, divided by cement production volume • Energy saving from traditional energy saving technologies represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	2	2013 (FY)	0.2	2013 (FY)	0.5	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	14	2030 (FY)	2.4	2030 (FY)	6.4	
Technology to use waste as a substitute for thermal energy	Businesses: Use of wastes as a substitute for thermal energy	Support for introduction of facilities and equipment by businesses	—	The co-firing ratio of alternative waste to thermal energy (%)		(10^4 kL)		(10^4 t-CO2)		• Evaluation indicator: Replacement waste cofiring as a share of thermal energy For waste cofiring rates, the growth rate since 2012 as reported in the FY 2021 Ministry of the Environment report "Report on market size, employment, etc. in environmental industries" is used. • Energy saving from technology to use waste as a substitute for thermal energy is calculated by multiplying the difference in Energy intensity from previous methods by annual production volume.
				2013 (FY)	▲0.2	2013 (FY)	▲3.1	2013 (FY)	▲8.2	
				2025 (FY)	1	2025 (FY)	4.7	2025 (FY)	12.7	
				2030 (FY)	1.5	2030 (FY)	7.2	2030 (FY)	19.2	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
05. Promotion of the introduction of facilities and equipment with high energy- saving performance (cement and ceramic industry)										
Innovative cement production process	Businesses: R&D etc. toward practical application of technologies related to low-temperature firing in cement production processes	• Support for development of technologies related to low-temperature firing in cement production processes • Support for practical application and introduction of technologies related to low-temperature firing in cement production processes	—	Low-temperature firing clinker production volume (%)	(10^4 kL)	(10^4 t-CO2)	• Evaluation indicator: Rate of Introduction of this technology Projected through combination of results of interviews with leading businesses capable of using this technology • Energy saving from technologies related to low-temperature firing in cement production processes represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.			
				2013 (FY)	0	2013 (FY)		0	2013 (FY)	0
				2025 (FY)	28.9	2025 (FY)		4.5	2025 (FY)	12.2
				2030 (FY)	73.1	2030 (FY)		15.1	2030 (FY)	40.8
Glass melting process technology	Businesses: R&D etc. toward practical application of glass melting process technology	• Support for development of glass melting process technology • Support for practical application and introduction of glass melting process technology	—	Technology introduction rate (%)	(10^4 kL)	(10^4 t-CO2)	• Evaluation indicator: Rate of Introduction of this technology Projected through combination of results of interviews with leading businesses capable of using this technology • Energy saving from glass melting process technologies represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.			
				2013 (FY)	0	2013 (FY)		0	2013 (FY)	0
				2025 (FY)	1.2	2025 (FY)		1.5	2025 (FY)	4.1
				2030 (FY)	3.7	2030 (FY)		3.0	2030 (FY)	8.1

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
06. Promotion of the introduction of facilities and equipment with high energy- saving performance (pulp, paper, and paper product industry)										
Introduction of high-efficiency used paper pulping process technology	Businesses: Introduction of facilities and equipment with high energy saving performance	Support for introduction of facilities and equipment by businesses	-	Rate of widespread use (%)		(10^4 kL)		(10^4 t-CO2)	· Introduction of 35 units is anticipated by FY 2025 (Rate of widespread use = 59 units/172 units = 34%) · Introduction of 40 units is anticipated by FY 2030 (Rate of widespread use = 64 units/172 units = 37%) · Volumes of energy saving represent energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.	
				2013 (FY)	12	2013 (FY)	0.2	2013 (FY)		0.5
				2025 (FY)	34	2025 (FY)	3.4	2025 (FY)		9.2
				2030 (FY)	37	2030 (FY)	3.9	2030 (FY)		10.5

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
07. Promotion of the introduction of facilities and equipment with high energy- saving performance (construction work and use of special vehicles)										
Introduction of hybrid construction equipment, etc.	Construction contractors etc.: Striving to utilize construction machinery etc. with high energy saving performance in their construction work	Over the short term, aiming to reduce CO ₂ through promotion of construction machinery that has outstanding fuel-conservation performance. Over the long term, introducing, and promoting through establishing a certification program for innovative construction machinery based on thorough review of use of diesel as a fuel (e.g., that using electricity, hydrogen, or biomass), to realize carbon neutrality.	Through measures, such as promotion of i-Construction, including increasing use of ICT construction by Small and Midsize Enterprises contractors working on construction projects for local governments, promoting measures in areas such as further efficiency improvements in construction and maintenance management and reductions in staff and labor requirements, to enable adaptation to shortages of skilled labor.	Number of introduced units of hybrid construction machinery (10 ⁴ units)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		• Expected energy saving is estimated based on energy saving per unit and the increase in units since FY 2012 energy saving per unit: 3.65 kL/unit (Crude oil equivalent) Increase in units in use since FY 2012: 47,000-2000=45,000 units Expected energy saving: 36,500×4.5=160,000 kL • Expected emission reduction are calculated by multiplying projected energy saving by emission intensity Fuel (diesel) emission factor: 2.7 t-CO₂/kL (Source: Based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy])
				2013 (FY)	Approx. 0.2	2013 (FY)	0.3	2013 (FY)	0.7	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	Approx. 4.7	2030 (FY)	16	2030 (FY)	44	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures					
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction		
07. Promotion of the introduction of facilities and equipment with high energy- saving performance (construction work and use of special vehicles)									
				* Reference: Rate of widespread use of construction machinery that meets fuel efficiency standards	(10^4 kL)	(10^4 t-CO ₂)	* Reference: The base year has been set to FY 2017 as a result of revision of evaluation indicators. 1. CO ₂ emissions from construction machinery are estimated at 5.71 million t, based on total energy statistics (①). 2. The average composition of CO ₂ emissions from construction machinery for 2011-2015 was: 46% for hydraulic shovels, 11% for wheel loaders, and 3% for bulldozers (②). 3. CO ₂ emissions will be reduced by 15% in a case of construction machinery that satisfies 2020 fuel-consumption standards (construction machinery satisfying fuel-consumption standards) (③) Projected CO ₂ emission reduction from these initiatives are estimated by calculating reductions per unit and multiplying them by the projected number of units in use, as follows: CO ₂ reductions (10,000 t-CO ₂) =5.71 million t-CO ₂ × 46% × rate of adoption (hydraulic shovels) %×15% ① ② ③ +5.71 million t-CO ₂ × 11% × rate of adoption (wheel loaders) %×15% ① ② ③ +5.71 million t-CO ₂ × 3% × rate of adoption (bulldozers) %×15% ① ② ③ 4. For FCFL, reductions per unit are 4.70 [t-CO ₂ /unit].		
				FY 2017	Hydraulic excavators: 6.7% Wheel loaders: 2.0% Bulldozers: 5.1% FCFL: 77 units	2017 (FY)	1	2017 (FY)	4
				FY 2025	Hydraulic excavators: 49.4% Wheel loaders: 39.8% Bulldozers: 33.2% FCFL: 500 units	2025 (FY)	11	2025 (FY)	29
				FY 2030	Hydraulic excavators: 82.3% Wheel loaders: 60.7% Bulldozers: 49.3% FCFL: 2500 units	2030 (FY)	18	2030 (FY)	48

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
08. Promotion of the introduction of facilities and equipment with high energy- saving performance (greenhouse horticulture, agricultural machinery, and fisheries)										
Introduction of energy saving equipment in horticulture facilities	· Manufacturers: Development of equipment, facilities, and materials to contribute to greenhouse gas emission reduction · Vendors: Sale of equipment, facilities, and materials to contribute to greenhouse gas emission reduction · Nationwide private associations : energy saving rating, and provision of information to farmers, concerning equipment, facilities, and materials to contribute to greenhouse gas emission reduction · Growers: Choosing energy saving equipment, facilities, and materials and putting into practice energy saving production management technologies	· Promoting introduction of energy saving equipment in horticulture facilities to contribute to greenhouse gas emission reduction · Promoting and public awareness-raising of production management through energy saving production-management manuals in horticulture facilities and production-management check sheets in horticulture facilities · Promoting establishment of technologies for energy saving facilities and equipment etc.	· Public awareness-raising · Promotion of horticultural methods that conserve or do not use petroleum	Introduction of energy saving equipment (1,000 units)		(10^4 kL)	(10^4 t-CO ₂)	Scale of Introduction of energy saving equipment/machinery (increase in adoption from FY 2013 to FY 2030) ● Number of units of energy saving machinery adopted · Heat pumps: 26,700 units* · Heating equipment using wood biomass: 1,000 units* · Multilayer thermostats: 79,000 units* ● energy saving introduction of equipment sites · Circulating fans: 143,000 sites* · Curtain installation: 129,000 sites* * Scale of adoption estimated based on subsidy program results etc. Fuel (heavy oil A) emission factor: 2.7 t-CO₂/kL (prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy])		
				2013 (FY)	63					
				2025 (FY)	143					
				2030 (FY)	170	2013 (FY)	-		2013 (FY)	-
				Introduction of energy saving facilities (1,000 sites)		2025 (FY)	42.7		2025 (FY)	115
				2013 (FY)	105					
				2025 (FY)	304					
				2030 (FY)	376	2030 (FY)	57.3		2030 (FY)	155

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
08. Promotion of the introduction of facilities and equipment with high energy- saving performance (greenhouse horticulture, agricultural machinery, and fisheries)											
Introduction of energy saving agricultural machinery	・ Manufacturers/vendors: Development and promotion of energy saving agricultural machinery, awareness and promotion concerning energy saving in use of agricultural machinery ・ Consumers: Choosing energy saving agricultural machinery at time of purchase, and using it in ways that enable energy saving	・ Promotion of introduction of energy saving agricultural machinery ・ Awareness promotion concerning saving energy in use of agricultural machinery	Awareness promotion concerning saving energy in use of agricultural machinery	The number of widely-used energy saving agricultural machinery (Units)		(10^4 kL)		(10^4 t-CO2)		● Estimation of permeation of energy saving agricultural machinery ・ Estimation of permeation of energy saving agricultural machinery (automated steering equipment, electrically powered agricultural machinery) ・ Calculation of reductions in fuel consumption through permeation of energy saving agricultural machinery (using the energy saving rate of each machine) * Automated steering equipment: 13.3%; electrically powered agricultural machinery: 100% ・ CO2 emission reduction calculated using the conversion coefficient* * Chosen for each type of agricultural machinery, from diesel (2.7 t-CO2/kL) for automated steering equipment, kerosene (2.7 t-CO2/kL) and diesel (2.7 t-CO2/kL) for electrically powered agricultural machinery, etc. (prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy])	
				2013 (FY)	0.45	2013 (FY)	-	2013 (FY)	-		
				2025 (FY)	70	2025 (FY)	0.11	2025 (FY)	0.29		
				2030 (FY)	190	2030 (FY)	0.29	2030 (FY)	0.79		
energy saving on fishing vessels	・ Manufacturers/vendors: Development of energy saving fishing vessels, equipment, etc., and providing information to those in the fishing industry ・ Fishers: Choosing energy saving equipment etc. when updating fishing vessels	・ Promotion of development and practical application of energy saving technologies of fishing vessels ・ Promotion of the spread through replacement of energy saving and power-saving fishing vessels, etc.	Public awareness-raisin	Measure evaluation indicator Shift to energy saving fishing boats (%)		(10^4 kL)		(10^4 t-CO2)		・ Trend in number of fishing boats updated per year: approx. 1.7%/year ・ Energy saving effects of updating fishing boats: 10% vs. boat replaced ・ Projected improvement in efficiency of fishing boats through Introduction of smart technologies in offshore and open-sea fishing: approx. 5% ・ Manifestation of energy saving effects through smart technologies: increasing by approx. 2%/year ・ Crude oil emission factor: 2.7 t-CO2/kL (prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy])	
				2013 (FY)	12.4	2013 (FY)	-	2013 (FY)	-		
				2025 (FY)	32.6	2025 (FY)	4.8	2025 (FY)	13.2		
				2030 (FY)	41.0	2030 (FY)	7.2	2030 (FY)	19.4		

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
09. Promotion of energy conservation initiatives through inter-industry collaboration										
Promotion of energy conservation initiatives through inter-industry collaboration	Businesses: Striving to save energy in cooperation with multiple plants and businesses, through means such as energy accommodation	· Support for energy saving initiatives through cooperation of multiple businesses · Evaluation of energy saving initiatives through cooperation of multiple businesses under the Act on the Rational Use of Energy	Promoting energy saving initiatives through cooperation of multiple businesses	-		(10^4 kL)		(10^4 t-CO2)		· Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Calculated based on the Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) · Fuel (city gas) emission factor: 2.0 t-CO2/kL · Fuel (heavy oil A) emission factor: 2.7 t-CO2/kL · Fuel (imported thermal coal) emission factor: 3.5 t-CO2/kL * For convenience, the average of the emission intensity for coal, heavy oil A, and city gas (2.7t-CO2/kL) is used in estimating Expected emission reduction from fuel savings. · Energy saving from energy conservation initiatives through inter-industry collaboration represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	-	2013 (FY)	0	2013 (FY)	0	
				2025 (FY)	-	2025 (FY)	21	2025 (FY)	71	
				2030 (FY)	-	2030 (FY)	29	2030 (FY)	78	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
10. Promotion of fuel conversion										
Promotion of fuel conversion	· Manufacturers/vendors: Promoting cost reductions in fuel conversion from coal and heavy oil to natural gas etc., and provision of information · Consumers: Choosing fuel conversion from coal and heavy oil to natural gas etc.	· Subsidies for fuel conversion from coal and heavy oil to natural gas etc. · Provision of information on outstanding case studies related to fuel conversion from coal and heavy oil to natural gas etc.	-	The amount of fuel converted to gas (Million Nm ³)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		· Fuel conversion results (most recent four years in industry and commercial sectors) 2016-2019 CO ₂ reductions: 500,000 t-CO ₂ (125,000 t-CO ₂ /year) (2016: 160,000; 2017: 29,000; 2018: 133,000; 2019: 177,000 t-CO ₂ /year) (Source: The Japan Gas Association) · Average thermoelectric emission intensity are used for FY 2030 emission intensity for grid electricity: 0.60 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	-	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	-	2025 (FY)	-	2025 (FY)	151	
				2030 (FY)	-	2030 (FY)	-	2030 (FY)	211	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity (in power sector) are estimated based on from FY 2016 to FY 2019, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
11. Implementation of thorough energy management using FEMS										
Implementation of thorough energy management using FEMS	• Manufacturers/vendors: Development of low-cost, easy-to-use factory energy management systems (FEMSs) and providing information to businesses introducing • Businesses introducing: Introduction of FEMS	Supporting FEMS technological development and introduction by businesses	-	FEMS coverage rate (%)		(10^4 kL)		(10^4 t-CO ₂)		• FEMS coverage, energy saving rate • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Energy saving from FEMS installation represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	5	2013 (FY)	4	2013 (FY)	15	
				2025 (FY)	18	2025 (FY)	62	2025 (FY)	238	
				2030 (FY)	24	2030 (FY)	74	2030 (FY)	200	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
12. Improvement of the energy efficiency of buildings										
Improvement of the energy efficiency of buildings (new buildings)	· Contractors etc.: Building energy saving buildings · Owners of buildings etc.: Displaying energy consumption performance of buildings · Manufacturers of building materials preventing heat loss etc.: Improving the performance of building materials prevebting heat loss	· Requiring conformity to energy saving standards under the Act on the Improvement of Energy Consumption Performance of Buildings, strengthening guidance standards, and strengthening energy saving standards in stages · Support through subsidies to promote supply of buildings with improved energy saving performance, such as zero-emissions buildings (ZEB) · Realizing ZEB in the national government's newly constructed buildings · Enhancing the Top Runner Program for building materials	· Smooth operation of the Act on the Improvement of Energy Consumption Performance of Buildings · Public awareness-raising related to energy saving buildings · Proactive realization of ZEB in public buildings · Support for promotion and expansion of ZEB etc.	The percentage of medium to large-scale new buildings that meet the energy saving performance* of the ZEB standard (%)		(10^4 kL)		(10^4 t-CO ₂)		· FY 2030 energy saving represents energy saving through progress on countermeasures since FY 2013, and volumes of emission reduction are calculated based on these volumes of energy saving. · Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO₂/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (Source: Outlook for energy supply and demand in FY 2030) * Primary energy consumption not including renewable energy reduced as follows by use, from current energy saving standards. Hotels, hospitals, department stores, restaurants/bars, meeting places, etc.: 30% reduction (BEI=0.7) Offices, schools, factories, etc.: 40% reduction (BEI=0.6)
				2013 (FY)	0	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	-	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	100	2030 (FY)	403	2030 (FY)	1,010	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
12. Improvement of the energy efficiency of buildings										
Improvement of the energy efficiency of buildings (renovation and reconstruction of existing buildings)	• Owners etc.: energy saving renovation and reconstruction of existing buildings • Manufacturers of building materials preventing heat loss etc.: Improving the performance of building materials prevebting heat loss	• Support for promotion of energy saving renovation and reconstruction of existing buildings • Systematic energy saving renovation and reconstruction of public buildings	• Smooth operation of the Act on the Improvement of Energy Consumption Performance of Buildings • Promotion and awareness raising related to energy saving buildings • Systematic energy saving renovation and reconstruction of public buildings • Support for energy saving renovation and reconstruction of buildings	The percentage of building stock that meets energy saving standards (%)		(10^4 kL)		(10^4 t-CO ₂)		• FY 2030 energy saving represents energy saving through progress on countermeasures since FY 2013, and volumes of emission reduction are calculated based on these volumes of energy saving. • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	24	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	—	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	57	2030 (FY)	143	2030 (FY)	355	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
13. Promotion of high-efficiency energy-saving equipment (commercial and other sectors)										
Installation of energy-efficient commercial water heaters	• Manufacturers: Technological development, production, and cost reductions for high-efficiency water heaters • Vendors: Providing information to businesses concerning high-efficiency water heaters • Businesses: Introduction of high-efficiency water heaters	• Supporting introduction of high-efficiency water heaters • Promoting proactive installation under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	• Promotion of the spread of high-efficiency water heaters and provision of information to businesses • Promoting proactive installation under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	Cumulative number of introduced units of HP water heaters (10 ⁴ units)		(10 ⁴ kL)	(10 ⁴ t-CO ₂)	• Energy saving per unit of high-efficiency water heaters • Units of high-efficiency water heaters adopted • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO₂/kWh (source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (source: Outlook for energy supply and demand in FY 2030) • Fuel (city gas) emission factor: 2.0 t-CO₂/kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) • Energy saving from introduction of energy-efficient commercial water heaters represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.		
				2013 (FY)	2.9					
				2025 (FY)	9					
				2030 (FY)	14					
				Cumulative number of introduced units of latent heat recovery type water heater (10 ⁴ units)		2013 (FY)	2		2013 (FY)	5
				2013 (FY)	15					
				2025 (FY)	100					
				2030 (FY)	110					
						2025 (FY)	44		2025 (FY)	115
						2030 (FY)	66		2030 (FY)	141

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
13. Promotion of high-efficiency energy-saving equipment (commercial and other sectors)											
Introduction of high-efficiency lighting	• Manufacturers: Technological development and cost reductions related to high-efficiency lighting • Vendors: Providing consumers with information about high-efficiency lighting • Businesses: Proactive introduction of high-efficiency lighting	• Supporting technological development and introduction of high-efficiency lighting • Promoting technological development high-efficiency lighting through expansion of the standard of the Top Runner Program • Promoting proactive introduction under the Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	• Promotion of the spread of high-efficiency lighting and provision of information to businesses • Promoting proactive introduction under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	Cumulative number of introduced units (100 million units)		(10^4 kL)		(10^4 t-CO ₂)		• Energy saving per unit of high-efficiency lighting • Number of units of high-efficiency lighting promoted • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Energy saving from introduction of high-efficiency lighting represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.	
				2013 (FY)	0.5	2013 (FY)	16	2013 (FY)	98		
				2025 (FY)	2.7	2025 (FY)	205	2025 (FY)	1,257		
				2030 (FY)	3.2	2030 (FY)	250	2030 (FY)	672		
Introduction of refrigerant management technology	Businesses: • Firm establishment of appropriate management methods for refrigeration and air-conditioning equipment • Development of technical human resources with appropriate management skills	• Establishment of decision-making standards related to matters such as appropriate management for users of refrigeration and air-conditioning equipment under Act on Rational Use and Appropriate Management of Fluorocarbons • Public awareness-raising for firm establishment of the necessary appropriate and simplified inspection methods for refrigerant management by a wide range of businesses, and training machinery installation engineers	Promotion of the spread of Act on Rational Use and Appropriate Management of Fluorocarbons and providing information to businesses	Rate of widespread use of appropriate management technology (%)		(10^4 kL)		(10^4 t-CO ₂)		• Calculations reflect consideration for the rate of conversion to CFC-free equipment based on a number of 7.5 million units of refrigeration and air-conditioning equipment for business use subject to this measure, based on recent shipments • It is assumed that the leak prevention rate can reach 4.5% through implementing appropriate management • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Energy saving from introduction of refrigerant management technologies represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.	
				2013 (FY)	51	2013 (FY)	3.8	2013 (FY)	23.5		
				2025 (FY)	100	2025 (FY)	3.5	2025 (FY)	21.6		
				2030 (FY)	100	2030 (FY)	0.6	2030 (FY)	1.6		

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
14. Improvement of energy efficiency of equipment through Top Runner Programs (commercial and other sectors)										
Improvement of energy efficiency of equipment through Top Runner Programs	• Manufacturers: Development, production, and introduction of energy-efficient equipment surpassing standards of the Top Runner Program • Vendors: Introduction, sales promotion, and provision of information to consumers regarding energy-efficient equipment surpassing standards of the Top Runner Program • Consumers: Introduction of energy-efficient equipment surpassing standards of the Top Runner Program	• Expanding the ranks of equipment subject to the Top Runner Program and enhancing standards of the Top Runner Program • Proactive introduction of energy-efficient equipment surpassing standards of the Top Runner Program under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	• Public awareness-raising for businesses and consumers • Proactive introduction of energy-efficient equipment surpassing standards of the Top Runner Program under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	-		(10^4 kL)		(10^4 t-CO ₂)		• Commercial sector • Improving the energy-consumption efficiency of machinery • Commercial sector floor area • Number of units of machinery owned • Average years of use of machinery • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Calculated based on the Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Fuel (city gas) emission factor: 2.0 t-CO ₂ /kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) • Fuel (kerosene) emission factor: 2.7 t-CO ₂ /kL * For convenience, the weighted average (2.3 t-CO ₂ /kL) of the emission intensity for city gas, LPG, and kerosene is used in estimating Expected emission reduction from fuel savings. • Energy saving from improving the energy saving performance of machinery through the Top Runner Program etc. represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	-	2013 (FY)	8	2013 (FY)	52	
				2025 (FY)	-	2025 (FY)	212	2025 (FY)	1,300	
				2030 (FY)	-	2030 (FY)	342	2030 (FY)	920	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
15. Implementation of thorough energy management through the use of BEMS, and Energy Conservation diagnosis										
Implementation of thorough energy management through the use of BEMS and Energy Conservation diagnosis	· Manufacturers/vendors: Development of low-cost, easy-to-use building energy management systems (BEMSs) and providing information to businesses adopting BEMS systems · Businesses: Thorough energy management using BEMS, energy saving diagnostics, etc.	Support for thorough energy management by businesses using BEMS, energy saving diagnostics, etc.	· Proactive BEMS adoption · Promotion of the spread of BEMS , and providing information to businesses	Rate of widespread use (%)		(10^4 kL)		(10^4 t-CO ₂)		· Energy intensity of non-residential buildings · FY 2030 business floor area · Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) · Fuel (city gas) emission factor: 2.0 t-CO ₂ /kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) · Fuel (LPG) emission factor: 2.3 t-CO ₂ /kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) · Fuel (kerosene) emission factor: 2.7 t-CO ₂ /kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) * For convenience, the weighted average (2.2 t-CO ₂ /kL) of the emission intensity for city gas, LPG, and kerosene is used in estimating Expected emission reduction from fuel savings. · Energy saving from use of BEMS etc. represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	8	2013 (FY)	13	2013 (FY)	56	
				2025 (FY)	37	2025 (FY)	137	2025 (FY)	628	
				2030 (FY)	48	2030 (FY)	239	2030 (FY)	644	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
16. Promotion of local production for local consumption and areal use of energy										
Promotion of local production for local consumption and areal use of energy	• Energy suppliers etc.: Proactive development of systems for local production for local consumption of energy, utilizing distributed energy resources • Buyers: Deepening understanding of local production for local consumption of energy, proactive use of local production for local consumption systems	Support for development of systems for local production for local consumption of energy	Support for development of systems for local production for local consumption of energy	Number of regional microgrids constructed (Units)		(10^4 kL)		(10^4 t-CO ₂)		The evaluation indicator is the number developed (including those under development) of community microgrids, which are capable of separation from the wide-area grid to supply electricity independently from renewable energy and other sources in the event of a large-scale power failure. (The Ministry of Economy, Trade and Industry has provided support for their development since FY 2019.) Since current plans call for discontinuing this program in FY 2022, this indicator does not cover years after that.
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2020 (FY)	2	2020 (FY)	—	2020 (FY)	—	
				2030 (FY)	—	2030 (FY)	—	2030 (FY)	—	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
17. Decarbonization of urban areas through the improvement of the thermal environment by heat island control										
Decarbonization of urban areas through improvement of the thermal environment by heat island control	Private businesses: Implementing countermeasures contributing to heat island control and CO ₂ emission reduction	Promotion of heat island control such as rooftop planting	-	Area of rooftop greening construction (ha)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		• While there are multiple countermeasures against the heat island effect, due to a lack of knowledge on CO₂ emissions reduction effects for measures other than rooftop planting, Expected emission reduction have been estimated for promotion of rooftop planting. • Average electricity emission factor for all power sources in FY 2019: 0.444 kg-CO₂/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	-	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	245.4	2025 (FY)	-	2025 (FY)	0.78 to 3.64	
				2030 (FY)	302.1	2030 (FY)	-	2030 (FY)	0.71 to 3.32	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity (in power sector) are estimated based on FY 2019, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
18. Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and renewable energy measures in waterworks)										
Promotion of energy conservation and renewable energy measures in waterworks	Waterworks businesses etc.: Implementing energy saving and renewable energy measures	・ Promoting further introduction of energy saving and renewable energy measures in waterworks Expanding facilities and equipment eligible for subsidies ・ Ascertaining information such as the state of introduction of energy saving and renewable energy measures in waterworks ・ Provision of information concerning energy saving and renewable energy measures Promoting effective introduction of energy saving and renewable energy measures through means such as use of survey results and rolling out of outstanding case studies	Waterworks businesses etc.: Implementing energy saving and renewable energy measures	The amount of renewable energy generated (10^4 kWh)		(10^4 kL)		(10^4 t-CO ₂)		・ Conducting surveys on the state of implementation of energy saving and renewable energy measures among waterworks businesses and related parties nationwide ・ Calculating total volumes of energy saving and renewable energy at businesses as a whole ・ Adding the results of support by the the national government for Introduction of energy saving and renewable energy measures by waterworks businesses ・ It is anticipated that CO ₂ emissions will reduce through energy saving resulting from more efficient use of energy and through power generation by equipment using renewable energy ・ Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) ・ Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	5,496					
				2025 (FY)	17,004	2013 (FY)	—	2013 (FY)	—	
				2030 (FY)	24,852					
				The amount of energy savings compared to FY2013 (10^4 kWh)		2025 (FY)	11.6	2025 (FY)	32.0	
				2013 (FY)	—					
				2025 (FY)	44,911	2030 (FY)	19.3	2030 (FY)	21.6	
				2030 (FY)	75,054					

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
19. Introduction of energy conservation and renewable energy in water supply and sewage (promotion of energy conservation and energy creation measures in sewage systems)										
Promotion of energy conservation and energy creation measures in sewage systems	Private businesses: · Development of high-efficiency, low-cost technologies for converting sewage sludge to energy, development of energy saving facilities and equipment, introduction of sewage heat at facilities using heat	· Support for development and promotion of technologies for converting sewage sludge to energy · Provision of information such as energy saving facilities and equipment at final treatment facilities and other facilities and water-treatment technologies with low levels of greenhouse gas (GHG) emissions · Promoting use of sewage heat · Support for maintenance to sewage treatment facilities by local governments	· Introduction of energy creation technologies at times such as when renovating sludge treatment facilities · Introduction of energy saving facilities and equipment at final treatment facilities and other facilities, water-treatment technologies with low levels of GHG emissions, etc. · Introduction of equipment using sewage heat	Energy-derived CO ₂ emissions per treated water (t-CO ₂ /1,000 m3)	(10^4 kL)	(10^4 t-CO ₂)	· The share of energy generation from sewage sludge (calculated by dividing the sewage biomass recycling rate, a target of Priority Plan for Social Infrastructure Development, by green-space and agricultural-land use) will grow to 35% in 2025 and 37% by 2030. · Promoting energy saving initiatives at sewage treatment facilities · Continually increasing use of other renewable energy (solar, small-scale hydroelectric, wind power) · Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030)			
				2013 (FY)				0.28		
				2025 (FY)	0.22	2013 (FY)		-	2013 (FY)	-
				2030 (FY)	0.09					
				Sewage sludge energy conversion rate (%)	2025 (FY)	-		2025 (FY)	138	
				2013 (FY)						15
				2025 (FY)	35	2030 (FY)		-	2030 (FY)	130
				2030 (FY)	37					

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
20. Initiatives in waste treatment											
Promotion of sorted collection and recycling of plastic containers and packaging	- Consumers: Cooperating in sorted disposal of plastic containers and packaging - Manufacturers and business users of containers and packaging: Promoting manufacture and use of containers and packaging that are easy to sort, public awareness-raising among consumers, rationalized contribution to local governments	Promoting sorted collection and recycling of plastic containers and packaging	- Baling sorted plastic container and packaging wastes collected and improving bale quality - Public awareness-raising among consumers - Cooperation in demonstration projects and other policies	Sorted collection volume of waste from plastic containers and packaging (10 ⁴ t)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		- Calculation method - Projected volumes of sorted collection are estimated from FY 2013 results based on rates of increase in the seventh municipal sorted collection plan - Reduction effects are calculated based on recycling rates for plastic container and packaging wastes (FY 2013 values) - There is a possibility that results etc. could be revised in future council meetings etc. - Notes - Although estimates are based on the calculation methods from plans for achievement of Kyoto Protocol targets, they could be revised as a result of future studies. - The evaluation indicator "Volume of sorted collection of plastic container and packaging wastes" refers to volumes delivered to designated businesses	
				2013 (FY)	66	2013 (FY)	-	2013 (FY)	-		
				2025 (FY)	71	2025 (FY)	1.2	2025 (FY)	4.4		
				2030 (FY)	73	2030 (FY)	1.7	2030 (FY)	6.2		

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
20. Initiatives in waste treatment										
Introduction of waste power generation at municipal waste incineration plants	Local governments: Introduction of high-efficiency power generation facilities in accordance with facility size when building new municipal waste incineration plants or renovating or implementing fundamental improvements at existing ones	・ Initiatives to achieve targets of the Waste Management Facilities Improvement Plans (June 19, 2018 Cabinet decision) ・ Initiatives to achieve targets established in basic plans based on the Act on Waste Management and Public Cleaning ・ Initiatives based on guidelines for controlling GHG emissions in the waste-treatment sector ・ Certification program for waste heat recovery facility establisher ・ Support for improvements to municipal waste incineration plants	Introduction of high-efficiency power generation facilities in accordance with facility size when building new municipal waste incineration plants or renovating or implementing fundamental improvements at existing one	The amount of electricity generated per unit of waste disposed (kWh/t)		(10^4 kL)		(10^4 t-CO2)		● Projected energy saving volumes: Calculated by estimating increases in power generation per volume of waste (kWh/t) from business-as-usual (BAU) levels in the fiscal year subject to evaluation and multiplying these by the general-waste incineration volume (thousand t), heat from electric power (9.76 GJ/thousand kWh), and Crude oil conversion intensity (0.0258 kL/GJ), assuming that facilities set up 20 years earlier would be subject to fundamental improvements and those set up 35 years earlier to renovation, adopting high-efficiency power generation facilities in accordance with facility size that satisfies the requirements issued for energy-recovery waste-treatment facilities at that time, since the base year (FY 2013) ● Expected emission reduction: Calculated by multiplying the increase from the BAU case in power generation per volume of waste (kWh/t) in the fiscal year subject to evaluation by the general-waste incineration volume in the fiscal year subject to evaluation and the average electricity emission factor for all power sources (kg-CO2/kWh) ・ Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) ・ Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	231	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	321 to 382	2025 (FY)	65 to 112	2025 (FY)	147 to 253	
				2030 (FY)	359 to 445	2030 (FY)	92 to 158	2030 (FY)	91 to 157	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
20. Initiatives in waste treatment										
Promotion of fuel production and energy conservation measures in the waste management industry	• Treatment businesses: Use of plastic wastes and other wastes subject to simple incineration as raw materials for fuels. Also, implementing introduction of environmentally conscious equipment and initiatives of saving energy at waste incineration plants • Manufacturers etc.: Proactive use of fuels derived from wastes as alternative fuels • Waste collection and transport businesses: Introduction of fuel-efficient waste collection and transportation vehicles	• Measures to support formulation of business plans related to such as effective use of power from waste power generation • Measures to support energy creation and other activities using energy from wastes • Measures to support introduction of fuel-efficient waste collection and transportation vehicles • Measures to support introduction of low-carbon waste treatment facilities and equipment • Multifaceted support for promotion of the Action Plans for a Low- Carbon Society by industrial-waste treatment businesses	-	RPF production volume (1,000 t)		(10^4 kL)		(10^4 t-CO ₂)		• Projected energy saving volumes: • Projections assume production of 1.5 million tons of RPF in FY 2030, through means including use of the project to promote achievement of multiple benefits through effective use of energy from wastes. • Calculated based on actual RPF production volumes per facility in the base year (from a survey of industrial wastes), multiplied by the RPF solids rate (97.4%) (inventory setting value) heat from RPF (29.3 MJ/kg) (list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]), and Crude oil conversion intensity (0.0258 kL/GJ) • Expected emission reduction: Calculated by multiplying the increase from the BAU case (continuation of 2013 values) in power generation using RPF (t/year) since the base year by the RPF solids rate, heat generation, and CO ₂ emission factor (89.1 kg-CO ₂ /GJ since 2018) (carbon emission intensity [Agency for Natural Resources and Energy]) of fuel replaced by RPF in the fiscal year subject to evaluation.
				2013 (FY)	914	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	1,293	2025 (FY)	28	2025 (FY)	96	
				2030 (FY)	1,500	2030 (FY)	43	2030 (FY)	149	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
20. Initiatives in waste treatment										
Introduction of electric waste collection vehicles	Manufacturers: Technological development related to vehicles, loading platform, batteries, etc.	Subsidies for purchase of electric waste collection vehicles, electricity supply systems, etc.	CO ₂ emission reduction from the waste collection vehicles by replacing the current internal combustion engine waste collection vehicles with EV waste collection vehicle, which is fully electric from driving to loading	Number of introduced units of EV garbage collection vehicles (Units)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		● Projected energy saving volumes: · Calculated by ascertaining and totaling numbers of electric waste-collection vehicles adopted per fiscal year, through interviews with manufacturers, local governments, etc. · emission reduction are estimated by multiplying CO₂ reduction effects per waste-collection vehicle, calculated from the fuel consumption, electricity consumption of diesel-powered waste-collection vehicles and electric waste-collection vehicles, differences in their maximum loads, average distance travelled and days of operation, etc., by the cumulative total number of electric waste-collection vehicles. · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (Source: Outlook for energy supply and demand in FY 2030) · Years other than FY 2030: 0.57 kg-CO₂/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan])
				2013 (FY)	0	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	10,200	2025 (FY)	-	2025 (FY)	1.2	
				2030 (FY)	26,700	2030 (FY)	-	2030 (FY)	15	

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*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
21. Improvement of energy efficiency of housing										
Improvement of energy efficiency of housing (new housing)	· Contractors etc.: Building energy saving housing · Sellers, leasers of residences: Displaying energy consumption performance of housing · Designated owners and contractors: Supplying energy-efficient housing · Manufacturers of building materials preventing heat loss etc.: Improving the performance of building materials preventing heat loss	· Requiring conformity to energy saving standards under the Act on the Improvement of Energy Consumption Performance of Buildings, strengthening guidance standards, and strengthening energy saving standards in stages · Promoting supply of energy saving residences through the Top Runner Program for housing · Support through tax programs, subsidies, and lending to promote supply of residences with improved energy saving performance, such as zero-emissions homes (ZEH) · Introduction of labeling systems for residential energy saving performance · Enhancing the Top Runner Program for building materials	· Smooth operation of the Act on the Improvement of Energy Consumption Performance of Buildings · Public awareness-raising related to energy saving housing · Promoting ZEH in rental public housing · Support for promotion and expansion of ZEH etc.	The percentage of new houses that meet the energy saving performance* of the ZEH standard (%)		(10^4 kL)		(10^4 t-CO2)		· FY 2030 energy saving represents energy saving through progress on countermeasures since FY 2013, and volumes of emission reduction are calculated based on these volumes of energy saving. · Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) · Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) * Reducing by 20% from current energy saving standards primary energy consumption not including enhanced envelope thermal performance standards and renewable energy
				2013 (FY)	0	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	—	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	100	2030 (FY)	253	2030 (FY)	620	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures			
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction
Improvement of energy efficiency of housing (renovation and reconstruction of existing housing)	- Owners etc.: energy saving remodeling to existing housing - Manufacturers of building materials preventing heat loss etc.: Improving the performance of building materials preventing heat loss	- Support through tax programs, subsidies, and lending to promote energy saving remodeling of existing residences - Development and promotion of building materials, methods, etc. well suited to remodeling with superior energy saving performance	- Smooth operation of the Act on the Improvement of Energy Consumption Performance of Buildings - Promotion and awareness raising related to energy saving housing - Implementation of systematic energy saving remodeling of rental public housing - Support for energy saving remodeling of existing housing	The percentage of housing stock that meets energy saving standards (%)	(10 ⁴ kL)	(10 ⁴ t-CO ₂)	- FY 2030 energy saving represents energy saving through progress on countermeasures since FY 2013, and volumes of emission reduction are calculated based on these volumes of energy saving. - Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO₂/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) - Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (Source: Outlook for energy supply and demand in FY 2030) * Some energy saving effects of energy saving renovation not satisfying energy saving standards also are included in the figures.
				2013 (FY)	6	2013 (FY) —	2013 (FY) —
				2025 (FY)	—	2025 (FY) —	2025 (FY) —
				2030 (FY)	30	2030 (FY) 91 *	2030 (FY) 223

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
22. Diffusion of high-efficiency energy-saving equipment (residential sector)										
Installation of high-efficiency water heaters	- Manufacturers: Technological development, production, and cost reductions for high-efficiency water heaters - Vendors: Providing information to consumers concerning high-efficiency water heaters - Consumers: Proactive introduction of high-efficiency water heaters	- Promotion and expansion of use of high-efficiency water heaters through the Top Runner Program - Promoting energy saving countermeasures of residential	Promotion and expansion of use of high-efficiency water heaters and provision of information to consumers	Cumulative number of introduced units of heat pump (HP) water heaters (10 ⁴ units)		(10 ⁴ kL)	(10 ⁴ t-CO ₂)	- Energy saving per unit of high-efficiency water heaters - Units of high-efficiency water heaters adopted - Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO₂/kWh (source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) - Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (source: Outlook for energy supply and demand in FY 2030) - Fuel (city gas) emission factor: 2.0 t-CO₂/kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) - Fuel (LPG) emission factor: 2.3 t-CO₂/kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) - Fuel (kerosene) emission factor: 2.7 t-CO₂/kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) * For convenience, the weighted average (2.2 t-CO₂/kL) of the emission intensity for city gas, LPG, and kerosene is used in estimating Expected emission reduction from fuel savings. - Energy saving from Introduction of high-efficiency water heaters represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.		
				2013 (FY)	422					
				2025 (FY)	1,200					
				2030 (FY)	1,590	2013 (FY)	11		2013 (FY)	18
				Cumulative number of introduced units of latent heat recovery type (10 ⁴ units)						
				2013 (FY)	448					
				2025 (FY)	2,700	2025 (FY)	217		2025 (FY)	640
				2030 (FY)	3,050					
				Cumulative number of introduced units of fuel cells (10 ⁴ units)		2030 (FY)	332		2030 (FY)	898
				2013 (FY)	7.2					
				2025 (FY)	210					
				2030 (FY)	300					

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
22. Diffusion of high-efficiency energy-saving equipment (residential sector)										
Introduction of high-efficiency lighting	- Manufacturers: Technological development and cost reductions related high-efficiency lighting - Vendors: Providing consumers with information about high-efficiency lighting - Consumers: Proactive introduction of high-efficiency lighting	Promotion and expansion of high-efficiency lighting through the Top Runner Program	promotion of the spread of high-efficiency lighting and providing information to consumers	Cumulative number of introduced units (100 million units)		(10^4 kL)		(10^4 t-CO2)		- Energy saving per unit of high-efficiency lighting - Number of units of high-efficiency lighting promoted - Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO2/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) - Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) - Energy saving from Introduction of high-efficiency lighting represents energy saving from progress on countermeasures since FY 2012, and emission reduction are calculated based on these energy saving values.
				2013 (FY)	0.6	2013 (FY)	12	2013 (FY)	73	
				2025 (FY)	4.4	2025 (FY)	205	2025 (FY)	1,257	
				2030 (FY)	4.6	2030 (FY)	242	2030 (FY)	651	

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*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
23. Diffusion of high-efficiency energy- saving equipment (energy saving septic tanks) (residential sector)										
Promotion of energy-efficient septic tank application (introduction of advanced energy-efficient household septic tanks)	• Manufacturers: Technological development related to energy-efficient septic tank application • Local governments/vendors: Provision of information to consumers regarding energy-efficient septic tank application • Consumers: Choosing energy-efficient septic tank application at time of purchase	• Policy guidance toward energy-efficient septic tank application, through means such as establishment of power-saving standards on installation of septic tank application • Research on energy-efficient septic tank application and public awareness-raising among manufacturers, local governments, vendors, etc.	• Support for energy-efficient septic tank application • Provision of information and public awareness-raising among vendors, consumers, etc. regarding energy-efficient septic tank application	Cumulative number of septic tanks with a 26% reduction in power consumption compared to septic tanks for a low-carbon society in FY2013 (10^4 units)	(10^4 kL)		(10^4 t-CO2)		• While it is anticipated that septic tank application with power consumption 26% lower than that of current septic tank application will be installed through conversion from night-soil reservoirs and single-treatment septic tank application and from traditional compound-treatment septic tank application, since it is expected that installation of new compound-treatment septic tank application will involve installation of existing low-carbon septic tank application in the BAU case, this measure assumes replacement of such septic tank application with septic tank application having 26% lower power consumption, and GHG reductions are estimated based on the difference between the two. • For representative types of septic tank application, five-, seven-, and 10-person tanks, which have accounted for the majority of units shipped in recent years, have been chosen as targets under this measure. • A target also has been set regarding replacement of existing medium-sized and large septic tank application, which have low levels of energy efficiency. • Power-consumption base values of FY 2013 low-carbon septic tank application, by number of users (per unit): Five-person tank: 0.052 kW; seven-person tank: 0.074 kW; 10-person tank: 0.101 kW (Source: Handling of the water-purification tank improvement project implementation guidelines [2006, Ministry of the Environment]) • Simple average of power consumption per unit among products in the market as of 1990 for medium-sized and large septic tank application 51-100-person tank: 1.125 kW; 101-300-person tank: 2.293 kW; 300-person tank or larger: 6.779 kW • FY 2013: 0.57 kg-CO2/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030)	
				2013 (FY)	3.5	2013 (FY)	-	2013 (FY)		-
				2025 (FY)	63	2025 (FY)	1.0	2025 (FY)		6.1
				2030 (FY)	93	2030 (FY)	1.5	2030 (FY)		4.9

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
23. Diffusion of high-efficiency energy- saving equipment (energy saving septic tanks) (residential sector)										
Promotion of energy-efficient septic tank application (replacement of low energy-efficient existing medium- and large-sized septic tanks)	• Manufacturers: Technological development related to energy-efficient septic tank application • Local governments/vendors: Provision of information to consumers regarding energy-efficient septic tank application • Consumers: Choosing energy-efficient septic tank application at time of purchase	• Policy guidance toward energy-efficient septic tank application, through means such as establishment of power-saving standards on installation of septic tank application • Research on energy-efficient septic tank application and public awareness-raising among manufacturers, local governments, vendors, etc.	• Support for energy-efficient septic tank application • Provision of information and public awareness-raising among vendors, consumers, etc. regarding energy-efficient septic tank application	Cumulative number of energy saving medium-and large-scale septic tanks (10 ⁴ units)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		• While it is anticipated that septic tank application with power consumption 26% lower than that of current septic tank application will be installed through conversion from night-soil reservoirs and single-treatment septic tank application and from traditional compound-treatment septic tank application, since it is expected that installation of new compound-treatment septic tank application will involve installation of existing low-carbon septic tank application in the BAU case, this measure assumes replacement of such septic tank application with septic tank application having 26% lower power consumption, and GHG reductions are estimated based on the difference between the two. • For representative types of septic tank application, five-, seven-, and 10-person tanks, which have accounted for the majority of units shipped in recent years, have been chosen as targets under this measure. • A target also has been set regarding replacement of existing medium-sized and large septic tank application, which have low levels of energy efficiency. • Power-consumption base values of FY 2013 low-carbon septic tank application, by number of users (per unit): Five-person tank: 0.052 kW; seven-person tank: 0.074 kW; 10-person tank: 0.101 kW (Source: Handling of the water-purification tank improvement project implementation guidelines [2006, Ministry of the Environment]) • Simple average of power consumption per unit among products in the market as of 1990 for medium-sized and large septic tank application 51-100-person tank: 1.125 kW; 101-300-person tank: 2.293 kW; 300-person tank or larger: 6.779 kW • FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030)
				2013 (FY)	0.1	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	2.2	2025 (FY)	1.5	2025 (FY)	9.2	
				2030 (FY)	3.4	2030 (FY)	2.3	2030 (FY)	7.4	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
24. Improvement of energy efficiency of equipment through Top Runner Programs (residential sector)										
Improvement of energy efficiency of equipment through Top Runner Programs	• Manufacturers: Development, production, and introduction of energy-efficient equipment surpassing standards of the Top Runner Program • Vendors: Introduction, sales promotion, and provision of information to consumers regarding energy-efficient equipment surpassing standards of the Top Runner Program • Consumers: Introduction of energy-efficient equipment surpassing standards of the Top Runner Program	• Expanding the ranks of equipment subject to the Top Runner Program and enhancing standards of the Top Runner Program • Proactive introduction of energy-efficient equipment surpassing standards of the Top Runner Program under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	• Public awareness-raising among businesses and consumers • Proactive introduction of energy-efficient equipment surpassing standards of the Top Runner Program under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities	-		(10^4 kL)		(10^4 t-CO ₂)		● Residential sector • Energy-consumption efficiency etc. of equipment • Number of households • Number of units of equipment owned • Average years of use of equipment • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Fuel (city gas) emission factor: 2.0 t-CO ₂ /kL (Source: prepared based on the list of carbon emission intensity of total heat [Agency for Natural Resources and Energy]) • Fuel (kerosene) emission factor: 2.7 t-CO ₂ /kL * For convenience, the weighted average (2.3 t-CO ₂ /kL) of the emission intensity for city gas, LPG, and kerosene is used in estimating Expected emission reduction from fuel savings. • Energy saving from improving the energy saving performance of equipment through the Top Runner Program etc. represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	-	2013 (FY)	3.9	2013 (FY)	24.3	
				2025 (FY)	-	2025 (FY)	128	2025 (FY)	713.4	
				2030 (FY)	-	2030 (FY)	180	2030 (FY)	475.7	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
25. Implementation of thorough energy management through the use of HEMS, smart meters, and smart home devices and the provision of energy-saving information										
Implementation of thorough energy management through the use of HEMS and smart meters	• Manufacturers/vendors: Development of low-cost, easy-to-use home energy management systems (HEMSs, smart home devices) and providing information to consumers • Energy suppliers: Provision of information on saving energy to consumers • Consumers: Proactive introduction of HEMS and smart devices, and practicing energy saving activities	• Promoting introduction of HEMS through support for introduction of ZEH • Promoting design of standards and architectures by industrial organizations • Promoting provision of information on saving energy to consumers based on the energy saving guidelines by energy retailers	• Promotion of HEMSs and smart home devices, and provision of information to consumers	Number of widely-used HEMS (10 ⁴ households)		(10 ⁴ kL)	(10 ⁴ t-CO ₂)	• Rate of energy saving using HEMSs • Anticipated number of households in 2030 • Annual average power consumption per household • Rate of energy saving through provision of information • Energy consumption in the residential sector • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO₂/kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO₂/kWh (Source: Outlook for energy supply and demand in FY 2030) • Energy saving from HEMS energy management represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.		
				2013 (FY)	21					
				2025 (FY)	1,689	2013 (FY)	0.4		2013 (FY)	2.4
				2030 (FY)	4,941					
				Rate of implementation of energy saving information provision (%)		2025 (FY)	87.4		2025 (FY)	365.8
				2013 (FY)	21					
				2025 (FY)	44	2030 (FY)	216		2030 (FY)	569.1
				2030 (FY)	80					

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
26. Diffusion of next-generation vehicles, improvement of fuel efficiency, etc.										
Diffusion of next-generation vehicles, improvement of fuel efficiency	• Manufacturers, importers, etc.: Development, production, sale, and import of fuel-efficient vehicles • Vendors: Proactive sale of fuel-efficient vehicles • Consumers: Purchase of fuel-efficient vehicles	• Proactive introduction of next-generation vehicles, and supporting their adoption • Support for introduction of fuel-efficient diesel trucks etc. • Support for infrastructure development • Preferential tax treatment • Improving fuel efficiency through standards of Top Runner Program • Provision information on fuel efficiency to consumers, through evaluation and publication systems concerning vehicles' fuel efficiency and vehicle labeling • Supporting technological development and practical application of performance improvements in next-generation vehicles • Preferential treatment under financial, investment, and lending programs	• Promotion and awareness raising • Proactive introduction of next-generation vehicles, and supporting their adoption • Infrastructure development	The ratio of next-generation vehicles to new vehicle sales(%)	(10^4 kL)	(10^4 t-CO ₂)	• Evaluation indicator (next-generation vehicles as a percentage of new-vehicle sales): FY 2030 figures are based on the Japan Revitalization Strategy (2015): Investing in the future/productivity reforms (June 30, 2015 Cabinet decision). • Energy saving is calculated as the difference between average energy consumption of vehicles owned if measures were implemented and if they were not. • Energy saving from measures of diffusion of next-generation vehicles and improvement of fuel efficiency represent energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.			
				2013 (FY)				23.2		
				2025 (FY)				-		
				2030 (FY)	50 to 70	2013 (FY)		19.9	2013 (FY)	53.3
				Average fuel consumption (km/L)	2025 (FY)	-		2025 (FY)	-	
				2013 (FY)	14.7	2030 (FY)		990	2030 (FY)	2,674
				2025 (FY)	-					
				2030 (FY)	24.8					

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
28. Road traffic flow measures (promotion of the maintenance of LED road lighting)										
Promotion of the installation of LED road lighting	• Manufacturers: Technological development related to saving energy in road lights	• Promoting installation of LED road lights • Further saving energy and advancement in road lighting	• Promoting installation of LED road lights	Number of LED road lights on the national roads under the direct control (10^4 units)		(10^4 kL)		(10^4 t-CO ₂)		• Hours illuminated of street lights in illuminated areas: 12 hours • Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) • Emission reduction are calculated as differences from FY 2013
				2013 (FY)	Approx. 7	2013 (FY)	-	2013 (FY)	—	
				2025 (FY)	Approx. 20	2025 (FY)	Approx. 0.9	2025 (FY)	Approx. 5	
				2030 (FY)	Approx. 30	2030 (FY)	Approx. 1.4	2030 (FY)	Approx. 13	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
29. Road traffic flow measures (promotion of Intelligent Transport Systems (ITS) (centralized control of traffic lights))											
Promotion of intelligent transport system (ITS) (centralized control of traffic lights)	—	Promoting centralized control of traffic lights	Centralized control of traffic lights	Centralized control of traffic signals (units)		(10^4 kL)		(10^4 t-CO2)		• CO2 improvements per unit of traffic lights under centralized control (FY 2020 standard) • Evaluation indicator: Planned units of lights installed • Emission reduction are calculated based on the effects of the cumulative number installed under these measures.	
				2013 (FY)	48,800	2013 (FY)	—	2013 (FY)	133		
				2025 (FY)	52,700	2025 (FY)	—	2025 (FY)	144		
				2030 (FY)	—	2030 (FY)	—	2030 (FY)	150		

*1 Figures for FY 2025 are rough targets for confirming progress toward the target year of FY 2030.

*2 Figures for FY 2013-2019 are actual results.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
30. Road traffic flow measures (maintenance of traffic safety facilities (improvement and profile (hybrid) of traffic lights))											
Installation of traffic safety facilities (improvement of traffic lights and profiling [hybrid])	—	Promoting networking, responsivity, and other measures of traffic lights	Networking, responsivity, and other measures of traffic lights	Improvement of traffic lights (units)		(10^4 kL)		(10^4 t-CO ₂)		· CO ₂ improvements per traffic lights subject to improvement etc. (FY 2020 standard) · Evaluation indicator: Planned units of lights improved · Emission reduction are calculated based on the effects of the cumulative number adopted under these measures.	
				2013 (FY)	42,000	2013 (FY)	—	2013 (FY)	47		
				2025 (FY)	49,700	2025 (FY)	—	2025 (FY)	52		
				2030 (FY)	—	2030 (FY)	—	2030 (FY)	56		

*1 Figures for FY 2025 are rough targets for confirming progress toward the target year of FY 2030.

*2 Figures for FY 2013-2019 are actual results.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
31. Road traffic flow measures (maintenance of traffic safety facilities (promotion of the use of LED lights in signal lights))										
Installation of traffic safety facilities (promotion of the installation of LED traffic lights)	—	promotion of the installation of LED traffic lights	Switching to LED traffic lights	LED signal lights (Lights)		(10^4 kL)		(10^4 t-CO2)		• CO2 emission reduction per LED traffic-signal light • Planned units of lights improved • Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO2/kWh (Source: Outlook for energy supply and demand in FY 2030) • Emission reduction are calculated based on the effects of the cumulative number adopted under these measures.
				2013 (FY)	346,800	2013 (FY)	—	2013 (FY)	6.5	
				2025 (FY)	770,900	2025 (FY)	—	2025 (FY)	12.2	
				2030 (FY)	935,400	2030 (FY)	—	2030 (FY)	11.0	

*1 Figures for FY 2025 are rough targets for confirming progress toward the target year of FY 2030.

*2 Figures for FY 2013-2019 are actual results.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
32. Road traffic flow measures (promotion of autonomous driving)										
Promotion of automated driving	• Manufacturers: Development, production, and sale of automated driving vehicles • Citizens: Use of adaptive cruise control (ACC)	• Technological development • Business environmental improvements	—	Rate of widespread use of ACC/CACC (%)		(10^4 kL)		(10^4 t-CO2)		• Assumption: Use of ACC/cooperative adaptive cruise control (CACC) on expressways • Share of driving on expressways, for small and large vehicles (Source: Ministry of Land, Infrastructure, Transport and Tourism Road Traffic Census) • CO2 emission intensity by fuel • Energy saving from promotion of automated driving represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.
				2013 (FY)	1.3	2013 (FY)	2.1	2013 (FY)	5.6	
				2025 (FY)	43.3	2025 (FY)	31	2025 (FY)	83.3	
				2030 (FY)	76	2030 (FY)	62	2030 (FY)	168.7	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
33. Greening of the vehicle transportation business by promoting the use of environmentally friendly vehicles etc.										
Greening of vehicle transportation business by promoting the use of environmentally friendly vehicles etc.	• Manufacturers: Development and sale of machinery related to eco-driving • Transportation companies: Introduction of machinery related to eco-driving, undergoing training on eco-driving, and practicing eco-driving	• Public awareness-raising of eco-driving through implementing eco-driving promotion programs • Subsidies for introduction of machinery related to eco-driving and support for holding training sessions etc.	Public awareness-raising of eco-driving	Number of widely-used eco-driving-related equipment (1,000 units)		(10^4 kL)		(10^4 t-CO ₂)		• CO ₂ emissions reduction effect per vehicle equipped with machinery related to eco-driving: approx. 10% • Fuel-efficiency improvement: approx. 1%/year • Projected figures for 2020 and beyond will be revised in light of trends in recent years
				2013 (FY)	518	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	761	2025 (FY)	-	2025 (FY)	75	
				2030 (FY)	860	2030 (FY)	-	2030 (FY)	101	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
34. Promotion of the use of public transportation and bicycles (promotion of the use of public transportation)										
Promotion of the use of public transportation	· Transportation companies: Development of public transportation and improving services and convenience through provision of MaaS etc. · Businesses: Encouraging employees, customers, and others to use public transportation · Citizens: Using public transportation	· Promoting formulation of regional public transportation plans · social implementation of MaaS · Promoting development of Light-Rail Transit (LRT) and Bus Rapid Transit (BRT) · Promoting barrier-free railway stations etc. · Promoting introduction of transit IC card systems and bus location systems · Promotion of eco-commuting · Support for introduction of new services, such as AI on-demand services · Enhancement of modal connections, through bus terminal development	· Formulation of regional public transportation plans · Promoting use of public transportation through development of public transportation and improving services and convenience through provision of MaaS etc. · promotion of the spread of eco-commuting	Transfer volume from private traffic (million passenger)		(10^4 kL)		(10^4 t-CO2)		· Passenger-kilometers (Source: 2012 transport economic statistics overview [Institute for Transport Policy Studies]) · Rate of change in population (Source: Population statistics [January 2012 estimates] [National Institute of Population and Social Security Research]) · CO2 emissions intensity (Source: "CO2 emissions in the transport sector," CO2 emissions per transport volume [passengers] [Ministry of Land, Infrastructure, Transport and Tourism, FY 2018])
				2013 (FY)	38	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	135	2025 (FY)	—	2025 (FY)	131	
				2030 (FY)	163	2030 (FY)	—	2030 (FY)	162	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
Improving route efficiency through regional public transportation convenience improvement projects	・ Transportation companies: Improving route efficiency ・ Local governments: Formulation plans, coordination with businesses ・ Citizens: Using public transportation	・ Support through know-how related to formulation of implementation plans of regional public transportation convenience improvement	・ Formulation of implementation plans of regional public transportation convenience improvement	Number of implementation plans for improving the convenience of local public transportation compiled (Units)		(10^4 kL)		(10^4 t-CO2)		・ Projected number of implementation plans to make regional public transport more convenient authorized per year, and average length of routes made more efficient per authorization (estimated by the Ministry of Land, Infrastructure, Transport and Tourism from existing plans) ・ Average number of services (estimated as follows: 1 service/hour × 12 hours × 1 roundtrip) ・ Average passenger density (Source: "The bus business in Japan" [FY 2018, Nihon Bus Association]) ・ CO2 emissions intensity (Source: "CO2 emissions in the transport sector," CO2 emissions per transport volume [passengers] [Ministry of Land, Infrastructure, Transport and Tourism, FY 2018])	
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—		
				2025 (FY)	72	2025 (FY)	—	2025 (FY)	1.61		
				2030 (FY)	102	2030 (FY)	—	2030 (FY)	2.29		

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
35. Promotion of the use of public transportation and bicycles (promotion of the use of bicycles)										
Promotion of the use of bicycles	• Businesses: Encouraging employees to use bicycles in commuting, on the job, etc. • Citizens: Using bicycles	• Promoting systematic development of spaces for transportation by bicycle • Promoting bicycle sharing • Public awareness-raising of health promotion through bicycle use • Promoting commuting by bicycle	• Promoting systematic development of spaces for transportation by bicycle • Promoting bicycle sharing • public awareness-raising of health improvements through bicycle use • Promoting commuting by bicycle	Bicycle sharing for commuting purposes (%)		(10^4 kL)		(10^4 t-CO2)		• Aiming for conversion to about 30% use of bicycles for commutes of less than 5 km over the next 10 years • Annual CO2 emissions were calculated by multiplying drive kilometer-trip intensity (2015 national urban transport survey) when commuting by car for 5 km or less nationwide by the following indicators and reducing these by 30% (i) Future population in the target year (2017 estimates from the National Institute of Population and Social Security Research) (ii) Round trips (×2) (iii) Number of weekdays (243 days in 2019, after deducting weekends and holidays) (iv) emission intensity, derived by dividing CO2 emissions by vehicle-kilometers driven (April 22, 2020, Ministry of Land, Infrastructure, Transport and Tourism)
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	18.2	2025 (FY)	5	2025 (FY)	14	
				2030 (FY)	20.0	2030 (FY)	10	2030 (FY)	28	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
36. Decarbonization of the railways											
Promotion of decarbonization of the railways	Railway companies: ・ Voluntary action plans ・ Formulation and implementation of medium and long-term plans based on the Act on the Rational Use of Energy ・ Introduction of energy saving rolling stock ・ Introduction of energy saving equipment in railway facilities	・ Support for introduction of new rolling stock ・ Support for introduction of energy saving equipment at railway-related facilities ・ Application of the Act on the Rational Use of Energy to railway companies	—	Rate of improvement in energy consumption intensity (FY2013 standard)		(10^4 kL)		(10^4 t-CO ₂)		・ Introduction of energy saving rolling stock ・ Introduction of energy saving equipment at railway facilities	
				2013 (FY)	100.000	2013 (FY)	—	2013 (FY)	—		
				2025 (FY)	88.638	2025 (FY)	52.5	2025 (FY)	183.5		
				2030 (FY)	84.294	2030 (FY)	74.5	2030 (FY)	260.0		

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
37. Decarbonization of the shipping sector										
Promotion of energy saving and CO ₂ emission-saving vessels	• Ship operators: Introduction of energy saving ships through building replacement ships, Introduction of energy saving machinery through renovations, improvement in operating efficiency • Shipbuilders: Use of energy saving standard ship designs	• Supporting introduction of innovative energy saving technologies and CO ₂ emission-saving technologies • Supporting development of energy saving standard ship designs • Support through preferential tax and interest-rate treatment	—	Number of widely-used ships that contribute to energy conservation (Ships)		(10 ⁴ kL)	(10 ⁴ t-CO ₂)	● Assumptions of estimates • Annual fuel consumption per vessel: 2,650 kL (heavy oil C) (interviews with operators) • Fuel (heavy oil C) emission factor: 3.09 t-CO ₂ /kL (calculated based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) • Energy saving rate of energy saving vessels: 16% • Energy saving rate of intermodal energy saving vessels: 18% (adopted beginning in FY 2023) • Number of energy saving vessels/intermodal energy saving vessels adopted: 70 vessels/year ● Grounds and detailed description (e.g., breakdown) of calculation of projected energy saving and Expected emission reduction: (i) <Actual results> CO ₂ emissions from domestic marine vesselpeling in FY 2019 down 458,000 t-CO ₂ from FY 2013 (ii) <Construction of energy saving vessels to replace existing vessels> 2,650 kL × 16% × 70 vessels × 3 years × 3.09 t-CO ₂ /kL = 275,000 t-CO ₂ reduction (vs. FY 2019) (iii) <Construction of domestic energy saving vessels to replace existing vessels> 2,650 kL × 18% × 70 vessels × 8 years × 3.09 t-CO ₂ /kL = 825,000 t-CO ₂ reduction (vs. FY 2019) (iv) <Operating improvements> Improvements in vessel operating efficiency to realize approx. 3% reduction in CO ₂ emissions: 250,000 t-CO ₂ reduction (vs. FY 2019) > (i)+(ii)+(iii)+(iv) = 1,810,000 t-CO ₂ reduction (vs. FY 2013)		
				2013 (FY)	-	2013 (FY)	-		2013 (FY)	-
				2025 (FY)	730	2025 (FY)	40		2025 (FY)	118
				2030 (FY)	1,080	2030 (FY)	62		2030 (FY)	181

*1 It must be noted in evaluation that CO₂ emissions from the modal shift to marine transport contribute to CO₂ emission reduction of transport sector as a whole.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
38. Decarbonization of the aviation sector										
Promotion of decarbonization of aviation	—	Promote the introduction of new technologies in aircraft and equipment, improvement of flight operation methods by upgrading air traffic control, promotion of the introduction of sustainable aviation fuel (SAF), and CO2 emission reduction from airport facilities and airport vehicles, and promote public-private partnerships by examining measures to turn airports into renewable energy hubs	—	CO2 emissions per unit of transportation (k g-CO2/ton kilometer)		(10^4 kL)		(10^4 t-CO2)		Actual results for the evaluation indicator are calculated based on actual shipment figures for each fiscal year, using the following formula: Evaluation indicator (actual results) = CO2 emissions / t-km charged (Source: Annual Report on Air Transport Statistics [published each fiscal year])
				2013 (FY)	1.3977	2013 (FY)	-	2013 (FY)	-	
				2025 (FY)	1.2323	2025 (FY)	-	2025 (FY)	141.0	
				2030 (FY)	1.1693	2030 (FY)	-	2030 (FY)	202.4	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
39. Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (improvement of efficiency of truck transportation)										
Efficiency improvement of truck transportation	Transportation companies: Promoting use of larger trucks, trailers, and streamlining trucking, and formulation and implementing plans based on the Act on the Rational Use of Energy	• Promoting use of larger trucks and trailers • Application of the Act on the Rational Use of Energy to shippers, trucking companies, etc. • Promotion of initiatives through the Green Logistics Partnership Conference • Implementing projects to support businesses streamlining energy use • Promotion of the spread double-articulated trucks Promotion initiatives of using electric trucks such as the electrification of intra-regional transportation and delivery and the development and dissemination of fuel cell trucks for long-distance transportation	• Promoting the spread of adoption • Road improvements to accommodate larger trucks	Number of vehicles with a gross vehicle weight of more than 24 tons and less than 25 tons owned (units)		(10 ⁴ kL)	(10 ⁴ t-CO ₂)	• Fuel savings from Introduction of 25 t trucks: approx. 9,000 L/truck • Fuel savings from Introduction of trailers: approx. 24,000 L/trailer • Commercial truck vs. In-house truck intensity: approx. 15% • Fuel (diesel) emission factor: 2.7 t-CO₂/kL (Source: Prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) • Indicator values were revised for FY 2020 and later, in light of trends in recent years and new measures.		
				2013 (FY)	182,274					
				2025 (FY)	297,686					
				2030 (FY)	352,522					
				Number of trailers owned (units)		2013 (FY)	-		2013 (FY)	-
				2013 (FY)	98,720	2025 (FY)	-		2025 (FY)	858
				2025 (FY)	160,223					
				2030 (FY)	189,371					
				Percentage of business/private use (%)						
				2013 (FY)	86.3	2030 (FY)	-		2030 (FY)	1,180
				2025 (FY)	87.2					
				2030 (FY)	87.2					

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures			
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
40. Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (promotion of joint transportation and delivery)										
Promotion of joint transportation and delivery	• Logistics companies: Promotion of joint transportation and delivery through cooperation with shippers, other logistics companies, etc. • Shippers: Promotion of joint transportation and delivery through cooperation with other logistics companies, shippers, etc.	• Advancement of initiatives through the Green Logistics Partnership Conference • Promoting cooperation in shipping at logistics facilities under the Act on Advancement of Integration and Streamlining of Distribution Business • Promoting reductions in parcel redeliveries through joint transportation and delivery by businesses and others	Public awareness-raising	Rate of increase in the number of joint transportation and delivery initiatives (%)		(10^4 kL)		(10^4 t-CO ₂)		• Evaluation indicator: Rate of increase in number of joint-shipping initiatives (vs. 2013) • Truck CO₂ emissions intensity (FY 2013): approx. 217 g-CO₂/t-km • Truck CO₂ emissions intensity (FY 2018): approx. 233 g-CO₂/t-km (Reference) CO₂ emission reduction in FY 2025 • FY 2013 intensity: 18,000 t-CO₂ • FY 2018 intensity: 27,000 t-CO₂ • Difference: 27,000-18,000=9000 t-CO₂ increase in Expected emission reduction CO₂ emission reduction in FY 2030 • FY 2013 intensity: 21,000 t-CO₂ • FY 2018 intensity: 33,000 t-CO₂ • Difference: 33,000-21,000=12,000 t-CO₂ increase in Expected emission reduction
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	276	2025 (FY)	—	2025 (FY)	2.7	
				2030 (FY)	346	2030 (FY)	—	2030 (FY)	3.3	
				Result of the re-delivery rate of the survey on the actual situation of re-delivery of the courier service (%)		(10^4 kL)		(10^4 t-CO ₂)		• Evaluation indicator: Redelivery rate results from parcel redelivery survey • CO₂ emissions intensity of compact commercial vehicles (FY 2002): approx. 808 g-CO₂/t-km
				2013 (FY)	-	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	7.5%	2025 (FY)	—	2025 (FY)	1.7	
				2030 (FY)	7.5%	2030 (FY)	—	2030 (FY)	1.7	

*1 Figures for FY 2025 on the upper level are estimates for confirming progress toward FY 2030.

*2 Figures for FY 2030 on the lower level assume continued achievement of target redelivery rates for FY 2025

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
40. Improvement of efficiency of truck transportation and promotion of joint transportation and delivery (promotion of joint transportation and delivery)										
Social implementation of drone logistics	• Logistics companies: Promoting initiatives toward social implementation of drone logistics as an alternative means of delivery instead of using trucks or ships • Local governments: Promotion of environmental improvements to enable people to continue to reside in rural communities while solving local issues (e.g., support for shopping)	• Support for countermeasures, such as introduction of machinery toward practical application of drone logistics	• Measures to support operation etc.	Number of social implementations by local governments (Units)		(10^4 kL)		(10^4 t-CO2)		• Since the FY 2020 "Implementation project for logistics using unmanned aircraft in remote areas etc." projected CO2 reductions from replacement of trucks etc. of 16 t per project, a figure of 16 t/case is used here. • In some cases multiple projects are implemented in a single region, and these are included under "multiple projects included in a single region," using as units "projects (cases)." • It is assumed that the number of cases participating will increase based on the market growth rate through 2030 and the number of new drone distribution projects adopted (FY units) through practical application projects.
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	174	2025 (FY)	—	2025 (FY)	0.5	
				2030 (FY)	1,496	2030 (FY)	—	2030 (FY)	6.5	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
41. Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to marine transportation)										
Promotion of a modal shift to marine transportation	• Marine shipping companies: Cooperating with shippers to use marine shipping proactively • Shippers: Cooperating with marine shipping companies to use coastal shipping proactively	• Promoting building of energy-efficient domestic vessel, using the shared-shipbuilding program • Supporting promotion of a modal shift to marine transportation under the Act on Advancement of Integration and Streamlining of Distribution Business and other laws and regulations, promotion of Eco-Ship Mark • Promotion of initiatives through the Green Logistics Partnership Conference	Public awareness-raising	Marine cargo transportation volume (billion ton kilometer)		(10^4 kL)		(10^4 t-CO2)		● Evaluation indicator: Freight transportation in navigation (t-km) · FY 2020 figures are based on the "Basic Plan on Transportation Policy" (February 13, 2015 Cabinet decision). · FY 2030 figures are based on rough drafts of Japan's commitments. ● CO2 emissions intensity (FY 2013): · Truck CO2 emissions intensity: approx. 217 g-CO2/t-km · Ship CO2 emissions intensity: approx. 39 g-CO2/t-km ● CO2 emissions intensity (FY 2018): · Truck CO2 emissions intensity: approx. 233 g-CO2/t-km · Ship CO2 emissions intensity: approx. 39 g-CO2/t-km (Reference) CO2 emission reduction in FY 2025 · FY 2013 intensity: 1,256,000 t-CO2 · FY 2018 intensity: 1,369,000 t-CO2 · Difference: 1,369,000-1,256,000=113,000 t-CO2 increase in Expected emission reduction CO2 emission reduction in FY 2030 · FY 2013 intensity: 1,724,000 t-CO2 · FY 2018 intensity: 1,879,000 t-CO2 · Difference: 1,879,000-1,724,000=155,000 t-CO2 increase in Expected emission reduction
				2013 (FY)	330	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	388.9	2025 (FY)	—	2025 (FY)	136.9	
				2030 (FY)	410.4	2030 (FY)	—	2030 (FY)	187.9	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
42. Promotion of a modal shift to marine and rail freight transportation (promotion of a modal shift to rail freight transportation)										
Promotion of a modal shift to rail freight transportation	• Railway companies: Promoting a modal shift to rail freight transportation through coordination with shippers, transportation companies used, etc. • Transportation companies used: Promoting use of rail through enhancement of use of transport equipment such as large-scale containers • Shippers: Proactively using eco-friendly rail freight transportation	• Promotion of initiatives through the Green Logistics Partnership Conference • Support for introduction of new high-performance rolling stock to contribute to enhancement of transport capacity • Supporting promotion of a modal shift to rail freight under the Act on Advancement of Integration and Streamlining of Distribution Business and other laws and regulations • Public awareness-raising of eco-friendly rail freight transportation (publicity and promotion of Eco Rail Mark, etc.) • Support for development of models of a modal shift to rail freight using passenger railways • Support for new transport services (e.g., block trains, temperature-controlled freight trains)	Public awareness-raising	Rail freight transportation volume (Billion ton kilometer)		(10^4 kL)		(10^4 t-CO ₂)		● Evaluation indicator: Freight transportation by rail (t-km) • FY 2020 figures are based on the Basic Plan on Transportation Policy. • FY 2030 figures are based on rough drafts of Japan's INDC. ● CO ₂ emissions intensity (FY 2013): • Truck CO ₂ emissions intensity: approx. 217 g-CO ₂ /t-km • Rail CO ₂ emissions intensity: approx. 25 g-CO ₂ /t-km ● CO ₂ emissions intensity (FY 2018): • Truck CO ₂ emissions intensity: approx. 233 g-CO ₂ /t-km • Rail CO ₂ emissions intensity: approx. 22 g-CO ₂ /t-km (Reference) CO ₂ emission reduction in FY 2025 • FY 2013 intensity: 386,000 t-CO ₂ • FY 2018 intensity: 424,000 t-CO ₂ • Difference: 424,000-386,000=38,000 t-CO ₂ increase in Expected emission reduction CO ₂ emission reduction in FY 2030 • FY 2013 intensity: 1,334,000 t-CO ₂ • FY 2018 intensity: 1,466,000 t-CO ₂ • Difference: 1,466,000-1,334,000=132,000 t-CO ₂ increase in Expected emission reduction
				2013 (FY)	193.4	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	208.9	2025 (FY)	-	2025 (FY)	42.4	
				2030 (FY)	256.4	2030 (FY)	—	2030 (FY)	146.6	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
43. Promotion of decarbonization of logistics facilities										
Promotion of decarbonization of logistics facilities	· logistics companies: Introduction of machinery to contribute to decarbonization, such as equipment using renewable energy and energy saving machinery	· Promotion of adoption and public awareness-raising of equipment using renewable energy and energy saving machinery	Public awareness-raising	Number of decarbonized logistics facilities (Facility)		(10^4 kWh)	(10^4 t-CO ₂)	· Evaluation indicator: Number of decarbonized logistics facilities · Evaluation indicator: Number of decarbonized logistics facilities (FY 2020 and later*) * Since related subsidy programs began in FY 2020 · Estimated reduction per decarbonized warehouse: 538 t-CO ₂ · For FY 2020 and later, CO ₂ emission reduction per facility are estimated based on data on projects accepted for related subsidy programs in FY 2020-2021 (including projections).		
				2013 (FY)	-	2013 (FY)	-		2013 (FY)	-
				2024 (FY)	35	2024 (FY)	3.7		2024 (FY)	1.9
				2030 (FY)	200	2030 (FY)	44.0		2030 (FY)	11.0

*1 CO₂ emission intensity in power sector are estimated based on FY 2018 emission intensity for FY 2024 and based on FY 2030 average emission intensity for all power sources for FY 2030.

*2 Figures for FY 2024 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator (100 million t-km)	Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
44. Efforts at ports and harbors (reduction of the distance of land transportation of cargo through optimal selection of ports and harbors)										
Reduction of the distance of land transportation of cargo through optimal selection of ports and harbors	—	· Improving logistics terminals etc. · Improving harbor roads	· Improving logistics terminals etc. · Improving harbor roads	Amount of reduction in land transportation of cargo (Billion ton kilometer)		(10^4 kL)		(10^4 t-CO2)		CO2-reduction intensity: 271 g-CO2/t-km (calculated by the Ministry of Land, Infrastructure, Transport and Tourism Ports and Harbors Bureau from data on actual results)
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	35	2025 (FY)	—	2025 (FY)	96	
				2030 (FY)	35	2030 (FY)	—	2030 (FY)	96	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
45. Efforts at ports and harbors (comprehensive decarbonization of ports and harbors)											
Comprehensive decarbonization of ports and harbors [promotion of introduction of energy-efficient cargo handling machinery, etc.]	Manufacturers: Technological development related to energy-efficient cargo handling machinery etc.	Supporting introduction of energy-efficient cargo handling machinery etc.	—	Number of introduced units of energy saving cargo handling machineries, etc. (Units)		(10,000 kL)		(10,000 t-CO ₂)		● Promotion of Introduction of energy-efficient cargo handling machinery etc. • Calculations for FY 2020 and later assume progress in introduction of 19 units/year, based on past results • Cargo handling machinery is assumed to be in operation for 3000 hours/year (from interviews with businesses) • Fuel use used in calculations: 21.7 L/unit-hour (from interviews with businesses) • Emission factor used in calculations (diesel): 2.7 kg-CO₂/kL (Based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) • Fuel savings rate used in calculations: 0.378 (from interviews with businesses) * Reference: more ambitious case Calculations for FY 2020 and later assume progress in introduction of 24 units/year, based on past results (maximum)	
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—		
				2025 (FY)	225 *Reference (255)	2025 (FY)	—	2025 (FY)	2.02 *Reference (2.22)		
				2030 (FY)	320 *Reference (375)	2030 (FY)	—	2030 (FY)	2.65 *Reference (3.01)		
Comprehensive decarbonization of ports and harbors [promotion of modal shift and transportation efficiency improvement related to venous logistics]	Generator, Marine shipping companies, Processors: Development of decarbonized venous logistics systems, proactive use of recycle ports	• Promoting a modal shift and more efficient transport in venous logistics • Promoting initiative through the Recycle Ports Promotion Council	Promoting use of recycle ports	Transportation volume of recyclable resources, etc. modally shifted from land transportation to marine transportation (Billion ton kilometer)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		● Promoting a modal shift and more efficient transport related to venous logistics • Calculations for FY 2020 and later assume implementation of one modal shift project per year, based on average past results • Emissions intensity of vehicles for commercial use: 173 g-CO₂/t-km used in calculations (from the "Guidelines on calculation methods for CO₂ emissions in the logistics field") • Emissions intensity of domestic marine transport: 39 g-CO₂/t-km used in calculations (from the "Guidelines on calculation methods for CO₂ emissions in the logistics field") * Reference: more ambitious case Calculations for FY 2020 and later assume progress in Introduction of three modal shift projects per year, based on past results (maximum)	
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—		
				2025 (FY)	3.40 *Reference (5.67)	2025 (FY)	—	2025 (FY)	13.3 *Reference (16.3)		
				2030 (FY)	4.35 *Reference (8.51)	2030 (FY)	—	2030 (FY)	14.5 *Reference (20.1)		

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
46. Utilization of the Special Zones for Structural Reform system related to global warming countermeasures										
Utilization of the Special Zones for Structural Reform system related to global warming countermeasures	• Local governments: Proposals related to special exception measures, applying for approval of special zone plans, project development using to special exception measures • Private businesses etc.: Making proposals related to special exception measures, business development using special exception measures	● Proposals related to special exception measures • Proposals to be sought twice a year, in the first and second halves. • In preparation for calling for proposals, the special zone system will be explained and consultation provided on proposals, and sites will be visited nationwide as necessary in this process. ● Application for approval of special zone plans Applications to be accepted roughly in May, September, and January of each fiscal year	• Opportunities will be provided for discussions with related agencies and other parties in preparation for project development using special exception measures • Developing an environment for informing local residents for project development using special exception measures and other matters	Number of cases of approved plans for the relevant special districts (Cases)		(10^4 kL)		(10^4 t-CO ₂)		• In calculating projected reductions, estimates are collected from each governmental ministry and agency regarding measures used in structural-reform special zones to derive total figures of projected reductions for each measure. • For this reason, the estimates of projected reductions related to promotion of use of structural-reform special zones are repeated from elsewhere in this report.
				2013 (FY)	2	2013 (FY)	-	2013 (FY)	5.3	
				2025 (FY)	3	2025 (FY)	-	2025 (FY)	5.3	
				2030 (FY)	3	2030 (FY)	-	2030 (FY)	5.3	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
47. Reduction of CO ₂ emission intensity in power sectors										
Improving efficiency of thermal power generation	・ Autonomous framework of the electric power industry: Projecting the maximum potential emission reduction through means that include the use of the best available technology (BAT) that is economically feasible, in light of the size of the power plant, when establishing a new thermal power plant ・ Striving toward efficiency improvements in thermal power generation, etc., and running through the plan-do-check-act (PDCA), including plans of initiatives of individual companies, to ensure efficacy	Demanding the following from power generators through amendment of the Act on the Rational Use of Energy: ・ For newly installed generating equipment: satisfaction of generating efficiency standards per unit of generating equipment ・ For existing generating equipment: satisfaction of efficiency standards in generation results, per power generators		CO ₂ reduction by utilizing BAT (10 ⁴ t-CO ₂)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		Maximum reduction potential indicating results of comparison of Introduction of BAT in main power development since FY 2013 with use of previous technologies
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	—	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	1,100	2030 (FY)	—	2030 (FY)	1,100	
Improving efficiency of thermal power generation, utilization of nuclear power generation that has been confirmed safe, maximum introduction of renewable energy	・ Autonomous framework of the electric power industry: Striving toward use of nuclear power and renewable energy, efficiency improvements in thermal power generation, etc., and running through the plan-do-check-act (PDCA), including plans of initiatives of individual companies, to ensure efficacy	● Regarding the autonomous framework of the electric power industry, promoting initiatives toward achievement of targets through measures under the Act on the Rational Use of Energy, the Act on the Promotion of the Use of Non-fossil Energy Sources and the Effective Use of Fossil Energy Raw Materials by Energy Suppliers, and other laws and regulations, and securing both efficacy and transparency. Also, through amendment of the Act on the Promotion of the Use of Non-fossil Energy Sources and the Effective Use of Fossil Energy Raw Materials by Energy Suppliers, demanding the following from retail electric utilities: ・ Satisfying at least a minimum ratio of non-fossil fuel sources in the electricity sold by retail electric utilities ● Identifying the description of CO ₂ -adjusted emission intensity in guidelines on retail sale of electricity as a desirable practice. ● Based on the enforcement ordinance and enforcement regulations to the Act on Promotion of Global Warming Countermeasures, asking all retail electric utilities to report their actual CO ₂ emission intensity for the greenhouse gas emissions calculation, reporting, and publication system, and publishing these. ● Evaluating the progress of the above initiatives every fiscal year, to make sure that their efficacy is improving continuously		CO ₂ emission factor of the electric power industry (kg-CO ₂ /kWh)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		Energy-derived CO ₂ emission reduction from electricity, calculated for Outlook for energy supply and demand in FY 2030 ・ FY 2013 emissions: 572 million t-CO ₂ ・ FY 2030 emissions: 219 million t-CO ₂ "
				2013 (FY)	0.57	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	—	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	0.37	2030 (FY)	—	2030 (FY)	35,300	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

CO₂ emission intensity in electric power industry of FY 2030 represent CO₂ emission intensity consistent with the national energy mix formulated in 2015 and greenhouse gas reduction targets, and there is a need for future review of targets in light of factors such as new expected emission reduction.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
48. Maximum introduction of renewable energy											
Expansion of use of renewable heat	Private businesses, local governments, etc.: Proactive introduction of equipment using renewable heat	• Support for introduction of equipment for supplying renewable heat • Testing, development, etc. of models for effective use of various thermal energies in the region	• Support for introduction of renewable energy by businesses and other users in their districts • Proactive adoption in public facilities and other facilities of local governments	Amount of heat supply (crude oil equivalent) (10^4 kL)		(10^4 kL)		(10^4 t-CO ₂)		• Renewable energy (heat): Solar heat, biomass, unused heat, etc. • Crude oil emission factor: 2.7 t-CO ₂ /kL • Figures for FY 2030 are based on Outlook for energy supply and demand in FY 2030 * Progress will be made on expanding Introduction of heat from renewable energy while taking into consideration matters such as biofuel supply targets under the Advancement Act of Non-fossil Energy Sources and the Effective Use of Fossil Energy Raw Materials by Energy Suppliers	
				2013 (FY)	1,104	2013 (FY)	-	2013 (FY)	2,980		
				2025 (FY)	*	2025 (FY)	-	2025 (FY)	*		
				2030 (FY)	1,341	2030 (FY)	-	2030 (FY)	3,618		

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
49. Promotion of the introduction of facilities and equipment with high energy-saving performance (petroleum product manufacturing sector)										
Effective use of heat, introduction of advanced control and high-efficiency equipment, improvement of power system operations, and large-scale improvements and upgrades of processes	Businesses: Steady realization of a low-carbon society in the petroleum industry	Promoting steady realization of a low-carbon society in the petroleum industry	—	Prospect of introduction and widespread use (%)		(10^4 kL)		(10^4 t-CO2)		• Petroleum Industry's Action Plans for a Low-Carbon Society Through energy saving measures since FY 2010, striving to achieve energy saving equivalent to 1 million kL when converted to Crude oil equivalent vs. BAU (the absence of additional measures) in FY 2030 • Industry-wide energy saving: Ascertaining and totaling industry-wide the energy saving vs. BAU from the individual conservation measures adopted by the oil-refining industry at its refineries and plants since FY 2010, for each fiscal year • Evaluation indicator: Rate of achievement of FY 2030 target energy saving (Crude oil equivalent kL) (Crude oil equivalent million kL) • Expected energy saving, Expected emission reduction: Expected energy saving are the industry-wide energy saving vs. BAU from the individual conservation measures adopted by the oil-refining industry at its refineries and plants since FY 2010, ascertained and totaled for each fiscal year. Expected emission reduction are the projected energy saving (Crude oil equivalent) multiplied by the carbon emission factor (2.7 t-CO2 /Crude oil equivalent kL). • Other matters Reconsideration of targets will be considered in the event of major changes to the industry situation, such as a reduction in the number of refineries due to falling domestic demand and other factors or large-scale changes in production processes. Target levels will be evaluated roughly every five years after 2015.
				2013 (FY)	29.9	2013 (FY)	2.9	2013 (FY)	7.7	
				2025 (FY)	76.5	2025 (FY)	59.7	2025 (FY)	161.2	
				2030 (FY)	100	2030 (FY)	76	2030 (FY)	208	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures			
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction	
50. Expansion of the use of blended cement							
Expansion of the use of blended cement	The national government, local governments, businesses, etc.: Proactive use of blended cement in various opportunities, public awareness-raising, playing active roles, etc.	• Promotion of use under the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities, by the the national government and others (In the part that blended cement is specified as a material which should be promoted to use in public-works projects.) • Promotion of use under the Low Carbon City Act (Act No. 84 of 2012) (Use of blended cement or fly-ash cement is specified as one selection criterion in the certification standards for low-carbon buildings.) • Addition to the J-Credit methodology • Implementing studies on policies for promotion and expansion of blended cement	• Expanding use of blended cement through means such as recycled-product certification systems • Incorporation of blended cement into systems such as those for evaluation of the environmental performance of buildings And other infrastructure improvements to help promote and expand use of blended cement	Mixed cement production/total cement production (%)	(10 ⁴ t-CO ₂)	● Evaluation indicator: Blended cement production as a percentage of total cement production (%) Blended cement production = Blast-furnace cement production volume + fly-ash cement production volume under the Cement Handbook Total cement production = Cement production volume + clinker exports under the Cement Handbook ● Expected emission reduction = (CO₂ emissions in the absence of any measures)-(CO₂ emissions with measures taken) in the subject fiscal year CO₂ emissions = Portland cement production volume × CO₂ emission factor from Portland cement limestone decarboxylation + blended cement production volume × CO₂ emission factor from blended cement • Absence of any measures: Blended cement production volume as a percentage of total cement production volume remains unchanged from the base year FY 2013 • With measures: Blended cement production volume as a percentage of total cement production volume trends as projected under the evaluation indicator • Projected production volumes Figures from the Cement industry’s Action Plans for a Low-Carbon Society and Outlook for energy supply and demand in FY 2030 are cited. ● CO₂ emission intensity from limestone decarboxylation LCI data (September 2015, Japan Cement Association) are cited.	
				2013 (FY)	22.1		2013 (FY)
				2025 (FY)	-		2025 (FY)
				2030 (FY)	25.7		2030 (FY)

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
51. Diffusion of biomass plastics								
Diffusion of biomass plastics	• private businesses: Adopting biomass plastics in the plastics used in products, packaging, etc. • Consumers: Choosing products (certified products) using biomass plastics preferentially at the time of purchasing products • Local governments: Promoting policies to promote biomass plastics in their regions	Studying countermeasures to promote introduction of biomass plastics for plastic products that need to be incinerated, due to reasons such as difficulties in material recycling, and promoting and supporting their adoption	• Promoting policies to advance biomass plastics in their regions • Also, choosing products using biomass plastics preferentially at the time of procuring products themselves	Domestic shipments of biomass plastics (10^4 t)		(10^4 t-CO ₂)		Evaluation indicator: Domestic shipments of biomass plastics by raw-material resin and by use, for each fiscal year, are ascertained from sources such as the National Inventory Survey (Japan Organics Recycling Association)
				2013 (FY)	7	2013 (FY)	-	
				2025 (FY)	138	2025 (FY)	141	
				2030 (FY)	197	2030 (FY)	209	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
52. Reduction of waste incineration								
Promotion of recycling of waste plastics	Private businesses: Reducing volumes of incinerated waste through promoting reductions in use of plastic containers and packaging and recycling of plastic wastes Local governments: Reducing volumes of incinerated wastes through controlling their emission and promoting their recycling and reuse	- Initiatives toward achievement of the targets established in the Waste Management Facilities Improvement Plans - Promoting three-R initiatives toward achievement of the targets established in basic policies based on the Act on Waste Management and Public Cleaning - Implementing measures based on individual recycling acts - Initiatives based on guidelines for controlling GHG emissions in the waste sector - Supporting improvements to municipal waste incineration plants - Promoting charging fees for municipal waste incineration and guidelines on sorted collection and other matters at municipalities and others - Proactive introduction of products etc. to contribute to reducing waste generation based on the Act on the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities - Multifaceted support for promotion of Action Plans for a Low- Carbon Society by industrial-waste treatment operators - Support for introduction of recycling equipment by waste processors - Implementation of measures based on the Act on the Promotion of Resource Circulation related to Plastics	- Reducing volumes of incinerated wastes through controlling emissions of plastic waste and other wastes and promoting recycling and reuse through means such as sorted collection and recycling of plastic containers and packaging based on the The Law for Promotion of Sorted Collection and Recycling of Containers and Packaging - Implementation of measures based on the Act on the Promotion of Resource Circulation related to Plastics	Amount of plastic waste incinerated (dry base) (10^4 t)		(10^4 t-CO₂) Based on Resource Circulation Strategy for Plastic and other measures, reductions are projected in incineration volumes of plastic resources in general waste under the following assumptions - Reductions are projected of 140,000 t/year based on results of charging fees for shopping bags, and the difference of 4.4%, or 78,000 t, between current levels of wastes and reduction rates and the levels projected for PET bottles and other plastic container wastes based on the reduction target of 22% by FY 2025 identified in the 3R Promotion Council's 2025 Voluntary Action Plan for Three R's for Containers and Packaging (vs. 17.6% in FY 2019)*, is used as projected reductions. * From Document 2 of the Ministry of Economy, Trade and Industry's 26th Industrial Structure Council Industrial Technology Environmental Subcommittee Wastes and Recycling Group - It is expected that the volume of plastic resources recovered per person will rise to 9.64 kg/year with expansion of segregated collection efforts for plastic resources by municipalities and others and implementation of segregated collection in all municipalities For plastic resources from industrial wastes, it is anticipated that chemical recycling will be conducted for 1.5 million t (up 1.27 million t from FY 2018) by 2030, based on the Japan Chemical Industry Association's The Chemical Industry’s Future Vision on the Chemical Recycling of Plastic Waste. The volume of incinerated waste is projected to decrease by 490,000 t based on the portion of this figure treated in FY 2019. These figures are multiplied by the CO₂ emission factor during incineration of plastics (2.71 t-CO₂/t) in calculations.		
				2013 (FY)	515		2013 (FY)	0
				2025 (FY)	331		2025 (FY)	498
				2030 (FY)	278		2030 (FY)	640

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
52. Reduction of waste incineration								
Promotion of recycling of waste oil	・ Businesses using oil and emitting waste oil: sorted emission of waste oil and using recycled oil ・ Waste-oil recyclers: Reducing incineration volumes through promoting recycling	・ Supporting promotion of recycling of waste oil	-	Amount of material recycled from waste solvents (kt)		(10^4 t-CO ₂)		It is anticipated that material recycling of solvents will advance in FY 2021 and later, through means including projects to promote waste-oil recycling, resulting in 2030 in material recycling of 30% of solvents previously incinerated. This is multiplied by the average yield-to-weight ratio of CO ₂ emissions from incineration to organic solvents (3.1) in calculations.
				2013 (FY)	490	2013 (FY)	0	
				2025 (FY)	619	2025 (FY)	40	
				2030 (FY)	716	2030 (FY)	70	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
53. Measures to reduce greenhouse gas emissions related to agricultural soil (reduction of methane emissions in paddy fields)								
Measure to reduce GHG emissions in agricultural soils [CH ₄ emission reduction from rice cultivation]	Farmers: Implementing prolonging the midseason drainage period as water management for rice cultivation	• Together with initiatives to reduce use of chemical fertilizers and chemical synthesized pesticides by 50% or more in principle, promoting agricultural management activities that are highly effective in areas such as preventing global warming • Conducting surveys to collect data needed in greenhouse gas inventory reports • Verification of agricultural management technologies to contribute to greenhouse gas reductions and other goals	Prefectures: Promoting environmentally friendly agriculture to contribute to reducing methane emissions from paddy fields	[Reference indicator] Area ratio of paddy fields conducted prolonging midseason drainage (%)		(10 ⁴ t-CO ₂) * Total emissions in FY 2013 (actual figures) = BAU	• Nationwide methane emissions from paddy fields were estimated for each fiscal year using the DNDC-Rice Model developed by the National Agriculture and Food Research Organization. The difference from FY 2013 emissions is used as the reduction volume. • These measures are based on the concept of deployment of agricultural management to reduce greenhouse gas emissions while improving the soil in agricultural production activities. In addition, projected volumes of emission reduction assume achievement of projections of land area under paddy rice cultivation and other figures identified in the Basic Plan for Food, Agriculture and Rural Areas. • Area ratio of paddy fields conducted prolonging the midseason drainage is considered a reference indicator because it is not the only variable affecting methane emissions.	
				2013 (FY)	-	2013 (FY)		-
				2025 (FY)	-	2025 (FY)		-
				2030 (FY)	30%	2030 (FY)		104

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
54. Reduction of final waste disposal								
Reduction of final waste disposal	Local governments: Promoting reductions in volumes of organic waste directly placed in landfills	- Initiatives toward achievement of the targets established in Waste Management Facilities Improvement Plans - Promoting three-R initiatives toward achievement of the targets established in basic policies based on the Act on Waste Management and Public Cleaning - Implementing measures based on individual recycling laws - Supporting improvements to municipal waste incineration plants - Promoting charging fees municipal waste incineration and guidelines on sorted collection and other matters at municipalities and others - Multifaceted support for promotion of Action Plans for a Low- Carbon Society by industrial-waste treatment operators	Promoting reductions in volumes of organic waste directly placed in landfills	Final disposal amount of organic municipal waste (based on dry weight) (1,000 t)		(10^4 t-CO ₂)		Expected emission reduction are calculated by multiplying the difference from the BAU case in waste decomposition volume in the fiscal year under evaluation and calculated based on the final disposal volume of organic general waste by the methane emission factor of each type of waste and the various parameters identified in inventories, assuming that progress has been made on reducing the final disposal volume of organic general wastes since the base year (FY 2013).
				2013 (FY)	325	2013 (FY)	-	
				2025 (FY)	20	2025 (FY)	39	
				2030 (FY)	10	2030 (FY)	52	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator		Expected energy saving		Assumptions of expected energy saving and expected emission reduction
55. Adoption of semi-aerobic landfill structures in final waste disposal sites								
Adoption of semi-aerobic landfill structures in municipal waste disposal sites	Local governments: Reducing methane generation from biodegradation of organic general waste in comparison to anaerobic landfills, through use of semi-aerobic landfill structures when setting up new landfills as well as managing collection and drain pipe terminals in an open state	Promoting use of semi-aerobic landfills through thorough facility installation and maintenance based on technical standards related to final disposal locations for general waste (which cover collection and drainage facilities for water load etc. and ventilation equipment)	Controlling methane generation from biodegradation of organic general waste in comparison to anaerobic landfills, through use of semi-aerobic landfill structures when setting up new landfills as well as managing collection and drain pipe terminals in an open state	Percentage of quasi-aerobic landfill disposal volume (%)		(10^4 t-CO2)		Expected emission reduction are calculated by multiplying waste decomposition volume in the fiscal year under evaluation for each type of final disposal structure and calculated based on the final disposal volume of organic general waste by the methane emission factor of each type of waste and the various parameters identified in inventories, assuming that progress has been made on installation of semi-aerobic landfill structures since the base year (FY 2013).
				2013 (FY)	60	2013 (FY)	-	
				2025 (FY)	75	2025 (FY)	3.9	
				2030 (FY)	77	2030 (FY)	5.4	
Adoption of semi-aerobic landfill structures in industrial waste disposal sites	Businesses: Reducing methane generation from biodegradation of organic industrial waste in comparison to anaerobic landfills, through use of semi-aerobic landfill structures when setting up new final disposal locations as well as managing collection and drain pipe terminals in an open state	· Promoting use of semi-aerobic landfills through thorough facility installation and maintenance based on technical standards related to final disposal locations for industrial waste (which cover collection and drainage facilities for water load etc. and ventilation equipment) · Multifaceted support for promotion of Action Plans for a Low- Carbon Society by industrial-waste treatment operators	Providing appropriate guidance to businesses to enable maintenance of semi-aerobic properties at the managed final disposal locations they set up	Percentage of quasi-aerobic landfill disposal volume at final industrial waste disposal sites (%)		(10^4 t-CO2)		Figures from Japan's Greenhouse Gas Inventory Report (April 2015, National Institute for Environmental Studies) are used as FY 2013 figures for the evaluation indicator of the share of disposal in semi-aerobic landfills.
				2013 (FY)	70	2013 (FY)	-	
				2025 (FY)	74	2025 (FY)	2	
				2030 (FY)	76	2030 (FY)	3	

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Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
56. Measures to reduce greenhouse gas emissions related to agricultural soil (reduction of nitric oxide associated with fertilization)								
N ₂ O emission reduction associated with fertilizer application	• Reducing fertilizer volumes, through means such as reviewing fertilizer designs • Practicing environmentally friendly agriculture	• Promoting proper fertilizing based on soil diagnostics • Promoting environmentally friendly agriculture	• Promoting proper fertilizing based on soil diagnostics • Promoting environmentally friendly agriculture	Demand for chemical fertilizers (1,000 tons N)		(10^4 t-CO ₂)		• Projected demand for chemical fertilizers is calculated by multiplying projected land area in cultivation for each crop by the volume of fertilizer used per unit of land area • Actual figures are calculated using actual demand for nitrogen fertilizer (domestic production + imports - exports - industrial use etc.)
				2013 (FY)	410	2013 (FY)	-	
				2025 (FY)	380	2025 (FY)	16	
				2030 (FY)	358	2030 (FY)	24	

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Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures		
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction
57. Advancement of incineration at sewage sludge incineration facilities						
Advancement of incineration at sewage sludge incineration facilities	Private businesses: Development of high-efficiency, low-cost high-temperature incineration technologies and technologies for sewage sludge solid fuel conversion	• Support for development, promotion, and deployment of high-temperature incineration technologies and technologies for sewage sludge solid fuel conversion • Support for improvements to sewage-treatment facilities by local governments	• Use of higher temperatures in sludge incineration • Introduction of technologies such as high-temperature incineration technologies and technologies for sewage sludge solid fuel conversion when renovating sludge incineration facilities	High temperature incineration rate (%)	(10^4 t-CO ₂)	
				2013 (FY)	63%	
				2025 (FY)	90%	
				2030 (FY)	100%	
				2013 (FY)		-
				2025 (FY)		63
				2030 (FY)		78
				2013 (FY)		-
				2025 (FY)		2
				2030 (FY)		2
• 100% high-temperature incineration rate in 2030 • Perspective of adopting facilities for sewage sludge solid fuel conversion and turbo furnaces						

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
58. Fluorinated Gases: (HFCs, PFCs, SF ₆ , NF ₃)								
Promotion of non-fluorocarbons and low GWP products in gas and manufacturing sector	• Manufacturers: Technological development related to use of CFC-free and low-GWP technologies in designated products • Vendors: Providing information to consumers concerning designated CFC-free and low-GWP products • Consumers: Choosing CFC-free and low-GWP products when making purchases	• To promote introduction of CFC-free and low-GWP technologies in products using CFCs, setting targets for greenhouse gas emission reduction for manufacturers and others and establishing systems for achieving targets on a weighted-average basis for each product category shipped by manufacturers • Supporting introduction of devices using energy saving natural coolants	Promoting introduction of designated CFC-free and low-GWP products and providing information to consumers	Rate of introduction and widespread use of fluorocarbon-free and low GWP designated products (%)	(10 ⁴ t-CO ₂)		It is assumed that conversion of each coolant will be achieved by the target fiscal year identified under the designated-product system, while reflecting the reduction effects of the Kigali Amendment	
				2013 (FY)	7	2013 (FY)		-
				2025 (FY)	95			
				2030 (FY)	100			
				Cumulative number of natural refrigerant equipment introduced(1000 cases)	2025 (FY)	891	Estimating cumulative adoption volumes based on results of adoption subsidy programs and their ripple effects, with reference to interviews with manufacturers	
				2013 (FY)	-	2030 (FY)		1,463
				2025 (FY)	190			
				2030 (FY)	370			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
58. Fluorinated Gases: (HFCs, PFCs, SF ₆ , NF ₃)								
Preventing leakage of fluorocarbons from the use of refrigeration and air-conditioning equipment for business use	· Managers of refrigeration and air-conditioning equipment for business use: Conforming to Act on Rational Use and Appropriate Management of Fluorocarbons (e.g., conducting inspections)	· Effective use of the accounting and reporting system for fluorocarbons leakage under Act on Rational Use and Appropriate Management of Fluorocarbons · Appropriate enforcement and management of the law (e.g., support for guidance and supervision by prefectures, public awareness-raising) · Supporting adoption and promotion of IoT-based remote-monitoring systems etc.	· Guidance and supervision of managers by prefectures, based on Act on Rational Use and Appropriate Management of Fluorocarbons · Promotion and awareness raising	Reduction rate of leakage rate when using equipment 7.5 kW or more (%)		(10 ⁴ t-CO ₂)	For refrigeration and air-conditioning equipment for business use for which the rated output of the compressor electric motor is 7.5 kW or above, which is subject to both periodic inspection and simplified inspection under Act on Rational Use and Appropriate Management of Fluorocarbons, reducing the rate of reduction in leakage during use in 2030 by 83% vs. 2013	
				2013 (FY)	-			
				2025 (FY)	54			
				2030 (FY)	83			
				Reduction rate of leakage rate when using equipment less than 7.5 kW (separate SC) (%)		2025 (FY)	1,330	For refrigeration and air-conditioning equipment for business use for which the rated output of the compressor electric motor is less than 7.5 kW, which is not subject to periodic inspection under Act on Rational Use and Appropriate Management of Fluorocarbons, for showcases installed separately, which involve relatively high leakage rates, reducing the rate of reduction in leakage during use in 2030 by 50% vs. 2013, through simplified inspection
				2013 (FY)	-			
				2025 (FY)	32			
				2030 (FY)	50			
				Reduction rate of leakage rate when using equipment less than 7.5 kW (other than separate SC)(%)		2030 (FY)	2,150	For refrigeration and air-conditioning equipment for business use for which the rated output of the compressor electric motor is less than 7.5 kW, which is not subject to periodic inspection under Act on Rational Use and Appropriate Management of Fluorocarbons, for those other than showcases installed separately reducing the rate of reduction in leakage during use in 2030 by 10% vs. 2013, through simplified inspection
				2013 (FY)	-			
				2025 (FY)	6			
				2030 (FY)	10			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator		Expected energy saving		Assumptions of expected energy saving and expected emission reduction
58. Fluorinated Gases: (HFCs, PFCs, SF ₆ , NF ₃)								
Recovery of fluorocarbons from refrigeration and air-conditioning equipment for business use waste	• Businesses disposing of refrigeration and air-conditioning equipment for business use: Duty to request reliable recovery during disposal, duty to issue and retain documentation • Building dismantlers: Duty to check for equipment installed in buildings to be dismantled, duty to explain matters to clients • Waste and recycling companies accepting equipment: Prohibition of transactions involving equipment from which CFCs have not been recovered • Filling and recovery vendors: Reliable recovery, duty to issue and retain documentation	• Appropriate enforcement and management of the law (e.g., support for guidance and supervision by prefectures, promotion and public awareness-raising) • Organizing and verifying issues in improving rates of coolant recovery per unit of equipment	• Guidance and supervision of businesses disposing of equipment, designated dismantling contractors, parties to transactions, filling and recovery vendors, etc. by prefectures, based on Act on Rational Use and Appropriate Management of Fluorocarbons • Promotion and awareness raising	Recovery rate of HFC during disposal (%)		(10 ⁴ t-CO ₂)		Increasing the HFC recovery rate during disposal etc. of refrigeration and air-conditioning equipment for business use under Act on Rational Use and Appropriate Management of Fluorocarbons from 34% in 2013 to 60% in 2025 and 75% in 2030
				2013 (FY)	34	2013 (FY)	-	
				2025 (FY)	60	2025 (FY)	1,350	
				2030 (FY)	75	2030 (FY)	1,690	
Recovery and proper processing of fluorocarbons from the disposal of household air conditioners	• Disposing parties: Properly disposing of waste household air-conditioners • Retailers: Collecting waste household air-conditioners from disposing parties and delivering them to manufacturers and other related parties at designated collection locations • Manufacturers etc.: Accepting waste air-conditioners at designated collection locations and using them for recycling and other purposes	• Implementing measures to increase recovery rates for waste household air-conditioners through appropriate enforcement and management of the Act on Recycling of Specified Kinds of Home Appliances, promotion and awareness raising, and other activities	• Reliably dealing with unlawful collection vendors under the Act on Waste Management and Public Cleaning • Developing routes for collection of equipment not subject to obligations • Promotion and public awareness-raising of the Act on Recycling of Specified Kinds of Home Appliances, etc.	Reduction of discarded household air conditioners that are not properly disposed of (10 ⁴ units)		(10 ⁴ t-CO ₂)		By disposing through proper routes of the 3.12 million waste household air-conditioners accepted by scrap vendors and junkyards in FY 2019, which are thought not to have been subjected to proper processing, reducing the number of waste household air-conditioners not disposed of properly by 1.56 million units in FY 2030 * Measures, policies, subject evaluation indicators, and Expected emission reduction may be subject to revision, including further enhancement, based on discussions in a joint meeting of the Industrial Structure Council Industrial Technology Environmental Subcommittee Wastes and Recycling Team's Electric/Electronic Devices Recycling Working Group and the Central Environmental Council Recycling-based Society Subcommittee's Recycling System Assessment Team.
				2019 (FY)	0	2019 (FY)	0	
				2025 (FY)	84	2025 (FY)	62	
				2030 (FY)	156	2030 (FY)	113	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected energy saving	Assumptions of expected energy saving and expected emission reduction		
58. Fluorinated Gases: (HFCs, PFCs, SF ₆ , NF ₃)								
Promotion of voluntary initiatives by industry	· Manufacturers: Implementing initiatives based on voluntary action plans formulated by related industries, to promote systematic efforts by industry related to controlling emissions of alternative CFCs and other substances	· Reporting on the state of progress of voluntary action plans formulated by related industries to the Industrial Structure Council Manufacturing Subcommittee Substance Policy Team's CFCs Working Group	—	Number of organizations that achieved the target (%)		(10^4 t-CO ₂)		Totaling emission reduction volumes assuming that all industries achieve their targets in each fiscal year under the voluntary action plan formulated by each industry
				2013 (FY)	100	2013 (FY)	-	
				2025 (FY)	100	2025 (FY)	88	
				2030 (FY)	100	2030 (FY)	122	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures		
				Measure evaluation indicator	Expected removals	Assumptions of expected removals
59. Policies and measures for forest carbon sink						
Policies and measures for forest carbon sink	· To achieve removals by forest removals of approx. 38 million t-CO₂ (corresponding to 2.7% of total emissions in FY 2013) in FY 2030, as a contribution by the forestry field to achievement of greenhouse gas reduction targets, promoting forest removals measures, such as sound forestry development through means including appropriate cutting and planting, appropriate management and conservation of protected forests and other sites, efforts to develop efficient and stable forest management, forestry activities in which the public can take part, and use of lumber and wood biomass. · To achieve removals by forest removals, it will be necessary to carry out forestry development for 700,000 ha (including 450,000 ha subject to thinning work) on average per year during FY 2021-2030, under the Basic Plan for Forests and Forestry (June 15, 2021 Cabinet decision).	Area of forest management practices (10 ⁴ ha)			(10 ⁴ t-CO ₂)	● Forests included in calculation of removals by forest removals · Planted forests: Forests subject to forestation (e.g., renewal [e.g., land clearance, surface improvements, planting], preservation [shrub cutting and weeding], thinning, final cutting) since 1990 to maintain appropriate forest conditions · Natural forests: Forests subject to protection and conservation measures, such as thinning and restriction on reuse, under laws, regulations, etc. ○ FY 2030 ● Expected removals by forest removals if the necessary funding is secured and forest removals measures, including forest management, are conducted in accordance with targets: approx. 31.2 million t-CO₂ ● Projected effects from harvested wood products (HWP) if the necessary funding is secured and efforts are made to expand supply and use of forestry products: approx. 6.8 million t-CO₂ ● Approx. 31.2 million + approx. 6.8 million = approx. 38 million t-CO₂
		2013 (FY)	83	2013 (FY)	5,172	
		2025 (FY)	—	2025 (FY)	—	
		2030 (FY)	2021-2030 (FY) Average: 70	2030 (FY)	Approx. 3,800	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures		
				Measure evaluation indicator	Expected removals	Assumptions of expected removals
59. Policies and measures for forest carbon sink						
	[Sound forest improvement] The national government, local governments, etc.: Promoting necessary forest improvement to achieve the targets of the Basic Plan for Forests and Forestry Local governments, parties involved in forestry, nonprofits, etc.: Reliably and efficiently implementing improvement of forests not managed adequately	• Promotion of diverse forest management, including through appropriate thinning, reforestation after harvesting, development of multi-layered forests, and long rotation forest management • Promotion of additional thinning and reforestation, including through further promotion of municipal efforts based on the Act on Special Measures concerning Promotion of Forest Thinning • Promotion of forest management by public entities, utilizing the private forest management entrustment system and the Forest Environment Transfer Tax based on the Private Forest Management Entrustment Act • Development of forestry road systems by appropriately combining forest roads and forestry operation roads while also taking into consideration the preservation of the natural environment • Promotion of the development of mixed conifer-broadleaf forests through harvesting and introducing broadleaf trees depending on natural conditions • Promotion of reforestation through labor-saving and low-cost silviculture practices, including by using drones and forestry machinery to transport saplings, leveraging integrated harvesting and reforestation operations, low-density planting, and the use of elite trees and large saplings to reduce the frequency of weeding • Efficient development and expansion of seed and seedling production of elite trees with excellent growth, and promotion of countermeasures against damage by wild birds and animals • Securing reforestation through proper implementation of regulations such as the logging and reforestation notification system • Restocking of unforested and unplanted areas in upstream watersheds. and rehabilitation of devastated satoyama forests	In accordance with the basic philosophies of the Forest and Forestry Basic Act (Act No. 161 of 1964) (Basic Plan for Forests and Forestry based on the Forest and Forestry Basic Act), the Act on Promotion of Global Warming Countermeasures, and other laws and regulations, promoting measures in accordance with the natural, economic, and social conditions of their districts, through appropriate division of responsibilities with the the national government in forests and forestry			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures			
				Measure evaluation indicator	Expected removals	Assumptions of expected removals	
59. Policies and measures for forest carbon sink							
	[Promoting appropriate management, conservation, etc. of protected woodlands, natural parks, and other areas] The national government, local governments, etc.: Appropriate implementation of measures, such as improving forest-conservation facilities and conserving protected woodlands	• Appropriate operation of regulations under the protection forest system, planned designation of Protected Forest, appropriate conservation and management under the forest protection system in national forest, and promotion of measures to conserve and restore natural vegetation collaboratively including with NPOs • Systematic implementation of forest conservation projects in areas vulnerable to mountain disasters and in devastated forests • Prevention of forest pests and diseases, as well as the damage caused by animals and implementation of forest fire prevention measures • Expansion of nature parks and nature conservation areas and proper operation of regulations and strengthening of conservation management within these areas	In accordance with the basic philosophies of the Forest and Forestry Basic Act (Basic Plan for Forests and Forestry based on the Forest and Forestry Basic Act), the Act on Promotion of Global Warming Countermeasures, and other laws and regulations, promoting measures in accordance with the natural, economic, and social conditions of their districts, through appropriate division of responsibilities with the the national government in forests and forestry				
	[Development of efficient and stable forest management] The national government, local governments, parties involved in forestry, etc.: Promoting measures as necessary for the sound, sustained	• Securing long-term sustainable forestry management by clarifying forest ownership and boundaries, consolidating forest operations, promoting long-term outsourcing of operations, establishing management rights under the private forest management entrustment system, promotion of forest management projects by forest owners’ cooperatives, and formulation of forest management plans • Promotion of “new forestry” initiatives through the reduction of silviculture cost as well as the labor saving and lightening of forestry work through the development and diffusion of remotely and automatically operated machinery • Development of forest resource information using laser scanning surveys, sharing and advanced use of forest-related information, including those on forest owners, and streamlining of timber production, distribution, and management using ICT • Introduction and efficient use of operation systems that properly combines forest road network development and high-performance forestry machinery, and implementation of initiatives based on the Forestry Innovation Program for On-site Implementation (formulated by the Ministry of Agriculture, Forestry and Fisheries in December 2019) • Promotion of initiatives to train and secure forestry workers	In accordance with the basic philosophies of the Forest and Forestry Basic Act (Basic Plan for Forests and Forestry based on the Forest and Forestry Basic Act), the Act on Promotion of Global Warming Countermeasures, and other laws and regulations, promoting measures in accordance with the natural, economic, and social conditions of their districts, through appropriate division of responsibilities with the the national government in forests and forestry				

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures		
				Measure evaluation indicator	Expected removals	Assumptions of expected removals
59. Policies and measures for forest carbon sink						
	[Promoting forestry activities in which the public can take part] The national government, local governments, businesses, nonprofits, etc.: Promoting adoption and awareness raising, forestry volunteer activities, forestry and environmental education, diverse use of forests, etc.	• Promotion of public participation in forest management activities through nationwide greening events such as the National Tree-Planting Festival • Support for forest management and conservation activities, such as tree planting by a wide range of entities, including companies and NPOs, and support for forest creation activities by companies etc., and promotion of green fundraising activities • Improvement of skills of and safety systems for forest volunteers and others • Promotion of forest environment education • Promotion of forest conservation and management and use of forest resources through cooperation among local residents, forest owners, and others • Creation and promotion of forest service industries that comprehensively utilize forest spaces • Promotion of ecosystem maintenance and restoration projects related to deer and other animals and green worker projects, for the conservation of forest ecosystems in national parks and other areas • Cultivation of public awareness of the fact that people's lives are supported by the rich forests, countryside, rivers, and oceans	In accordance with the basic philosophies of the Forest and Forestry Basic Act (Basic Plan for Forests and Forestry based on the Forest and Forestry Basic Act), the Act on Promotion of Global Warming Countermeasures, and other laws and regulations, promoting measures in accordance with the natural, economic, and social conditions of their districts, through appropriate division of responsibilities with the the national government in forests and forestry			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures		
				Measure evaluation indicator	Expected removals	Assumptions of expected removals
59. Policies and measures for forest carbon sink						
	[Promoting use of lumber and wood biomass] The national government, local governments, businesses, nonprofits, etc.: Promoting measures necessary to secure supply and use of forestry products	• Promotion of the use of local timber for housing and construction • Further promotion of wood use in urban areas through the construction of wooden public buildings and medium- and large-scale buildings as well as the development and dissemination of products and technologies, such as cross-laminated timber (CLT) and fire-resistant wood materials under the Wood Use Promotion Act. • Promotion of new technologies for forest product, utilization as well as, materials derived from woody biomass such as cellulose nanofibers and modified lignin, research, development and practical application of new wood-based materials. that can replace plastics • Establishment of a stable supply system for domestic wood to meet demand, including the development of efficient wood processing and distribution facilities • Promotion of power generation and heat utilization through the establishment of efficient and low-cost collection and transportation systems for woody biomass in a manner that guarantees the sustainable use of forest resources • Promotion of the use of wood by disseminating the significance and effects of wood use, the "Kizukai Undo“ (attention to wood use) initiative and “Mokuiku” (wood use education) activities and promote efforts such as networking among companies, in order to foster public understanding of wood use and also lead to ESG investment in companies that use wood sustainably	In accordance with the basic philosophies of the Forest and Forestry Basic Act (Basic Plan for Forests and Forestry based on the Forest and Forestry Basic Act), the Act on Promotion of Global Warming Countermeasures, and other laws and regulations, promoting measures in accordance with the natural, economic, and social conditions of their districts, through appropriate division of responsibilities with the the national government in forests and forestry			

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected removals	Assumptions of expected removals		
60. Policies and measures to increase carbon removals in agricultural soils								
Policies and measures to increase carbon removals in agricultural soils	Farmers: Promoting soil preparation through means such as use of organic matter like compost and green manure	• Together with initiatives to reduce use of chemical fertilizers and chemical synthesized pesticides by 50% or more in principle, promoting agricultural management activities that are highly effective in areas such as preventing global warming • Development of manure production facilities and promoting use of manure • Conducting surveys to collect data needed in greenhouse gas inventory reports • Verification of agricultural management technologies to contribute to greenhouse gas reductions and other goals • Promoting use of biochar through use of the J- Credit Scheme and other measures	Prefectures: Promoting environmentally friendly agriculture to help increase carbon storage in cropland	Soil carbon storage amount (mineral soil) (10^4 t-CO2)	(10^4 t-CO2)		• Using the calculation model (improved Roth-C model) developed by the National Agriculture and Food Research Organization, the change per year in soil carbon of mineral soil included in cropland and grassland nationwide (stock change) is estimated and soil carbon storage (sink volume) is estimated using the calculation rules in the Kyoto Protocol (the net-net method using 1990 as the base year, as stipulated in IPCC guidelines). • These countermeasures are based on the concept that activities such as soil preparation through agricultural production activities contribute to greenhouse gas emission reduction. Projected removal volumes assume achievement of targets such as the projected land under cultivation under the Basic Plan on Food, Agriculture and Rural Areas. They also assume establishment of necessary cultivation systems, technologies, etc. and implementation of financial assistance and other countermeasures.	
				2013 (FY)	145	2013 (FY)		145
				2025 (FY)	-	2025 (FY)		-
				2030 (FY)	850	2030 (FY)		850

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator		Expected removals	Assumptions of expected removals	
61. Promotion of urban greening								
Promotion of urban greening	• The national government, local governments, etc.: Promoting revegetation of public facilities, public awareness-raising of revegetation, and promoting revegetation by a wide range of parties • Citizens, businesses, nonprofits, etc.: Active participation in revegetation and other activities across a wide range of land, facilities, etc.	• Promoting development of urban parks, revegetation along roads, rivers (including sand prevention), ports and harbors, sewage treatment facilities, public rental housing, facilities of public agencies, etc., and creation of new green spaces in sites such as on rooftops, based on the Green Policy Guidelines and other measures • Close examination and study of methods of calculating sink effects of revegetation of urban communities etc., and development of reporting and verification systems • Promoting adoption and public awareness-raising of revegetation, and promoting revegetation by a wide range of parties including members of the public, businesses, and nonprofits	Promoting development of urban parks, revegetation along roads, rivers (including sand prevention), ports and harbors, sewage treatment facilities, public rental housing, facilities of public agencies, etc., and creation of new green spaces, based on the Green Basic Plan and other measures • Calculating removals effects of revegetation of urban communities etc., and providing information for reporting, verification, etc. • Promoting adoption and public awareness-raising of revegetation, and promoting revegetation by a wide range of parties including members of the public, businesses, and nonprofits	Maintenance area (1,000 ha)		(10^4 t-CO ₂)		CO ₂ sink effects are calculated and totaled for each carbon pool (biomass [trees], litter [fallen leaves], soil, etc.) by collecting statistical data on land area subject to development of urban parks, and land areas subject to revegetation along roads, rivers (including sand prevention), ports and harbors, sewage treatment facilities, public rental housing, facilities of public agencies, etc., which are subject to reporting under the Kyoto Protocol, and using calculation formulas, coefficients, etc., indicated in international guidelines on removal calculation methods.
				2013 (FY)	77	2013 (FY)	115	
				2025 (FY)	83	2025 (FY)	122	
				2030 (FY)	85	2030 (FY)	124	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator	Expected removals	Assumptions of expected removals		
62. Activation of J- Credit Scheme								
Revitalization of the J-Credit Scheme	· private businesses etc. (creators of credits): Implementation of greenhouse gas emission reduction and sink measures and recovery of funds through sale of credits · private businesses etc. (users of credits): Implementation of measures, such as adjustment of emissions and emission intensity and carbon offsetting, using the credits	Operation and management of the J-Credit Scheme	· Implementation of greenhouse gas emission reduction and removals measures by creators of credits · Implementation of the greenhouse gas emission reduction and removals measures of creators of credits through use of credits · Operation and management of local J- Credit Scheme	J-Credit certified amount (10^4 t-CO ₂)		-		
				(10^4 t-CO ₂)				
				2013 (FY)	3		2013 (FY)	3
				2025 (FY)	1,100		2025 (FY)	1,100
				2030 (FY)	1,500		2030 (FY)	1,500

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures				
				Measure evaluation indicator		Cumulative Expected emission reduction by 2030		Assumptions of expected energy saving and expected emission reduction
63. Promotion of the Joint Crediting Mechanism (JCM)								
Promotion of the Joint Crediting Mechanism (JCM)	・ Partner countries: Holding joint committee meetings to approve methodologies and discuss allocation of credits and other matters with the Japanese government, and calculating volumes of emission reduction (credits) ・ Japanese firms: Accelerating measures to promote outstanding decarbonization technologies, products, systems, services, and infrastructure as well as the implementation of countermeasure activities ・ Partner-country firms: Adoption, management, and monitoring at local facilities	・ Support through means such as subsidies for up to one-half of the costs of initial investment, field testing, etc. ・ Holding joint committee meetings with partner countries to approve methodologies and discuss allocation of credits and other matters	—	Estimated cumulative emissions reductions and absorption through JCM financial support projects, etc. (10^4 t-CO2)		(10^4 t-CO2)		・ Estimating cumulative emission reduction by FY 2030, based on results such as the number of 184 projects using the JCM funding support program in the past (as of April 7, 2021) ・ Deciding on allocation of credits through discussions with partner countries
				2013 (FY)	1.5	2013 (FY)	1.5	
				2025 (FY)	-	2025 (FY)	-	
				2030 (FY)	10,000	2030 (FY)	10,000	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
64. Decarbonization initiatives in national parks										
Promotion of decarbonization efforts in national parks [Zero Carbon Park]	・ Local governments: Formulation of plans and visions related to carbon-zero parks, and efforts toward their realization ・ Hotel industry, tourism industry: Introduction of energy saving equipment, renewable-energy private generators, and equipment using hot-spring heat in facilities for lodging and other uses inside national parks, developing decarbonization tour options, etc. ・ Transportation companies: Realizing decarbonized mobility in areas such as access to national parks ・ Consumers: Choosing decarbonized tours, lodging facilities, and other facilities	・ Cooperation with regional environmental offices to develop plans and visions related to carbon-zero parks ・ Decarbonization of visitor centers and other facilities inside national parks ・ Support for introduction of equipment using renewable energy, such as equipment using hot-spring heat, and energy saving equipment	・ Formulation of plans and visions related to carbon-zero parks in cooperation with the regional environmental offices of the Ministry of the Environment ・ introduction of equipment using renewable energy and energy saving equipment at facilities owned by local governments inside national park	Number of areas where Zero Carbon Parks are registered (Location)		(10 ⁴ kL)		(10 ⁴ t-CO ₂)		After launching the carbon-zero parks program in March 2020, aiming to achieve 10 registered sites by 2025 and 20 sites by 2030
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	10	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	20	2030 (FY)	—	2030 (FY)	—	

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
65. Proactive actions by the national government										
Proactive actions by the national government	—	· Implementation and inspection of government action plans · Implementation and inspection of action plans of individual related agencies	—	Emissions reduction rate (%)		(10^4 kL)		(10^4 t-CO2)		· Greenhouse gas reduction targets for 2030 under National Government Action Plan (October 22, 2021 Cabinet decision) (50% reduction vs. FY 2013) · FY 2013 emissions: 2.393 million t-CO2 (total greenhouse gas emissions from government administration and operations in FY 2013: 3.009 million t-CO2 [the figure fromNational Government Action Plan under the Act on Promotion of Global Warming Countermeasures in FY 2019 {March 2021, Global Warming Prevention Headquarters Executive Committee} minus emissions from use of government sea and air craft and emissions from government incineration of waste related to the Great East Japan Earthquake in Fukushima Prefecture]) * Base-year emissions may change in the future due to close examination of measures in the subject scope
				2013 (FY)	-	2013 (FY)	-	2013 (FY)	239.3	
				2030 (FY)	50	2030 (FY)	-	2030 (FY)	119.7	

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
66. Proactive actions by local governments and promotion by the national government										
Initiatives led by local governments and promotion by the national government	Local governments: Formulation and review of local government's action plans for operations, and promoting initiatives to carry out measures based on the action plans for these	Provision of technical advice etc. to staff of local governments, through means such as development of manuals on formulation of local government's action plans for operations	Establishing measures for reducing the amount of greenhouse gas emissions and maintaining and intensifying the absorption of greenhouse gas sinks in connection with their own operations in local government's action plans for operations	Rate of formulation of action plans of local governments, the formulation and review, etc. of which are carried out by prefectures and municipalities (%)	(10^4 kL)		(10^4 t-CO2)		Aiming to increase the percentage of prefectures and municipalities that have formulated action plans of local government, through formulation, review, etc., to 95% by FY 2025 and 100% by FY 2030	
				2013 (FY)	-	2013 (FY)	-	2013 (FY)		-
				2025 (FY)	95	2025 (FY)	-	2025 (FY)		-
				2030 (FY)	100	2030 (FY)	-	2030 (FY)		-

* Figures for FY 2025 are estimates for confirming progress toward FY 2030.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction
67. Promotion of initiatives based on the local government's action plan for entire municipal jurisdictions										
Promotion of efforts local government's action plans for entire municipal jurisdictions	Local governments*2: Formulation of local government's action plans for entire municipal jurisdictions, and promoting initiatives to carry out measures based on these	Provision of technical advice etc. to staff of local governments, through means such as development of manuals on formulation of local government's action plans for entire municipal jurisdictions	Local governments*2: Establishing measures for purposes, such as reducing greenhouse gas emissions in local government's action plans for entire municipal jurisdictions in accordance with natural and social conditions in their districts	Rate of formulation of action plans of local governments*2(%)		(10^4 kL)		(10^4 t-CO2)*3		—
				2013 (FY)	—	2013 (FY)	—	2013 (FY)	—	
				2025 (FY)	100	2025 (FY)	—	2025 (FY)	—	
				2030 (FY)	100	2030 (FY)	—	2030 (FY)	—	

*1 Figures for FY 2025 are estimates for confirming progress toward FY 2030.

*2 Prefectures, ordinance-designated major cities, and central cities obligated to formulate these plans by law (including those subject to special exceptions on the timing of implementation)

*3 This countermeasure provide backing support for all of other coutermeasures shown on the Annex.

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
68. Transition to a decarbonized lifestyle											
Promotion of thorough implementation of Cool Biz and Warm Biz: Cool biz	Businesses, ordinary households, individuals: Promoting Cool Biz and Warm Biz seasonal lifestyles to enable comfortable living at indoor temperatures of 28° C (target) when using air-conditioning and 20° C (target) when using heating	Promoting a sense of urgency regarding climate change, adoption and awareness raising of global-warming countermeasures, and changes in behavior	Promoting an understanding of the urgency of global warming and its negative impact on society, and advancing effective initiatives that are easy for people to participate in, in accordance with community and individual lifestyles, to raise awareness among residents and lead to growth of autonomous initiatives and to their taking root	Rate of implementation of Cool Biz (commercial) (%)		(10^4 kL)		(10^4 t-CO ₂)		○ Evaluation indicators ・ Cool Biz/Warm Biz implementation rate ・ Actual figures (FY 2013): Cool Biz (28° C) or Warm Biz (20° C) implementation rate from annual surveys ・ Projected future implementation rates: Assuming linear growth from current trends toward 100% implementation rates in FY 2030 ○ Reductions in electricity use and emissions from these measures ● Commercial sector ・ Cool Biz Reduction from increasing temperature setting by 2° C: 2.9% ・ Warm Biz Reduction from decreasing temperature setting by 3° C: 4.0% ● Residential sector ・ Cool Biz Reduction from increasing temperature setting by 1° C: 7.0% ・ Warm Biz Reduction from decreasing temperature setting by 1° C: 8.0% (air-conditioning) Reduction from decreasing temperature setting by 1° C: 5.6% (oil and gas fan heaters) ・ Average electricity emission factor for all power sources in FY 2013: 0.57 kg-CO ₂ /kWh (Source: Environmental Action Plan by the Japanese Electric Utility Industry [Federation of Electric Power Companies of Japan]) ・ Average electricity emission factor for all power sources in FY 2030: 0.25 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) ・ Average thermoelectric electricity emission factor in FY 2030: 0.60 kg-CO ₂ /kWh (Source: Outlook for energy supply and demand in FY 2030) ・ Fuel emission factor: 2.26 t-CO ₂ /kL (Prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) ・ Energy saving from thorough implementation of Cool Biz and "Warm Biz" seasonal lifestyles represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.	
				2013 (FY)	71.3	2013 (FY)	▲0.5	2013 (FY)	▲2.9		
				2025 (FY)	91.6	2025 (FY)	2.2	2025 (FY)	13.2		
				2030 (FY)	100	2030 (FY)	3.2	2030 (FY)	8.7		
				Rate of implementation of Warm Biz (Household) (%)		(10^4 kL)		(10^4 t-CO ₂)			
				2013 (FY)	77.0	2013 (FY)	▲0.3	2013 (FY)	▲1.8		
				2025 (FY)	93.2	2025 (FY)	1.4	2025 (FY)	8.9		
				2030 (FY)	100	2030 (FY)	2.2	2030 (FY)	5.8		

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
68. Transition to a decarbonized lifestyle											
				Rate of implementation of Warm Biz (commercial) (%)		(10^4 kL)		(10^4 t-CO ₂)			
				2013 (FY)	71.0	2013 (FY)	0.1	2013 (FY)	0.3		
				2025 (FY)	91.5	2025 (FY)	1.3	2025 (FY)	7.9		
				2030 (FY)	100	2030 (FY)	1.8	2030 (FY)	4.9		
				Rate of implementation of Warm Biz (household) (%)		(10^4 kL)		(10^4 t-CO ₂)			
				2013 (FY)	81.2	2013 (FY)	0.2	2013 (FY)	0.7		
				2025 (FY)	94.5	2025 (FY)	10.2	2025 (FY)	44.2		
				2030 (FY)	100	2030 (FY)	14.4	2030 (FY)	35.9		

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
68. Transition to a decarbonized lifestyle										
Home Eco-Diagnosis	Ordinary households and individuals: Switching to energy saving products, using related services, and choosing decarbonized lifestyles through the household eco-diagnostics program, which provides energy saving diagnostics for households	Use of online diagnostics and other services of the household eco-diagnostics program	Promoting an understanding of the urgency of global warming and its negative impact on society, and advancing effective initiatives that are easy for people to participate in, in accordance with community and individual lifestyles, to raise awareness among residents and lead to growth of autonomous initiatives and to their taking root	Cumulative number of households diagnosed (1000 households)		(10^4 kL)	(10^4 t-CO ₂)	● Evaluation indicators ・ Cumulative number of households for which diagnostics were conducted (source: results of the household eco-diagnostics program [Ministry of the Environment]) and implementation rate (cumulative number of households for which diagnostics were conducted/total households) ・ Actual figures (FY 2013): The cumulative number of households for which diagnostics were conducted was 31,000 households, for an implementation rate of 0.1% ・ Projected future number of household eco-diagnostics: Expected to be implemented for 1.555 million households in FY 2030 (for an implementation rate of 2.9% [1.555 million households/53.48 million households]) ● Reductions in electricity consumption through this measure: Resulting reductions in electricity consumption are considered to overlap with HEMS figures, and for other fuels consumption is assumed to decrease by 5% after various energy saving measures. ・ Fuel emission factor: 2.26 t-CO₂/kL (Prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) ・ Energy saving from household eco-diagnostics represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.		
				2013 (FY)	31					
				2025 (FY)	830	2013 (FY)	0		2013 (FY)	0.1
				2030 (FY)	1555					
				Implementation rate (%)		2025 (FY)	1.1		2025 (FY)	2.6
				2013 (FY)	0.1					
				2025 (FY)	1.5	2030 (FY)	2.2		2030 (FY)	4.9
				2030 (FY)	2.9					

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures						
				Measure evaluation indicator	Expected energy saving	Expected emission reduction	Assumptions of expected energy saving and expected emission reduction			
68. Transition to a decarbonized lifestyle										
Eco-driving	Drivers of ordinary vehicles: Implementing "eco-driving" to lessen the environmental impact of driving and reduce both fuel consumption and CO2 emissions, for example by not idling the engine while the vehicle is parked and driving safety at lower speeds in accordance with traffic conditions	Public awareness-raising of global warming countermeasures among drivers of passenger vehicles and personal trucks, and adopting eco-driving support systems using the latest ICT technologies, to promote and raise awareness of eco-driving and encourage changes in behavior	Advancing effective initiatives that are easy for people to participate in, in accordance with community and individual lifestyles, to raise awareness among residents and lead to growth of autonomous initiatives and to their taking root	Implementation rate of eco-driving (passenger cars) (%)		(10^4 kL)	(10^4 t-CO2)	● Evaluation indicators · Eco-driving implementation rates · Actual figures (FY 2013): Assumed to be 6% for passenger vehicles and 9% for personal trucks · Future projected implementation rates: Implementation rates are assumed to be 67% for passenger vehicles and 60% for personal trucks in FY 2030 ● energy saving effects of eco-driving: 10% reduction · emission factor of gasoline etc. for passenger vehicles: 2.65 t-CO2/kL · emission factor of gasoline etc. for personal trucks: 2.66 t-CO2/kL (Prepared based on the list of carbon emission intensity of total heat by energy source [Agency for Natural Resources and Energy]) · Energy saving from eco-driving represents energy saving through progress on countermeasures since FY 2012, and volumes of emission reduction are calculated based on these volumes of energy saving.		
				2013 (FY)	6%					
				2025 (FY)	60%	2013 (FY)	10.6		2013 (FY)	28
				2030 (FY)	67%					
				Implementation rate of eco-driving (private freight cars) (%)		2025 (FY)	219		2025 (FY)	582
				2013 (FY)	9%					
				2025 (FY)	53%	2030 (FY)	249		2030 (FY)	659
				2030 (FY)	60%					

Name of mitigation action	Countermeasures of each actor	Countermeasures of the national government	Examples of countermeasures expected to be implemented by local governments	Measure evaluation indicator, and results of countermeasures							
				Measure evaluation indicator		Expected energy saving		Expected emission reduction		Assumptions of expected energy saving and expected emission reduction	
68. Transition to a decarbonized lifestyle											
Reduction of food loss and waste in households	・ General households: Implementing measures to counter food loss and waste, such as checking the content of the refrigerator before going shopping to avoid buying too much and preparing suitable volume meals that eating up	Public awareness-raising that reducing food loss and waste in the household helps to global warming countermeasures, encouraging changes in behavior, etc.	Promoting an understanding of the urgency of global warming and its negative impact on society, and advancing effective initiatives that are easy for people to participate in, in accordance with community and individual lifestyles, to raise awareness among residents and lead to growth of autonomous initiatives and to their taking root	Amount of food loss and waste generated from households (10^4 tons)		(10^4 kL)		(10^4 t-CO ₂)		● Evaluation indicator ・ Food loss and waste from household Measured based on Ministry of the Environment, "Status of wasted food etc." ・ Actual figure (FY 2013): 3.02 million t (Source: "Status of wasted food etc." [FY 2013 estimate]) ・ Projected future food loss and waste: Assumed to be 2.16 million t in FY 2030 (Based on the target of halving household food loss and waste by FY 2030 vs. the FY 2000 level in the Basic Policy on Promotion of Food Loss and Waste Reduction [March 2020 Cabinet decision] and the 4th Fundamental Plan for Establishing a Sound Material-Cycle Society [June 2018 Cabinet decision]) ・ Food loss and waste in FY 2025 is estimated based on the target halved level of food loss and waste in FY 2030 (2.16 million t) and the actual figure in FY 2018 (2.76 million t). ・ CO₂ emissions intensity related to food loss: 0.46 t-CO₂/t (CO₂ emissions intensity of procurement and production of 1 t of food raw materials for each food category, multiplied by the food self-sufficiency rate, as a weighted average for the share of food loss form households) ・ Energy saving from addressing food loss and waste represents energy saving through progress on countermeasures since FY 2013, and volumes of emission reduction are calculated based on these volumes of energy saving.	
				2013 (FY)	302	2013 (FY)	0	2013 (FY)	0		
				2025 (FY)	241	2025 (FY)	10.6	2025 (FY)	28.1		
				2030 (FY)	216	2030 (FY)	14.9	2030 (FY)	39.6		

*1 Because of the difficulty of projecting expected energy mix, CO₂ emission intensity in power sector are estimated based on FY 2013, with the exception of figures for FY 2030, which reflect a preferable energy mix.

*2 Figures for FY 2025 are estimates for confirming progress toward FY 2030.