PRACTICE AND EXPERIENCE OF ADDRESSING CLIMATE CHANGE IN JAPAN

Supplementary Reader for
the Training Workshop on Climate Change Strategies
for Local Governments

FY2018

Institute for Global Environmental Strategies

INDEX

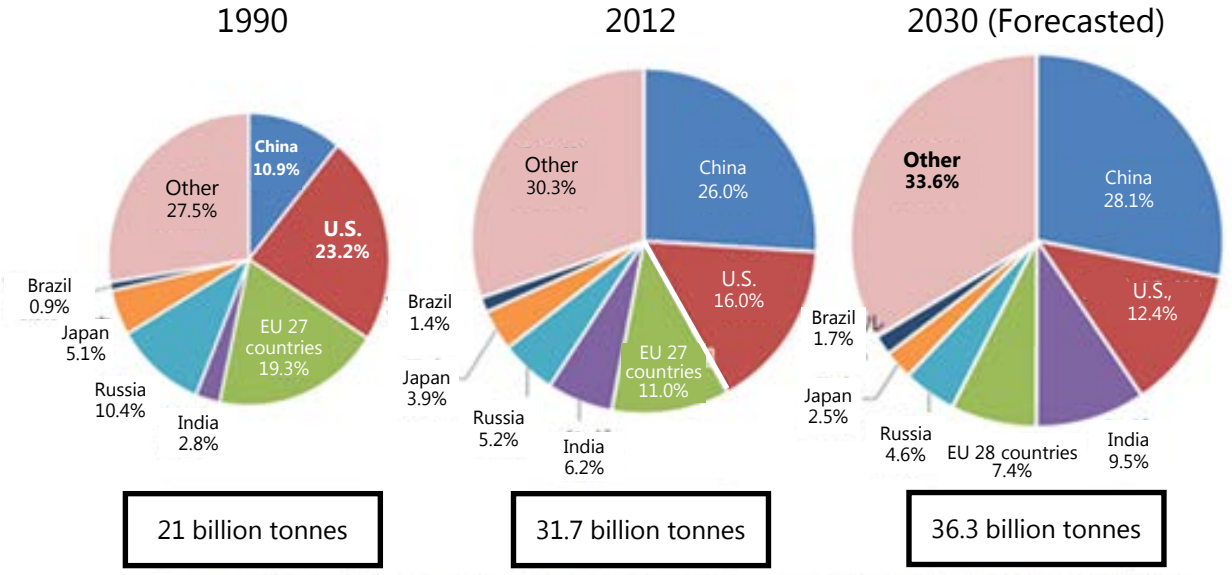
1. Background on the Implementation of Climate Change Countermeasures by Cities

1) Scientific findings and international trends

According to the Fifth Assessment Report (AR5)[1] of the Intergovernmental Panel on Climate Change (IPCC), impacts from climate change are already being seen in different areas around the world. The reason for this is that man-made (anthropogenic) greenhouse gas (GHG) is affecting climate systems as it increases in the atmosphere. If GHG emissions continue along current trends, there is a possibility that climate systems will change over the long term, resulting in serious and irreversible impacts on humans and ecosystems.

In order to avoid this scenario, countries around the world have taken measures to control GHG emissions (mitigation measures) and measures to minimize impacts from climate change (adaptation measures) under the United Nations Framework Convention on Climate Change (UNFCCC, adopted in 1992 and put into effect in 1994). With the limited achievements of agreements in the framework (Kyoto Protocol) that only covers emissions from developed countries along with the recent rise of emerging economies and the rapid economic growth of developing countries (Fig. 1), the Paris Agreement was adopted in 2015 (and put into effect in 2016) as a new international framework for climate change that targets the development and implementation of climate change countermeasures by all countries. As a result, all countries have decided to work towards the goal of "keeping a global temperature rise this century well below 2°C above pre-industrial levels, aiming to create a decarbonized society in the second half of this century" (hereinafter the "2 °C target").

According to the IPCC, in order to achieve the 2 °C target, it will be necessary to keep GHG emissions since 1870 at 2,900 $GtCO_2$ or less. However, to date, two-thirds of this figure have already been emitted (Fig. 2).[2] If measures are not taken and life continues along the path of business as usual, it is predicted that the carbon budget,[3] or the remaining one-third of GHG emissions, will be depleted in about 30 years. We have reached a "now or never" situation with regard to measures that must be taken.

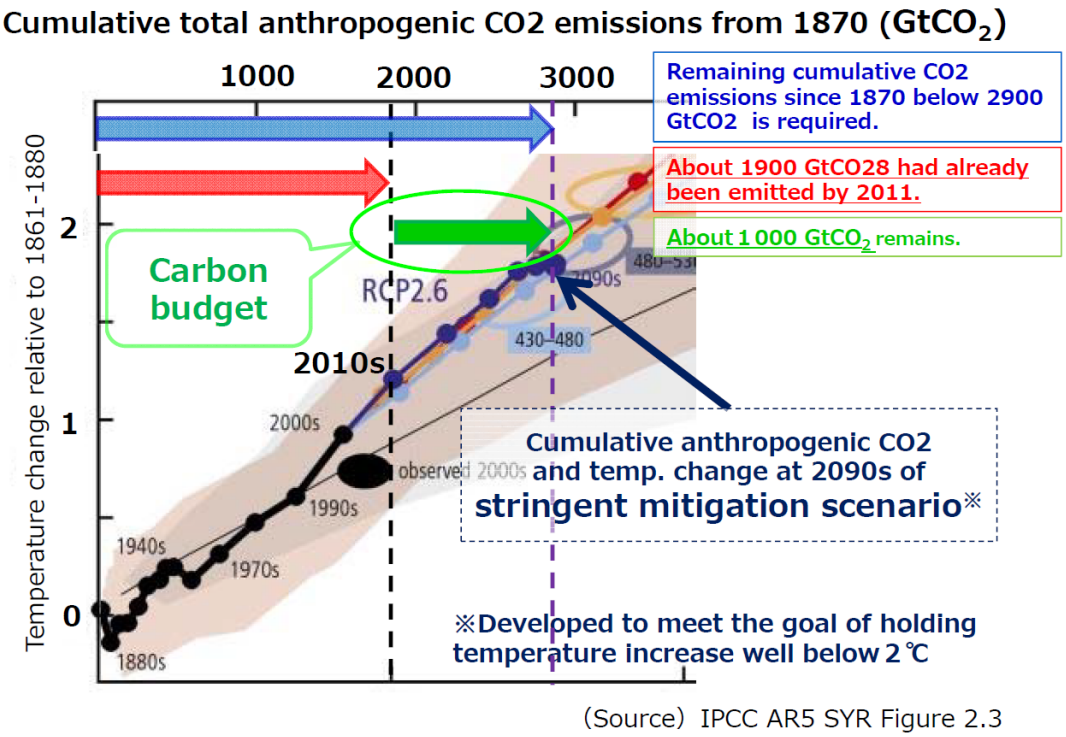


Created by the Ministry of the Environment based on IEA's "CO_2 Emissions from Fuel Combustion 2014" and the "World Energy Outlook (2014 Edition)."
*Values for 2030 are from the New Policies Scenario.

Fig. 1. Changes in global energy-related CO_2 emissions

Source: Handouts and Reference materials 5: Current status of greenhouse gas emissions from the 42nd Joint Meeting of the Industrial Structure Council, Committee on Industrial Science and Technology Policy and Environment, Global Environment Subcommittee, and the Global Environment Committee, Central Environment Council, January 23, 2015.

[1] IPCC, 2013. 5th Assessment Report.
[2] IPCC, 2014: Climate Change 2014: Synthesis Report.
[3] Carbon dioxide emissions budget (or Carbon budget): For a given temperature rise limit, for example a 1.5 or 2 degrees Celsius long-term limit, the corresponding carbon budget reflects the total amount of carbon emissions that can be emitted to stay within that limit. Stated differently, a carbon budget is the area under a greenhouse gas emissions trajectory that satisfies assumptions about limits on cumulative emissions estimated to avoid a certain level of global mean surface temperature rise. (Source: UNEP, 2014. The Emissions Gap Report 2014 A UNEP Synthesis Report)



(Source) IPCC AR5 SYR Figure 2.3

Fig. 2. Remaining carbon budget up to 2°C of temperature rise from the late 19th century

Source: T. Ichikawa. Latest Japanese Climate Change Policies MOEJ. WGIA15. 12 July 2017.

2) Overview of the Paris Agreement and the SDGs

In the Paris Agreement, all countries have pledged to set goals and take initiatives through Intended Nationally Determined Contributions (INDC) to achieve the 2 °C target. However, it has become clear that the 2 °C target cannot be sustained under the current INDCs even if all measures taken by countries submitting their targets are stacked together.[4] Despite the fact that the Paris Agreement has mechanisms in place where each country can boost its INDCs based on regular reviews, it is essential to encourage technological innovation and paradigm shift in order to bridge this gap.

In the same year that the Paris Agreement was adopted, the Sustainable Development Goals (SDGs) were also adopted by the United Nations, which are common goals for the international community through 2030 that aim at the creation of a sustainable society by encouraging a paradigm shift through partnerships with diverse stakeholders. “Climate action (Goal 13)” and “Sustainable Cities and Communities (Goal 11)” are listed as targets under the SDGs (Fig. 4). Specific goals and indicators related to climate change countermeasures, in particular, are shown in Table 1. The formulation and execution of action plans and the implementation of environmental education and public awareness activities are required for the steady promotion of climate change countermeasures.

Both the Paris Agreement and SDGs are initiatives that are not limited to one country, but target all countries throughout the world, focusing on cooperation among diverse stakeholders. For this reason, local governments, which are regional administrative bodies, are required to promote technological innovation and paradigm shifts to create a low-carbon and sustainable society mainly by mainstreaming climate change measures into various administrative plans and encouraging actions by local businesses and residents.

[4] FCCC/CP/2016/2

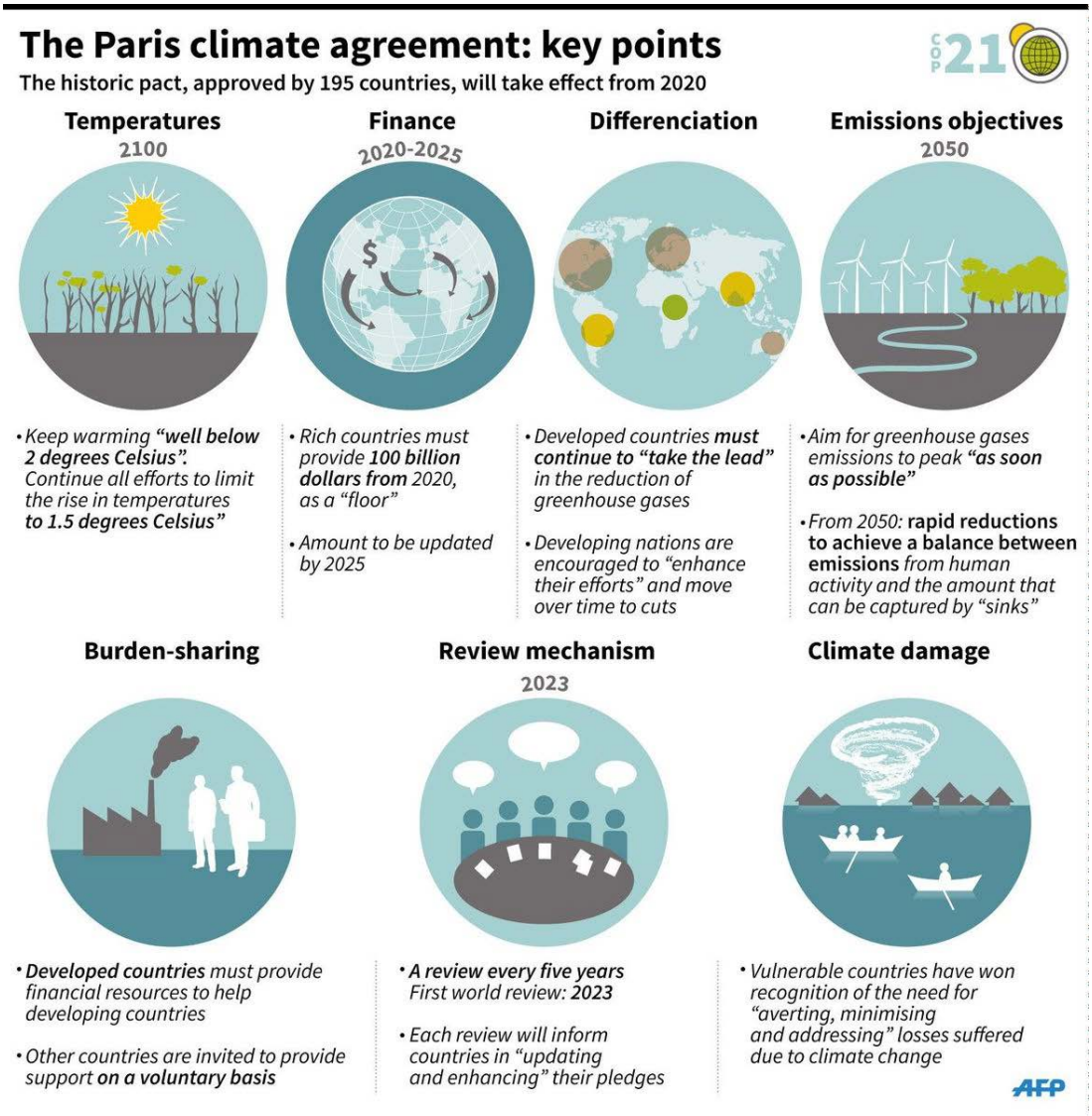


Fig. 3. The Paris climate agreement: key points

Source: AFP news agency

Fig. 4. Sustainable Development Goals

Source: United Nations Department of Public Information

Table 1. Specific goals and indicators related to climate change countermeasures

Goal	Target	Indicator
Goal 1: End poverty in all its forms everywhere	1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	1.5.4 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (repeat of 11.b.2 and 13.1.3)
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels	11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (repeat of 1.5.4 and 13.1.3)
Goal 12: Ensure sustainable consumption and production patterns	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies ;(b) curricula ;(c) teacher education ;and (d) student assessment
Goal 13. Take urgent action to combat climate change and its impacts	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (repeat of 1.5.4 and 11.b.2)
	13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1 Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)
	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula
		13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions
	13. b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	13.b.1 Number of least developed countries and small island developing States that are receiving specialized support, and amount of support, including finance, technology and capacity-building, for mechanisms for raising capacities for effective climate change-related planning and management, including focusing on women, youth, and local and marginalized communities

3) Significance and support for cities developing and implementing climate change countermeasures

Even as cities with a concentration of resources (people, things, money) face vulnerability risks in which they are susceptible to climate change, they also have various opportunities to become the stage for social change and innovation. This concentration of resources is expected to continue in the future with the global trend of urbanization, making it important to promote systematic measures with strategies at the city level to create a sustainable society.

As climate change countermeasures are a universal challenge, international organizations and donor agencies from various countries provide a great deal of support for related projects. Since the importance of non-state actors has been clearly stated in the Cancun Agreement (COP16, 2010), support to accelerate urban initiatives is on the rise. For example, ICLEI – Local Governments for Sustainability (ICLEI)[5] and the CDP[6] that both have a goal of sustainability have developed platforms through which cities can voluntarily communicate information on their own initiatives and raise their profiles by disseminating information, and also offer opportunities to attract investment.[7] The World Bank also has programs to commend initiatives by advanced cities. In addition, the Japan International Cooperation Agency (JICA), The World Bank, The C40 Cities Climate Leadership Group (C40)[8] and other organizations provide support to improve the capacity of cities. Japan's Ministry of the Environment (MOEJ) has moved one step forward and is working on exporting low-carbon technologies and climate change policies and systems as a package. As local governments in Japan work with companies to approach cities in Asia, direct benefits can be expected along with improvements in the capacities of local governments and reductions in GHG emissions by cities.

Local governments can enjoy various benefits by making good use of these types of support menus. In addition to direct benefits, such as the improvement of the capacity of staff and the acquisition of advanced low-carbon technologies, there are more opportunities for active cities to present case studies on the creation of sustainable cities at international conferences, for example, and increase their name recognition, making it possible to create a positive spiral to attract additional investment. This is expected to help cities further develop as green cities.

In this way, the active engagement of cities in climate change policies can no longer be justified as a "burden", but rather is being seen in a more positive light as an "opportunity" to achieve sustainable development.

Box 1: Benefits for local governments as a result of addressing climate change issues

- Strengthen city management to address climate change issues
- Capacity development of staff
- Improvement of the local environment through a co-benefit approach
- Promotion of a paradigm shift through lifestyle changes of citizens and technology innovation
- Creation of business opportunities for local companies

Source: MOEJ, 2017. Creating Sustainable, Low-Carbon Cities through City-to-City Collaboration. (Partial revision)

[5] http://www.iclei.org/
[6] https://www.cdp.net/en
[7] Information on each platform is compiled on the UNFCCC website: http://climateaction.unfccc.int/
[8] http://www.c40.org/

2. Climate Change Countermeasures in Japan

1) History of climate change measures and regulations

Climate change countermeasures in Japan entered into full swing after the adoption of the Kyoto Protocol at the Third Conference of the Parties to the UNFCCC in 1997. In 1998, Japan enacted the Act on Promotion of Global Warming Countermeasures, whereby a framework was set up for the national and local governments, businesses, and citizens to work together on global warming countermeasures (Table 2).

Since the Kyoto Protocol came into effect in 2005, various measures have been implemented under the Kyoto Protocol Target Achievement Plan (formulated in 2005 and completely revised in 2008), aiming at a reduction target of "greenhouse gas emissions by 6 percent compared to the base year during the commitment period (2008 to 2012)." Due to the effects of a deterioration in CO_2 emission intensity of electricity as a result of the Great East Japan Earthquake, Japan's GHG emissions rose 1.4% (initial target was -0.6% for the effects of domestic mitigation measures). However, ultimately, Japan was able to achieve a reduction target at a level above its target (-8.4%) through the application of forest sink measures and market mechanisms (Fig. 6).

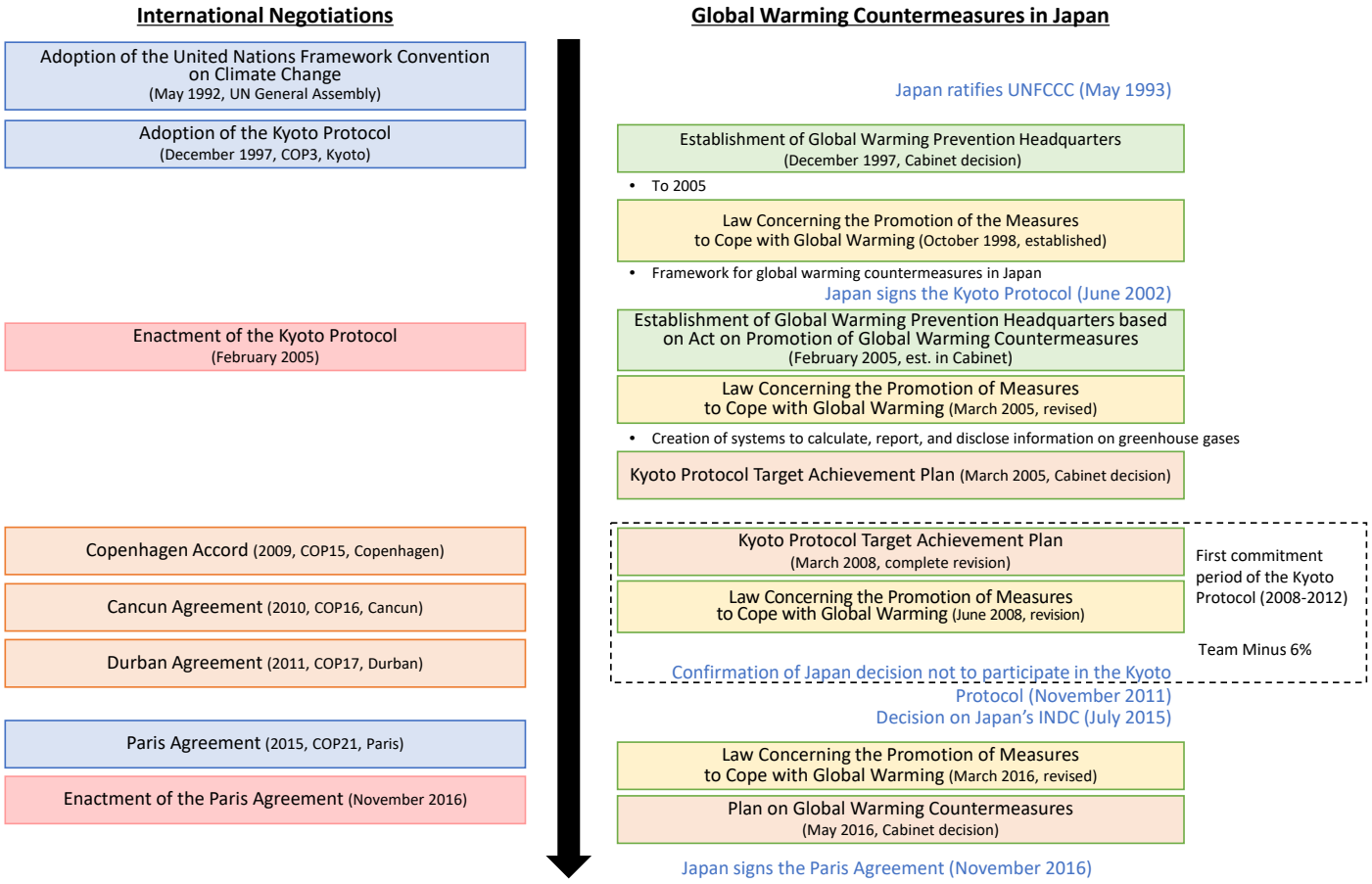
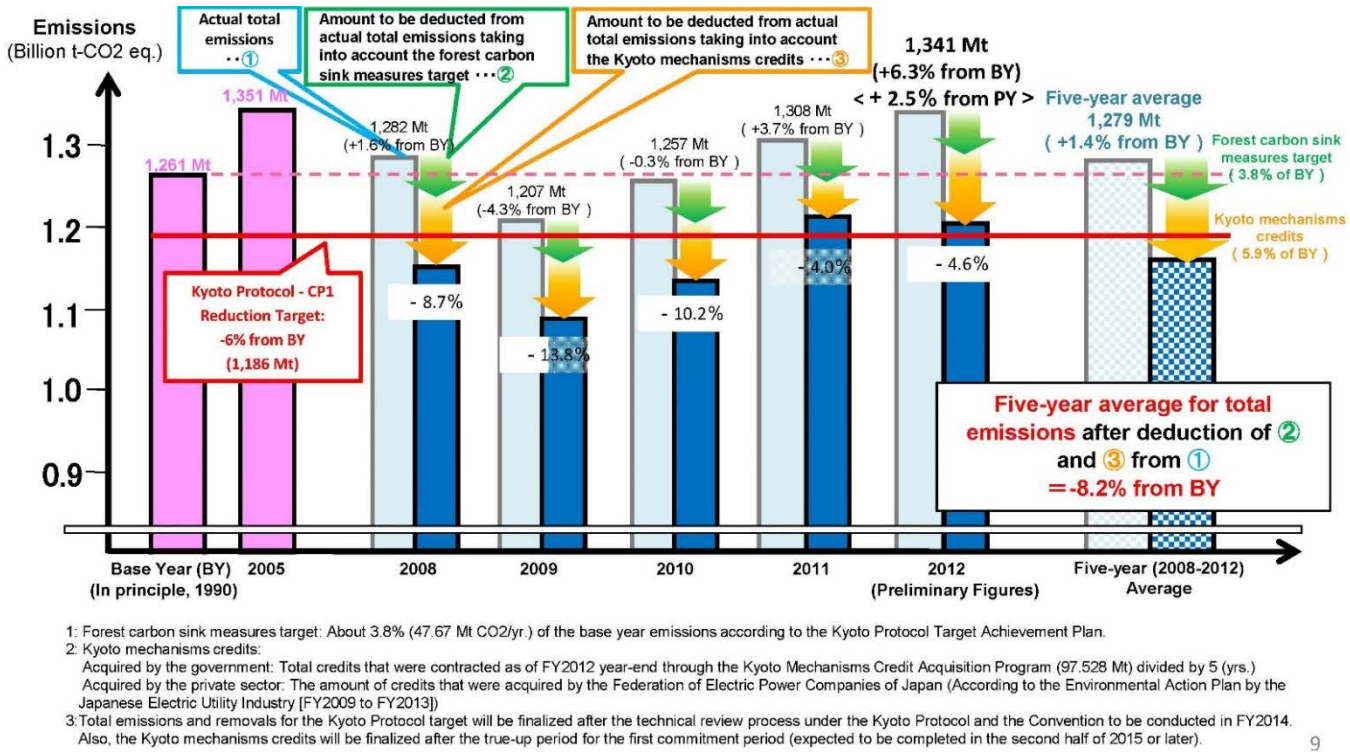


Fig. 5 Timeline of Japan's climate change measures

Source: Created by the authors based on websites of the Prime Minister's Office and the MOEJ



1: Forest carbon sink measures target: About 3.8% (47.67 Mt CO2/yr.) of the base year emissions according to the Kyoto Protocol Target Achievement Plan.
2: Kyoto mechanisms credits:
Acquired by the government: Total credits that were contracted as of FY2012 year-end through the Kyoto Mechanisms Credit Acquisition Program (97.528 Mt) divided by 5 (yrs.)
Acquired by the private sector: The amount of credits that were acquired by the Federation of Electric Power Companies of Japan (According to the Environmental Action Plan by the Japanese Electric Utility Industry [FY2009 to FY2013])
3:Total emissions and removals for the Kyoto Protocol target will be finalized after the technical review process under the Kyoto Protocol and the Convention to be conducted in FY2014. Also, the Kyoto mechanisms credits will be finalized after the true-up period for the first commitment period (expected to be completed in the second half of 2015 or later).

9

Fig. 6 Status of achievement of Japan's reduction targets (first commitment period of the Kyoto Protocol)

Source: MOEJ, 2014. Japan's Climate Change Policies. (18th Mar. 2014)

Table 2. Role of each stakeholder in climate change countermeasures in Japan

Stake-holder	Responsibility (Act on Promotion of Global Warming Countermeasures)	Basic Role (Action Plans)
National government	• Observation/monitoring of the environment • Formulation and implementation of comprehensive and systematic global warming measures • Promotion of measures • Control of GHG emissions from business activities • Support for measures by local governments • Improvement of public awareness and technical advice to promote efforts by businesses, citizens, and private organizations • Research • International cooperation	• Comprehensive promotion of global warming measures in which various policy measures are mobilized • Implementation of pioneering initiatives (control of GHG emissions from business activities) • Call for action by each level of society to prevent global warming • Promotion of international cooperation related to global warming measures • Observation and monitoring of changes in concentrations of greenhouse gases in the atmosphere
Local governments	• Promotion of measures to control GHG emissions according to the natural and social conditions of the area • Control of GHG emissions from business activities • Measures to promote activities to control GHG emissions by local businesses and residents	• Promotion of policies in accordance with local natural and social conditions • Measures concerning local government affairs and business • Matters that are expected to be addressed by prefectures, in particular (Measures to collect information on good practices of actions in municipalities under its jurisdiction and promotion of the expansion of these activities to other municipalities, measures such as technical advice and support for human resources development to municipalities that have difficulty with initiatives based on the formulation/revision of action plans and similar plans of local governments)
Businesses	• Implementation of measures to control GHG emissions in relation to business activities • Cooperation on measures established by the national and local governments	• Implementation of appropriate, effective, and efficient measures in light of the contents of business activities • Initiatives based on social existence • Reduction of environmental impacts through the life cycle of providing products and services
Citizens	• Implementation of measures to control GHG emissions in relation to daily life • Cooperation on measures established by the national and local governments	• Control of greenhouse gas emissions that result from daily life • Participation in global warming prevention activities

Source: Act on Promotion of Global Warming Countermeasures, Plan on Global Warming Countermeasures (2016)

As Japan announced its intention not to take part in the second commitment period of the Kyoto Protocol, the country has been under no obligation to reduce emissions since 2013. Nevertheless, Japan has continued to consider countermeasures since 2013 under the Act on Promotion of Global Warming Countermeasures. Following the Great East Japan Earthquake in 2011, national targets have been in a state of flux, as the direction for energy policies has not been determined. However, in 2015, Japan declared the country's target of a "26% reduction by 2030 and an 80% reduction by 2050 compared to 2013 levels" as its INDC. Following that, Japan revised the Act on Promotion of Global Warming Countermeasures in 2016 based on the adoption of the Paris Agreement and formulated the Plan on Global Warming Countermeasures in May of that same year, which contains information on Japan's emission reduction targets and measures. Various measures are currently being carried out under this plan (Table 3).

Table 3. Main policies and measures listed in the Plan on Global Warming Countermeasures

Sector	Policies & Measures
Industrial sector	• Promotion and verification of action plans towards a low carbon society • Introduction of highly energy-efficient equipment/devices, and use of Factory Energy Management System (FEMS)
Commercial and other sectors	• Improvement of energy efficiency performance of buildings • Energy-efficient devices • Intensive energy management by using Building Energy Management System (BEMS) and energy saving diagnostics
Residential sector	• Promotion of nationwide campaigns • Improvement of energy efficiency performance of housing • Energy-efficient equipment • Intensive energy management by using Home Energy management system (HEMS), smart meters
Transport sector	• Diffusion of next-generation automobiles, improvement of fuel efficiency • Other measures in transport sector
Energy conversion sector	• Expanding renewable energy introduction to the maximum extent possible • Pursuit of high efficiency in thermal power generation and etc.
Other GHG and removals by LULUCF	• Measures to non-energy-originated CO2, CH4, N2O, fluorinated gases, and LULUCF sector
Cross-sectional strategies	
<u>Cross-sectional measures for achieving target</u> • Promotion of the J-Credit Scheme • Promotion of nationwide campaigns • Builds low-carbon city, area structure and socio-economic system	<u>Other related cross-sectional strategies</u> • Realization of hydrogen society • Efforts based on guidelines for GHG emission reductions control • Estimation, reporting and disclosure of businesses' GHG emissions • Encouraging environmental consideration in business activities • Joint Crediting Mechanism (JCM) • Greening tax system and utilization of GW Countermeasure Tax • Greening finance system • Domestic Emissions Trading Scheme
Foundational measures, international cooperation	
• Development and societal implementation of technology, and measurement and monitoring (GaN, CNF, battery, ocean energy, Satellite 'Ibuki'; "National Energy and Environment Strategy for Technological Innovation towards 2050" • Efforts of public organization • Promotion of international cooperation • Progress management (Yearly progress review, consider revision of plan every 3 years, taking account of 5 year cycle of Paris Agreement)	

Source: MOEJ. Overview of the Plan on Global Warming Countermeasures. Cabinet decision on May 13, 2016.

Box 2: International Cooperation Efforts by the Japanese Government

The Plan for Global Warming Countermeasures is positioned as one set of measures to counter climate change through international cooperation.

Vision for International Cooperation on Climate Change Mitigation

The Vision for International Cooperation for Climate Change Mitigation[9], compiled by the Ministry of the Environment in March 2018, aims to achieve significant reductions in emissions in Japan by 2050 and demonstrates Japan's determination to lead global economic growth and decarbonization efforts by establishing a position for itself as a leader to drive decarbonization around the world. Japan is promoting the creation of a global-scale decarbonized society and the development and improvement of the environment and foundations to achieve this by 2030 through the concept of "co-innovation" to enable innovation that offers benefits for both parties through partnerships. Related actions are below.

○Strengthening of partnerships with diverse actors and promotion of collaboration

- ✧ Expansion of non-governmental activities
- ✧ Promotion of collaboration with stakeholders, mainly in cities

○Institution building in partner countries and strengthening a sense of ownership

- ✧ Creation of policies and institutions as the basis for emissions reductions
- ✧ Strengthening of organizational and human-resource capacity to self-directedly carry out initiatives
- ✧ Improving transparency as the key to reducing GHG emissions
- ✧ Determining total supply chain emissions and strengthening emissions-reduction efforts
- ✧ Efforts in sector-specific international standardization and technological cooperation

○Mainstreaming climate change in public funds and increased mobilization of private funds

- ✧ Mainstreaming of climate change mitigation in public funds
- ✧ Promotion of investments in climate change mitigation based on private funds, including use of public funds
- ✧ Expansion of investments in renewable energy

○Creation and scaling-up of "successful models"

International Environmental Cooperation with ASEAN

Under the Japan-ASEAN Environment Cooperation Initiative[10], the Japanese government fundamentally strengthens and promotes cooperation and takes a comprehensive and multi-tiered approach to promoting the spread of high-quality environmental infrastructure and environmental cooperation projects in various sectors (biodiversity, marine pollution, climate change, etc.) in order to promote the Sustainable Development Goals (SDGs) in the ASEAN region. There are seven priority areas under this initiative: waste and recycling sector, sustainable cities, wastewater treatment sector, marine pollution, chemical substances, biodiversity, and climate change. The Chairman's Statement at the 21st Japan-ASEAN Summit Meeting[11] (November 14, 2018, Singapore) welcomed a variety of actions being deployed in the field of climate change and development of high-quality environmental infrastructure for sustainable cities through the ASEAN-Japan Climate Change Action Agenda*[12] under the Japan-ASEAN Environment Cooperation Initiative.

※ASEAN-Japan Climate Change Action Agenda

The Japanese government declared that the ASEAN-Japan Climate Change Action Agenda will strengthen regional cooperation on climate change with ASEAN in three areas: transparency, adaptation and mitigation, as a key program for climate change in the Japan-ASEAN Environment Cooperation Initiative. The agenda promotes increasing support for the development of measurement, reporting and verification (MRV) systems as part of transparency measures, supporting capacity building for adaptation planning and implementation, and formulating projects for funding and promoting investment in adaptation projects by the private sector as part of adaptation measures, and promoting Joint Crediting Mechanism (JCM) projects and accelerating the creation of markets for low-carbon and decarbonized products, services and technologies as part of mitigation measures.

[9] Commission on International Cooperation for Climate Change Mitigation, March 2018. "Vision for International Cooperation on Climate Change Mitigation"
[10] Ministry of the Environment, Japan-ASEAN Environment Cooperation Initiative
[11] Ministry of Foreign Affairs website, 21st Japan-ASEAN Summit Meeting (November 14, 2018)
[12] MOEJ. "ASEAN-Japan Climate Change Action Agenda"

2) Act on Promotion of Global Warming Countermeasures and related laws

The major framework for climate change countermeasures in Japan is prescribed in the Act on Promotion of Global Warming Countermeasures. However, measures for each sector have been promoted under other laws and regulations. Among them, measures in the energy sector, which accounts for approximately 90% of GHG emissions in Japan, target business operators that consume more than a fixed amount of energy under the Act on the Rational Use of Energy (Energy Savings Act) and require reports to be submitted on the state of energy consumption and measures to curb energy consumption to control energy use in the industrial and transportation sector. Even under the Act on Promotion of Global Warming Countermeasures, reports are required on the state of GHG emissions via the Mandatory Greenhouse Gas Accounting and Reporting System introduced in 2006. The "visualization" of energy consumption or GHG emissions helped facilitate the development and implementation of countermeasures by the industry sector. In addition, the development of energy-saving devices (lighting, air conditioning, vehicles, other) has also been promoted through the introduction of a top-runner program. This, together with the establishment of the Act on Promoting Green Procurement in 2000, tax reduction measures, such as lowering taxes for eco-cars introduced in 2009, and the development of the national campaign, "Team Minus 6%", has boosted the spread of energy-saving products to the market. Such measures have been effective, with emissions on the decline in the industrial sector since 1990 and in the transportation sector since its peak in 2002 (Fig. 8). Since 1990, the trend of "decoupling", which is the achievement of economic development without emitting as much GHG as before, has also gained recognition.[13]

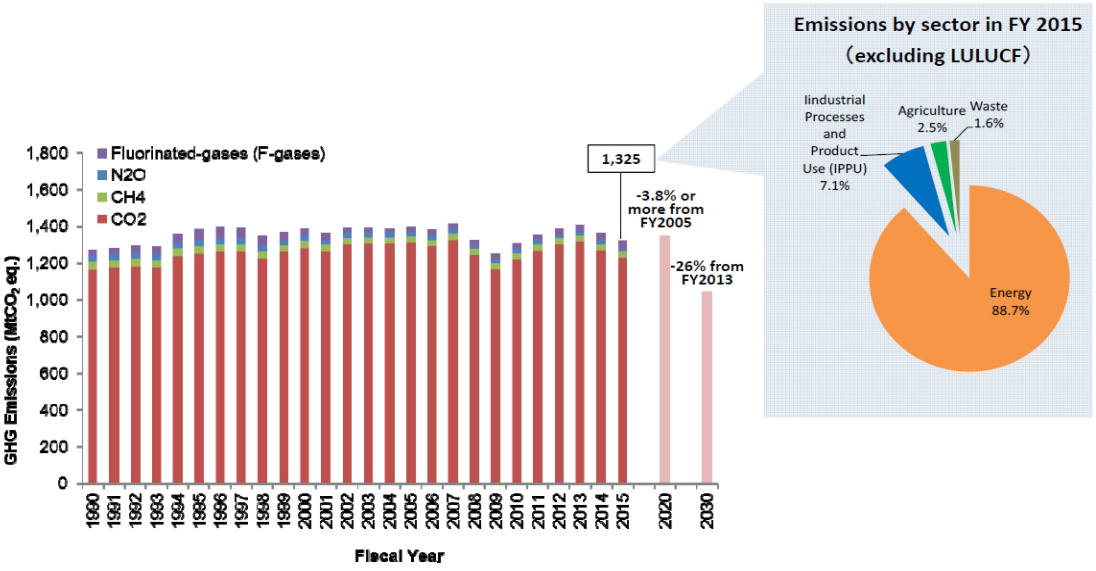


Fig. 7. Japan's GHG emissions profile and emission reduction targets
Source: T. Ichikawa. Latest Japanese Climate Change Policies, MOEJ. WGIA15. 12 July 2017

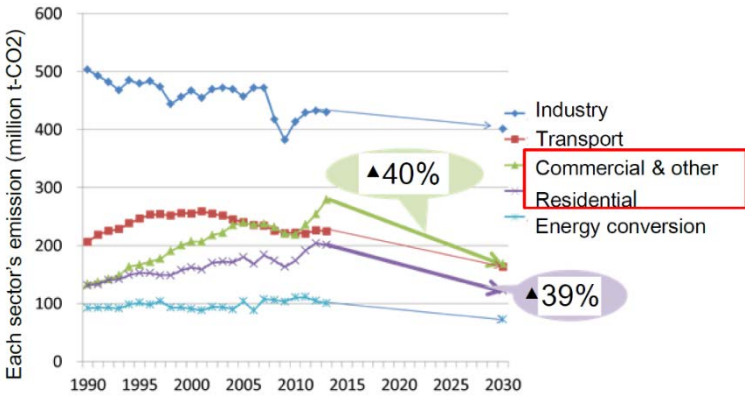


Fig. 8 Japan's energy-origin CO_2 emissions by sector
Source: S. Sato. Japan's Climate Change Policies. MOEJ. WGIA14. 27 July 2016

[13] MOEJ, 2017. 2017 White Paper on the Environment, Material Cycle Society, and Biodiversity, Part 1, Chapter 2, Section 3

However, there has been a trend of rising emissions from the commercial and residential sectors (collectively referred to as the "consumer sector") due to a deterioration of the CO_2 emission intensity of electricity as a result of the effects from the Great East Japan Earthquake and lifestyle changes of the public (Fig. 8). For this reason, countermeasures in the consumer sector, in particular, have been strengthened in recent years. Legislation specializing in promoting the development of low-carbon buildings, such as offices and residences,[14] and laws designed to encourage contributions to the development of low-carbon societies through urban planning,[15] have also been enacted. In addition, initiatives to expand climate change countermeasures to citizens and the promotion of civil movements are also underway (Box 2). Against this backdrop, the importance of the role of local governments, which is in a position closest to local businesses and residents, has increased significantly in the promotion of actions by the consumer sector in recent years.

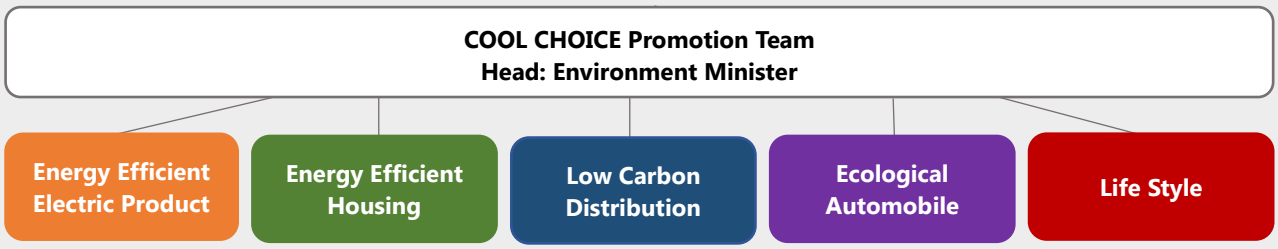
Box 3: "COOL CHOICE" Campaign by the Ministry of the Environment, Japan

"Cool Choice" means "Wise Choice" for the future.

You may see this logo in electric products, housings, public transportation, cars, and even in some events in Japan. It is a sticker to demonstrate those products or means are energy efficient or somehow contributing to the low-carbon society. It is also a slogan to create a `national movement` towards Japan's commitment to reduce GHG emissions by 26% by 2030.

The Japanese prime minister announced that such ambitious target cannot be achieved only by the central government, thus all citizens, municipalities, companies, NPOs, etc. must unite and act together. This statement was not only political call but also based on the Japan's emission source trend: emissions from household and business are noticeably increasing and estimated that 40% reduction in household and business along with 30% in transportation sector are necessary to meet the Japan's goal.

Cool Choice promotion team has been established along with the 5 Working Groups illustrated in below.



What is new in this campaign is that it labels human act such as going to a soccer game since it will avoid using air conditioner at home, and receiving a delivery package at first time so that the delivery company doesn't need to drive again due to the receiver's absence.

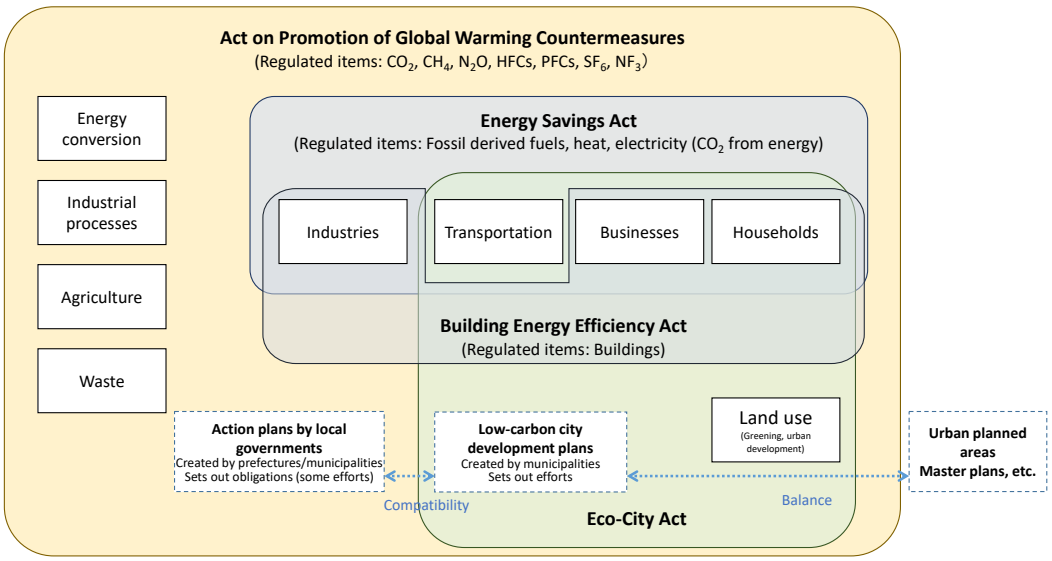
Furthermore, the collaboration with municipalities and local media is emphasized to disseminate the campaign. Subsidiary is granted for the selected local municipalities (up to 5 to 10 million JPY according to the population size of municipality) to implement their Cool Choice proposals, and for media such as local radio station to publicize the idea. It aims to educate people to make a wise choice in a variety of ways while labeling the eco-friendly products and activities.

[14] Act on the Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act, enacted in 2015))
[15] Act on the Promotion of Low-Carbon Cities (Eco-City Act, enacted in 2012)

Table 4. Overview of the four laws related to low-carbon city development

Law	Act on Promotion of Global Warming Countermeasures	Act on the Rational Use of Energy (Energy Savings Act)	Act on the Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act)	Act on the Promotion of Low-Carbon Cities (Eco-City Act)
Enacted (Most recent revision)	1998 （2016）	1979 （2013）	2015	2012
Background / Purpose	Adoption of the Kyoto Protocol (1997) Promote climate change countermeasures and contribute to the health and cultural lives of citizens both present and future, as well as the welfare of the human race.	Oil crisis (1970s) Comprehensively promote the rational use of energy and contribute to the sound development of the nation's economy	Great East Japan Earthquake (2011), other Improve energy consumption performance of buildings and contribute to the sound development of the nation's economy and stability of people's lives	Great East Japan Earthquake (2011), other Promote the revitalization of the housing market and local economy by collecting and disseminating successful cases on the low-carbon development of cities and transportation and the rational use of energy
Targets (Sectors)	Energy (energy conversion, industries, businesses, households, transportation), industrial processes, waste, agriculture, land use	Energy (industries, businesses, households, transportation)	Energy (industries, businesses, households)	Energy (businesses, households, transportation), land use
Targets (Groups)	National and local public bodies, businesses, citizens	Businesses that consume more than a fixed amount of energy	Owners of buildings over a certain size (newly built, expanded, renovated) (Guidance measures target all buildings)	Building operators, local public bodies
Main Measures	• Calculation, reporting, and disclosure system for greenhouse gas emissions • Implementation plans of local public bodies • Public awareness activities (COOL CHOICE), etc.	• Regular reporting systems • Top runner system for energy consumption equipment, etc.	• Mandatory compliance and obligations to determine compliance for large-scale, non-residential buildings • Mandatory reporting for medium-sized buildings or larger • Certification for energy-savings improvement plans • Demonstration of energy consumption performance	• Certified low-carbon buildings • Low-carbon city development plan • Preferential treatment for the above, etc.
Penalties	Fine of no more than ¥200,000 for failure to submit reports according to the rules laid out in the calculation, reporting, and disclosure system or for false reporting (Article 68, paragraph 1)	For cases when no notification is made to become a designated business operator or for false notification. Fine of no more than ¥500,000 for non-submission of periodic reports or false reports, refusing inspections, etc. (Article 96)	Fine of no more than ¥300,000 in cases where there has been a violation of standard compliance orders (Article 68). Fine of no more than ¥500,000 for starting construction when notification has been filed or a false notification has been filed (Article 70).	Fine of no more than ¥300,000 for failure to submit reports requested by the Minister of Land, Infrastructure, Transport and Tourism or other competent administrative agency, or for submission of a false report
(Reference) Main points of latest revision	• Strengthen dissemination and awareness through collaboration between the national government and various entities • Promotion of global warming measures through international cooperation • Promotion of global warming measures in regions	• Promote the levelling out of electricity demand • Expansion of top runner system to building materials, etc.	—	—

Source: Created by the authors based on the Act on Promotion of Global Warming Countermeasures, Act on the Rational Use of Energy, Act on the Improvement of Energy Consumption Performance of Buildings, and Act on the Promotion of Low-Carbon Cities



* Solid squares indicate GHG emission sources and sinks. Dotted squares indicate the administrative plans of local governments.

Fig. 9. Regulated items and their relevance to the four laws related to low-carbon city development

Source: Created by the authors based on the Act on Promotion of Global Warming Countermeasures, Act on the Rational Use of Energy, Act on the Improvement of Energy Consumption Performance of Buildings, and Act on the Promotion of Low-Carbon Cities

3) Governmental budget for global warming countermeasures

In February 2018, the Ministry of the Environment announced the compilation of a preliminary budget for global warming countermeasures in each ministry and agency for fiscal 2018 with the aim of understanding actions carried out by the entire government from a budgetary perspective and strengthening cooperation to comprehensively and systematically promote countermeasures and policies based on the Plan for Global Warming Countermeasures. Breakdowns of the budget compiled in four categories (A to D) are shown for each ministry and agency (Table 5).

Actions detailed in the main budget that involve local governments include support for projects to formulate action plans, strengthen carbon management of municipalities, develop and improve urban railroads, and promote low-carbon development using local funds.

Table 5. Draft FY 2018 budget for global warming countermeasures by ministry/agency

(Unit: million yen)

	A	B	C	D
Government departments, ministries and agencies	Effective in reducing GHG emissions by 2030	Effective in reducing GHG emissions after 2030	Contributes to reducing GHG emissions based on other results	Basic measures, etc.
	FY 2018	FY 2018	FY 2018	FY 2018
Cabinet Office, other	481		1,298	1,786
Reconstruction Agency	15,951		14,300	
Ministry of Internal Affairs and Communications	1			
Ministry of Justice				
Ministry of Foreign Affairs				485
Ministry of Finance				
Ministry of Education, Culture, Sports, Science and Technology		12,080	21,939	19,863
Ministry of Health, Labour and Welfare	305			
Ministry of Agriculture, Forestry and Fisheries	119,601		58,741	1,697
Ministry of Economy, Trade and Industry	136,820	38,002	110,864	4,949
Ministry of Land, Infrastructure, Transport and Tourism	18,123	8	28,006	1,188
Ministry of the Environment	135,117	9,150	62,603	12,748
Ministry of Defense	177			
All ministries and agencies	426,577	59,240	297,812	42,717

*1: "Cabinet Office, other" indicates the Cabinet Office, National Police Agency and other offices.
*2: "Reconstruction Agency" budget is the total amount of the special budget for reconstruction from the Great East Japan Earthquake, which is transferred to the ministries or agencies implementing projects.
*3: Reductions that cannot be specified as corresponding to the global warming countermeasures budget have not been included in the total.
*4: The total figure may not be uniform because numbers have been rounded off the nearest whole number.

Source: Ministry of the Environment, "FY 2018 draft budget for global warming countermeasures"

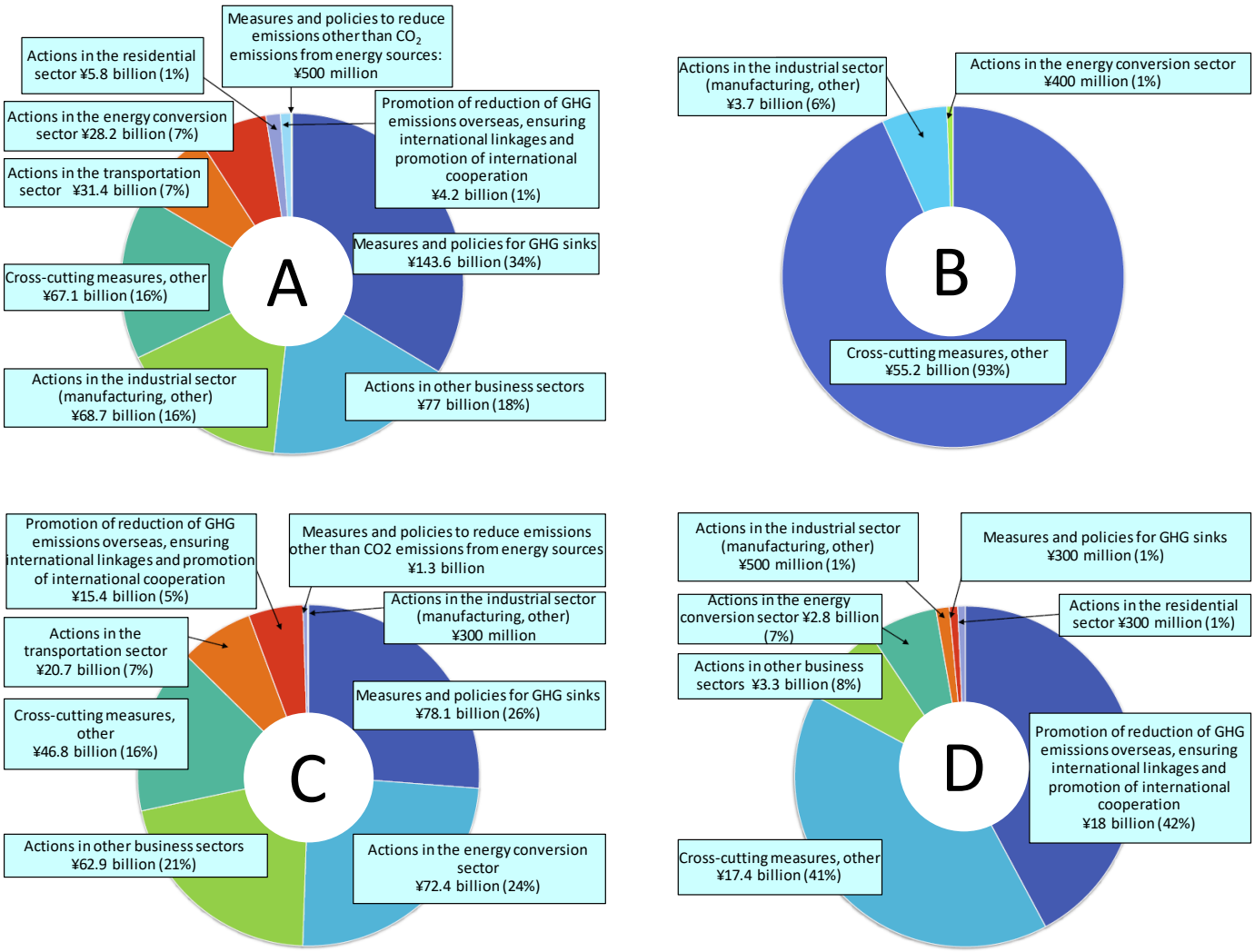


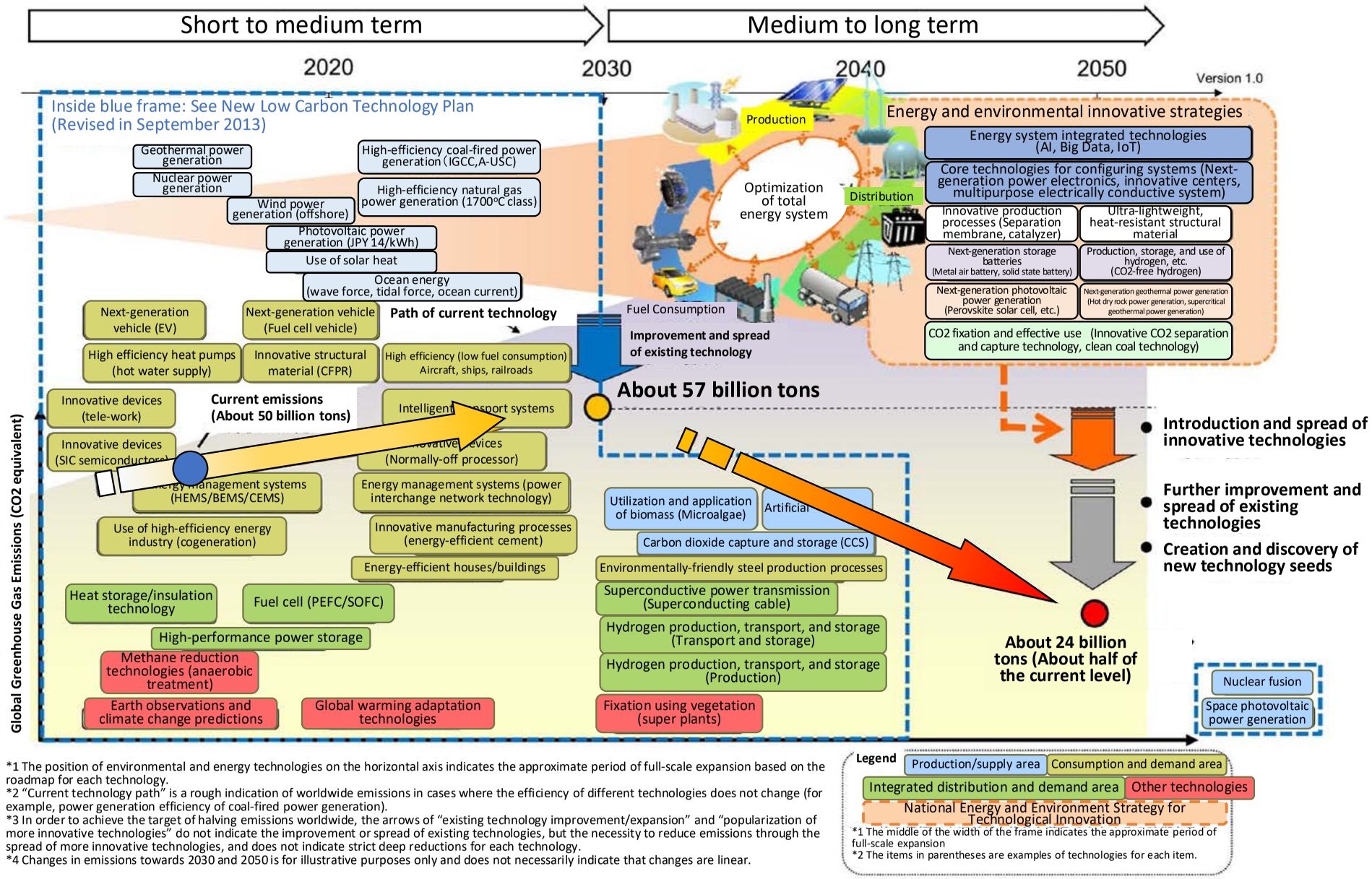
Fig. 10. Breakdown of FY 2018 draft budget for global warming countermeasures by target sector

A: Effective in reducing greenhouse gas emissions by 2030
B: Effective in reducing greenhouse gas emissions after 2030
C: Contributes to reducing greenhouse gas emissions based on other results
D: Basic measures, etc.

Source: Ministry of the Environment, "FY 2018 draft budget for global warming countermeasures

4) Future direction of climate change countermeasures in Japan

At the same time that the Plan on Global Warming Countermeasures (2016) was formulated, the Innovative Energy Strategy, a strategy to achieve an energy mix looking ahead to 2030, and the National Energy and Environment Strategy for Technological Innovation, a strategy on the development of innovative technologies with a focus on 2050, were also being formulated. In the future, the energy industrial revolution and climate change countermeasures will be integrated through the promotion of energy savings, energy creation, and energy storage, as well as the introduction of the most up-to-date technologies (Fig. 11). By creating smart cities with the use of the latest technologies of artificial intelligence (AI) and the Internet of Things (IoT), an environment will be created in the future that can contribute to the development of climate change countermeasures through the creation of comfortable lifestyles by optimizing systems with measures that involve the concept of "restraint" or the conscious reduction of conventional activities. However, in order to introduce and disseminate the latest technology in the everyday environment, there must be consistency with existing local master plans, and understanding, agreement, and cooperation with residents. It should be remembered that awareness raising activities for the public and cooperation with local governments and businesses must be continued, as before.



*1 The position of environmental and energy technologies on the horizontal axis indicates the approximate period of full-scale expansion based on the roadmap for each technology.
*2 "Current technology path" is a rough indication of worldwide emissions in cases where the efficiency of different technologies does not change (for example, power generation efficiency of coal-fired power generation).
*3 In order to achieve the target of halving emissions worldwide, the arrows of "existing technology improvement/expansion" and "popularization of more innovative technologies" do not indicate the improvement or spread of existing technologies, but the necessity to reduce emissions through the spread of more innovative technologies, and does not indicate strict deep reductions for each technology.
*4 Changes in emissions towards 2030 and 2050 is for illustrative purposes only and does not necessarily indicate that changes are linear.

Fig. 11. Image of global reductions of greenhouse gas emissions by 2050

Source: Cabinet Office, 2016. National Energy and Environment Strategy for Technological Innovation towards 2050 (NESTI2050).

3. Climate Change Countermeasures by Local Governments in Japan

1) Roles of local governments

The responsibilities and basic roles of local governments in the development and implementation of climate change countermeasures are stipulated in both the Act on Promotion of Global Warming Countermeasures and the Plan on Global Warming Countermeasures (Table 6). Basically, local governments must formulate "action plans" either alone or in cooperation with multiple local governments, make efforts to control emissions from businesses through the active introduction of energy-saving equipment, provide support in disseminating information needed to encourage actions by local businesses and residents, and in cases where authorized, cooperate with measures developed by the national government through supervision and guidance, all taking local conditions into consideration. Of these, the formulation of action plans is mandatory as prescribed in Article 21 of the Act on Promotion of Global Warming Countermeasures. Under this act, various measures will be promoted by local governments themselves or in cooperation with local stakeholders. In the most recent revision to the Act on Promotion of Global Warming Countermeasures, it is now possible for multiple local governments to jointly formulate action plans (local area policies) and for several local governments to cooperate in taking measures across a wide area, such as promoting the use of public transportation that crosses over areas. The "consolidation of urban functions" and "promotion of the use of low-carbon items for daily use" are also clearly stated in the Plan on Global Warming Countermeasures, and it was decided that local governments will work together with the national government to promote the development of compact cities and strengthen public campaigns (Fig. 12). In this way, a foundation is being put into place to solve social problems while also simultaneously promoting climate change countermeasures.

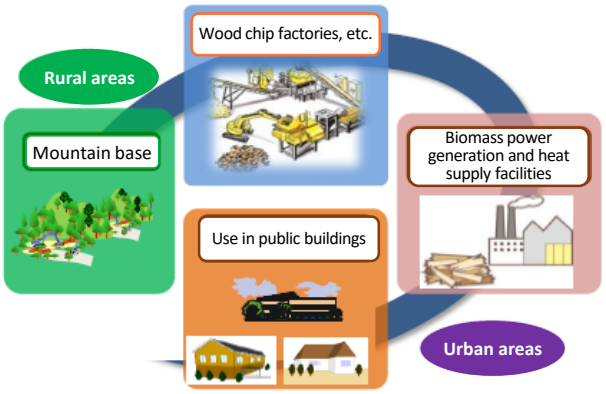
In the manual published by the MOEJ to support the formulation of action plans by local governments, "future modalities of global warming countermeasures in local areas" are shown as follows (Box 4).

Table 6. Role of local governments in climate change countermeasures

Stake-holder	**Responsibility** (Act on Promotion of Global Warming Countermeasures)	**Basic Role** (Action Plans)
Local governments	• Promote measures to control GHG emissions in accordance with the natural and social conditions of the local area • Control GHG emissions from business activities • Measures to promote activities by local businesses and residents, such as activities to control GHG emissions	• Promote policies in accordance with natural and social conditions of the local area • Measures related to local government activities and projects • Matters that are expected to be addressed by prefectures, in particular (Measures to collect information on good practices of actions in municipalities under its jurisdiction and promotion of the expansion of these activities to other municipalities, measures such as technical advice and support for human resources development to municipalities that have difficulty with initiatives based on the formulation/revision of action plans and similar plans of local governments)

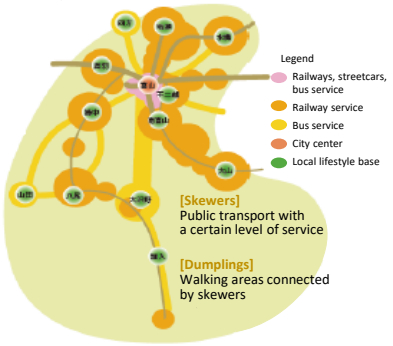
Source: Act on Promotion of Global Warming Countermeasures, Action Plans on Global Warming Countermeasures (2016)

(Example)
Promotion of the utilization of biomass resources across municipalities
Municipalities in urban areas with a certain level of financial independence invite investment from residents and partner with municipalities in rural areas to set up biomass power generation projects, invest in the introduction of power generation facilities and are supplied with power.



(Example)
Concentration of urban functions
Various urban functions, such as residential, commercial, and business, will be concentrated through the revitalization of public transport and the promotion of relocating from detached houses to apartment housing.

Example: Urban structure of "dumplings and skewers" targeted by Toyama City
City development that allows the functions needed for daily life to be used without the use of automobiles by connecting "dumplings = walking areas (local lifestyle bases)" with "skewers = public transportation".



Phase II Toyama City Center Revitalization Basic Plan (Summary)

Fig. 12. Examples of promoting global warming countermeasures by local governments at the local level

Source: Overview of the draft legislation to partially revise the Act on Promotion of Global Warming Countermeasures, MOEJ

Box 4: Future modalities of global warming countermeasures in local areas

<Pursuit of co-benefits>

- Global warming countermeasures at the local level are not only formulated to achieve reductions in greenhouse gas emissions. Countermeasures will also contribute to solving various issues concerning regional revitalization, population decline, industrial promotion, disaster prevention, and health, and have the potential to benefit residents and businesses.
- Global warming countermeasures are positioned within the future image of the area and are based on socioeconomic conditions and technological trends. These countermeasures should also consider the economic and social benefits that can be pursued by local governments, together with co-benefits, that is, the reduction of greenhouse gas emissions.
- In addition, policies in other related sectors should be reviewed from the perspective of global warming countermeasures, aiming at effective cooperation.

<PDCA where efforts are visible>

- Greenhouse gas emissions in local areas are also influenced by a variety of external factors. In some cases, it is difficult to grasp the reduction effects from individual measures.
- Therefore, it is effective to set figures for final energy consumption and renewable energy to be introduced as planned targets, not only a target of reducing the total amount of greenhouse gases.
- Indicators to evaluate progress should also be set for individual measures, not only for reduction effects, and the PDCA cycle should be carried out even within the government to make efforts visible to residents as well.
- In order to raise the interest of local stakeholders, including residents, and to motivate activities, communication is important so that information can be passed on in such a way that progress (achievements and challenges) can be visualized in an easy to understand way.

<Strategic partnerships>

- Global warming countermeasures should not only be taken by the environmental sector, but by all levels of government, including related sectors. The participation and collaboration of stakeholders outside of the government (residents, businesses, financial institutions, private organizations, other local governments, etc.) are also essential.
- Strategic cooperation is preferred in all phases of regional measures and policies, from planning and implementation to assessment and improvement.
- It is important to divide the roles of prefectures and municipalities based on their respective characteristics, with prefectures developing wide-ranging rules and providing support to municipalities, and municipalities focusing on supporting projects close to home and public awareness of residents.

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0.

2) Overview of action plans of local governments in the development and implementation of global warming countermeasures

There are two kinds of action plans that must be formulated by local governments under Article 21 of the Act on Promotion of Global Warming Countermeasures: administrative work and projects of the local government itself (administrative operations) and activities in the entire administrative area (local area policies) (Fig. 13). All local governments are required to formulate administrative work and projects. However, only municipalities of a certain size or larger are required to formulate local area plans. Other municipalities are only required to make an effort to formulate these plans.

Information contained in each of these plans include common matters concerning the period, target, and implementation of the plan, as well as other points that must be implemented. Other information related to measures to be promoted will be covered by local area policies, after further consideration of natural and social conditions of the region. Table 7 shows the actions that national governments expect local governments to take.

In light of the aim of global warming countermeasures, the overall target for these actions plans is the reduction of total GHG emissions. However, it is conceivable for targets to be set to supplement this based on local conditions, such as GHG emissions intensity targets, final energy consumption reduction targets, and targets for the introduction of renewable energy.

Typical frameworks and components of local area policies are shown in Table 8. However, changes to the name of the plan, integrating both action plans, and the inclusion of adaptation measures are at the discretion of each local government, including the volume of the plan itself.

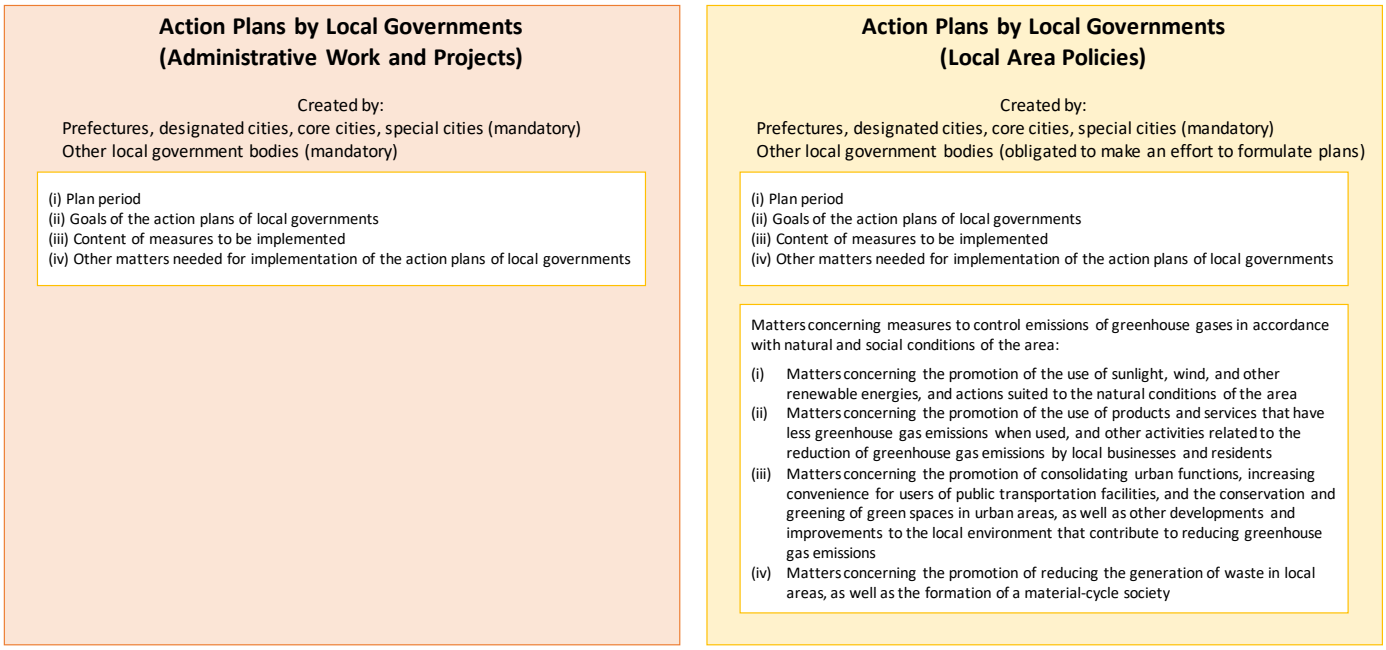


Fig. 13. Obligations for local governments when formulating action plans and information contained in each action plan

Source: Created by the authors based on the Act on Promotion of Global Warming Countermeasures

Table 7. Examples of measures that are expected to be carried out by local government bodies

(i) Matters concerning the promotion of the use of sunlight, wind, and other renewable energies, and actions suited to the natural conditions of the area

○ Expand the use of renewable energy power and renewable energy heat
○ Promote energy-saving and energy-creation measures in sewerage systems
○ Promote energy-saving and renewable-energy measures in waterworks
○ Introduce waste-to-energy projects at municipal waste incineration facilities
○ Promote the J-Credit Scheme

(ii) Matters concerning the promotion of the use of products and services that have less greenhouse gas emissions when used, and other activities related to the reduction of greenhouse gas emissions by local businesses and residents

CO_2 from energy sources
○ Promote the introduction of facilities and equipment with high energy-saving performance
○ Expand chemical recycling of waste plastic at steelworks
○ Promote the introduction of facilities and equipment with high energy-saving performance in protected horticulture, agricultural machinery, and fisheries
○ Cooperate in energy-saving efforts among industries
○ Promote compliance with energy-saving standards for new buildings and energy savings in buildings (renovations)
○ Spread the use of highly efficient energy-saving equipment in operations and other sectors
○ Introduce refrigerant management technologies
○ Improve energy-saving performances of equipment through the top runner system, etc.
○ Implement total energy management in the business sector through the use of BEMS and energy-saving diagnoses, etc.
○Expand the use of energy in the entire region
○ Promote energy-saving and energy-creation measures in sewerage systems
○ Promote energy-saving and energy-creation measures in waterworks
○ Promote sorted collection and recycling of plastic containers and packaging
○ Promote compliance with energy-saving standards in new housing and the renovation of insulation in existing housing
○ Expand the use of highly efficient energy-saving equipment in the household sector
○ Develop energy-saving septic tanks
○ Implement total energy management using HEMS and smart meters
○ Expand the use of next generation vehicles and improve fuel economy
○ Advance the greening of automobile transportation activities by promoting the use of environmentally-friendly vehicles, etc.
○ Promote the use of public transportation
○ Improve efficiency of truck transportation
○ Promote joint delivery
○ Promote comprehensive measures for greening of shipping
○ Promote a modal shift to railway freight transport
○ Reduce shipment distance by land for cargo through the optimal selection of ports
○ Comprehensive low-carbon development in ports (promotion of a modal shift for waste distribution, promotion of transport efficiency)
○ Use of special zoning systems for structural reforms related to global warming countermeasures in the transport sector
○ Expand the use of renewable energy power and renewable energy heat
CO_2 from non-energy sources
○ Expand the use of mixed cement
○ Expand the use of biomass plastics
○ Reduce the volume of incinerated waste
CH4/N2O-related
○ Reduce methane emissions in rice paddies
○ Adopt semi-aerobic landfill structures at final disposal sites for industrial waste
○ Reduce dinitrogen oxide from fertilizer
4 gases, including CFC substitutes
○ Promote non-CFC/low GWP (global warming potential) in gas/product manufacturing areas
○ Prevent leakage of CFCs when using refrigeration/air conditioning equipment for commercial use
○ Promote the recovery of CFCs when disposing of refrigeration/air conditioning equipment for commercial use
Cross-cutting measures
○ Promote the J-Credit Scheme
○ Promote the thorough implementation of Cool Biz and Warm Biz and replacement of equipment, and use lighting efficiently
○ Promote eco-driving and car sharing

(iii) Matters concerning the promotion of consolidating urban functions, increasing convenience for users of public transportation facilities, and the conservation and greening of green spaces in urban areas, as well as other developments and improvements to the local environment that contribute to reducing greenhouse gas emissions

CO_2 from energy sources
○ Promote energy-saving initiatives among industries
○ Expand area use of energy
○ Promote energy-saving and energy-creation measures in sewerage systems
○ Promote energy-saving and energy-creation measures in waterworks
○ Introduce waste-to-energy at municipal waste incineration facilities
○ Expand the use of next-generation cars and improve fuel economy
○ Promote traffic flow measures
○ Promote the use of public transportation
○ Improve efficiency of truck transport: Promote use and improve roads to support the increase in vehicle size
○ Reduce shipment distance by land for cargo through the optimal selection of ports
○ Comprehensive low-carbon development in ports (promotion of a modal shift for waste distribution, promotion of transport efficiency)
CO_2 from non-energy sources
○ Expand the use of mixed cement
CH4/N2O-related
○ Adopt semi-aerobic landfill structures at final disposal sites for municipal waste
○ Adopt semi-aerobic landfill structures at final disposal sites for industrial waste
○ Promote the advancement of incineration at sewage sludge incineration facilities
GHG sinks
○ Promote forest sink countermeasures
○ Promote urban greening
Cross-cutting countermeasures
○ Promote J-Credit Scheme

(iv) Matters concerning the promotion of reducing the generation of waste in local areas, as well as the formation of a material-cycle society

CO_2 from energy sources
○ Expand chemical recycling of waste plastic at steelworks
○ Promote energy-saving and energy-creation measures in sewerage systems
○ Promote sorted collection and recycling of plastic containers and packaging
○ Introduce waste-to-energy at municipal waste incineration facilities
○ Develop energy-saving septic tanks
○ Comprehensive low-carbon development in ports (promotion of a modal shift for waste distribution, promotion of transport efficiency)
CO_2 from non-energy sources
○ Expand the use of mixed cement
○ Expand the use of biomass plastics
○ Reduce the volume of incinerated waste
CH4/N2O-related
○ Reduce the volume of waste sent to final landfill
○ Adopt semi-aerobic landfill structures at final disposal sites for municipal waste
○ Adopt semi-aerobic landfill structures at final disposal sites for industrial waste
○ Promote the advancement of incineration at sewage sludge incineration facilities
Cross-cutting countermeasures
○ Promote J-Credit Scheme

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0.

Table 8. Example of configuration of local area policies

Framework Example	Component Example
① Basic matters, background, and significance of formulating local area policies	• Background and significance of formulating local area policies • Area features (natural and social conditions and features of each stakeholder, etc.) • Plan period • Promotion system
② Estimates and factor analysis of greenhouse gas emissions	• State of greenhouse gas emissions in the area
③ Overall targets of plan	• Targets for local area policies
④ Countermeasures and policies on controlling greenhouse gas emissions, etc.	• Countermeasures expected for each stakeholder in the area • Countermeasures to be implemented by local governments
⑤ Implementation of local area policies and management of progress	• Implementation of local area policies and management of progress

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0.

3) Process of formulating local area policies

The typical process of formulating action plans that cover the entire area is shown in Fig. 14. The time series includes the organization of basic information, examination of systems, estimates of GHG emissions, setting targets for the overall plan, proposing countermeasures and policies, and announcing plans.

In order to connect a plan to actual implementation, consensus needs to be formed within the local government itself and related stakeholders outside the government from the planning stages, as shown in the figure. Local governments can set up "Councils for Action Plans of Local Governments" for the purpose of coordinating consultations related to the formulation of the action plan and implementation under the Act on Promotion of Global Warming Countermeasures (Box 5). Through these councils or by inviting public comments via the Internet, local governments can build consensus with local residents and related stakeholders. It is also important to improve systems within the government. Municipalities are setting up cross-departmental organizations and working groups to carry out studies by sector.

Fig. 15 provides examples of local governments in Japan that have innovated ways to build consensus both within and outside the government.

Box 5: Council members

- Planners (Prefectures and designated cities, etc.)
- Related administrative organizations
- Related local governmental bodies
- Promoters of global warming activities[16]
- Regional Centers for Climate Change Actions[17]
- Business operators
- Residents
- Stakeholders to promote measures in other areas
- Academic experts, etc.

Source: Act on Promotion of Global Warming Countermeasures, Article 22

[16] Persons who promote global warming countermeasures in local areas that have been commissioned by the prefectural governor and heads of designated cities, etc. (Act on Promotion of Global Warming Countermeasures, Article 37

[17] Groups that promote global warming countermeasures in local areas that have been commissioned by the prefectural governor and heads of designated cities, etc. (Act on Promotion of Global Warming Countermeasures, Article 38)

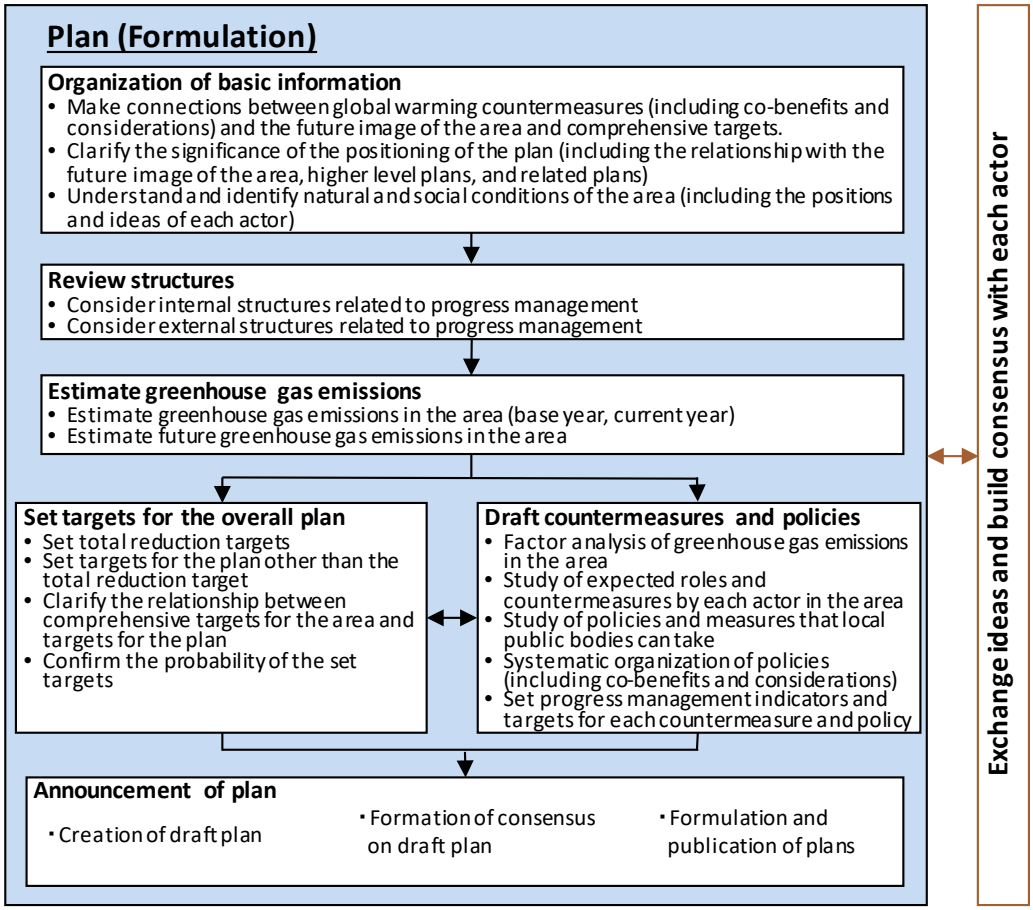


Fig. 14. Example of the process of formulating local area policies

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0.

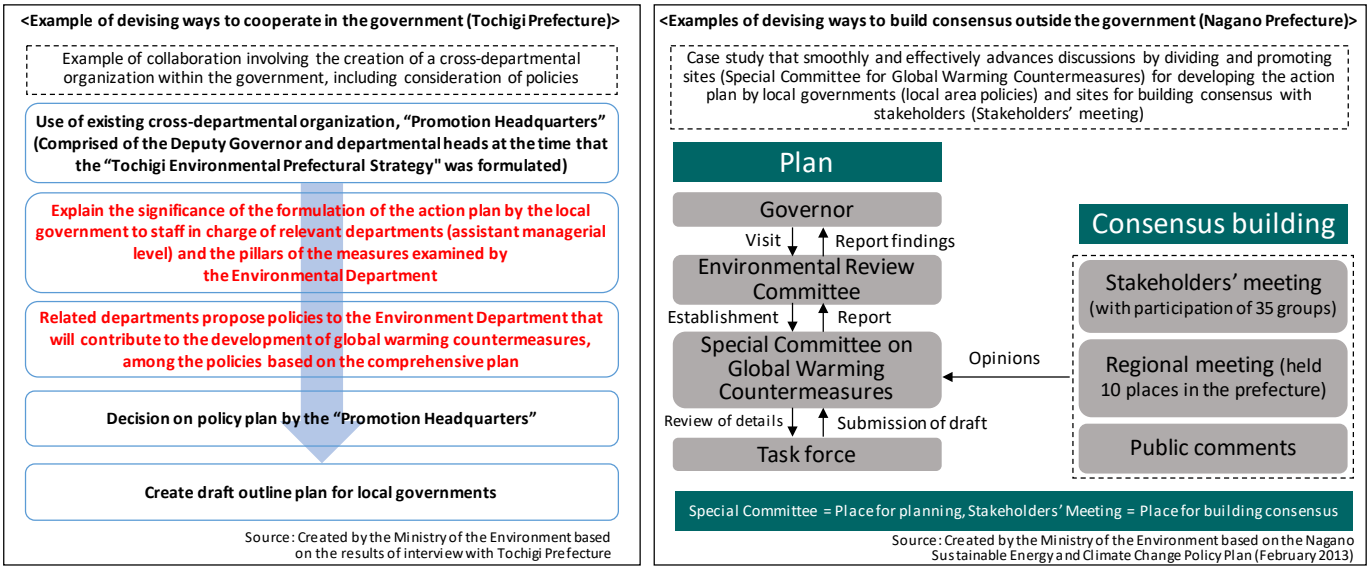


Fig. 15. Example of building consensus within and outside the government (Tochigi and Nagano prefectures)

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0.

4) Overall perspective of PDCA in local area policies

In action plans for global warming countermeasures, emphasis is placed on the evaluation and review process (PDCA) as the basic idea behind climate change countermeasures. In the PDCA process, there are evaluations and reviews that are conducted each fiscal year in the PDCA process, as well as those that are conducted throughout the period of the plan (Fig. 16). Local governments are required to collaborate with related stakeholders to confirm the progress of activities and promote improvements, but it is also necessary to consider these points during the plan formulation stage (Refer to "Review structures" in Fig. 14).

Based on Article 21, paragraph 10 in the Act on Promotion of Global Warming Countermeasures, local governments publish the implementation status of measures and policies based on the action plan (including total GHG emissions) annually. Many local governments disclose information on their own websites.

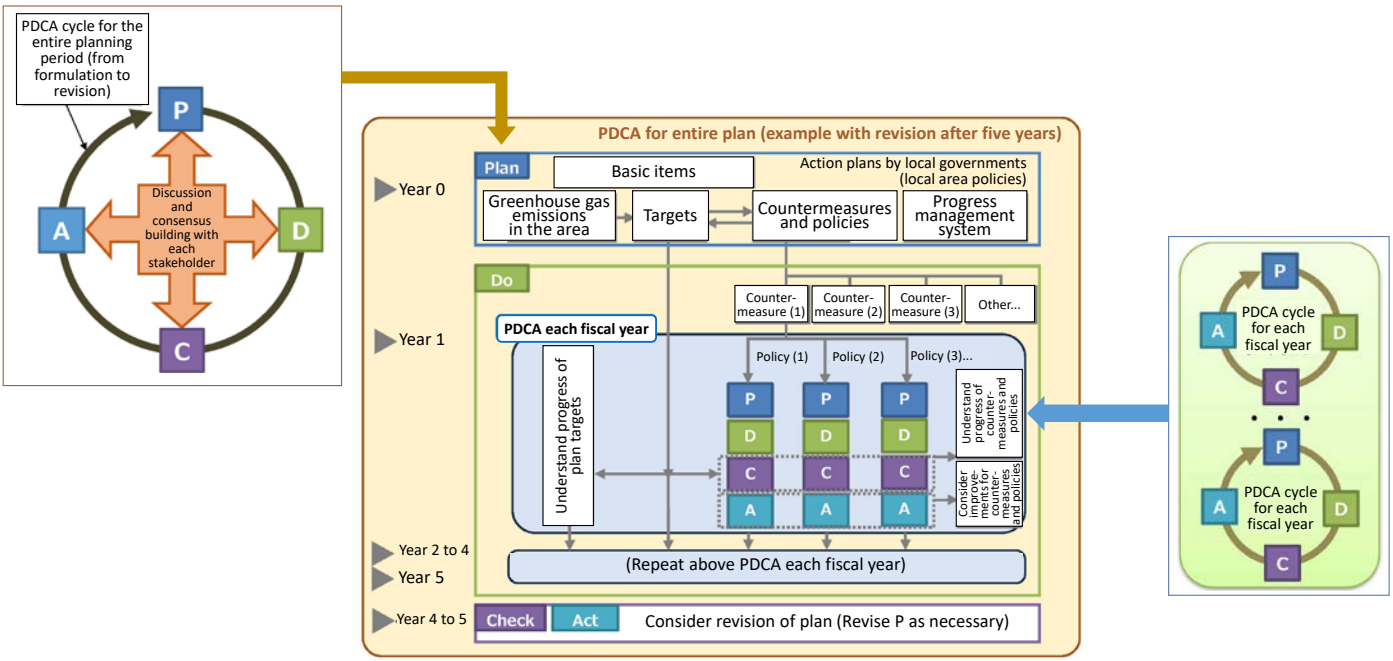


Fig. 16. Perspective of PDCA in local area policies (when reviewed in five years)

Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation. Ver. 1.0. (Partial revision)

5) Current state of the formulation of action plans by local governments

Over 80% of municipalities have already formulated administration work and project plans, which is mandatory for all municipalities. When looking only at those municipalities that are required to formulate local area policies, we can see that all municipalities are developing plans.[18] Local governments that have not yet formulated these plans face issues such as a lack of staff, lack of expert knowledge, and difficulty in securing budgets for countermeasures to be included in the plan. In response to technical issues, the MOEJ has set up a support site, where various manuals and tools are available.[19] Workshops, such as "Local Low-Carbon Schools",[20] are also held so that staff members can take part and efforts are being made to improve capacity through the exchange of information among the parties concerned.

As of August 2016, there are only 23 cities[21] that are required to formulate "Low-Carbon City Development

[18] As of October 2016, 1,475 groups (82.5%) out of 1,788 prefectures and municipalities have formulated administrative work and project plans. Of the 104 groups that are required to formulate local area policies, 103 (99%) have already formulated plans. However, when looking at all local government bodies, the percentage that have formulated plans remains at 27.9%. Source: EX Research Institute Ltd. FY 2016 Survey on the state of legal enforcement of the promotion of global warming countermeasures by local governments: Report on study results. Commissioned by the Environmental Policy Bureau, MOEJ in FY 2016. Published in March 2017.

[19] MOEJ. Website supporting the formulation of action plans by local governments: http://www.env.go.jp/policy/local_keikaku/index.html

[20] Workshop on Global Warming Countermeasures organized by prefectures. Targets include municipal officials under jurisdiction.

[21] Website of the Ministry of Land, Infrastructure and Transport: http://www.mlit.go.jp/toshi/city_plan/eco-machi-case.html

Plans" (target group: municipalities) under the Eco-City Act. However, since 2016, action plans also refer to policies from city development that have been incorporated as elements in these plans (Fig. 13).

6) Eco-Model Cities/FutureCities・SDGs Future Cities

Local governments should formulate voluntary climate change policies that simultaneously bear in mind solutions for local issues, rather than promoting climate change countermeasures only in response to legal obligations or in cooperation with national policies. In response to proposals from regions, the Japanese government has been promoting the FutureCity Initiative since 2008 after its approval as a mechanism to support these activities. The outline and scheme of the FutureCity Initiative are as shown in Fig. 17 and Fig. 18, respectively. By promoting the Eco-Model City and FutureCity initiatives (Table 9) together, cities and regions can create sustainable economic and social systems at an early stage, forming the ideal of the FutureCity concept.

By 2013, 23 cities had been recognized as Eco-Model Cities, and in 2011, 11 cities were approved as FutureCities. Four cities have the distinction of being approved as both Eco-Model Cities and FutureCities: Shimokawa Town, Toyama City, Yokohama City, and Kitakyushu City.

The Japanese government's SDGs Future Cities initiative was launched in 2018. A total of 29 municipalities, including Kitakyushu City and Hiroshima Prefecture, were selected as a part of this initiative (Fig. 19). Of these 29 municipalities, ten local governments were also recognized as model projects promoting the achievement of synergistic effects within the three dimensions of the environment, society and economy.

In this way, climate change countermeasures that are regionally autonomous and creative can be promoted, with the provision of a mechanism for the national government to promote plans for policies proposed by regions.

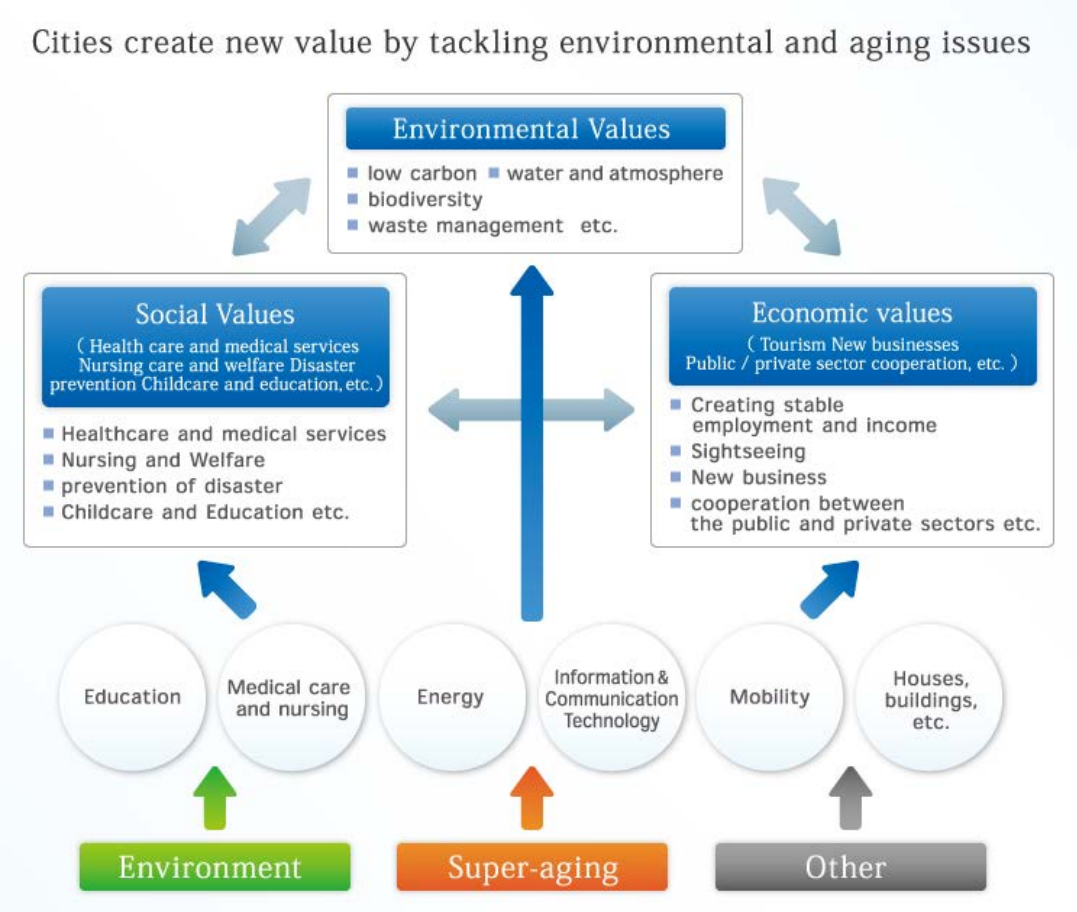


Fig. 17. Concept of "FutureCity" Initiative

Source: Future City Eco Model City Homepage

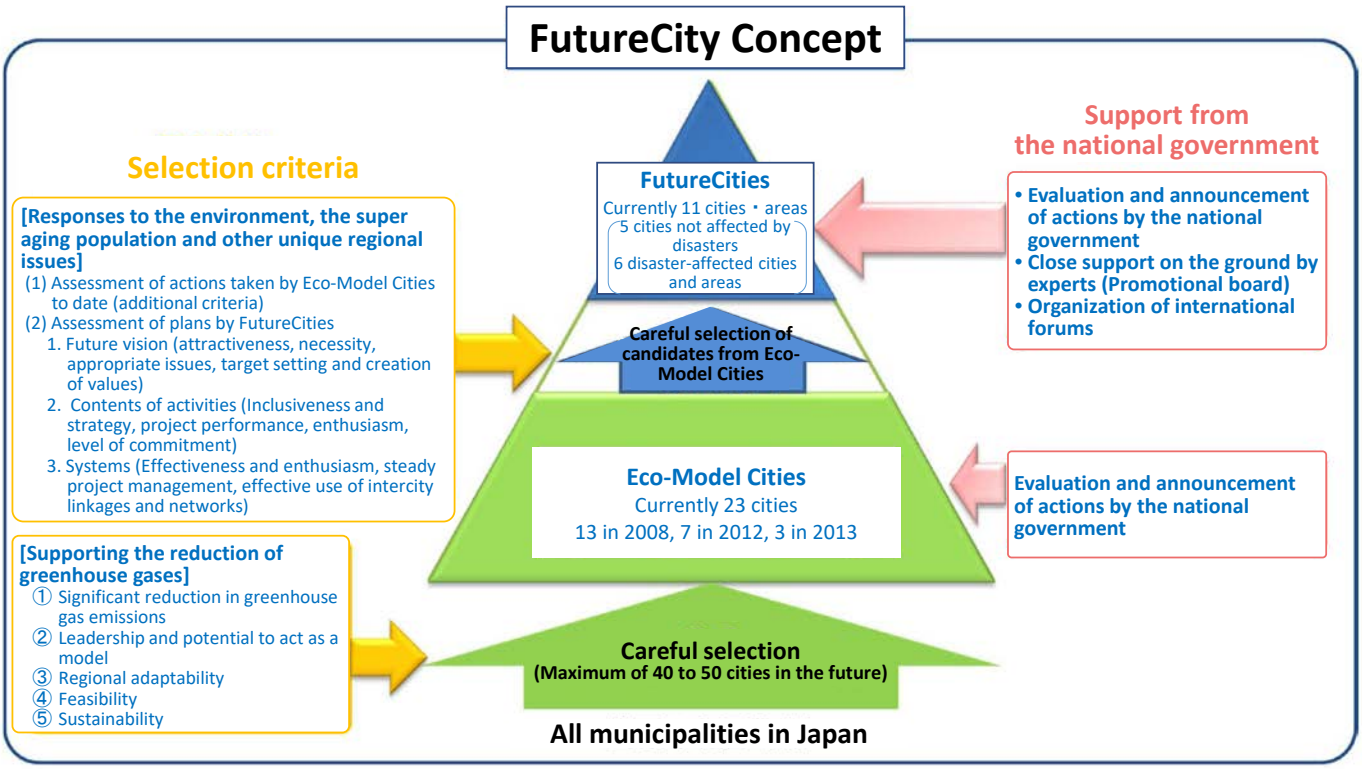


Fig. 18. Scheme of "FutureCity" Initiative

Source: Future City Eco Model City Homepage

Table 9. Description FutureCity and Eco-Model City and selected cities

Future City	The Japanese Government has been promoting the FutureCity Initiative in anticipation of the future worldwide trend toward urbanization. The aim is to create the urban city and community with the sustainable economic and social system that can respond to the issues of aging and the environment. Once a city is chosen as a FutureCity, to be a community to meet the shared human challenges of the environment and aging, it will develop pioneering projects to realize the dream of a community that is continuously creating environmental, social and economic values, a community everyone wants to live, and a community where everyone is empowered.	Selected cities: Shimokawa, Kashiwa, Yokohama, Toyama, Kitakyushu, Kesen Area, Kamaishi, Iwanuma, Higashimatsushima, Minamisouma, Shinchi
Eco-Model City	The Eco-Model City has been promoted since 2008. This low carbon city is promoted as a part of the same initiative and supports the foundation of the FutureCity Initiative. The government has selected as Eco-Model Cities those cities that are working on high but achievable goals, making pioneering efforts to realize the low-carbon society. This is to clearly show the low-carbon society in practice that Japan should aim at in the future. The first thirteen cities were selected in 2008. After the Great East Japan Earthquake in 2011, energy issues received close attention. Seven cities were selected in 2012 and three cities in 2013 to promote the effort to realize a low-carbon society nationwide. Each of these communities is making maximum use of local resources and taking a crosscutting approach that goes beyond stakeholder boundaries to establish local models for carbon reduction and sustainable development.	Selected cities: Shimokawa, Obihiro, Tsukuba, Chiyoda, Yokohama, Niigata, Toyama, Iida, Mitake, Toyota, Kyoto, Sakai, Amagasaki, Kobe, Nishiawakura, Matsuyama, Yusuhara, Kitakyushu, Minamata, Miyakojima, Oguni, Niseko, Ikoma

Source: Concept of “FutureCity” Initiative

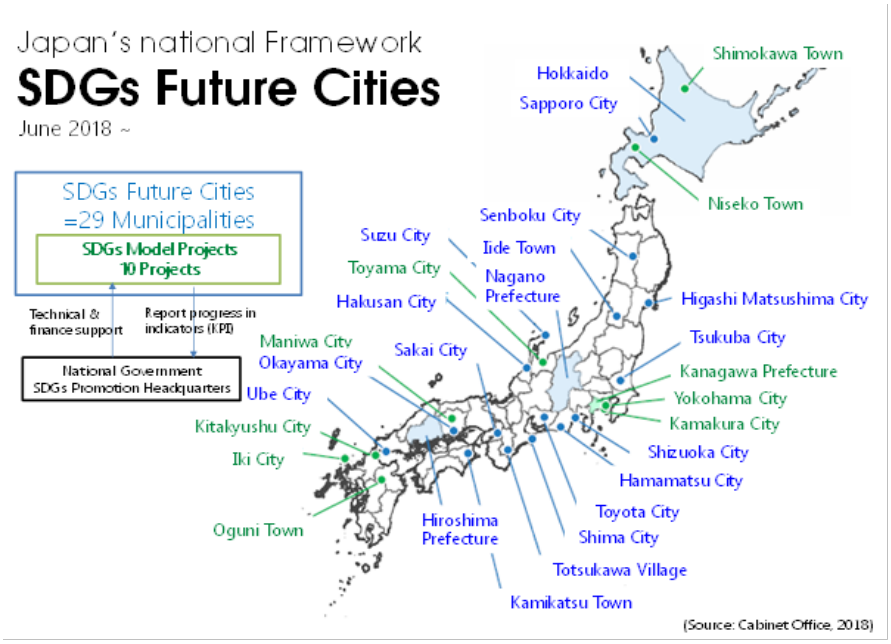


Fig. 19. 29 municipalities selected as SDGs Future Cities

7) Ordinances related to local climate change countermeasures

Local municipalities in Japan must promote climate change countermeasures by legally formulating and implementing action plans. However, some local governments have established ordinances and are promoting their own actions. Kyoto City was the first in the nation to establish the "Kyoto City Code of Global Warming Countermeasures," in 2004. Since then, municipalities that have established similar regulations have increased in number, reaching 33 as of the end of 2012 (17 prefecture, 12 cities, 2 wards, 2 towns) (Fig. 20). These actions are not only limited to large cities; smaller municipalities have also enacted ordinances and there are a wide range of municipalities that are focusing on climate change. In recent years following the adoption of the Paris Agreement, ordinances that have been labeled as focusing on decarbonization, such as the "Tokushima Prefecture Ordinance to Promote Climate Change Countermeasures to Achieve a Carbon-Free Society" (effective on January 1, 2017), are also being enacted.

Different local governments are reflecting the elements of climate change countermeasures in ordinances in other areas, and in reality, more municipalities are moving ahead with their own countermeasures.

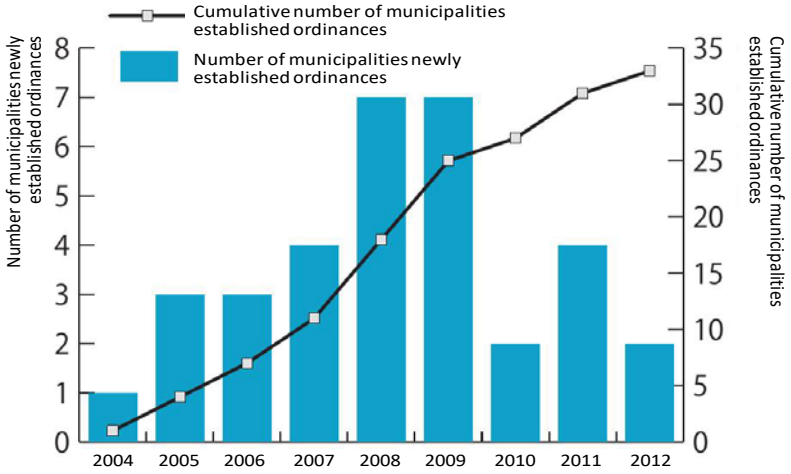


Fig. 20. Number of municipalities that have established ordinances with a special focus on climate change countermeasures
Source: Kiko Network Homepage

The significance of the establishment of ordinances by local governments is outlined below.

- Clarification of intentions to resolve local issues and proactively promote global warming countermeasures that will revitalize the region
- Ensure that activities will continuously be carried out by clarifying the future image (vision) of the area, purpose and targets of countermeasures, implementation areas, countermeasure menus, and methods to manage progress
- Shared understanding among diverse stakeholders in the region to create a regional network for global warming countermeasures through repeated discussions during the process of formulating ordinances
- Set rules that are unique to local governments, impose obligations and offer rights to certain stakeholders

Although there are various measures that can be positioned in ordinances (Table 10), there are a number of cases in which local business operators are required to submit GHG emission reduction plans and reports on the status of implementation. As of March 2017, 30 prefectures, eight designated cities, and four cities have introduced their own reporting systems.[22] Some systems target the same business operators as the reporting system under the Act for Promotion of Global Warming Countermeasures, while others target business operators that are not subject to regulations, such as SMEs. In either case, these systems are used to gain an understanding of the state of emissions by local business operators and form the foundation for communication to consider countermeasures for the future.

Table 10. Local climate change countermeasures stipulated under ordinances

Activity	Details
Reporting system	System for businesses to formulate plans to reduce GHG emissions, systems to formulate plans to improve building environments
Automobiles	Use of public transportation, idling stop, use of low-emission vehicles, automobile environmental plans, considerations for business commutes, information dissemination environment for retailers
Electrical machinery and apparatus	Use of low-emission equipment, provision of information on energy-saving performance, etc.
Use of renewable energies	—
Controlling waste generation	—
Promotion of environmental education, etc.	—
Forest protection and improvement	—
Other	Promotion of greening, reduction in the number of plastic bags used, green purchasing, certification, subsidies

8) Budgetary measures for activities by local governments

Since October 2012, the Japanese government has applied exceptions (additional) to oil and coal tax rates for global warming countermeasures.[23] This tax revenue is being applied to countermeasures to control CO_2 emissions from energy sources under a special energy account. With the enforcement of these exceptions, discussions on mechanisms to secure local revenue sources have stalled and have yet to materialize, despite requests by the National Governors' Association, Japan Association of City Mayors, and the National Association of Towns and Villages to secure resources for the roles local governments play in formulating countermeasures to control CO_2 emissions from energy sources.[24] However, in collaboration with other ministries and agencies, the MOEJ is carrying out subsidy projects for local governments and private companies under the special energy account (Table 11). The size of the budget for 2018 is about ¥120 billion, of which a budget of ¥53 billion has been applied to local governments. Local governments use these subsidies to promote regional climate change countermeasures and to build the capacity of their staff.

[22] Website on the calculation, reporting, and disclosure system for greenhouse gas emissions "Refer to related systems"
[23] Website of the Agency for Natural Resources and Energy: Coal policies
[24] Prefectural Tax Policy Division, Local Tax Bureau, Ministry of Internal Affairs and Communications, Explanatory materials on securing financial resources for local global warming countermeasures, November 4, 2016

Table 11. Projects for local governments or private organizations (subsidy projects)

Project Name
Development of net-zero energy buildings (ZEB) in business facilities and promotion of CO_2 emission reductions (Partially carried out as a collaborative project by the Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Health, Labor and Welfare, Ministry of Internal Affairs and Communications)
Support for improving efficiency of equipment and facilities
Development of independent and distributed energy system using hydrogen
Accelerated introduction of energy-saving natural refrigerating equipment for the early creation of a CFC-free and low-carbon society (Partially carried out as a collaborative project by the Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism)
Promotion of the introduction and expansion of L2-Tech (pioneering low-carbon technologies)
Promotion of diagnoses on potential to reduce CO_2 emissions
Promotion of low-carbon development of resource-circulation areas and Eco-Towns (Collaborative project by the Ministry of Land, Infrastructure, Transport and Tourism)
Promotion of the introduction of medium and large energy-saving *jokaso* (septic tank) systems
Development of plans to introduce renewable energy through the sustainable use of woody biomass resources (Collaborative project by the Ministry of Economy, Trade and Industry)
Promotion of the autonomous spread of renewable energy electricity and heat (Partially carried out as a collaborative project by the Ministry of Economy, Trade and Industry, Ministry of Agriculture, Forestry and Fisheries)
Improvement of carbon management in local public institutions
Model project for advanced CO_2 emission reduction countermeasures in public facilities
Promotion of the development of systems for low-carbon societies through the effective use of untapped resources, such as waste heat and spring water
Verification of thermal insulation performance of commercial facilities through the use of lumber] (Collaborative project by the Ministry of Agriculture, Forestry and Fisheries)
Promotion of global warming countermeasure actions in cooperation with local communities
Support for energy applications and low-carbon development measures in waste treatment facility projects
Improvement of facilities to promote low-carbon development and use of public transport facilities (Collaborative project by Ministry of Land, Infrastructure, Transport and Tourism)
Promotion of low-carbon development of social infrastructure using renewable energy and hydrogen (Partially carried out as a collaborative project by the Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism)
Accelerated introduction of green trucks and buses (Collaborative project by Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Economy, Trade and Industry)
Model projects installed in business entities promoting low-carbon development of the region under projects promoting low-carbon development using green bonds and local funds
Promotion of CO_2 emission reduction countermeasures in distribution sector (Collaborative project by Ministry of Land, Infrastructure, Transport and Tourism)
Creation of regional low-carbon development base formed around the action plans of local governments

Source: MOEJ, FY 2018 Subsidies and commissioned projects under the special account for energy countermeasures (pamphlet)

4. Examples of Climate Change Countermeasures by Local Governments in Japan

1) Climate change countermeasures based on local conditions

As described in the "future modalities of global warming countermeasures in local areas" (Box 3), local governments in Japan are expected to devise their own policies in consideration of the natural and social conditions of the region at the same time as climate change countermeasures. Here, the effects of co-benefits (secondary effects), outline of policies, background, and results obtained to date on policies that are independently promoted by local governments will be introduced.[25]

Tokyo Metropolitan Government (Population: 13,415,349)

Action	Tokyo Metropolitan Government's total emission reduction obligations and emissions trading system
Secondary effects	Environment (pollution), disaster prevention and crisis management, commerce and labor
Overview	● System introduced by TMG to raise the level of voluntary and systematic countermeasures for global warming by business operators and achieve reductions in the total CO_2 emissions in the city ● Development of basis on which global warming countermeasures can be rationally promoted by business operators with the imposition of obligations on business operators that are targeted by this system to reduce greenhouse gas emissions and allow them to procure reductions through emissions trading, in addition to their own reduction measures. ● Provisions in the "Ordinance on Environmental Preservation to Secure the Health and Safety of Citizens of the Tokyo Metropolitan Area"
Background	● CO_2 emissions from SMEs in the metropolitan area account for about 60% of all CO_2 emissions in the industrial and business sectors.
Achievements (Global warming countermeasures)	● 25% reduction of CO_2 emissions from target businesses (approximately 1,300) during the five-year period (2010-2014) ● 125 businesses implemented emissions trading to fulfil obligations (192,700 tons CO_2)

Activity	Energy-saving promotion tax system for SMEs: Environmental tax reduction system for the introduction of low-carbon facilities by SMEs
Secondary effects	Environment (pollution), disaster prevention and crisis management, commerce and labor
Overview	● When SMEs and individual business operators introduce energy-saving facilities/equipment that have been specified by the Tokyo Metropolitan Government, TMG deducts 1/2 of the purchase price for the equipment from the business tax (max. ¥20 million). Started in April 2009. ● Must submit "Report on Global Warming Countermeasures" under the Tokyo Metropolitan Government's scheme on emissions trading and obligations to reduce total emissions of greenhouse gases.
Background	● CO_2 emissions from SMEs in the metropolitan area account for about 60% of all CO_2 emissions in the industrial and business sectors. ● Compared to large companies, SMEs and individual business operators are not able to move ahead with energy-saving measures because they do not have sufficient capital to invest.
Achievements (Global warming countermeasures)	● In the cumulative total of reductions from 2010 to 2015, reductions and exemptions for the corporate enterprise tax amounted to about ¥1.16 billion. Reductions and exemptions for sole proprietorship taxes came to about ¥85 million.

[25] Source: MOEJ, 2017, Action Plans of Local Governments (Local area policies): Manual on formulation and implementation (Case studies, Ver. 1.0)

Action	Public-Private Partnership Renewable Energy Fund
Secondary effects	Disaster prevention and crisis management, commerce and labor, regional promotion and city development, administrative and financial reform
Overview	● TMG established the Public-Private Partnership Renewable Energy Fund in FY 2014 to promote the wide-area expansion and spread of renewable energies, as well as its introduction to the city. ● System in which TMG and private investors invested funds for capital, and the fund operating company invested and loaned the invested funds to renewable energy power generation projects in the metropolitan area and renewable energy power projects of TEPCO and Tohoku Electric Power under its jurisdiction. ● This is a project under the Long-term Vision for Tokyo
Background	● Promote specific actions as an environmentally-advanced city with the aim of expanding the use of renewable energies, promoting energy conservation and energy savings, and securing diversified energy sources.
Achievements (Global warming countermeasures)	● Nine projects are being implemented in one city and seven prefectures as of February 2016

Kawasaki City, Kanagawa Prefecture (Population: 1,459,768)

Action	Kawasaki Mechanism Certification System
Secondary effects	Environment (pollution), environment (waste), commerce and labor
Overview	● System introduced in 2013 as a mechanism to visualize contributions by companies in the city to reductions of greenhouse gas emissions outside of the municipal area with their environmental technologies and properly evaluate companies in the market, in order to promote a reduction in greenhouse gas emissions on a global scale, making use of the excellent environmental technologies of companies in Kawasaki City. ● The system is managed by the Low CO2 Kawasaki Brand Promotional Council, consisting of representatives from Kawasaki City and industrial support organizations since 2016
Background	● By creating a mechanism in which business operators that are contributing to the reduction of greenhouse gas emissions outside of the municipal area can be properly assessed in the market, it is possible to achieve a balance between reducing greenhouse gas emissions on a global scale and promoting industries in Kawasaki City by taking advantage of the environmental technologies of local business operators in Kawasaki.
Achievements (Global warming countermeasures)	● 18 contributions to reducing GHG emissions outside the municipal area were certified as of March 2017 ● Reduction of GHG emissions outside the municipal area in 2014 was 2.849 million t-CO2/year (equivalent to 9.8% of GHG emissions in Kawasaki City in 1990)

Sagamihara City, Kanagawa Prefecture (Population: 716,643)

Activity	Implementation of a planning system for SMEs that is not subject to national or prefectural systems
Secondary effects	Environment (pollution), disaster prevention and crisis management, commerce and labor
Overview	● Sagamihara City introduced a "System for Global Warming Countermeasure Plans" targeting SMEs that are not subject to systems run by the national government or Kanagawa Prefecture, in order to promote the development of systematic global warming countermeasures by business operators. ● Implemented from 2013 based on the "Sagamihara City Ordinance to Promote Global Warming Countermeasures" ● When preparing plans, it is essential to seek energy-saving diagnoses using the energy-saving advisory dispatch service. After a plan is submitted, SMEs can use subsidies to introduce equipment/facilities as a form of additional support.
Background	● Approximately 50% of the greenhouse gas emissions in the entire area are from the industrial and business sectors. Businesses with less than 20 employees account for 90% of the total number of businesses.
Achievements (Global warming countermeasures)	● 77 t-CO2 reduction is predicted for the years 2013-2017 (66 plans submitted) ● Use of subsidies from 2013 to 2016 has led to a reduction of 774 t-CO2/year (99 applications, 119 facilities/equipment introduced)

Shimokawa Town, Hokkaido (Population: 3,423)

Activity	Support for child care by promoting the use of energy from local resources (woody biomass)
Secondary effects	Agriculture, forestry and fisheries, education and culture, measures to mitigate population decline, commerce and labor, regional promotion and city planning
Overview	● Shimokawa Town promotes the introduction of woody biomass boilers into public facilities as part of plans to use local woody biomass resources as a source of thermal energy and use saved costs to support child care as a measure to revitalize the region.
Background	● About 90% of the town area (64,000 ha) is made up of forestland ● Advancing depopulation and increasing number of elderly (percentage of the population aged 65 and older: 38%)
Achievements (Global warming countermeasures)	● CO_2 emissions in 2012 decreased by 9.5% compared with 2008 (due to increased self-sufficiency ratio of local energy) ● CO_2 sinks in 2012 amounted to 14,306 t-CO_2 (certified by the J-Credit Scheme)

Iida City, Nagano Prefecture (Population: 104,247)

Activity	Promotion of support measures for the utilization of "regional environmental rights" based on ordinances
Secondary effects	Disaster prevention and crisis management, commerce and labor, regional promotion and city development
Overview	● In order to promote locally-led renewable energy projects in the area, Iida City established the "Iida City ordinance on the development of sustainable communities through the introduction of renewable energy." Revenue from projects is used to support regional issues.
Background	● Iida City has offered subsidies for the introduction of renewable energy to date, but with the introduction of a feed-in tariff scheme, the city realized that it should create sustainable communities by promoting the use of renewable energy in which the community could actively participate.
Achievements (Global warming countermeasures)	● Through the use of renewable energy, Iida City achieved reductions (20,000 t-CO_2 and higher) as of 2014 that greatly exceeded the targets for 2018 (17,477 t-CO_2) listed in the "2nd Iida City Environmental Model City Action Plan." ● Use of revenue from the sale of electricity for projects that can respond to challenges facing the region

Miyama City, Fukuoka Prefecture (Population: 39,084)

Activity	Regional revitalization through public-private partnerships in integrated energy services
Secondary effects	Measures to mitigate population decline, health and welfare, commerce and labor, regional promotion and city development
Overview	● Miyama City established Miyama Smart Energy with joint investment from private companies to expand the use of renewable energy, revitalize the local economy through the local production and consumption of energy, and create local employment to promote the supply of electricity generated with photovoltaic power generation facilities and biomass, etc. ● With the establishment of an energy company, Miyama City aims not only to offer a stable supply of inexpensive electricity, which is basic infrastructure for daily life, but to also provide daily life support services as an added value and respond to local challenges.
Background	● Participation in the "Large-scale HEMS Information Infrastructure Improvement Project" of the Ministry of Economy, Trade and Industry from 2014 and began introducing HEMS to 2,000 households in the city.
Achievements (Global warming countermeasures)	● Electricity demand to energy companies over a one-month period in August 2016 was 2,278 MWh (public and private facilities: 1,772 MWh, households: 506 MWh)

Kobe City, Hyogo Prefecture (Population: 1,547,850)

Activity	"Kobe Biogas": Effective utilization of digestion gas generated in the sewage treatment process
Secondary effects	Environment (waste), education and culture, disaster prevention and crisis management, commerce and labor, administrative and financial reform
Overview	● By purifying digestion gas with the aim of the 100% effective utilization of the anaerobic digestion gas generated from the sewage treatment process by Kobe City, selling it as fuel for automobiles, and supplying highly pure gas as city gas, Kobe City is contributing to the recycling of resources and energy and reduction of greenhouse gas emissions ● By effectively utilizing digestion gas, which is a typical resource from sewage, as locally produced and locally consumed energy not only in facilities, but also outside, Kobe City can control the generation of greenhouse gas emissions and also obtain income from the sale of gas.
Background	● In Kobe City, digestion gas generated in conventional sewage treatment processes has been used as fuel in boilers at treatment plants. However, due to impurities in digestion gas leading to the deterioration of equipment, about 30% of the amount of digestion gas generated was incinerated.
Achievements (Global warming countermeasures)	● CO_2 reductions: About 2,800 t-CO_2/year (2014)

Kyoto Prefecture (Population: 2,574,842)

Activity	"Kyoto CO_2 Emissions Trading System": Negotiated transaction-type regional emissions trading system
Secondary effects	Commerce and labor, regional promotion and city development
Overview	● This system is designed to trade credits created from activities by SMEs, businesses, NPOs, prefectural residents and the local community in the prefecture in order to allow Kyoto Prefecture to promote energy-saving measures by SMEs that are unable to move forward with greenhouse gas emission reductions in terms of funding and have difficulty creating credit through the national credit system. ● Purchased credits can be used to achieve targets of specified business operators in the "Emissions Reduction Planning, Reporting, and Disclosure System by Business Operators" run by Kyoto Prefecture, descriptions in CSR reports, and to sell carbon offset products.
Background	● Energy-saving measures for SMEs that are unable to promote the reduction of GHG emissions in terms of funding ● Development of forests, which account for three-quarters of the area of Kyoto Prefecture, that will be a source of GHG sinks ● Support for large-scale producers to achieve emission reduction targets through the use of credits ● Promote the use of company CSR and tourism products
Achievements (Global warming countermeasures)	● By the end of February 2017, 8,179 t-CO_2 credits were created and 4,027.5 t-CO_2 transactions were completed.

Toyama City, Toyama Prefecture (Population: 418,686)

Activity	Compact City Planning Based on Polycentric Transport Networks
Secondary effects	Health and welfare, commerce, industry and labor, regional promotion, urban planning
Overview	● With the launch of the Hokuriku Shinkansen line and the opening of Toyama Light Rail in 2006, Toyama has promoted compact city planning to concentrate urban functions along railway lines around public transportation. ● The provision of various incentives is leading to a shift from the use of private cars to public transport, resulting in a reduction of greenhouse gas emissions.
Background	● In Toyama, which covers a vast area, people have a strong inclination to own their own homes and the dependency on private cars is high. In this city, where the birth rate continues to drop and the elderly population is increasing, concerns were expressed about the loss of mobility for elderly residents living in the suburbs and increases in administrative costs in the future.
Results (Global warming countermeasures)	● 6.7% rate of reduction in citywide CO_2 emissions from 2005 levels (2012)

Yokohama City, Kanagawa Prefecture (Population: 3,730,000)

Activity	Yokohama Smart City Project (YSCP)
Secondary effects	Commerce, industry and labor, regional promotion, urban planning, disaster prevention and crisis management
Overview	● The Yokohama Smart City Project introduced HEMS, renewable energy and EV and carried out demonstrations on the effectiveness of demand responses. This project demonstrated the effectiveness of peak cuts to electricity consumption by helping residents and businesses visualize the amount of electricity used, providing guidance on prior days by requesting residents' cooperation in conserving energy and offering appropriate incentives. Interest from companies and residents on energy savings has increased even more as participation is encouraged and publicity about these types of demonstration projects is promoted. ● Since 2015, following the conclusion of the demonstration project, Yokohama launched the "Smart Business Association" with the participation of local companies and has taken a step forward from demonstration to implementation.
Background	● With the rising momentum of energy savings triggered by the 2011 Great East Japan Earthquake, YSCP was adopted as an "energy management demonstration project" by the Ministry of Economy, Trade and Industry in 2014. Demonstrations are implemented for a menu of energy management systems and demand responses in existing large-scale cities in collaboration between the government and companies.
Results (Global warming countermeasures)	● Reduction of about 39,000 t-CO_2/year through demonstration projects under the YSCP (2014)

Kitakyushu City, Fukuoka Prefecture (Population: 960,000)

Action	Kitakyushu Eco-Town Project
Secondary effects	Commerce, industry, and labor, regional promotion and urban development, disaster prevention and crisis management
Overview	● There are 26 companies developing 27 projects in Eco-Town. The promotion of recycling activities is leading to a reduction in CO2 emissions. ● Currently, a regional energy base is being developed, where power generation using solar power, biomass, and wind power is being promoted. The promotion of recycling of equipment needed for such power development is also contributing to the low-carbon development of the city.
Background	● This project was formulated as a result of an investigation into how local companies and the city could each utilize abandoned/idle sites in the Hibikinada district and what types of new businesses could be developed around the environment. In 1997, Kitakyushu was selected as a model city for the Eco-Town project under the jurisdiction of the Ministry of the Environment and the Ministry of Economy, Trade and Industry.
Results (Global warming countermeasures)	● Estimated reduction of about 433,000 t-CO_2/year in line with the implementation of the project (2016)