Japan's Fourth National Communication

Under the United Nations Framework Convention on Climate Change

The Government of Japan

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Contents

Executive Summary

Chapter 1: National Circumstances Relevant to Greenhouse Gas Emissions and Removals

Japan is an archipelago stretching approximately between latitudes 24° and 46° north, and consists of four major islands as well as more than 6,800 smaller islands. Japanese territory extends over 37,790,000 hectares, about 0.3 percent of the earth's terrestrial surface, of which about 80 percent is either forested or agricultural land. Japan stretches over a great distance from north to south with a vast range of climatic zones from subtropical to subarctic and has distinct defined seasons.

As of 2000, Japan's population was 127 million, and the population density was 340 inhabitants per square kilometer. The ratio of the elderly amongst the population has rapidly increased at a higher rate than ever, and the population segment aged 65 or older was 17%. From fiscal 1980 to fiscal 2003 Japan's gross domestic product (GDP) increased by 1.8 times to 554 trillion yen.

Domestic passenger and freight traffic grew significantly with economic growth throughout the period of rapid economic growth of the 1960s. The number of vehicles owned and total vehicle mileage of passenger car has been consistently increasing since the 1960s.

Domestic final energy consumption continued to increase significantly with the Japanese economy's rapid growth during the 1960s. However, after the first oil shock in 1973, it leveled off and eventually decreased. From 1986 onwards, however, the economic pickup primed new growth in energy consumption, equivalent to $15{,}912 \times 10^{15}$J in fiscal 2003. These trends from 1990 can be summarized for different sectors as follows. Energy consumption leveled off in the industrial sector. On the other hand, it has significantly increased in the residential and commercial sector. In the transport sector, it has significantly increased in early 1990s; however, its increase rate has slowed down in late 1990s.

Japan's dependence on foreign energy sources peaked in fiscal 1973 at 89.4 percent of its energy supply; since then, this dependence has been reduced by efforts to find substitutes for oil. In recent years, it has remained about 80 percent, putting the nation in an extremely vulnerable energy-supply situation. In fiscal 2003, the shares of the total primary energy supply for oil, coal, natural gas and nuclear power are 51%, 20%, 15%, and 10%, respectively. The shares of natural gas and nuclear power have swiftly increased from the fiscal year 1973.

Japan's total primary energy supply per capita as of 2003 is 181 × 10^9J, a level that has remained steady recently. Japan's total primary energy supply per unit of GDP has improved significantly by the oil shock, but it has remained static during the 1990s.

Chapter 2: National Inventory of Greenhouse Gas Emissions and Removals

Total greenhouse gas emissions in fiscal 2003 was 1,339 million tons (in CO_2 equivalents), an increase of 8.3 percent compared to emissions in the base year (1990) under the Kyoto Protocol (1995 for emissions of HFCs, PFCs, and SF_6).

This increase can be drawn back to the effects caused by a temporary major decline in the operating rate of nuclear power plants. However, when presuming that the nuclear power plants operated at the scheduled rate, it has been estimated that the carbon dioxide emissions would have been roughly 60 million tons, about 4.9% reduction from the total emissions in the base year under the Kyoto Protocol.

Table 1 Trends in Emissions and Removals of Greenhouse Gases in Japan

[Mt CO2 eq.]	GWP	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CO_2 Emissions	1	1,122.3	1,131.4	1,148.9	1,138.7	1,198.2	1,213.1	1,234.8	1,242.0	1,195.2	1,228.4	1,239.0	1,213.6	1,247.8	1,259.4
Removals	1	-83.9	-83.9	-85.6	-90.1	-93.5	-96.7	NE	NE	NE	NE	NE	NE	NE	NE
CH_4	21	24.8	24.7	24.6	24.5	24.1	23.5	22.9	22.1	21.5	21.1	20.7	20.2	19.5	19.3
N_2O	310	40.2	39.7	39.9	39.6	40.5	40.6	41.5	41.9	40.6	35.1	37.5	34.6	34.7	34.6
HFCs	HFC-134a: 1,300 etc.	NE	NE	NE	NE	NE	20.2	19.9	19.8	19.3	19.8	18.5	15.8	12.9	12.3
PFCs	PFC-14: 6,500 etc.	NE	NE	NE	NE	NE	12.6	15.3	16.9	16.6	14.9	13.7	11.5	9.8	9.0
SF_6	23,900	NE	NE	NE	NE	NE	16.9	17.5	14.8	13.4	9.1	6.8	5.7	5.3	4.5
Gross Total		1,187.3	1,195.8	1,213.4	1,202.9	1,262.8	1,326.9	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1
Net Total		1,103.4	1,111.9	1,127.8	1,112.8	1,169.3	1,230.2	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1

Chapter 3: Policies and Measures

The Government of Japan has been promoting global warming countermeasures through establishing the Action Program to Arrest Global Warming in October 1990, the Outline for Promotion of Efforts to Prevent Global Warming in June 1998 following the adoption of Kyoto Protocol (December 1997) and revising the Outline for Promotion of Efforts to Prevent Global Warming in March 2002 following the enactment of the Marrakesh Agreements (November 2001).

A step-by-step approach that regularly evaluates the progress of countermeasures, policies and emission statuses, and that implements any additional requisite measures and policies was adopted in the Outline revised in 2002. Specifically, the period between 2002 and the end of the first commitment period was divided into three steps between 2002-2004, 2005-2007 and 2008-2012, and the reviewing of countermeasures and policies were to be implemented in 2004 and 2007.

Discussion on the evaluation and revision of the Outline were held in 2004, resulting in the Cabinet approval of the Kyoto Protocol Target Achievement Plan in April 2005. This Plan comprehensively included countermeasures and policies necessary for Japan in achieving the target six percent reduction commitment under the Kyoto Protocol.

The outline of the Kyoto Protocol Target Achievement Plan is provided below.

1. Direction of Global Warming Countermeasures

- Steadily achieve the 6 percent reduction commitment under the Kyoto Protocol.
- Further pursue long-term and continuous reduction of greenhouse gas emissions on a global scale.

2. Basic Philosophy

- Compatibility between the Environment and the Economy

  In order for efforts to achieve the 6 percent reduction commitment under the Kyoto Protocol to also lead to Japan's economic revitalization, employment creation, etc., Japan will take full advantage of technological innovation and its originality and ingenuity to develop and build mechanisms that contribute to compatibility between the environment and the economy.

- Promotion of Technological Innovation

  The Government of Japan will accelerate technological innovations such as energy

conservation, utilization of unused energy, etc., work to disseminate efficient equipment and cutting-edge systems, and aim to be an environmental nation which leads the world.

- Promotion of the Participation and Collaboration of all Stakeholders (National Campaign and Sharing of Information)

The Government of Japan will promote the active participation of all stakeholders including central and local governments, corporations and citizens in countermeasures and policies, and strengthen collaboration between each stakeholder by actively providing and sharing information concerning the progress of global warming countermeasures as well as actions where specific efforts are required.

- Utilization of Diverse Policy Instruments

The Government of Japan will effectively utilize diverse policy instruments, such as voluntary methods, restrictive methods, economic methods, informational methods, etc., while taking advantage of their special characteristics.

- Placing of Importance on the Evaluation and Review Process

In 2007, the Government of Japan will comprehensively evaluate the progress of countermeasures and policies and the level of emissions, etc. and will implement necessary countermeasures and policies starting in 2008. Furthermore, the Government of Japan will strengthen the policies as necessary by checking the progress, etc. of policies formulated by the Government each year.

- Ensuring of International Collaboration

The Government of Japan will put in its utmost efforts to make it possible for common rules to be built that will be participated in by all countries, including the United States and developing countries. The Government of Japan will also take a leading role in the world's efforts to combat global warming through international cooperation.

3. Targets for Greenhouse Gas Emissions Control and Removal Amount

Classification		Target		Reduction rate from enhanced countermeasures scenario in fiscal 2010 (base year total emission + 6%)
Greenhouse gas		Emission in fiscal 2010 (million t-CO2)	Ratio to fiscal 1990 (ratio to base year total emissions)	
	(1) CO_2 generated from energy use	1,056	+0.6%	-4.8%
	(2) Non-energy-originated CO_2	70	-0.3%	-0.4%
	(3) Methane	20	-0.4%	
	(4) Nitrous oxide	34	-0.5%	
	(5) Three fluorinated gases	51	+0.1%	-1.3%
Forests and other greenhouse gas sinks		-48	-3.9%	(same as left) -3.9%
Kyoto Mechanism		-20	-1.6%	(same as left) -1.6%
Total		1,163	-6.0%	-12%

(Target Value for Each Sector Regarding CO_2 Renerated from Energy Use in Fiscal 2010)

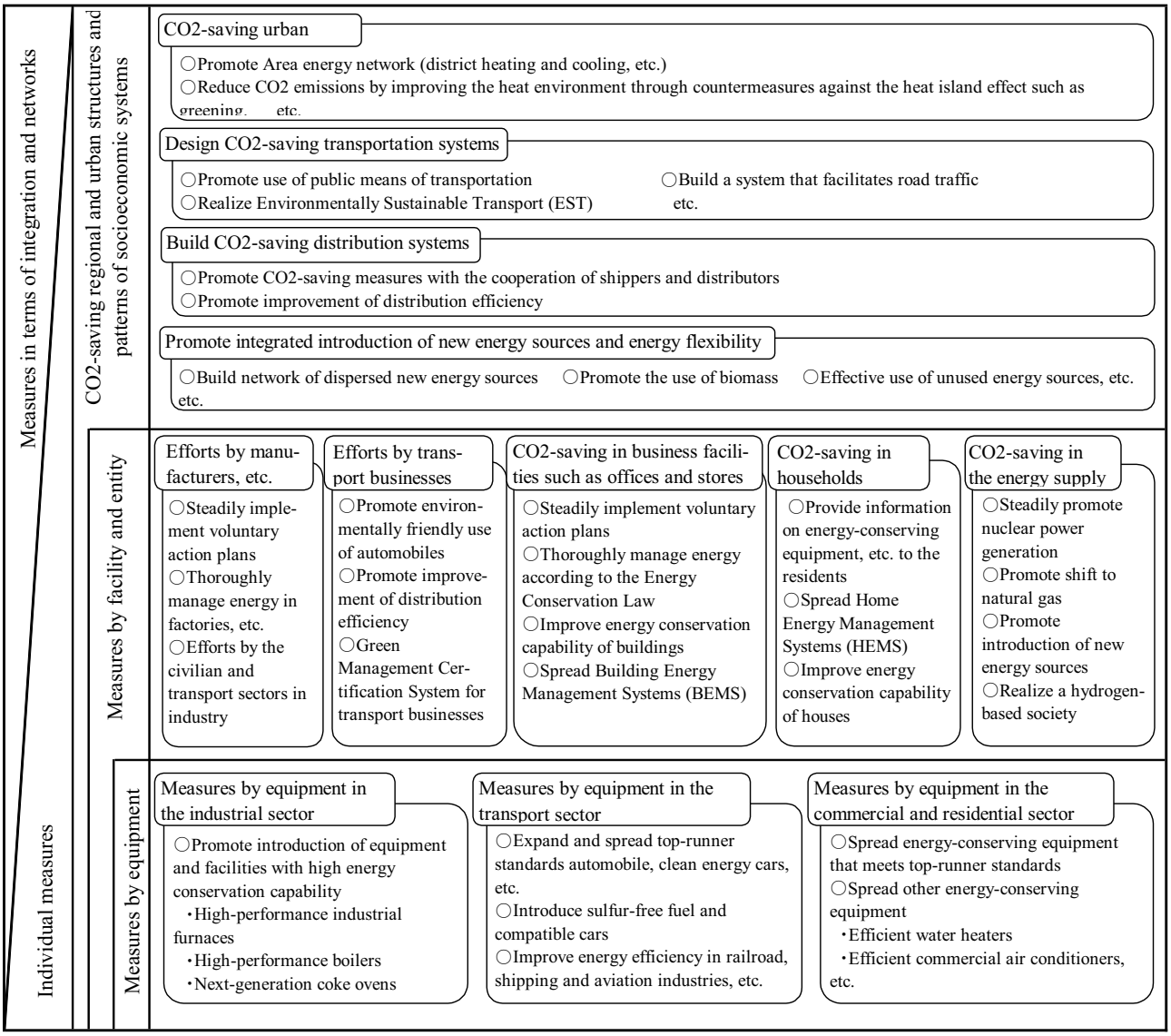
	Emission (million t-CO_2)	<Reference> Reduction rate from enhanced countermeasures scenario in fiscal 2010 (million t-CO_2)
CO_2 generated from energy use	1,056	-59
Industrial sector	435	-15
Commercial and Residential sector	302	-31
(Commercial and other sector)	165	-13
(Residential sector)	137	-18
Transport sector	250	-9
Energy industries sector	69	-4

4. Countermeasures and Policies to Achieve the Targets

(1) Countermeasures and Policies Concerning Reduction, Removal, etc. of Greenhouse Gas Emissions

(i) Energy-originated Carbon Dioxide

The Government of Japan will continue to promote countermeasures for energy-related equipment and countermeasures taken by facilities or entities such as offices regarding energy-originated carbon dioxide, which accounts for 90 percent of the total greenhouse gas emissions, while utilizing the results of technological innovation. At the same time the Government of Japan will engage in measures such as the reform of Japan's socioeconomic structure to carbon dioxide-saving structure, including the design of cities and regions and public transport infrastructure, in order to change Japan's energy supply and demand structure itself into a carbon dioxide-saving structure.



*The Government of Japan will aim for absolute achievements for each countermeasure through implementation of evaluations, reviews, etc. by clarifying the "evaluation indicators of the measure," which is to serve as a platform and measuring scale for its promotion.

(ii) Non-energy-originated Carbon Dioxide

- Expand the use of blended cement and promote measures to reduce carbon dioxide emissions deriving from waste incineration.

(iii) Methane

- Reduce the amount of final disposal of waste, etc.

(iv) Nitrous Oxide

- Upgrade combustion in sewage sludge and general waste incineration facilities, etc.

(v) Three Fluorinated Gases (HFC, PFC, and SF_6)

- Planned efforts made by industry, and promotion of development, etc. of substitute materials and use of substitute products.
- Recovery of HFC charged as refrigerant in equipment in accordance with laws, etc.

(2) Greenhouse Gas Sinks

(i) Forest Sink Measures

The Government of Japan will make united efforts to steadily and comprehensively promote the relevant measures in order to achieve the targets of the Forests and Forestry Basic Plan.

(ii) Promotion of Urban Greening, etc.

The Government of Japan will actively promote the urban greening, etc. based on comprehensive central and local government plans for the conservation and creation of greenery

(3) Kyoto Mechanism

The public and private sectors will work collaboratively to utilize the "Kyoto Mechanism," which allows for countries to acquire emissions reduction in exchange to transfer of environmental technologies to developing countries and others. Furthermore, the Government of Japan will look into formulating a concrete system for smooth acquisition of emissions reduction, with an aim to implement this starting in fiscal 2006.

(4) Cross-sectoral Policies

(i) Development of National Campaigns

The Government of Japan will disseminate knowledge, enrich environmental education and promote individual efforts, in collaboration with the business circle, NPOs, the labor circle, researchers, etc.

(ii) Initiative of Public Institutions

The Government of Japan will formulate a new government action plan. The progress of the action plan will be examined annually in a meeting of the Global Warming Prevention Headquarters, and the results will be published.

(iii) Systems for Calculation, Reporting and Public Disclosure of Greenhouse Gas Emissions

The Government of Japan will propose to amend the Law Concerning the Promotion of Measures to Cope with Global Warming, etc. so that the actual emissions status of greenhouse gas will be made clear to the public, which in turn shall serve as the basis of the voluntary measures taken by the people at all levels.

(iv) Policy Mix

In order to advance the effective and efficient reduction of greenhouse gas emissions, and to pursue the environment and the economy simultaneously, the Government of Japan will utilize the policy mix approach of fully mobilizing all policy methods, including voluntary methods, restrictive methods, economic methods and informational methods, taking advantage of their respective characteristics and organically combining them. （The environmental tax is an issue where serious considerations shall be made in a comprehensive manner. The domestic emissions trading system is subject for consideration as well.)

(5) Basic Policies

The Government of Japan will develop a domestic framework for calculating greenhouse gas emissions and removals as well as comprehensively promote technology developments and research studies to enhance the observation and monitoring systems.

Furthermore, the Government of Japan will endeavor to ensure international coordination and promote international cooperation for the measures to cope with global warming.

5. Promotion Framework, etc.

- The Global Warming Prevention Headquarters will conduct annual reviews, as well as quantitative evaluations and reviews on plans for 2007.

- Furthermore, with the Global Warming Prevention Headquarters playing a leading role, the Government of Japan will engage in efforts for the steady progress of this plan. In particular, working groups will be established under the Headquarters in response to issues such as the development of national campaigns, and the related office and ministries will engage in efforts through close coordination.

- The Government of Japan will establish the Regional Committees on Energy Supply and Demand and Prevention of Global Warming in each regional block, and the related office and ministries will cooperatively back each other up on regional measures.

Chapter 4: Projections and the Total Effect of Policies and Measures

Japan has been implementing various global warming countermeasures based on the Outline for Promotion of Efforts to Prevent Global Warming revised in fiscal 2002. When the Outline was evaluated and re-examined in fiscal 2004, the outlook of total greenhouse gas emission by fiscal 2010, if countermeasures and policies that are already or those predetermined will be continually implemented under the current domestic situation, was estimated to be 1,311 million t-CO_2, approximately six percent increase compared to the base year.

Consequently, the additional emission reduction equivalent to approximately 12 percent (approximately 148 million t-CO_2) and other achievements must be sought on top of the conventionally implemented countermeasures and policies for Japan to achieve its six percent reduction commitment under the Kyoto Protocol. To this end, in April 2005 the Government of Japan decided on the Kyoto Protocol Target Achievement Plan which includes countermeasures and measures necessary for additional emission reduction, etc.

The future prospect drawn in this Plan has shown that the abovementioned approximately 12 percent reduction will be achieved with the following breakdown: 6.5 percent with emissions reduction (energy-originated carbon dioxide: 4.8 percent; non-energy-originated carbon dioxide, methane, nitrous oxide: total of 0.4 percent; the three fluorinated gases: 1.3 percent), 3.9 percent with forest sinks, and 1.6 percent with the Kyoto Mechanism.

Table 2 Future Outlook and Results by Category of Greenhouse Gas Emission

(Unit : Million t-CO_2)

	Base year	Achievement in fiscal 2002		Existing countermeasures scenario in fiscal 2010		Enhanced countermeasures scenario in fiscal 2010	
	Million t-CO_2	Million t-CO_2	Ratio to base year total emissions	Million t-CO_2	Ratio to base year total emissions	Million t-CO_2	Ratio to base year total emissions
Energy-originated CO_2	1,048	1,174	10.2%	1,115	5.4%	1,056	0.6%
Industrial sector	476	468	-0.7%	450	-2.1%	435	-3.3%
Commercial and Residential sector	273	363	7.3%	333	4.9%	302	2.3%
(Commercial and other sector)	144	197	4.3%	178	2.8%	165	1.7%
(Residential sector)	129	166	3.0%	155	2.1%	137	0.6%
Transport sector	217	261	3.6%	259	3.4%	250	2.7%
Energy industries sector	82	82	0.0%	73	-0.8%	69	-1.1%
Non-energy-originated CO_2, CH_4, N_2O	139	128	-0.9%	130	-0.8%	124	-1.2%
Non-energy-originated CO_2	74	73	-0.1%	74	0.0%	70	-0.3%
CH_4	25	20	-0.4%	20	-0.3%	20	-0.4%
N_2O	40	35	-0.4%	35	-0.4%	34	-0.5%
Three fluorinated gases	50	28	-1.7%	67	1.4%	51	0.1%
HFC	20	13	-0.6%	46	2.1%	34	1.1%
PFC	13	10	-0.2%	9	-0.3%	9	-0.3%
SF_6	17	5	-0.9%	12	-0.4%	8	-0.7%
Greenhouse gas emissions	1,237	1,331	7.6%	1,311	6.0%	1,231	-0.5%

Source of Greenhouse Gas Removal -3.9%

Utilization of the Kyoto Mechanism -1.6%

Total -6.0%

Chapter 5: Vulnerability Assessment, Climate Change Impacts and Adaptation Measures

Research to date indicates that climate change may have a major effect on Japan's agriculture, forestry, fisheries, water resources, coastal management, natural ecosystems, and human health.

For example, it is estimated that, due to global warming, the number of typhoons will decrease and their maximum intensity will increase slightly. In terms of rice cultivation in paddy fields, it is estimated that the production volume will increase in upper latitudes while problems may occur with growth due to higher temperatures in lower latitudes. It is thought that demand for water supply will increase by approximately 1.2 to 3.2 percent per 3°C increase in temperature. Furthermore, it is thought that heat stress will increase due to higher temperatures in summer, with effects also seen on human health due to increased vectors and improved growth conditions for pathogenic organs and parasites.

Meanwhile, several important items are considered to be issues for future research but are not addressed in this report. These include forecasting climate changes by region, and indirect effects on Japan's socioeconomic system such as problems with importing foodstuffs, energy, and other resources. It is also clear that climate changes will have a massive effect on natural ecosystems, but at present it is extremely difficult to quantitatively assess such an effect.

Chapter 6: Financial Resources and Transfer of Technology

In August 2003, the Cabinet adopted Japan's Official Development Assistance Charter (the ODA Charter), which spells out the philosophy and principles of Japan's official development assistance. The ODA Charter identifies addressing global issues, including environmental problems, as one of the priority issues of ODA and states as a principle of ODA implementation that "environmental conservation and development should be pursued in tandem." Japan's Medium-term Policy on ODA announced in February 2005 also makes addressing global issues, including environmental problems, a priority issue. In this way the Government of Japan is trying to realize sustainable development on a global scale by supporting the ownership of developing countries.

On the basis of the above, Japan's environmental cooperation follows the Environmental Conservation Initiative for Sustainable Development (EcoISD) announced in August 2002 at the World Summit on Sustainable Development (WSSD). In particular concerning the global-warming issue, which threatens sustainable development on a worldwide scale, the Government of Japan announced the Kyoto Initiative on aid for anti-global warming programs in developing countries during the Third Session of the Conference of the Parties to the United

Nations Framework Convention on Climate Change (COP3) held in Kyoto in December 1997. Under the initiative the Government of Japan provides active support for anti-global warming programs and projects.

Chapter 7: Research and Systematic Observation

1. Research

Under the "Global Warming Research Initiative" which has been organized by the Council for Science and Technology Policy (CSTP), Japan has been promoting climate change research in modeling and projection, impact and risk-assessment and response policies, together with technology developments in greenhouse gas fixation and sequestration, and in anthropogenic Greenhouse gas emissions reduction.

Particularly, outcomes from high-resolution climate projection models under a project utilizing the Earth Simulator, one of the highest performance supercomputer in the world are expected to contribute to the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC). Part of computed results has been provided for regional adaptation studies in developing countries. Besides, guidelines for the implementation of the Kyoto Protocol and methods for assessing the removal of greenhouse gases by forests will be established.

2. Systematic Observations

The Government of Japan is comprehensively promoting the systematic observation under the Earth Observation Implementation Policy to be revised annually and the Comprehensive Monitoring Program for Global Warming included in the Global Warming Research Initiative based on the Earth Observation Promotion Strategy (proposed by the Council for Science and Technology Policy in December 2004).

Baring in mind the contribution to the establishment of the Global Earth Observation System of Systems (GEOSS) based on the 10-Year Implementation Plan, the Government of Japan is participating and cooperating in the Global Climate Observing System (GCOS), the Global Environmental Monitoring System (GEMS), the Global Atmosphere Watch (GAW) programme and other international observation and monitoring programs, and conducts wide-ranging observations and monitoring based on an appropriate sharing of international tasks. The Government of Japan is also working to promote the Asia-Pacific Network for Global Change Research (APN) and to facilitate smooth implementation of observation and monitoring throughout the Asia- Pacific region.

Chapter 8: Education, Training, and Public Awareness

Carbon dioxide emissions have been consistently increasing in recent years in the residential sectors, which are closely related to the lifestyles of citizens. To mitigate global warming, all citizens must shift from the mass consumption and disposal lifestyle to resource and energy conservation as well as recycling. At the same time, consideration should be taken for the usage of non-fossil fuel energy, including new and renewable energy and nuclear energy.

To that end, the Government of Japan provides the opportunities to learn about the global warming issue, as well as the energy issues closely involved with it at households, schools, and society at large. The Government of Japan promotes improved awareness through advertising in the mass media, distribution of pamphlets, and holding of symposiums. Also, the Government of Japan is committed to increasing the support for environmental NGOs, which promise to play roles as leaders or advisors for national.

The Government of Japan will actively provide and share, in as visible a manner as possible, knowledge about the increasingly serious global warming issue, the specific actions for which enormous efforts are needed in order to achieve the six percent reduction commitment, and information about what each individual should do, as well as carry out public relations and dissemination activities on these topics in order to improve the awareness of households and businesses and rouse them to take action.

Chapter 1

National Circumstances Relevant to Greenhouse Gas Emissions and Removals

1.1 National Land Use

Japan is located on the east side of Eurasia, is an archipelago stretching approximately between latitudes 24° and 46° north, and consists of four major islands – namely (north to south) Hokkaido, Honshu, Shikoku, and Kyushu – as well as more than 6,800 smaller islands.

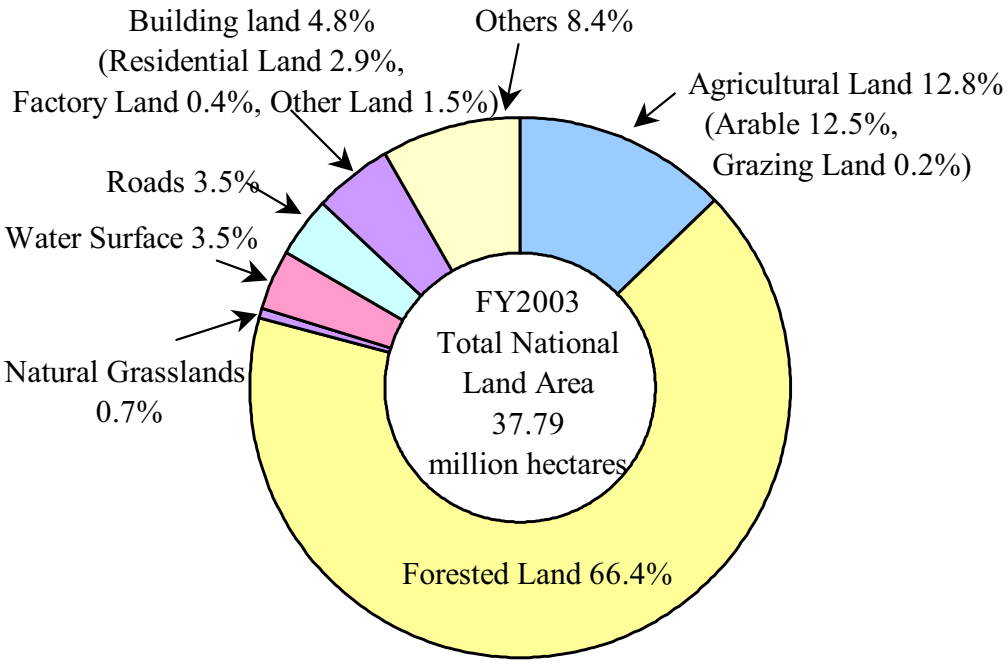


Figure 1.1 Land Use in Japan[1]

Source: Ministry of Land, Infrastructure and Transport – 'White Paper on Land (2005)'

Japanese territory as of 2003 extends over 37,790,000 hectares, or about 0.3 percent of the earth's terrestrial surface, of which about 80 percent is either forested (25.09 million hectares (66.4 percent)) or agricultural land (4.82 million hectares (12.8 percent)). In recent years, the total area devoted to forestry or agricultural purposes has diminished, while that used for buildings and roads has increased.

[1] The term 'roads' includes agricultural and forestry roads in addition to ordinary roads. All data is derived from estimates based on readily available statistics from different sources complied by the Ministry of Land, Infrastructure and Transport.

1.2 Climate

Japan stretches over a great distance from north to south with a vast range of climatic zones and has four distinct seasons. The mountain ranges forming the backbone of Japan's main islands also serve to enhance the climatic variation between different regions of Japan. In winter, northerly cold winds from Siberia (the winter monsoon) bring a large amount of snowfall to the coastal areas facing the Japan Sea, while southerly winds (the summer monsoon) make summer hot and wet in most of Japan except for Hokkaido.

With such a varied natural environment, Japan is home to a wide variety of species. With regard to fauna, about 1,400 vertebrates and about 35,000 invertebrates have been identified, while amongst the flora, some 7,000 vascular plants (tracheophytes), 5,500 algae, 1,800 mosses, 1,000 lichens, and about 16,500 fungi (excluding marine species) have been found.

The climate statistics (30-year average for the period 1971-2000)[2] are shown in Table 1.1 based on reports from several meteorological stations, which are considered affected only slightly by urbanization.

Table 1.1 Climate of Japan

		Latitude (N)	Longitude (E)	Elevation (meters)	Annual Mean Temperature (ºC)	Annual Mean of Daily Maximum Temperature (ºC)	Annual Mean of Daily Minimum Temperature (ºC)	Annual precipitation (mm)
Northern Japan	Abashiri	44°01.0'	144°17.0'	37.6	6.2	10.0	2.6	801.9
	Nemuro	43°19.7'	145°35.4'	25.2	6.1	9.4	3.0	1,030.0
	Yamagata	38°15.2'	140°20.9'	152.5	11.5	16.4	7.2	1,125.0
	Ishinomaki	38°25.5'	141°18.2'	42.5	11.4	15.3	7.9	1,064.5
Eastern Japan	Fushiki	36°47.3'	137°03.4'	11.6	13.7	17.7	10.3	2,196.4
	Mito	36°22.6'	140°28.2'	29.3	13.4	18.5	8.9	1,326.0
	Iida	35°30.6'	137°50.3'	482.3	12.5	18.6	7.5	1,606.7
	Hamamatsu	34°42.4'	137°43.4'	31.7	16.0	20.2	12.4	1,875.5
Western Japan	Sakai	35°32.5'	133°14.2'	2.0	14.9	19.0	11.1	1,894.9
	Hamada	34°53.6'	132°04.4'	19.0	15.2	19.1	11.5	1,705.7
	Hikone	35°16.4'	136°14.8'	87.3	14.4	18.5	10.8	1,617.9
	Miyazaki	31°56.1'	131°25.0'	9.2	17.3	22.0	13.1	2,457.0
	Tadotsu	34°16.4'	133°45.3'	3.7	16.0	20.0	12.2	1,090.7
Nansei Islands	Naze	28°22.6'	129°29.9'	2.8	21.5	24.7	18.6	2,913.5
	Ishigakijima	24°19.9'	124°09.8'	5.7	24.0	26.6	21.9	2,061.0

Source: Japan Meteorological Agency - 'Climate Table of Japan'

[2] Annual mean temperatures, annual means of daily maximum, and minimum temperatures are obtained by averaging monthly mean normals calculated for the 1971-2000 base period.

In order to examine the long-term changes in temperature and precipitation in Japan, the average of the anomaly difference from the norm for annual mean surface temperature and annual precipitation relative to the average year in the observation points of the Japan Meteorological Agency in the period 1898-2004 were taken and the results[3] of the analysis of the data are presented here.

Japan's annual mean surface temperature has repeatedly fluctuated, but is on a long-term increasing trend and is currently increasing at approximately 1.06ºC per 100 years (Figure 1.2). In particular, preeminently high temperatures have been frequently recorded since the 1990s. The anomaly difference from the norm of Japan's annual mean surface temperature in 2004 was +0.99°C and 2004 recorded the second highest temperatures since statistics began in 1898. 1990 was the hottest year in the period. It is highly likely that the impact of human actions, such as an increase in greenhouse gases, is being seen in the long-term trend of increasing surface temperatures. For this analysis seventeen meteorological stations relatively unaffected by urbanization were chosen to calculate the surface temperatures but it was not possible to completely remove the effects of urbanization.

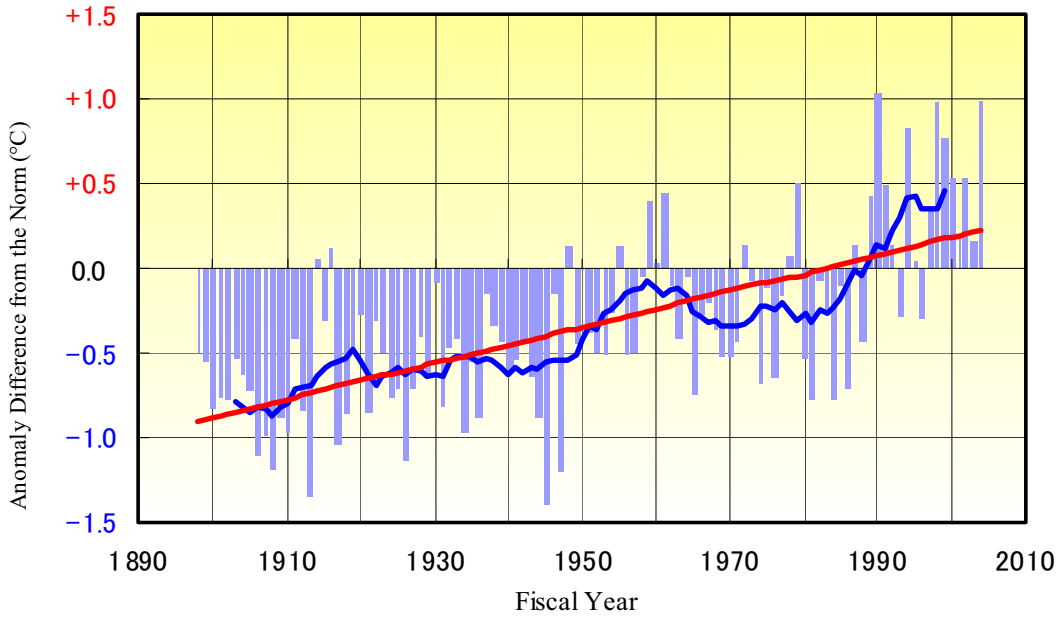


Figure 1.2 Variations in the anomaly difference from the norm of Japan's annual mean surface temperature from 1898-2004

The bar graph (light blue) shows the figure of each year, the curve (blue) indicates the year-to-year change made smoother, and the straight line (red) represents the long-term trend. The mean figure is derived from the average of 30 years between 1971 and 2000.

[3] For the analysis of surface temperature we used 17 areas for which the observed data maintained its homogeneity in the long term and for which changes in the environment due to urbanization, etc. were relatively minor. For the calculation of precipitation, we used 51 areas for which the observed data maintained its homogeneity in the long term.

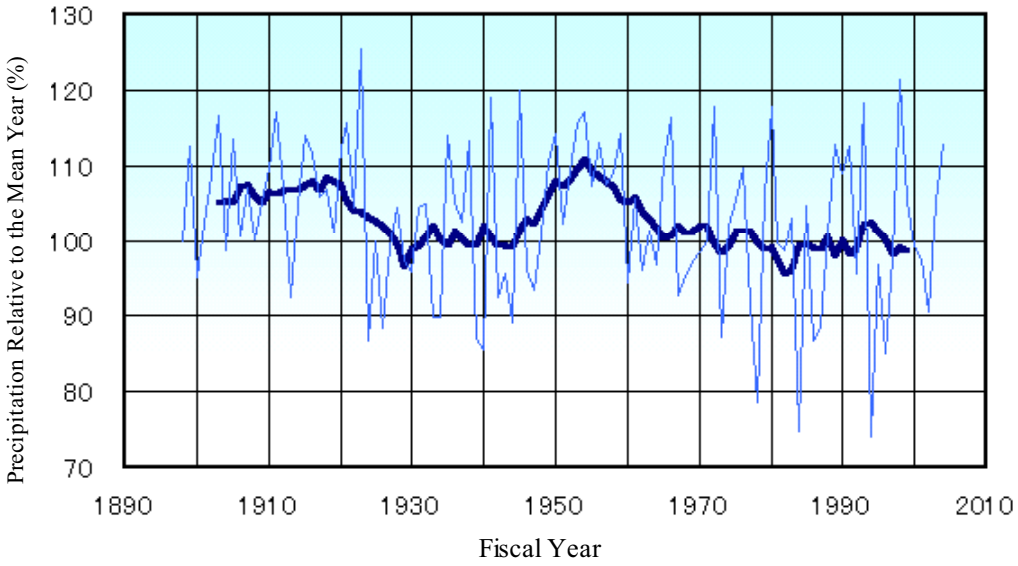


Figure 1.3 Variations of annual precipitation relative to the mean year in Japan from 1898-2004

The light blue solid line shows the figure for each year while the blue solid line indicates the year-to-year change made smoother. The mean figure is derived from the average of 30 years between 1971 and 2000.

Source: Japan Meteorological Agency – '2005: Report on Climate Change'

The annual precipitation of Japan (Figure 1.3) does not provide any clear long-term trend. On the other hand, the variations between years have widened in recent years. There are noticeably both more years with a lot of rain as well as those with not much rain.

1.3 Population and Households

According to the latest population census, as of October 1st 2000, Japan's population was 126,925,843, representing a 1.1 percent increase over the previous census (October 1995). The population density was 340 inhabitants per square kilometer. In line with the falling birthrate and increased average longevity, the ratio of the elderly amongst the population has rapidly increased at a higher rate than ever, and the population segment aged 65 or older as of 2000 was 17 percent. This rate is the highest of all the developed countries.

One of the major factors behind the aging of the population is the decline in the number of births. During the 1960s generally the number of births increased but they peaked in 1973 and began to decline after that and have continued to gradually decline ever since. On the other hand the number of deaths has gradually increased and it is estimated that the number of deaths will slightly exceed the number of births in 2005. As a result within the next few years a period of declining population will begin in Japan.

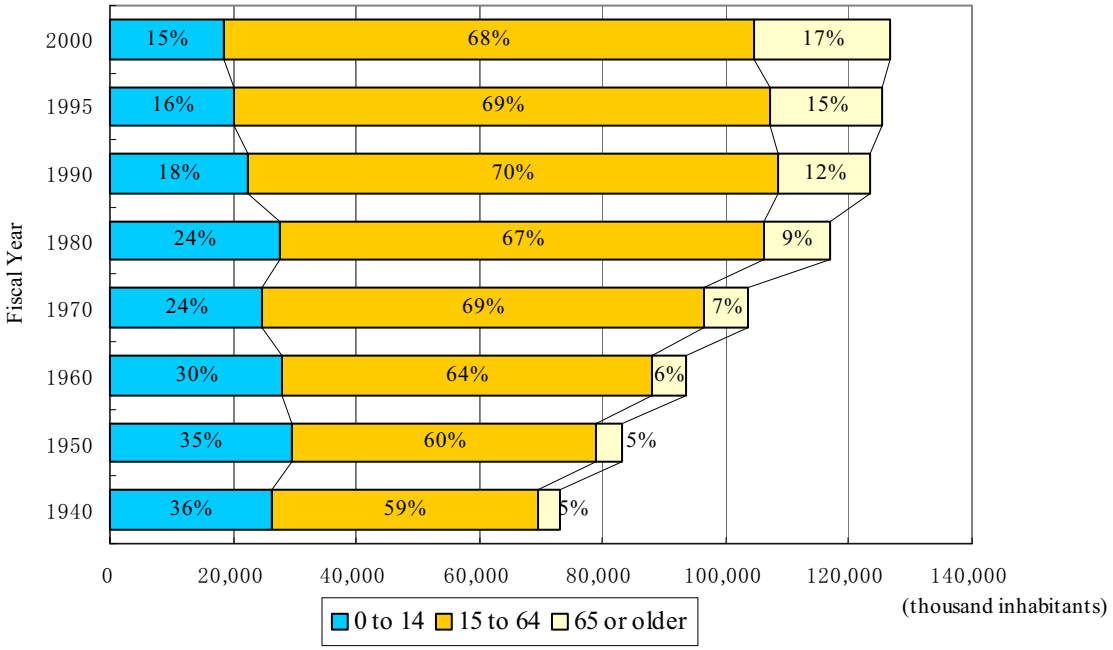


Figure 1.4 Age Distribution of the Japanese Population

Source: Ministry of Public Management, Home Affairs, Posts and Telecommunications – 'Population Census'

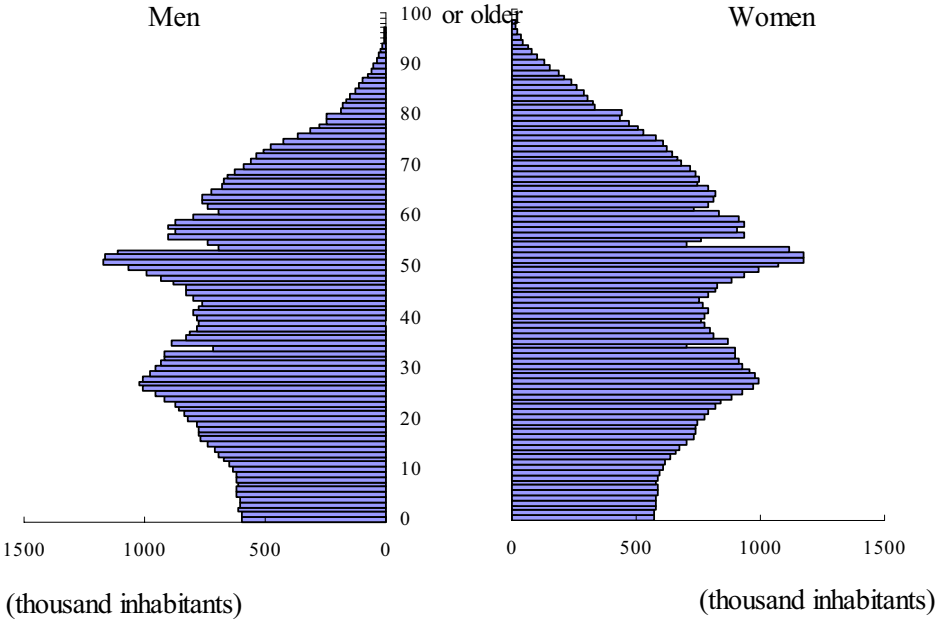


Figure 1.5 Japanese Population Pyramid in 2000

Source: Ministry of Public Management, Home Affairs, Posts and Telecommunications – 'Population Census'

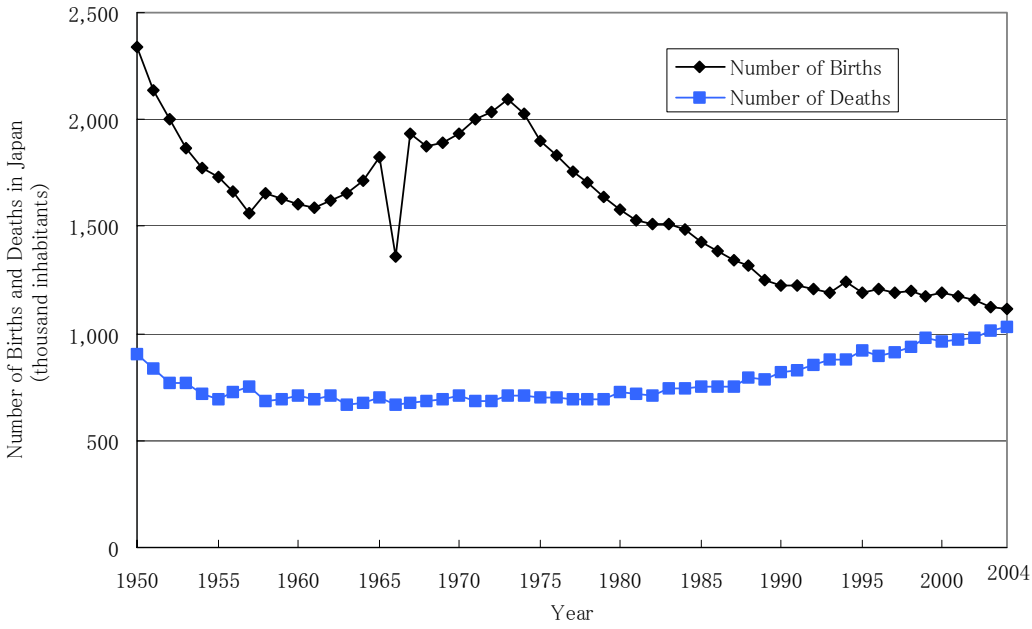


Figure 1.6 The Number of Births and the Number of Deaths in Japan

Source: Ministry of Health, Labour and Welfare – 'Annual Estimate of Vital Statistics 2005'

During the 1960s, the years of the so-called Japanese economic miracle when the economy grew very rapidly, the number of people migrating into Japan's three metropolitan areas substantially exceeded the number leaving, with a net immigration into such areas of approximately 500,000 people per year. But this net immigration into the three metropolises decreased in the 1970s. On a nationwide scale, however, as of October 2000, 65 percent of the population lived in the densely inhabited districts (i.e. DIDs)[4], showing the continued concentration of the population in metropolitan areas.

[4] DIDs: Indicates areas adjacent to the basic unit district with high population density (as a general rule, population density of 4,000 or more inhabitants per square kilometer) within a city, ward, town or village boundary, and whose population is 5,000 or more.

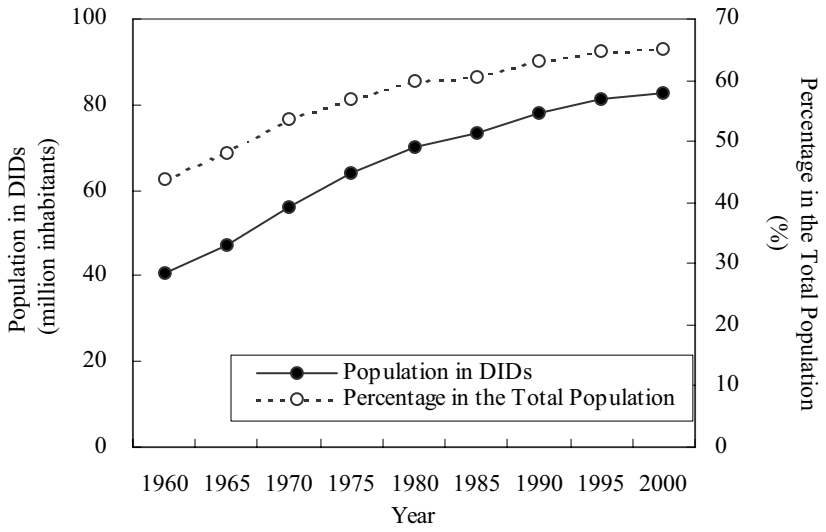


Figure 1.7 Population Residing in Densely Inhabited Districts

Source: Ministry of Public Management, Home Affairs, Posts and Telecommunications – 'Population Census'

In 2000, there were 46,780,000 households in Japan, 6.6 percent more than in 1995. The average size of households was 2.67 persons in 2000. Since 1970, the number of households has continued to increase and the average size of households has continued to decline, reflecting changes in household formation patterns, such as changing from extended family systems to nuclear families and increased numbers of solitary-person households, as well as a reduction in the number of children reflecting the falling birthrate.

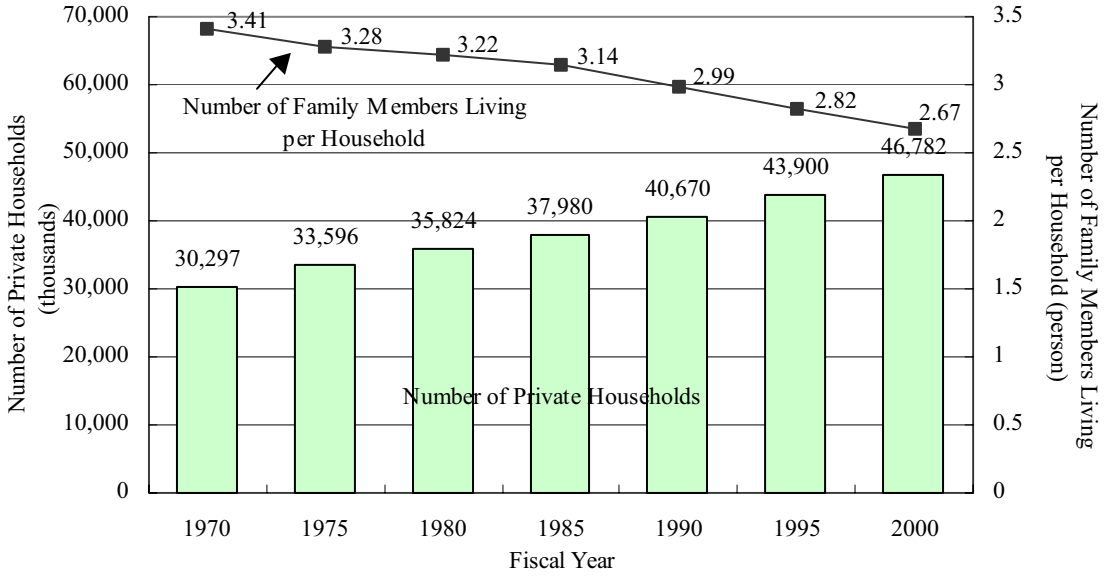


Figure 1.8 The Number and Average Size of Japanese Households

Source: Ministry of Public Management, Home Affairs, Posts and Telecommunications – 'Population Census'

1.4 Houses and Commercial Facilities

According to the 'Housing and Land Survey of Japan' in 2003, the total number of houses has reached 53.87 million for a total of 47.22 million households. As a result, the number of houses per household has reached 1.14, representing a continued improvement.

In terms of the quality of such accommodation, the average area of floor space per home has risen to 93.85m^2, demonstrating a steady improvement overall, but when the details are analyzed, a stark contrast can be seen between owned houses (123.03m^2) and rented houses (46.91m^2), illustrating the number of small rented houses.

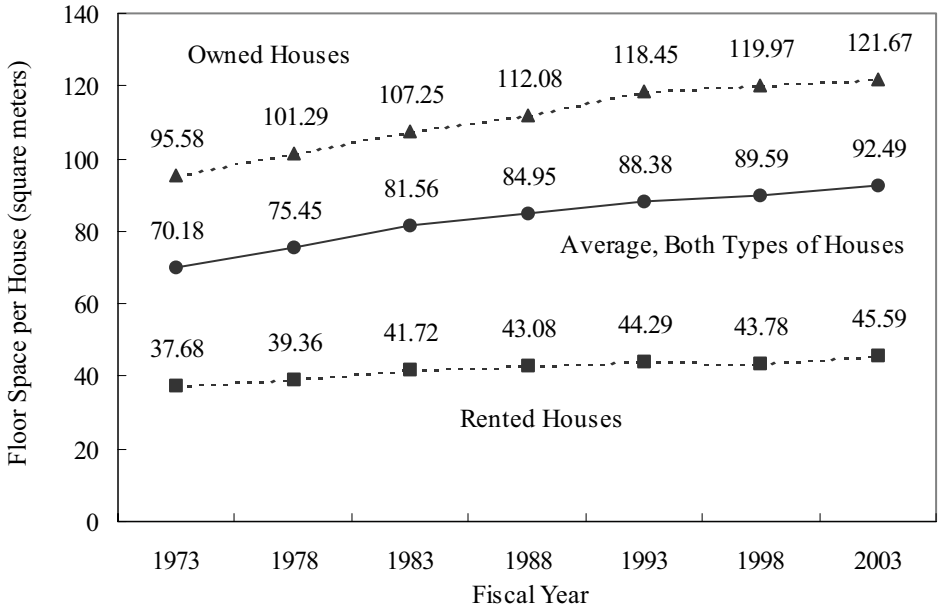


Figure 1.9 Floor Space Areas per House

Source: Ministry of Internal Affairs and Communications – '2003 Housing and Land Survey of Japan'

In Japan, since the period of economic rapid growth, the ratio of tertiary industries, concerning the industrial structure, and in particular the employment structure, has increased. The importance of technology, information, planning and design, etc., for each industry has also increased, and the weight of indirect sectors has increased. In line with the general shift of the Japanese economy towards the tertiary industries as indicated above, the amount of floor space devoted to the commercial sector has steadily increased. Since 1965, it has increased at an average of 4.1 percent annually. As a result, the amount of floor space for commercial sectors in 2003 was approximately quadruple that of 1965.

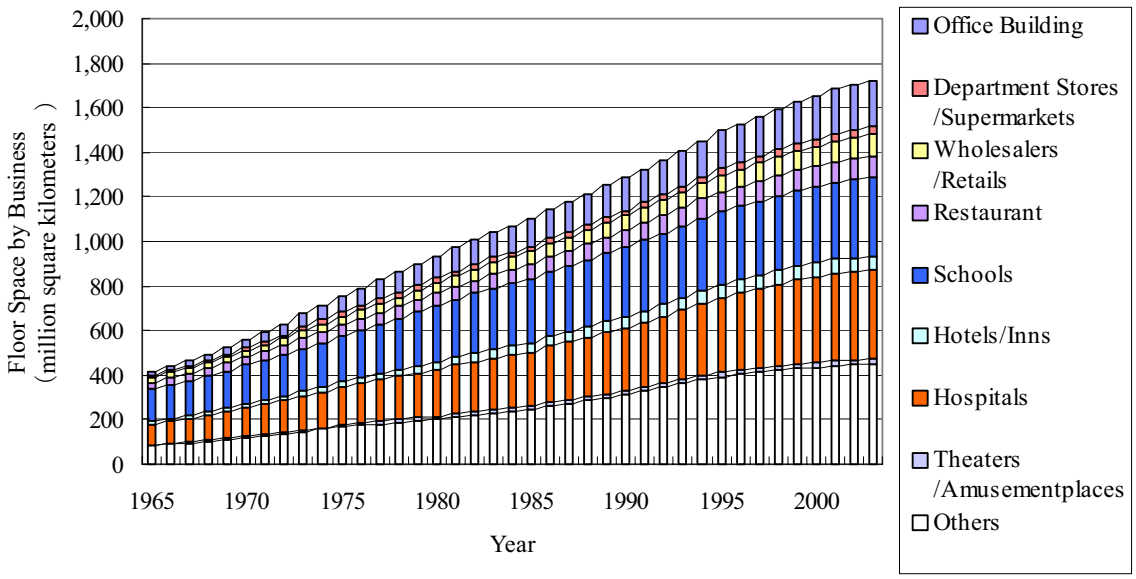


Figure 1.10 Change in Amount of Floor Space in the Commercial Sector by Business Type

Source: The Institute of Energy Economics, Japan – 'Handbook of Energy & Economic Statistics in Japan'

1.5 Japan's Industry and Economy

From fiscal 1980 to fiscal 2003, Japan's real gross domestic product (GDP)[5] increased by 1.8 times to 554 trillion yen. During the same period, per capita real GDP increased by about 1.6 times from 2.69 million to 4.34 million yen. The growth process of the Japanese economy up until the present day is explained below.

Japan's economy grew extremely rapidly in the 1960s resulting in the development of heavy industry, mainly producing such essentials as steel and petrochemical materials. Synchronously with this, the Japanese economy consumed a large amount of resources and energy. During the same period, the workforce shifted from primary to secondary and tertiary industries. Agricultural production increased despite a reduction in the number of agricultural laborers. Nevertheless, because of the growing income gap compared with other industries, depopulation and other factors, the number of younger laborers working in agriculture villages decreased while the average age of the nation's farmers increased. At that time, Japanese forestry was primarily practiced by well-dispersed, extremely small businesses operating in steep mountainous areas. It was difficult to improve labor productivity, so forestry faced various problems including a price differential versus imported lumber and other industries. As a result, depopulation of mountain villages continued, the average age of forestry workers increased, and production stagnated.

In the 1970s, following the first oil shock (1973), in 1974 Japan's economy recorded its first contraction since the Second World War. Economic growth remained sluggish for some time thereafter. At the same time, the nation's manufacturing focus shifted from energy-intensive basic industries such as the steel and

[5] Real GDP according to fixed based year method (base calendar year 1995)

petrochemical industries to high value-added processing and assembly industries such as electrical appliances and machinery. As income levels rose, the growth of the economy's services and software components expanded. Tertiary industry (services) came to account for over 50 percent of gross domestic product and total employment. In agriculture, the consistent shares of vegetables and dairy products increased as Japanese dietary habits changed and the nation produced a surplus of rice and other items.

Following the Plaza Accord of 1985, the yen began to grow ever stronger on exchange markets, severely hurting Japanese industry, which was generally very dependent on exports. With the subsequent structural adjustment of the Japanese economy, however, domestic demand expanded, business boomed, the sectorial shares of the financial, wholesale, and retail industries increased, and the prices of land, securities, and other assets skyrocketed.

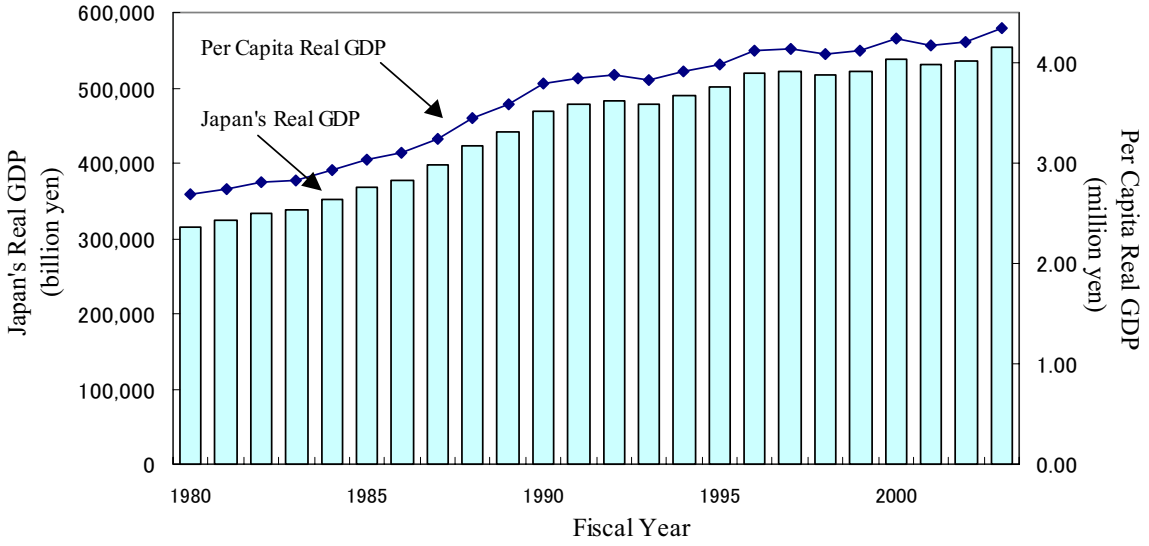


Figure 1.11 Change in Real Gross Domestic Product
(Fixed Based Year Method, Base Calendar Year 1995)

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2005'

Then, in the early 1990s, the prices of land, securities, and other assets nose-dived due to monetary tightening and other factors. The collapse in asset prices led to a reduction in expenditure on consumables and to adjustments in consumer durables and capital stock and these in turn led to the stagnation of economic activities and to a large volume of irrecoverable debts amongst the nation's financial institutions. The Asian economic and currency crises also had an impact and the economy continued to be marked by low growth. For example in 1998 Japan actually recorded negative growth.

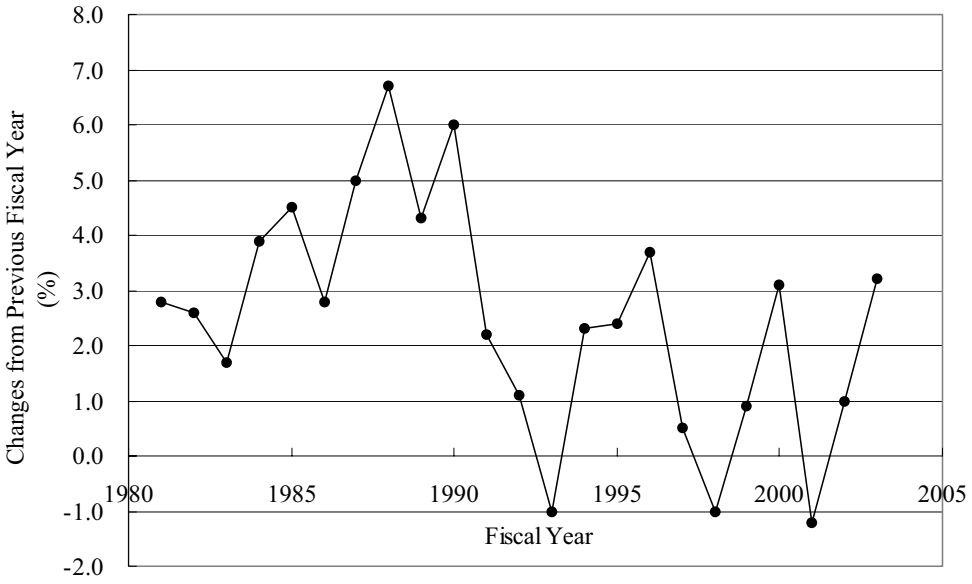


Figure 1.12 Change in Year-on-Year Real Gross Domestic Product Growth Rate (Fixed Based Year Method, Base Calendar Year 1995)

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2005'

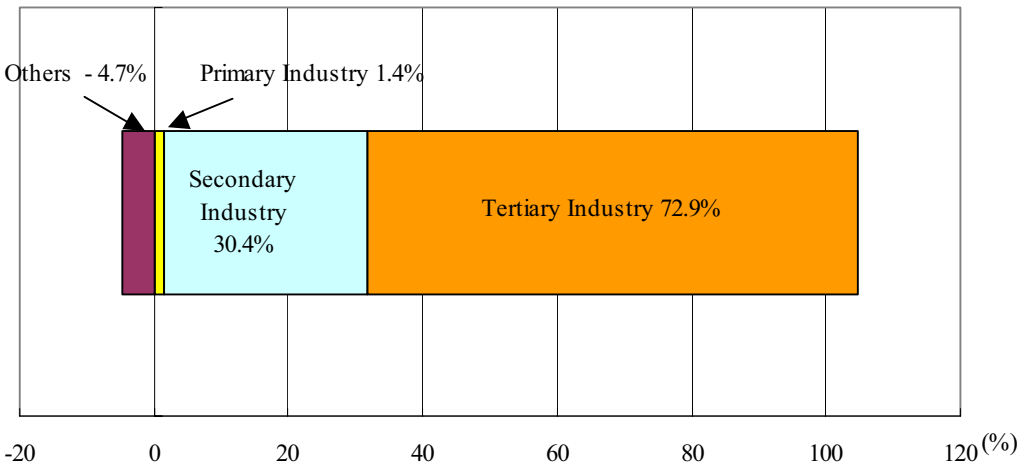


Table 1.13 Composition Ratio of Real Gross Domestic Product in 2003 by Economic Activity Type at 1995 Market Prices

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2005'

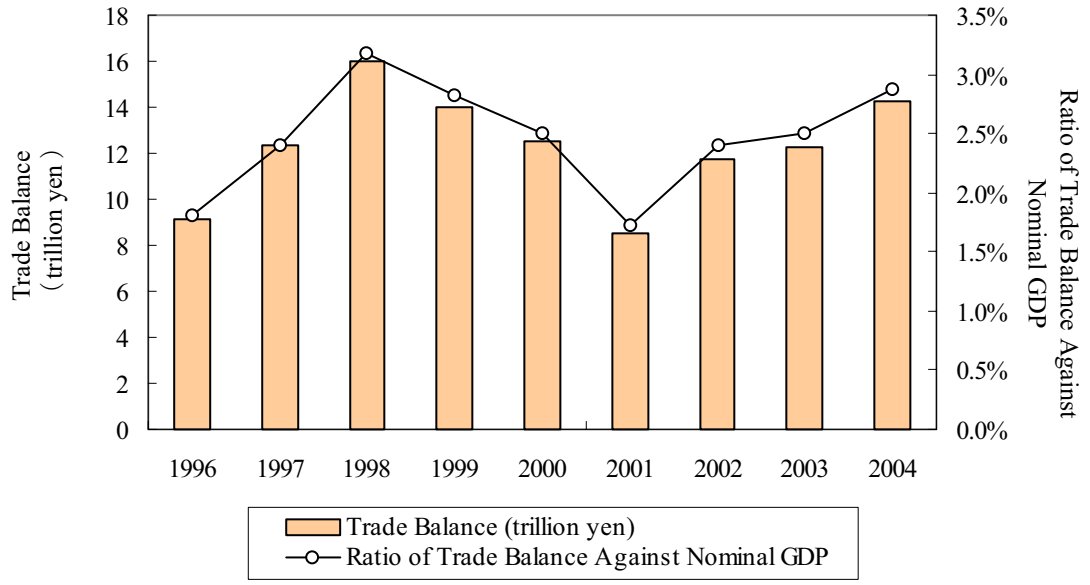


Figure 1.14 Changes in Trade Balance

Sources: Bank of Japan - 'Balance of Payments Monthly'; Economic and Social Research Institute, Cabinet Office, Government of Japan – 'National Accounts of FY2004'

This difficult period for the economy lasted approximately ten years but with the arrival of the new century the economy entered a recovery phase. The three excesses – excessive employment, excessive capital stock, and excessive debt – have been largely eliminated and as the financial position of companies has strengthened, investment and consumption has also begun to rise. Oil prices have been increasing since 2002 and presently there are concerns that they might put pressure on the economy but as of this point in time they have had no major impact on the Japanese economy.

In terms of the industrial structure, the yen continued to appreciate from the spring of 1990 through the spring of 1995, influencing the processing and assembly industries and spurring on a structural shift among Japanese firms towards greater overseas production. On the other hand, the information, telecommunications, and other nascent industries recorded large growth. In agriculture, competition with foreign producers intensified as the volume of imports increased sharply. In response, Japanese farmers have been strengthening their operations by moving towards larger-scale production and pursuing other rationalization measures.

Looking at the trade balance, a deficit of between 10 and 15 trillion yen has been recorded each year since the 1980s but the ratio of the deficit to nominal GDP has been declining since its peak year of 1986.

1.6 Transport

1.6.1 Passenger Transport

Domestic passenger traffic grew significantly throughout the period of rapid economic growth as a result of the popularization of automobiles, improvements to the rapid and comfortable transport system with mobility and the reduction of travelling time with the network expansion. In particular, private automobile ownership began to grow from about 1960 in line with the growth of income level. As a result, rail traffic's share decreased as road traffic's share increased significantly in the 1960s. Air traffic represented a small fraction of the whole traffic, but its transport volume grew significantly, as its timesaving features and the growth of air transport services with the introduction of jet aircraft in domestic airlines.

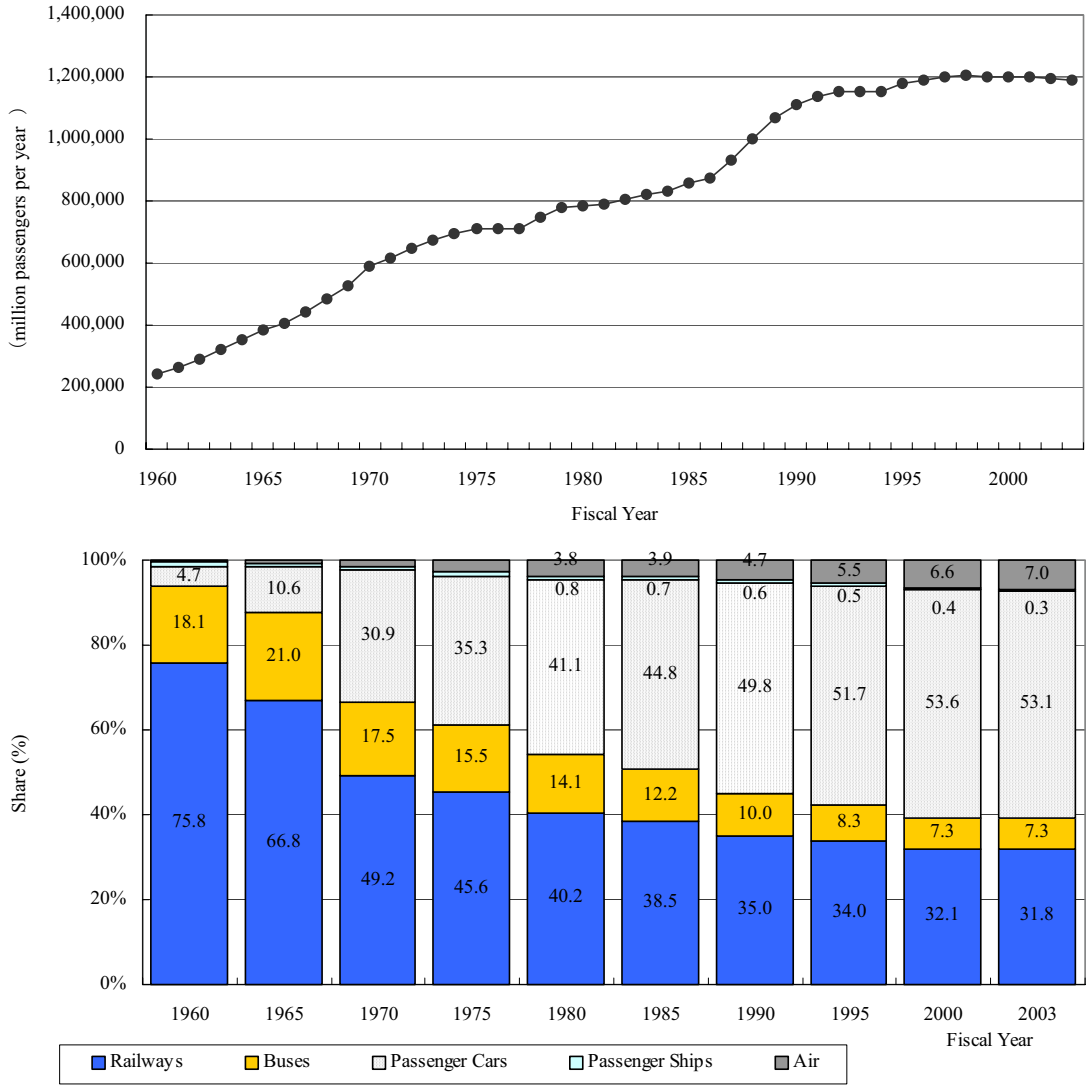


Figure 1.15 Volume of Domestic Passenger Traffic (above) and Modal Shares (below) in Passenger-Kilometers[6]

Source: Ministry of Land, Infrastructure and Transport – 'Domestic Transportation Statistics Handbook'

[6] Passenger cars do not include light motor vehicles and private use trucks. Numeric data on passenger cars for fiscal 1994 does not include figures for Hyogo prefecture between January and March 1995 due to the Great Hanshin-Awaji earthquake.

Following the first oil shock, the growth in the whole domestic passenger traffic shrank, but the rise in the standard of living and the increase of recreational time pushed up the passenger travel by motorcar. The introduction of jumbo jets, relatively low airfares and a growing preference for faster modes of transportation caused increase in the volume of air traffic and its share. On the other hand, the share of railways decreased and, it decreased to mere above 40 percent in the end of the 1970s, which was 75 percent in 1960.

The growth rate of passenger traffic during the early 1980s lowered, but it suddenly increased in the latter 1980s along with the economic boom (bubble economy). In the 1990s, however, passenger traffic volume and the share of each transportation mode has remained almost constant.

1.6.2 Freight Transport

Domestic freight traffic followed the same upward path as the economy during the period of rapid economic growth. Freight road transport showed especially rapid growth, because of increasing demand for transportation of relatively light processing components. Trucking also benefited from the demand for short-distance transport along with the development of industrial complexes in coastal areas near major cities. With the shift of the energy source from coal to oil and the development of heavy industry in coastal areas, domestic sea freight traffic of raw materials for the petrochemical, steel and cement industries and other key heavy industries grew. In contrast, the growth of freight traffic by rail barely increased.

The first oil shock in 1973 sharply decreased domestic freight traffic in fiscal 1974 and 1975. Freight traffic then gradually increased until fiscal 1979, primarily led by higher demand for civil engineering and construction-related cargos because expenditures for public works increased as part of policies to stimulate the economy. When the second oil shock struck in 1979, however, domestic demand and shipments of basic and material industries again stagnated and freight traffic shrank as oil consumption decreased with the conversion from oil to other forms of energy.

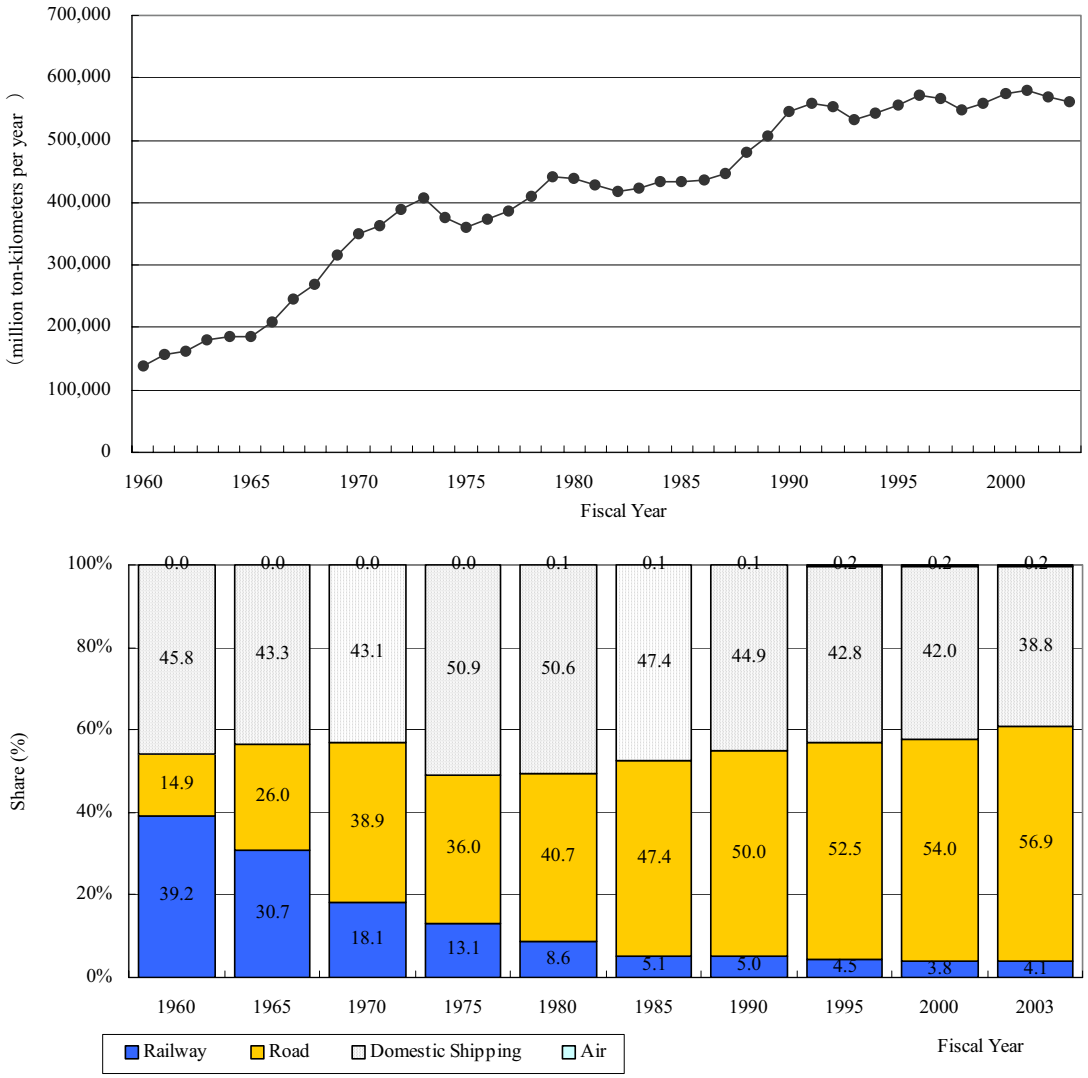


Figure 1.16 Domestic Freight Traffic (above) and Modal Shares (below) in Ton-Kilometers[7]

Source: Ministry of Land, Infrastructure and Transport – 'Domestic Transportation Statistics Handbook'

From the 1980s, Japan experienced industrial restructuring, including a shift from basic materials to processing and assembly, the growth of knowledge-intensive industries, and the transformation of the industrial structure towards tertiary industries. Import demand generated through industrial activities has been reduced in line with the shift to a service-oriented economy. As a result, freight traffic remained flat during this period, decoupled from the economic growth. In the latter half of 1980s, freight traffic turned to increase by a major, domestic, demand-led economic expansion. The modal share of road freight traffic recorded over 50 percent in 1987, as the characteristics of truck transport met the need for small-lot, high-frequency transportation brought on by the advance of the small-volume production of a wide variety

[7] Passenger cars do not include light motor vehicles. Numeric data on passenger cars for fiscal 1994 does not include figures for Hyogo prefecture between January and March 1995 due to the Great Hanshin-Awaji Earthquake.

of products, and small packet delivery services were upgraded. As a result of the decline in the basic material industries, growth of domestic sea transportation remained rather slack, but it showed some growth with the economic expansion in the late 1980s, the domestic sea shipment exceeded their second oil shock freight traffic level in fiscal 1990. As the share of airfreight was small, it has been growing to meet the demand for shipping relatively small, light items including machine parts, fresh foods and books. The share of rail freight transportation has steadily declined, but the advance of containerized transport slowed down this decline.

The total freight volume has remained flat since 1991 due to the recession following the collapse of the bubble economy at the beginning of the 1990s. In recent years the economy has entered a recovery phase but total freight volume is continuing to moderately decline due to greater distribution efficiency resulting from a greater awareness among freight companies of the need to reduce distribution costs and due to the impact of changes in the industrial structure.

1.6.3 Motor Vehicle Traffic

Road transport accounts for a large proportion of both passenger traffic and freight traffic. In this section, the number of motor vehicles owned and vehicle mileage are explained.
Total motor vehicle ownership has increased consistently since the 1960s.

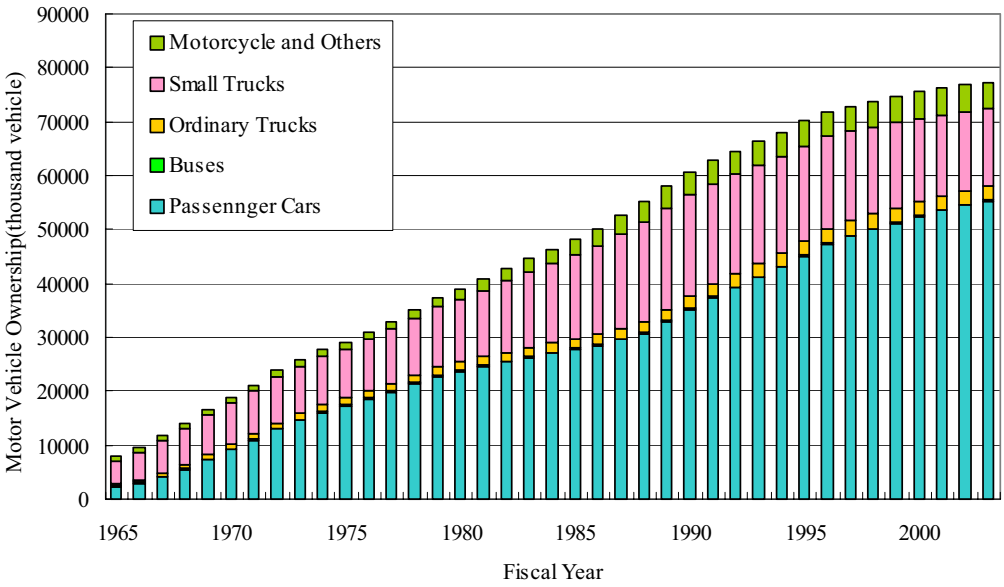


Figure 1.17 Motor Vehicle Ownership[8]

Source: Ministry of Land, Infrastructure and Transport

[8] "Passenger cars" includes light weight cars (the engine displacement is 660 cc or less). "Small trucks" includes light weight trucks (the engine displacement is 660 cc or less). Small special categories of vehicle, scooters (type I) and scooters (type II) are not included.

The number of passenger car in fiscal 2003 has increased by 58 percent since fiscal 1990. However, as the number in fiscal 2000 increased by just 23 percent over fiscal 1995, its increase rate has slowed down. The total travel distance of trucks, business passenger cars, and buses declined in fiscal 2003 compared to fiscal 1990. The travel distance of private passenger cars significantly increased by around 48.5 percent in fiscal 2003 compared to fiscal 1990. However, as the increase in fiscal 2003 was just 20 percent from fiscal 1995, its increase rate has slowed down.

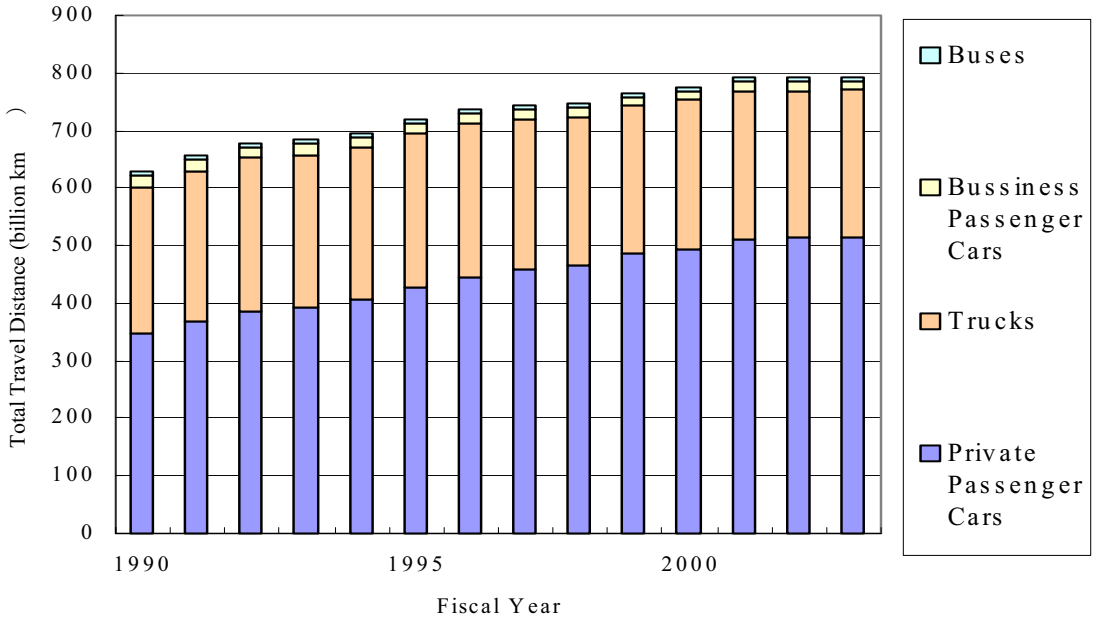


Figure 1.18 Changes in Vehicle Total Travel Distance

Source: Ministry of Land, Infrastructure and Transportation – 'Annual Statistical Report for Car Transportation'

With regard to private and business passenger cars, which account for a large proportion in the total fleet, preferences have shifted to saloon cars and recreational vehicles (RVs) since 1980, and the ratio of heavy vehicles has increased as part of safety measures and the like. In addition, the average weight of light weight cars has been increasing following legislation to improve their safety implemented in 1994.

The sales volume of light weight and small vehicles has increased recently, and the preference seems to be separated into two types. However, the preference for large vehicles has still been continued in general, and the number of vehicles whose weight is 1,000kg or less in fiscal 2004 decreased by around 42 percent compared to fiscal 1992. In the same period, the total number of passenger cars in the 1,001 to 1,500 kilograms category has increased by 1.3 times, while those of 1,501 kilograms or more has increased by about 2.3 times.

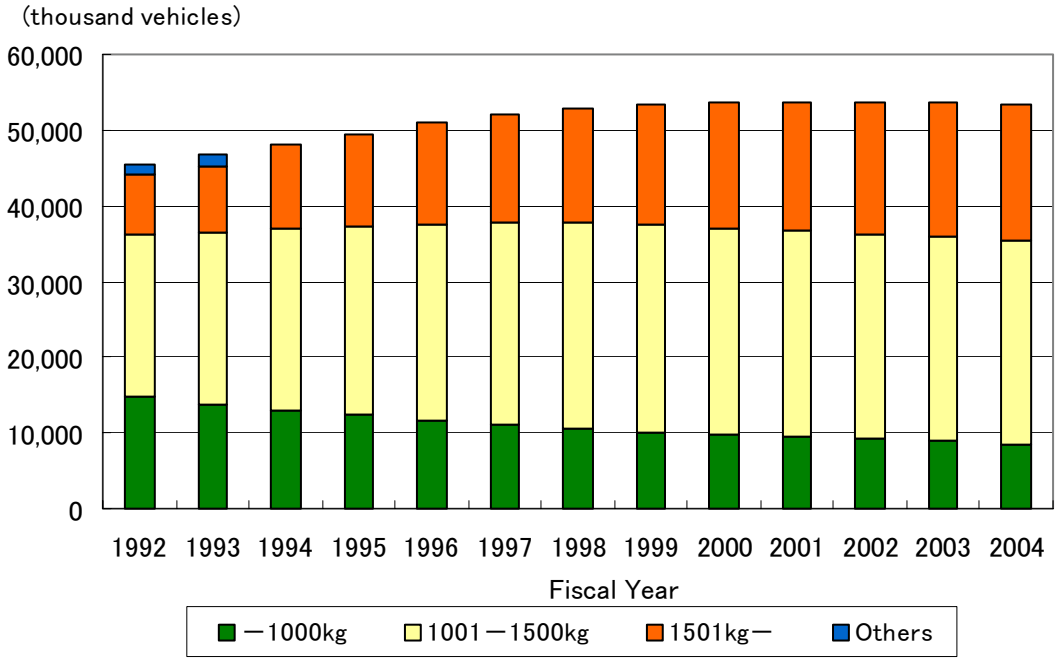


Figure 1.19 Increase in Size (Weight) of Passenger Cars

Source: Automobile Inspection and Registration Association - 'Car ownership by category'[9]

1.7 Energy

1.7.1 Consumption

Final energy consumption continued to increase significantly with the Japanese economy's rapid growth during the 1960s and until the first oil shock in 1973 (Phase I), after which it leveled off and eventually decreased (Phase II). From 1986 onwards (Phase III), however, the economic pickup primed new growth in energy consumption, equivalent to $15{,}912 \times 10^{15}$J in fiscal 2003.

These trends can be summarized for different sectors as follows. Until the first oil shock in 1973 (Phase I), industrial, commercial and residential, and transport sector energy consumption grew rapidly. From fiscal 1973 until 1986 (Phase II), commercial and residential, and transport sector energy consumption continued to grow, but industrial energy consumption began to decrease. After 1986 (Phase III), the strong economy in the latter half of 1980s boosted energy consumption in the industrial sector for a while, but it leveled off in 1990s. On the other hand, energy consumption in the commercial and residential sector has significantly

[9] Light weight cars (the engine displacement is 660 cc or less) are not included. Multi passenger vehicles (MPV) and minivans that weigh 1,501 kg or more were included under 'Others' until 1992, but they are categorized by weight from 1993 onwards.

increased. In the transport sector it has significantly increased between 1990 and 1995; however its increase rate has slowed down since 1995. In fiscal 2003, the industrial sector's share of the total energy consumption in Japan (including non-energy use) was 48 percent; while the commercial and residential sector's was 28 percent; and transport's 24 percent.

Energy consumption trends differ according to the type of energy in question. Electricity and gas consumption have grown uninterruptedly; in fiscal 2003, they were respectively 2.3 times and 3.4 times their fiscal 1973 levels. Coal consumption has been increasing, albeit very gradually. Oil consumption grew rapidly during Phase I, leveled off during Phase II, and has begun to rise again since Japan entered Phase III.

Recent growth in demand has been higher for electricity than for other forms of energy consumed by end-users: as a result, the proportion of energy consumed to generate electricity rose from 24.0 percent of the total primary energy supply in fiscal 1973 to 44.8 percent in fiscal 2003.

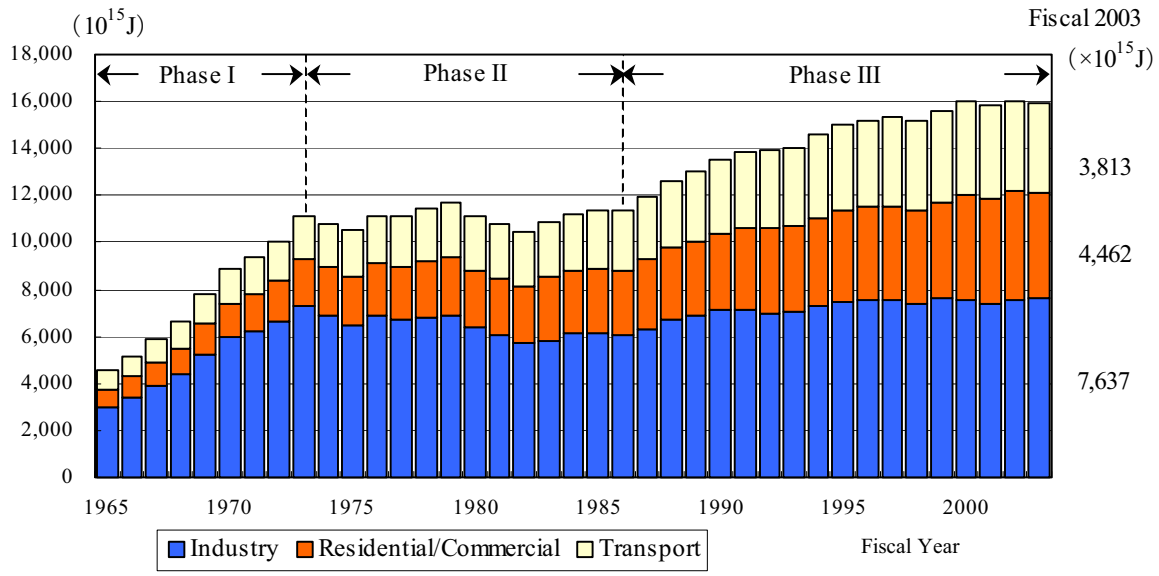


Figure 1.20 Final Consumer Energy Consumption[10]

Source: Agency of Natural Resources and Energy – 'General Energy Statistics'

1.7.2 Supplies

Japan has almost no domestic fossil fuel resources. The ratio of domestic production volumes for the total fossil fuel supply volume is crude oil: 0.3 percent and natural gas: 3.5 percent (all data as of fiscal 2003).

[10] Figures for the industrial and transport sectors include non-energy use. Furthermore, the compilation methods of the "General Energy Statistics" prior to fiscal 2001 and after fiscal 2002 are different, and attention shall also be given to the fact that there are points where data prior to fiscal 1989 differs from those after fiscal 1990.

Japan's dependence on foreign sources peaked in fiscal 1973 at 89.4 percent of its energy supply and although this dependence has been reduced by efforts to find substitutes for oil since then, in recent years foreign dependence has remained about 80 percent, putting the nation in an extremely vulnerable energy-supply situation.

Japan's total primary energy supplies reflect increases in final energy consumption; supplies continued to grow at a substantial rate until fiscal 1973 but leveled off after the first oil shock, and after 1986 there was again a surge of growth. In fiscal 2003, Japan's total primary energy supply was 23,076 × 10^{15}J.

Oil supplies grew continually during Phase I, shrank during Phase II, and again grew steadily during Phase III. Coal supplies are increasing very gradually. Supplies of natural gas and nuclear energy are growing at a substantial rate.

Different energy sources contribute different shares of the total primary energy supply: during Phase I, oil increased its share while coal and hydroelectric power decreased theirs. As a result, oil's share of total primary energy (the 'oil dependency' rate) rose to its peak at 77 percent in fiscal 1973. Oil's share then began to decrease during Phase II, and leveled off during Phase III, but recently decreased again and as of fiscal 2003, it was 51 percent. Coal gradually increased its share following the second oil shock in 1979 – it was 19 percent in fiscal 1985 – but since then, its share has remained level; in fiscal 2003, it accounted for 20 percent. The introduction of alternatives to oil beginning in fiscal 1973 swiftly increased the shares of natural gas and nuclear power, to 15 and 10 percent respectively in fiscal 2003 from 2 percent and 1 percent in fiscal 1973, and contributed to the energy security of Japan.

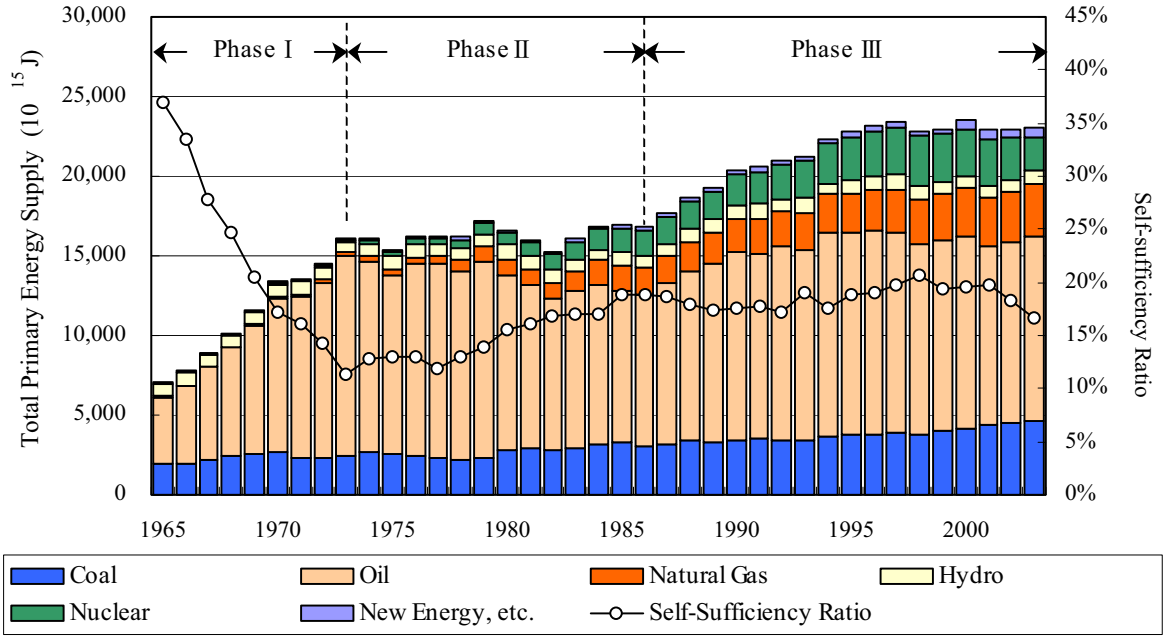


Figure 1.21 Total Primary Energy Supply and Self-Sufficiency Ratio[11]

Source: Agency of Natural Resources and Energy – 'General Energy Statistics'

[11] 'New energy, etc.' includes geothermal energy.

The total of electric power generation increased by about 25 percent in fiscal 2001[12] compared to fiscal 1990 and nuclear power by about 59 percent and thermal power by about 15 percent. As for thermal power generation, coal increased by about 163 percent and LNG by about 51 percent, on the other hand, oil decreased by about 64 percent in the same period.

1.7.3 Per Capita Total Primary Energy Supply and Total Primary Energy Supply per Unit of GDP

Japan's total primary energy supply per capita as of 2003 is 181×10^9J, a level that has remained steady recently.

Japan's total primary energy supply per unit of GDP (total primary energy supply per gross domestic production) increased (worsened) during Phase I, but has improved significantly since Phase II as a result of the world-leading introductions of energy-saving facilities and technologies brought about by the oil shock. Though it has tended to improve during Phase III as well, it has remained static during the 1990s. This is due both to the significant contribution of industry's massive energy-saving investments in reductions that have already been achieved in energy input per unit of output, and to the increase energy consumption in commercial and residential sector and vehicles of transport sector due to greater national affluence and a higher standard of living.

[12] The most recent data is from fiscal 2003 but this was an anomalous year in which nuclear power stations were shut down for long periods so here data from fiscal 2001 was used. In fiscal 2003 the increase in electric power generation relative to fiscal 1990 was just 13 percent.

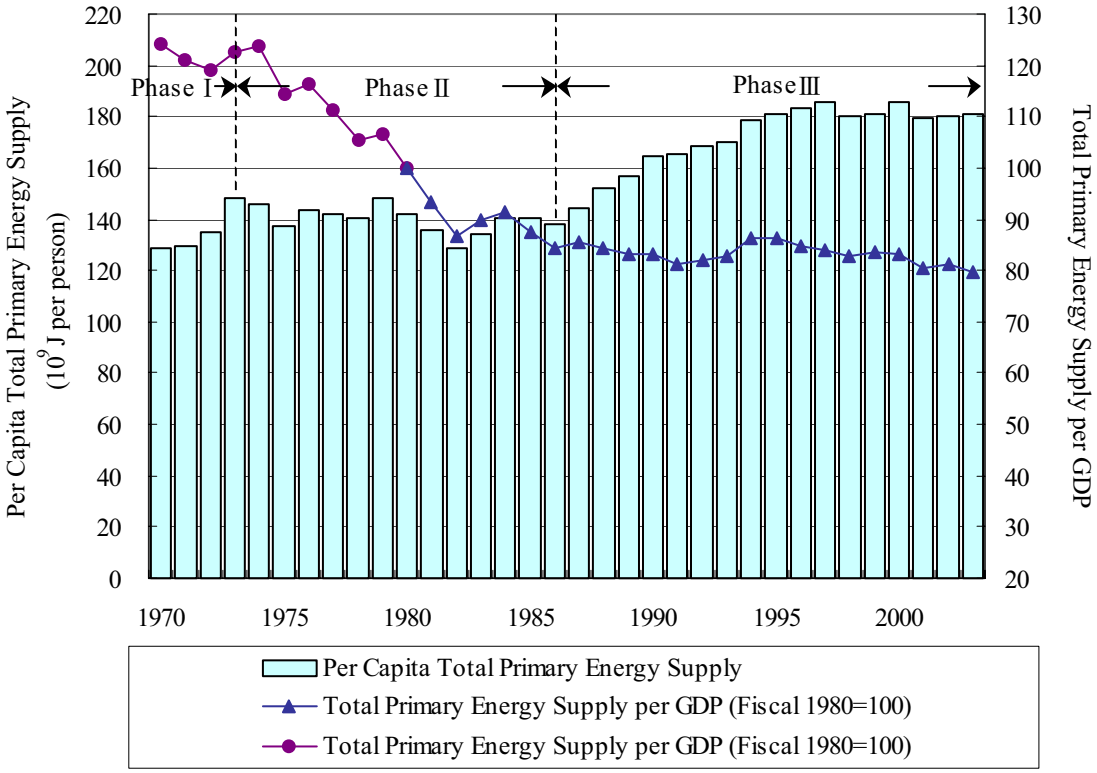


Figure 1.22 Per Capita Total Primary Energy Supply and Total Primary Energy Supply per GDP

Sources: Agency of Natural Resources and Energy – 'General Energy Statistics'; Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts'; Ministry of Public Management, Home Affairs, Posts and Telecommunications – 'Population Census' and 'The Annual Report on Current Population Estimates'.

1.7.4 Prices

Imported energy was cheap and supplies plentiful during Phase I; prices skyrocketed as a result of the two oil shocks, peaking in fiscal 1981 then beginning to fall, and have been steady since fiscal 1986. The fiscal 1990 yen-denominated price of crude oil[13] (partially due to the substantial appreciation of the yen) is only slightly higher than it was prior to the oil shock.

Crude oil prices did shoot up temporarily when the Gulf War broke out in 1990 but then returned to the levels prevailing prior to the Gulf War. In 1996, however, the price of crude oil topped $20 a barrel because of the strong growth of worldwide oil demand, the low inventory system for crude oil and oil products adopted by Western petroleum companies in an effort to reduce costs, coupled with the unstable political situation in the Persian Gulf region.

[13] Crude oil prices are adjusted to correct for price fluctuations caused by exchange rate changes after converting the dollar-based crude oil price to yen in the period concerned.

As per the above description, in the first half of the 1990s, the price per barrel changed to around $20, but the crude oil price fell to $10 per barrel because global oil stocks had increased in line with a slowdown in the increase rate of demand mainly in Asia resulting from the faltering Asian economy due to financial and currency crises from 1997 to 1998. Soon after, crude oil prices increased to the lower $30 per barrel level at one point as the production was repeatedly reduced by the OPEC countries as well as due to the recovery of the Asian economy among many other factors. Then the September 11, 2001 terrorist attacks on the United States led to a slowdown in the world economy and as a result crude oil prices fell to low levels.

However after the price of crude oil per barrel bottomed out at 17 dollars (OPEC basket) in January 2002, it began to rise dramatically. Even though it briefly declined in December 2004, it once again began to rise and in 2005 has been permanently above $40 per barrel. The reasons for the increase in the crude oil price are thought to include the weakening of the oil production and investment base until recently, the increased demand for oil from developing countries, particularly China and India, a decline in the surplus production capacity of the oil-producing countries, and the input of capital into the oil markets by speculators. Demand continues to grow strongly throughout the world and most observers believe that the oil price will remain at high levels for some time to come.

The increase in the crude oil price in recent years has had a relatively small impact on the economy of Japan compared to the time of the first and second oil shocks. This is because Japan has changed to an economic structure less susceptible to the effects of increased oil prices by diversifying its sources of energy to reduce its dependence on oil and by changing its industrial structure. In recent years, however, the price not only oil but also other energy sources such as natural gas, coal, LPG, uranium, etc. has been increasing (Figure 1.23) and the domestic price of secondary energy sources such as gasoline, heating oil, light oil, gas (LPG) has also been rising as a result, although not by as much as primary energy prices (Figure 1.24). If crude oil prices continue to rise in future, it will be necessary to closely watch the impact on Japan’s economy and industry.

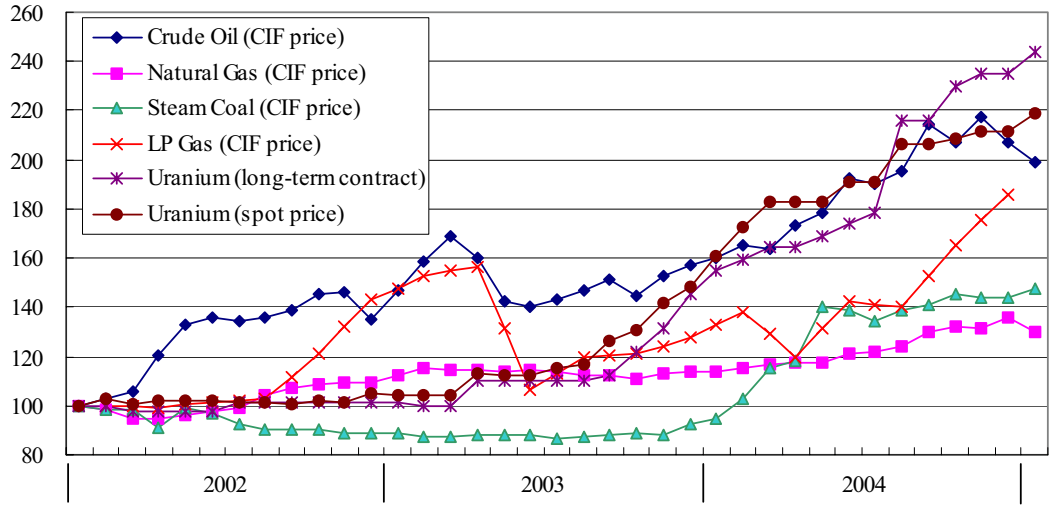


Figure 1.23 Increase in Primary Energy Prices[14] (January 2002=100)

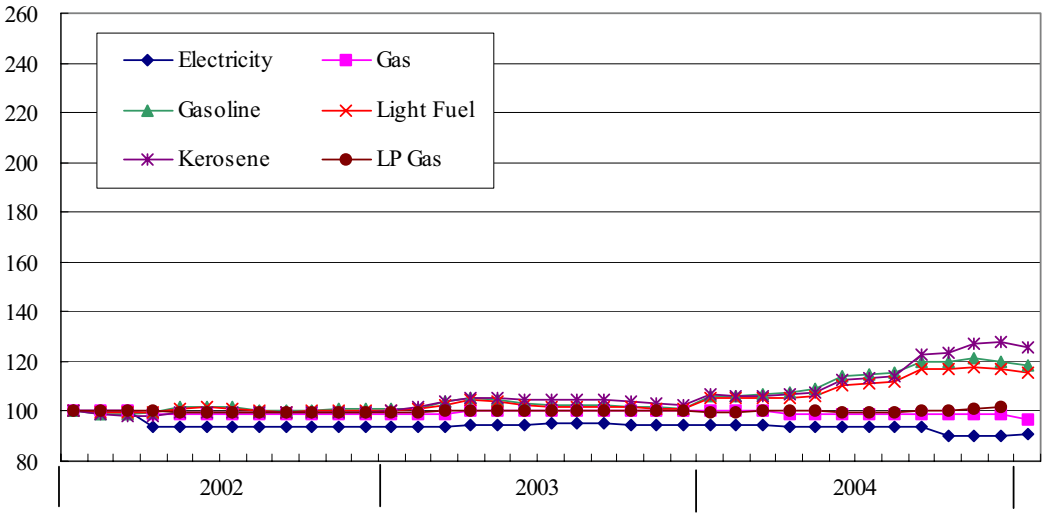


Figure 1.24 Increase in Secondary Energy Prices[15]

Source: Fiscal 2004 Annual Report on Energy (the Energy White Paper)

1.7.5 National Energy Budget and Taxation System

Today, Japan finds it necessary to reform its energy supply and demand structure in order to increase national energy security and positively address global environmental problems.

[14] Figures for crude oil, natural gas, and LPG are from the Ministry of Foreign Affairs – 'Trade Statistics', on a dollar basis. Uranium prices are spot prices on the international market for uranium concentrate (from a study by Trade Tech, Inc.) CIF: cost, insurance and freight.

[15] The data is from studies by The Oil Information Center, etc.

On the demand side, the government is trying to promote thoroughly efficient energy usage, beginning with energy conservation measures. In terms of supply, efforts are being made to promote the introduction of oil alternative energy such as new energy resources and to strengthen measures to secure a stable supply of oil. In order to further advance these policies, the funds for energy-related measures in the national budget are secured via special accounts. For example, the fiscal 2004 budget allocates 275.0 billion yen (an increase of 7.3 percent over the previous year) for the following policies aimed at developing a more sophisticated energy supply and demand structure: development of technologies related to the development of new energy and other oil alternative energy and energy conservation, and the conversion of facilities to alternative energy and energy conservation facilities, and the popularization of such facilities.

Table 1.2 Special Accounts for Coal, Oil and Policies for the Development of a more Sophisticated Energy Supply and Demand Structure

(Units: hundred million yen)

Account Name	Fiscal 2004 Budget	Fiscal 2005 Budget	Year-on-Year Growth	
Coal Account	541	512	-29	-5.4%
Petroleum and the More Sophisticated Structure of Demand and Supply of Energy Policy	6,242	6,432	190	+3.0%
Petroleum Policy	3,678	3,682	4	+0.1%
The More Sophisticated Structure of Demand and Supply of Energy Policy	2,563	2,750	187	+7.3%
Total	6,783	6,944	161	+2.4%

Sources: Ministry of Finance; Ministry of Economy, Trade and Industry

Note: The coal account is an estimated account that only seeks to redeem the principal on the original loan by fiscal 2006, excluding the portion of the Ministry of the Environment.

Table 1.3 Special Accounts for Electric Power Development Promotion Policy

(Units: hundred million yen)

Account Name	Fiscal 2004 Budget	Fiscal 2005 Budget	Year-on-Year Growth	
Electric Power Siting Account	2,577	2,163	-414	-16.1%
Electric Power Source Diversification Account	2,456	2,329	-127	-5.2%
Total	5,033	4,492	-541	-10.7%

Sources: Ministry of Finance; Ministry of Economy, Trade and Industry

Japan has a system of energy-related taxes that include the Petroleum and Coal Tax imposed on crude oil and imported oil products, etc., and promotion of power resources development tax. Revenues from the

Petroleum and Coal Tax are allocated for oil measures, energy conservation measures and new energy measures; while revenues from promotion of power resources development tax are allocated for measures for siting power generation facilities and the like.

An investment promotion tax system applied to the energy infrastructure has been implemented in Japan since fiscal 1981. In fiscal 1992, Japan also introduced a tax system to promote investment aimed at reforming the energy supply and demand structure. This system provides tax incentives to promote the introduction of energy conservation and new energy equipment.

In 2002 Japan reviewed the petroleum tax and reduced the promotion of power resources development tax in order to more fairly allocate the public costs of ensuring a stable supply of energy and stronger policies to combat global warming. Regarding the petroleum tax, the government increased the tax rate on LPG and LNG and at the same time created a new tax on coal and renamed the tax the Petroleum and Coal Tax. This amendment came into effect in fiscal 2003 and the imposition of the tax on coal and changes in the tax rates are being implemented in three stages: fiscal 2003, fiscal 2005, and fiscal 2007.

1.8 Waste

Waste mainly falls into two categories, namely, municipal solid waste and industrial waste. Industrial waste refers to that generated through enterprising activities and is comprised of 20 types specified by cabinet order. Municipal solid waste covers those other than industrial waste, and includes night soil, other household waste disposed of by families, as well as business waste disposed of from offices and restaurants.

Even though the total amount of municipal solid waste and the waste disposed per capita per day have decreased after the second oil shock (1979), it rapidly increased again during the bubble economy period since around 1985 and was relatively unchanged from 1989 until 2000 when it increased. Subsequently it began to decrease once again. The total amount of municipal solid waste disposed of in 2002 was 51.65 million tons, which equates to about 1.1 kilograms per capita per day. This is comprised of 33.1 percent business waste and 66.9 percent household waste. In terms of the disposal methods, most is incinerated (78.4 percent), some is recycled (17.3 percent) and the rest buried as direct landfill (4.3 percent).

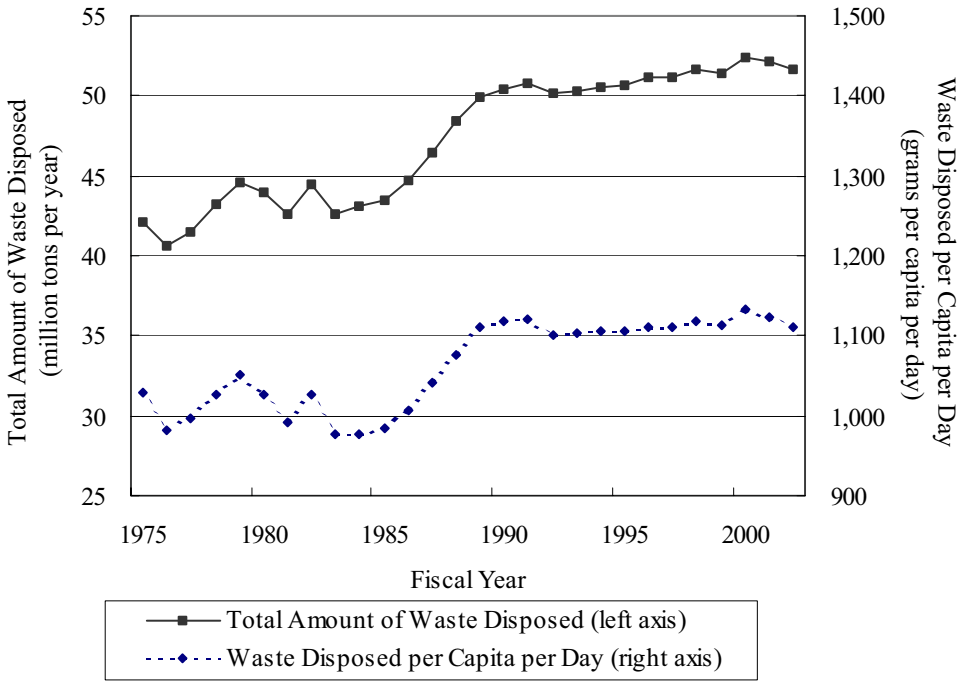


Figure 1.25 Changes in Amount of Municipal Solid Waste Disposed

Source: Ministry of the Environment – 'Status of Municipal Solid Waste Discharge and Disposal'

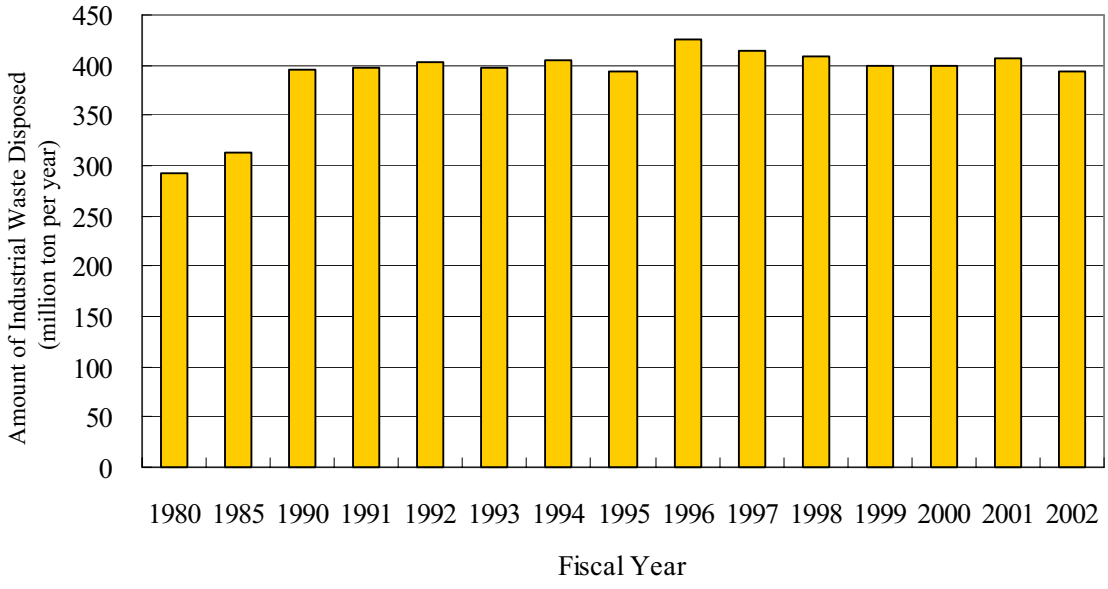


Figure 1.26 Changes in Amounts of Industrial Waste Disposed

Source: Ministry of the Environment – 'Status of Industrial Waste Discharge and Disposal'

The amount of industrial waste disposed of has not changed significantly since 1990, but has remained fairly static. The total amount of industrial waste disposed of in 2002 was about 400 million tons. After such industrial waste is disposed of, about 182 million tons (46%) is recycled and about 40 million tons (10%) is finally disposed.

1.9 Agriculture

In Japan, which falls within the Asian Monsoon region, rice cultivation in paddy fields has long formed part of the agricultural system suited to the humid and rainy summer condition. In order to develop paddy field cultivation, measures to improve paddy field irrigation have been implemented, and, as a result, the ratio of irrigated paddy fields out of the total agricultural area in Japan (54.4 percent) is quite high compared to other countries.

However, as Japan is mountainous and does not have much flat land (the mountain area accounts for 61 percent of the national land), conflicts among different types of land use has been long observed. The ratio used for agriculture within the national land is about 14 percent and the cultivated field per household is small (approximately 1.6 hectares). Furthermore, the cultivated area has been decreasing year by year, and in 2004, it had fallen about 25 percent from the peak period to 4.80 million hectares. In terms of paddy fields, new development of paddy fields was restricted in 1969, and since then the total area has declined by the rate of 1 percent per year due to the conversion to other fields for other crops and/or non-agricultural land use. Since the latter half of the 1980s, farmland development has been reduced, with a trend for farmland to be left uncultivated mainly in hilly and mountainous regions, and as a result the total area under cultivation has also reduced. Such tendency still remains today.

Japan's food self-sufficiency ratio has also fallen significantly. During the period from 1965 to 2002, the food self-sufficiency ratio in terms of calorie base[16] decreased from 73 percent to 40 percent, or 62 percent to 28 percent in terms of grain base. The main long-term cause for the decrease is significant changes in Japanese eating habits, including decreased consumption of rice and increased consumption of meat and fats which rely on imported feed grain and oilseeds due to restrictions on the national land.

[16] Food self-sufficiency ratio in terms of calorie base: Ratio of calorific value of food produced domestically over the total calorific value of food (including feed grain) supplied to the total population.

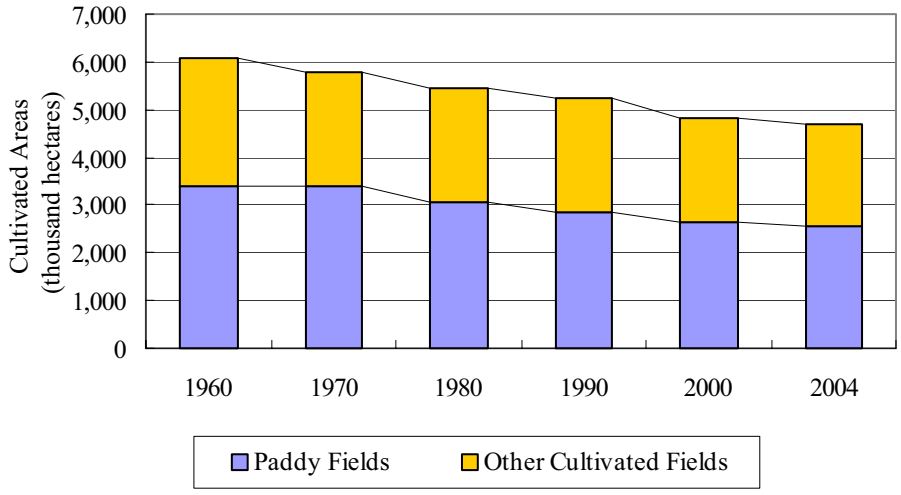


Figure 1.27 Changes in Cultivated Areas

Source: Ministry of Agriculture, Forestry and Fisheries of Japan – 'Statistics on Cultivated land and Planted Area'

1.10 Forestry

Forestry plays an important role in Japan in maintaining functions for the public benefit such as national land conservation through forestry activities such as thinning and tending as well as providing products such as timber.

Currently forest covers about 25 million hectares or about 70 percent of Japan's national land area. It is comprised of national forest: approximately 7.7 million hectares (31 percent) and non-national forest: 17.3 million hectares (69%). Approximately 10 million hectares (41%) of forest in Japan is planted while the other 15 million hectares (59%) is natural. In terms of the growing stock of forest, forest coverage has roughly doubled since 30 years ago as a result of the active planting in the 1960s and has been increasing by about 80 million cubic meters per year, most of which is planted forests.

On the other hand, wood demand in Japan has been stable recently at about 90 million cubic meters per year. In terms of the specifics, the domestic wood supply has been stable at roughly 16 million cubic meters, and its supply ratio was about 18.4 percent in 2004.

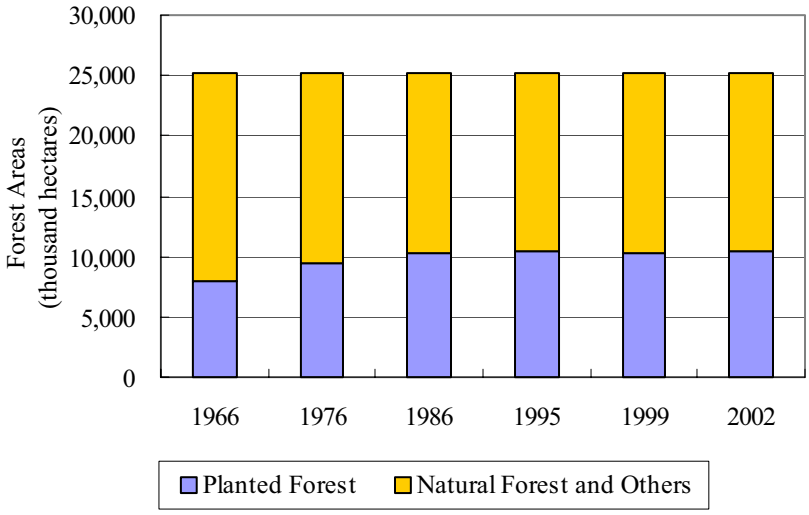


Figure 1.28 Changes in Forested Area

Source: Forestry Agency

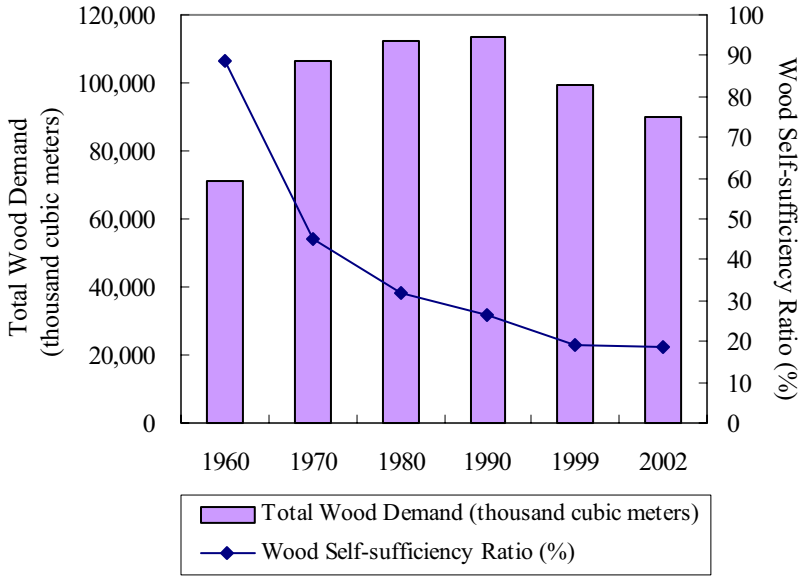


Figure 1.29 Change in Total Wood Demand and Wood Self-Sufficiency Ratio

Source: Forestry Agency – 'Demand and Supply of Woods'

1.11 Information and Telecommunications

There were 79.48 million Internet users in Japan as of the end of 2004, a diffusion rate among the Japanese population of 62.3 percent. This is a huge increase of 52.42 million people, or 40.9 percent of Japan's total population, in five years (Figure 1.30). However at the end of 2003 the population diffusion rate of the Internet passed 60 percent and since diffusion was quite advanced by this stage the rate of growth has

slowed down since. Looking at the number of Internet users by type of connecting device, the number of users connecting to the Internet from mobile telephones and PHSs, and mobile information devices with communications functions (mobile telephones, etc.) is rapidly growing. Users of such devices numbered just 25.04 million in 2001 but this figure had increased 2.3 times to 58.25 million by 2004.

In recent years the use of broadband lines to connect to the Internet has rapidly spread. At the end of 2004, 62.0 percent of households connecting to the Internet from their home computers were using broadband, a huge increase of 55.2 percentage points compared to the end of 2000.

With the development of information and communications technologies, electronic commerce has also expanded. In Japan in 2003 the size of the market for electronic commerce was 81.4 trillion yen, consisting of 77 trillion yen of Business to Business (B2B) transactions and 4.4 trillion yen of Business to Consumer (B2C) deals. So B2B transactions have increased by 3.5 times and B2C deals by 5.4 times since 2000.

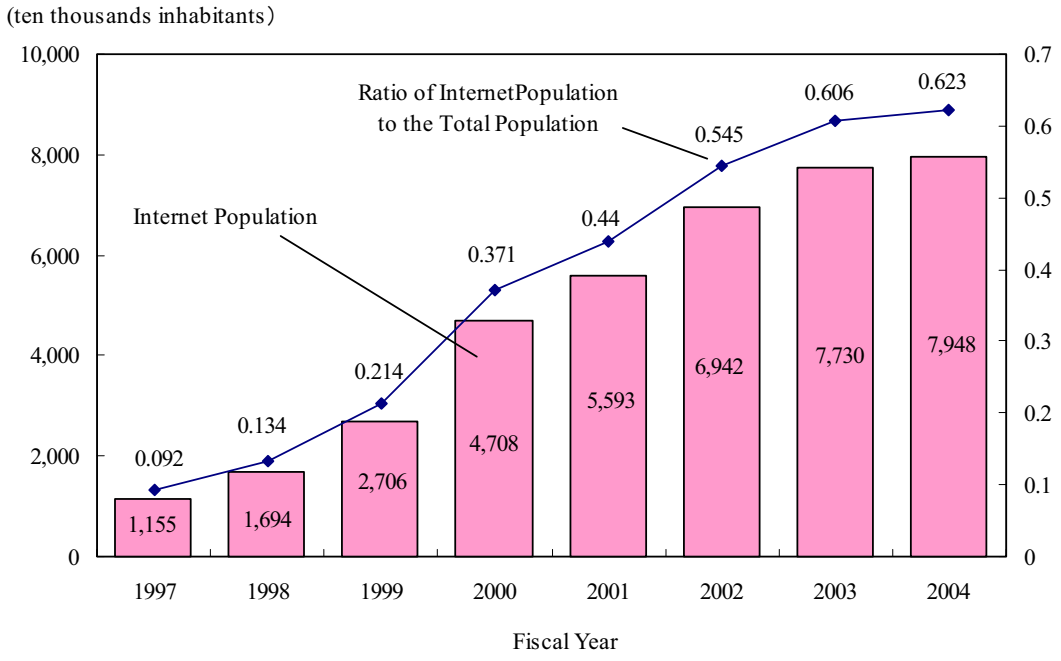


Figure 1.30 Number of Internet Users and the Internet Diffusion Rate

Source: 2005 White Paper - Information and Communications in Japan

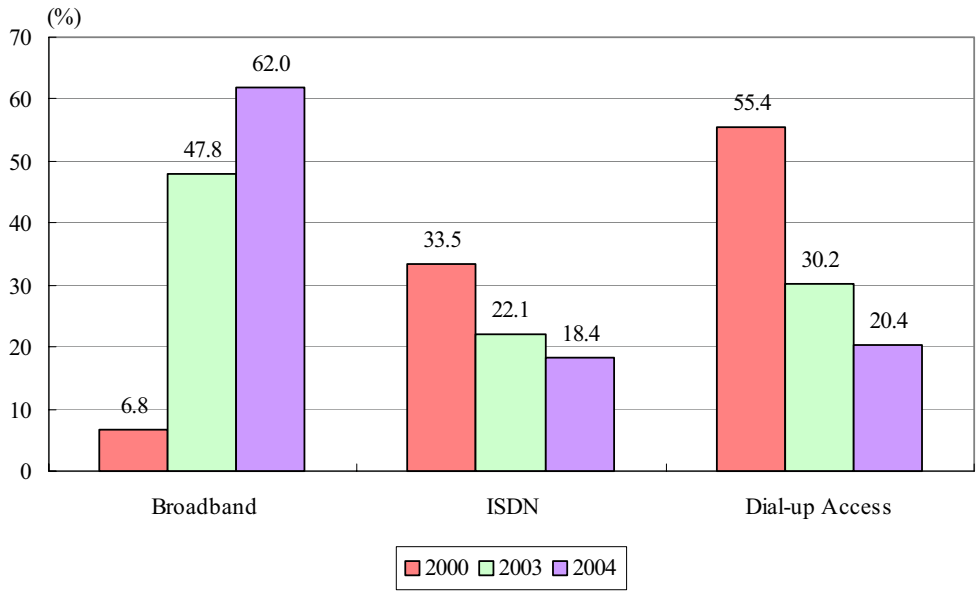


Figure 1.31 Methods of Connecting to the Internet from Home Computers[17]

Source: 2005 White Paper - Information and Communications in Japan

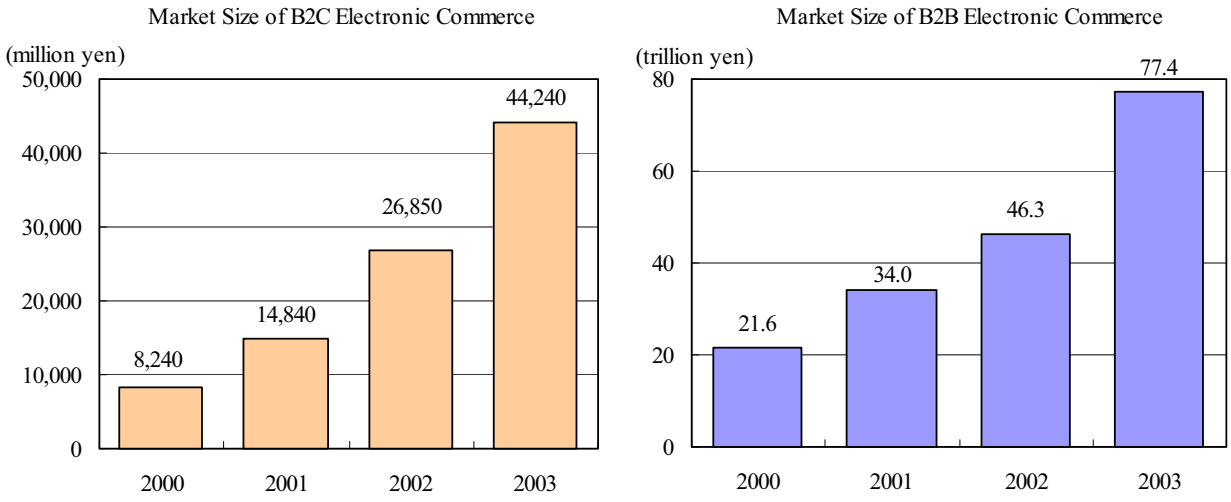


Figure 1.32 B2C and B2B Electronic Commerce

Source: 2005 White Paper - Information and Communications in Japan

[17] The total for each year may not add up to 100 as multiple answers were taken and there were choices other than those specified above.

1.12 Administration and Finances

1.12.1 Administration

Under the Japanese Constitution enacted in 1947, sovereign power resides with the people while the judicial, legislative, and executive powers of government are vested, respectively, in the mutually independent Supreme Court, Diet, and Cabinet. The constitution establishes a parliamentary cabinet linking the Cabinet to the Diet; the Diet designates the Prime Minister; the Prime Minister and a majority of the Ministers of State must be Diet members; and the Cabinet is collectively responsible to the Diet.

Organs of national administration under Cabinet jurisdiction are established – the Cabinet Office and ten ministries, namely: the ministries of Internal Affairs and Communications; Justice; Foreign Affairs; Finance; Education, Culture, Sports, Science and Technology; Health, Labour and Welfare; Agriculture, Forestry, and Fisheries; Economy, Trade and Industry; Land, Infrastructure and Transport; and the Environment. As the chief ministers of state, the Prime Minister and the individual ministers divide responsibility for national administrative duties. Councils are among the representative organs established under law with the object of ensuring that expert opinions and the views of the people are reflected in administrative actions. The main duty of the councils and other advisory bodies is to investigate and deliberate on the jurisdiction and stipulation of laws and to inform administrative organs of their views. As of September 2004, there were 103 councils and similar organs in existence.

Concerning the global warming issue, government level plans have been drawn up and countermeasures advanced. For example there is the Action Program to Arrest Global Warming of October 1990, the Guideline of Measures to Prevent Global Warming of June 1998, drawn up in response to the adoption of the Kyoto Protocol (December 1997), and the revision of the Outline for Promotion of Efforts to Prevent Global Warming in March 2002, in response to the adoption of the Marrakesh Accords (November 2001). Concerning structures for the promotion of global warming countermeasures, in December 1997 the Global Warming Prevention Headquarters was established with all of the government cabinet ministers as its members. The headquarters annually checks the level of progress of the specified measures for ways to address global warming.

In October 1998, the ‘Law Concerning the Promotion of the Measures to Cope with Global Warming’ (the Global Warming Measures Promotion Law) was enacted and the basic framework for the promotion of measures to cope with global warming in Japan was constructed. The law was amended in June 2002 and when the Kyoto Protocol came into force the Kyoto Protocol Target Achievement Plan was formulated. After the development of this domestic framework, Japan ratified the Kyoto Protocol in June 2002.

The Outline for Promotion of Efforts to Prevent Global Warming revised in 2002 divided the years from 2002 until the completion of the first commitment period into three step periods and adopted a step-by-step approach of evaluating the progress of measures and emissions in 2004 and 2007 and adopting additional policies and measures as necessary. In response to this, from 2003 debate concerning evaluation and revision of the Outline commenced in the Central Environment Council of the Ministry of the Environment,

the Industrial Structure Council and the Advisory Committee for Natural Resources and Energy of the Ministry of Economy, Trade and Industry, and the Social Capital Development Council and the Council for Transport Policy of the Ministry of Land, Infrastructure and Transport, among others. As a result, although in some areas the policies produced benefits it remained difficult for Japan to achieve its Kyoto Protocol commitments. Based on this realization, studies continued on further supplementary policies.

On the other hand, in February 2005 the Kyoto Protocol came into force and it became necessary to make a decision on the Kyoto Protocol Target Achievement Plan based on the Global Warming Measures Promotion Law. In response to this need, in April 2005 the Cabinet approved the Kyoto Protocol Target Achievement Plan based on the results of the evaluation and revision of the Outline carried out in 2004. The plan stipulates the countermeasures and policies necessary to reliably achieve Japan's 6% reduction commitment under the Kyoto Protocol.

In future the Global Warming Prevention Headquarters will examine the progress of policies taken by the government for individual countermeasures on an annual basis and will strengthen policies as necessary. Furthermore, in 2007 a quantitative evaluation and revision of the plan will be carried out and the countermeasures and policies necessary in the first commitment period will be taken beginning in fiscal 2008.

As of October 2005, local public organizations included 47 prefectures and 2,216 municipalities (cities, towns, and villages) with local assemblies serving as their legislatures; their executive branches being headed by a governor in the case of prefectures and by a mayor in the case of municipalities. The size of the prefectures and municipalities varies.

Since measures to prevent global warming are intimately related to all socioeconomic activities, in addition to the policies of national government organs, the policies and measures implemented by regional and local governments and efforts to induce appropriate behavior on the part of local communities and individual citizens in their daily lives are also extremely important.

To give a specific example of efforts by local governments, plans concerning the prevention of global warming have been formulated in 44 prefectures. And as of April 2005 plans of action concerning the reduction of greenhouse gas emissions from their own administration and projects have been formulated by all the prefectures and 890 municipalities. Furthermore, 3,677 volunteers to promote activities to mitigate global warming have been commissioned by 39 prefectures, prefectural centers for the promotion of activities to stop global warming have been designated in 38 prefectures, and 128 global warming countermeasures regional councils have been established in 39 prefectures.

In addition as a part of the promotional structure of the Kyoto Protocol Target Achievement Plan, in the regions the government will establish Regional Committees on Energy Supply and Demand and Prevention of Global Warming in nine regional blocks from Hokkaido to Okinawa in order for concerned ministries and agencies to cooperate to back up efforts in the regions for global warming countermeasures, in collaboration with local governments, etc.

In this way, the efforts of Japan's local governments are steadily growing and it is expected that they will develop even more in future.

1.12.2 Finances

Japan's national finances are administered as follows. Every fiscal year (April 1st to March 31st), the government prepares a budget, which must be approved by the Diet before it is implemented by the administrative organs. The national budget consists of three parts: the general account, special accounts, and government-related operating accounts.

The general account is the record of the national government's ordinary revenues and outlays. It is sourced from taxes and, when necessary, borrowing by the national government. This account covers the most fundamental national expenses, such as social welfare, education, and defense. In fiscal 2005, ordinary expenditure totaled 47.2829 trillion yen, 0.7 percent less than the initial budget for the previous year. The general account totaled 82.1829 trillion yen, an increase of 0.1 percent.

Special accounts are specially established under the Finance Law independently of the general account in cases where the national government runs certain enterprises, invests certain funds, or allots certain revenues to particular expenditures. There are 31 such special accounts including 25 special accounts for government enterprises, 2 special accounts for fund management, and 4 special accounts for the consolidation of funds. Government-related operations are wholly state-owned financial institutions established via special legislation; the National Life Finance Corporation, the Japan Finance Corporation for Small Business and the Development Bank of Japan are among the six finance corporations, two banks, and one enterprise set up in this way.

Table 1.4 Fiscal 2005 General Expenditure Budget

(Hundred million yen)

	Fiscal 2005 budget			Fiscal 2004 budget		
		2004-2005 change	Growth rate (%)		2003-2004 change	Growth rate (%)
Social Security	203,808	5,838	+2.9	197,970	8,063	+4.2
Education and Science	57,234	-4,096	-6.7	61,330	-3,382	-5.2
Science and Technology Promotion	13,170	329	+2.6	12,841	543	+4.4
Government Employee Pensions and Others	10,693	-628	-5.5	11,321	-708	-5.9
National Defense	48,564	-466	-1.0	49,030	-500	-1.0
Public Works	75,310	-2,849	-3.6	78,159	-2,812	-3.5
Economic Assistance	7,404	-282	-3.7	7,686	-475	-5.8
(Reference) ODA	7,862	-307	-3.8	8,169	-409	-4.8
Small- and Medium-sized Businesses	1,730	-8	-0.5	1,738	9	+0.5
Energy Measures	4,954	-111	-2.2	5,065	-502	-9.0
Major Foodstuff Measures	6,755	-70	-1.0	6,825	-139	-2.0
Transfer to the Industrial Investment Special Account	710	-278	-28.1	988	-648	-39.6
Miscellaneous	52,167	-541	+1.0	52,708	1,492	+2.9
Contingencies	3,500	0	0.0	3,500	0	0.0
General expenditure total	472,829	-3,491	-0.7	476,320	398	+0.1

Source: Ministry of Finance

Beginning in fiscal 2003, funds related to global warming countermeasures in the draft budgets of concerned ministries and agencies have been classified under the budget related to the Outline for Promotion of Efforts to Prevent Global Warming. The total value of the budget related to the Outline for Promotion of Efforts to Prevent Global Warming for fiscal 2005 is 1.1428 trillion yen, a 9.2% decline from the previous fiscal year. The breakdown of the budget is as follows.

Beginning in fiscal 2006, the budget related to global warming will be compiled based on the classification of countermeasures in the newly-formulated Kyoto Protocol Target Achievement Plan so it will not be possible to compare the new global warming-related budget directly with such budgets for the period up until fiscal 2005.

Table 1.5 Budget Related to the Outline for Promotion of Efforts to Prevent Global Warming (by ministry and agency) (Unit: million yen)

Ministry or agency	Fiscal 2004 budget	Fiscal 2005 budget	Change from previous fiscal year (%)
Cabinet and Cabinet Office	4,094	3,616	-478 (-12%)
Ministry of Internal Affairs and Communications	208	121	-87 (-42%)
Ministry of Justice	423	31	-393 (-93%)
Ministry of Foreign Affairs	465	483	17 (+4%)
Ministry of Finance	233	0	-233 (*)
Ministry of Education, Culture, Sports, Science and Technology	138,521	91,134	-47,388 (-34%)
Ministry of Health, Labour and Welfare	340	143	-197 (-58%)
Ministry of Agriculture, Forestry and Fisheries	437,749	408,063	-29,686 (-7%)
Ministry of Economy, Trade and Industry	370,833	385,292	14,460 (+4%)
Ministry of Land, Infrastructure and Transport	150,973	148,498	-2,475 (-2%)
Ministry of the Environment	154,697	105,431	-49,265 (-32%)
National Personnel Authority	11	0	-11 (*)
Board of Audit	36	0	-36 (*)
Total	1,258,584	1,142,811	-115,772 (-9%)

(Note 1) "Cabinet" indicates the Cabinet Secretariat and the Cabinet Legislation Bureau; "Cabinet Office" indicates the Cabinet Office, the Financial Services Agency, the National Policy Agency, the Imperial Household Agency, the Japan Defense Agency, and the Defense Facilities Administration Agency.

(Note 2) Budget items that do not fall under the Outline are excluded.

(Note 3) Due to rounding columns may not add up exactly to the total for that column.

(Note 4) * refers to items for which the requested budget amount was reduced due to the completion of the switch to low-emission official vehicles by fiscal 2005.

(Note 5) *2 is a reduction resulting from the exclusion of projects funded by the management subsidy for independent administrative institutions from the tabulation.

◊ Notes 2 and 3 also apply to Table 1.6.

◊ The Budget Related to the Outline for Promotion of Efforts to Prevent Global Warming includes items with the primary objective of combating global warming and in addition a large number of items that have the indirect effect of contributing to the fight against global warming.

Table 1.6 Budget Related to the Outline for Promotion of Efforts to Prevent Global Warming (classified by countermeasure) (Unit: million yen)

Countermeasure	Fiscal 2004 budget	Fiscal 2005 draft budget	Change from previous fiscal year (%)	
1. Promotion of global warming countermeasures aimed at achievement of the 6% reduction commitment				
(1) Reduction of CO_2 emissions centered on countermeasures on both the energy supply and demand sides				
<Promotion of countermeasures for the reduction of emissions of energy-originated CO_2 (energy conservation countermeasures)>				
Demand side countermeasures in the industrial sector	16,091	38,087	23,650	(+147%)
Demand side countermeasures in the residential and commercial sector				
Countermeasures to improve the efficiency of equipment	2,547	17,818	15,271	(+600%)
Improvement of the energy conservation capability of houses and buildings	25,031	25,912	882	(+4%)
Enhancement of energy demand management	582	437	-145	(-25%)
Demand side countermeasures in the transport sector				
Automobile traffic countermeasures	9,938	6,448	-3,490	(-35%[*1])
Construction of a transportation system which imposes a small environmental burden	124,376	127,608	3,232	(+3%)
<Promotion of countermeasures for the reduction of CO_2 on the energy supply side>				
New energy countermeasures	141,778	137,099	-4,679	(-3%)
Fuel conversion, etc.	9,693	10,426	733	(+8%)
Promotion of nuclear power	255,680	206,644	-49,036	(-19%[*2])
(2) Promotion of countermeasures for the reduction of emissions of non-energy-originated CO_2, CH_4 and N_2O	206,623	130,552	-76,071	(-37%)
(3) Promotion of countermeasures to reduce emissions of the three fluorinated gases	345	1,423	1,078	(+312%)
(4) Strengthening research and development on innovative environmental and energy technologies	37,458	30,308	-7,150	(-19%)
(5) Promotion of further activities to stop global warming by all sectors and strata of society	13,788	16,370	2,582	(+19%)
(6) Promotion of greenhouse gas sink measures				
Promotion of forests and forestry measures	385,145	356,673	-28,473	(-7%)
Promotion of urban greening, etc.	[*3]			
(7) Utilization of the Kyoto Mechanisms	4,999	9,599	4,600	(+92%)
(8) Others	210	307	97	(+46%)

2. Mechanism for quantitative evaluation and review	13	213	199	(+1476%)
3. Develop the domestic system for calculating greenhouse gas emissions	505	1,100	595	(+118%)
4. Strengthening of the scientific observation and monitoring structure and promotion of study and research	13,363	17,544	4,180	(+31%)
5. Ensuring of international collaboration on global warming countermeasures	10,419	8,244	-2,175	(-21%)
Total	1,258,584	1,142,811	-115,772	(-9%)

*1 Items for which the amount requested was reduced due to the completion of the switch to low-emission official vehicles by fiscal 2005.

*2 A reduction resulting from the exclusion of projects funded by the management subsidy for independent administrative institutions from the tabulation.

*3 Because it is not possible to separate the figure that only applies to “Promotion of urban greening, etc.” from the related budget, this figure is not given.

◊ The Budget Related to the Outline for Promotion of Efforts to Prevent Global Warming includes items with the primary objective of combating global warming and in addition a large number of items that have the indirect effect of contributing to the fight against global warming.

Chapter 2

National Inventory of Greenhouse Gas Emissions and Removals[1]

2.1 Description and Interpretation of Emission and Removal Trends for Aggregate Greenhouse Gases

2.1.1 Greenhouse Gas Emissions and Removals

Total greenhouse gas emissions in fiscal 2003[2] (the sum of emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) converted to CO_2 equivalents by multiplying its global warming potential (GWP)[3] respectively; excluding CO_2 removals) was 1,339 million tons (in CO_2 equivalents)[4], an increase of 12.8 percent compared to emissions (CO_2, CH_4, N_2O, excluding CO_2 removals) in fiscal 1990 (removals of CO_2 in fiscal 1995 were 96.7 million tons[5], an increase of 15.3 percent from fiscal 1990). Compared to emissions in the base year under the Kyoto Protocol (fiscal 1990 for emissions of CO_2, CH_4, N_2O; fiscal 1995 for emissions of HFCs, PFCs, and SF_6), it increased by 8.3 percent.

It should be noted that emissions of HFCs, PFCs and SF_6 in the period from 1990 to 1994 and emissions and removals by land-use change and forestry (LUCF) after 1996 have not been estimated (NE).

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[1] This chapter was written in accordance with the National Greenhouse Gas Inventory Report of Japan (May 2005). The complete report can be found in the URL below:
(http://www-gio.nies.go.jp/activites_e/lib-e/3-giopublish-e.html)

[2] "Fiscal" is used because the primary greenhouse gas emitted, CO_2, is estimated on a fiscal year basis; from April of the year mentioned to March of the following year.

[3] Global Warming Potential (GWP): It is the coefficient that indicates degrees of greenhouse gas effects caused by greenhouse gases converted into the proportion of equivalent degrees of CO_2. The figures are based on the Second National Assessment Report (1995) issued by the Intergovernmental Panel on Climate Change (IPCC).

[4] Refer to first bullet point in 1.3.2.1 Fuel Combustion (CO_2) of National Greenhouse Gas Inventory of Japan (2005).

[5] In the inventory submitted under the FCCC, removals by forests planted before 1990 are included in CO_2 removals in the LUCF sector. Therefore, this value does not correspond to 13 Mt indicated in the annex of "Draft decision -/CMP.1 (Land-use change and forestry) (FCCC/CP/2001/13/Add.1 p. 54) adopted in the decision 11/COP7.

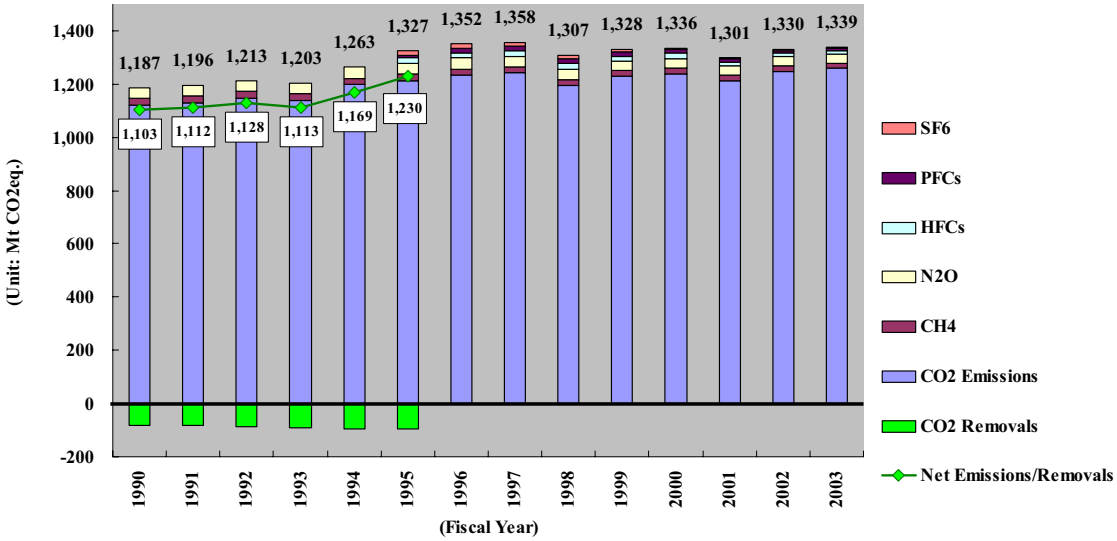

Figure 2.1 Trends in Emission and Removals of Greenhouse Gases in Japan

* Values in boxes represent net emissions or removals. No values appear after 1995, however, as CO_2 removals have not been estimated.

2.1.2 CO_2 Emissions Per Capita

Total CO_2 emissions in fiscal 2003 were 1,259 million tons, CO_2 emissions of 9.87 tons per capita. Compared to fiscal 1990, it represents an increase of 12.2 percent in total CO_2 emissions, and an increase of 8.7 percent in CO_2 emissions per capita. CO_2 emissions compared to the previous year increased by 0.9 percent in total CO_2 emissions and increased by 0.8 percent per capita.

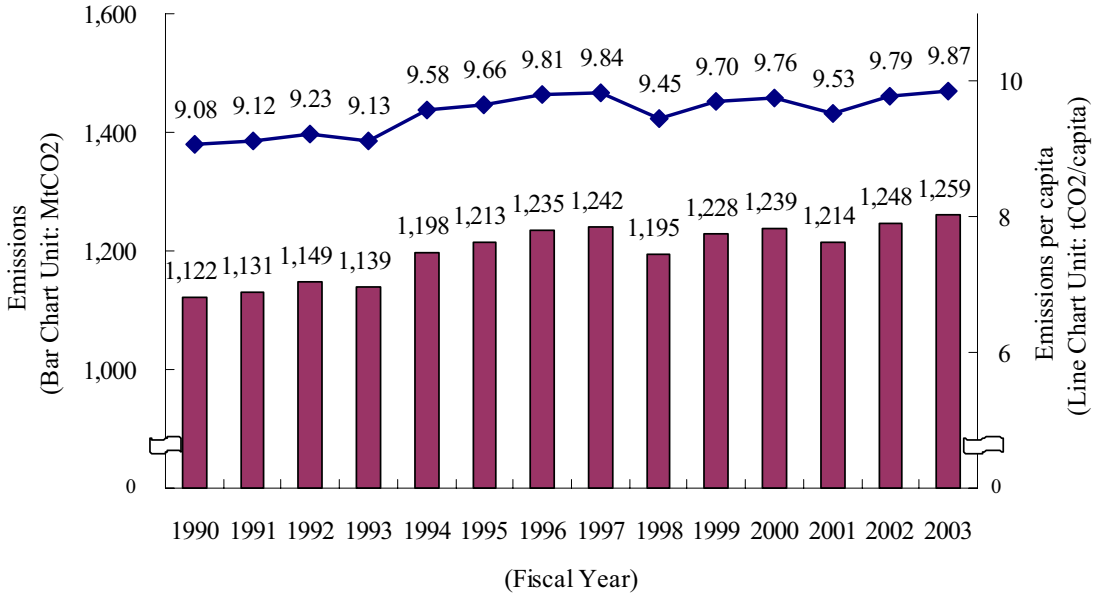

Figure 2.2 Trends in Total CO_2 Emissions and CO_2 Emissions Per Capita

Source of population: Ministry of Internal Affairs and Communications Japan, Population Census and Ministry of Internal Affairs and Communications, Annual Report on Current Population Estimates

2.1.3 CO_2 Emissions per unit of GDP

CO_2 emissions per unit of GDP in fiscal 2003 were 2,270 tons/billion yen, resulting in a decrease by 5.2 percent since fiscal 1990, and a decrease by 2.3 percent from the previous year.

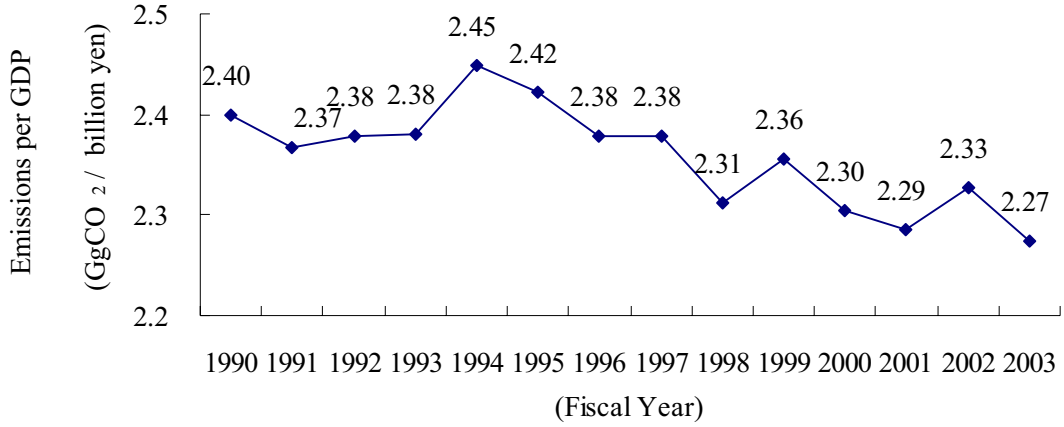

Figure 2.3 Trends in CO_2 Emissions per unit of GDP

Source of GDP: website of Economic and Social Research Institute (Preliminary Estimates ofNational Expenditure Oct-Dec.2004, Fixed-based)

2.2 Description and Interpretation of Emission and Removal Trends by Gas

Emissions of CO_2 in fiscal 2003 were 1,259 million tons, comprising 94.0 percent of total greenhouse gas emissions. It represents an increase by 12.2 percent from fiscal 1990, and an increase by 0.9 percent in comparison with the previous year. Removals of CO_2 in fiscal 1995[6] were 96.7 million tons, equivalent to 7.3 percent of total annual greenhouse gas emissions. It represents an increase by 15.3 percent from fiscal 1990, and an increase by 3.4 percent in comparison with the previous year.

Emissions of CH_4 in fiscal 2003 were 19.3 million tons (in CO_2 equivalents), comprising 1.4 percent of total emissions. The value represents a reduction by 22.1 percent from fiscal 1990 and 1.2 percent in comparison with the previous year.

Emissions of N_2O in fiscal 2003 were 34.6 million tons (in CO_2 equivalents), comprising 2.6 percent of total emissions. The value represents a reduction by 13.9 percent from fiscal 1990, and 0.2 percent in comparison with the previous year.

[6] Statistics on removals of CO_2 have not been updated. The most recently available data is therefore for fiscal 1995.

Emissions of HFCs in CY2003 were 12.3 million tons (in CO_2 equivalents), comprising 0.9 percent of total emissions. The value represents a reduction by 39.2 percent on CY1995, and 4.7 percent in comparison with the previous year.

Emissions of PFCs in CY2003 were 9.0 million tons (in CO_2 equivalents), comprising 0.7 percent of total emissions. The value represents a reduction by 28.2 percent from CY1995, and 8.3 percent in comparison with the previous year.

Emissions of SF_6 in CY2003 were 4.5 million tons (in CO_2 equivalents), comprising 0.3 percent of total emissions. The value represents a reduction by 73.6 percent on CY1995, and 15.3 percent in comparison with the previous year.

Table 2.1 Trends in Emissions and Removals of Greenhouse Gases in Japan

[Mt CO2 eq.]	GWP	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CO2 Emissions	1	1,122.3	1,131.4	1,148.9	1,138.7	1,198.2	1,213.1	1,234.8	1,242.0	1,195.2	1,228.4	1,239.0	1,213.6	1,247.8	1,259.4
Removals	1	-83.9	-83.9	-85.6	-90.1	-93.5	-96.7	NE	NE	NE	NE	NE	NE	NE	NE
CH4	21	24.8	24.7	24.6	24.5	24.1	23.5	22.9	22.1	21.5	21.1	20.7	20.2	19.5	19.3
N2O	310	40.2	39.7	39.9	39.6	40.5	40.6	41.5	41.9	40.6	35.1	37.5	34.6	34.7	34.6
HFCs	HFC-134a: 1,300 etc.	NE	NE	NE	NE	NE	20.2	19.9	19.8	19.3	19.8	18.5	15.8	12.9	12.3
PFCs	PFC-14: 6,500 etc.	NE	NE	NE	NE	NE	12.6	15.3	16.9	16.6	14.9	13.7	11.5	9.8	9.0
SF6	23,900	NE	NE	NE	NE	NE	16.9	17.5	14.8	13.4	9.1	6.8	5.7	5.3	4.5
Gross Total		1,187.3	1,195.8	1,213.4	1,202.9	1,262.8	1,326.9	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1
Net Total		1,103.4	1,111.9	1,127.8	1,112.8	1,169.3	1,230.2	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1

* NE: Not Estimated

* CH_4 and N_2O emissions in Table 2.1 include emissions from land-use change and forests based on the estimation method decided by the UNFCCC. Since emissions from land-use change and forests are regarded as an RMU (removal unit) according to Article 3.3 of the Kyoto Protocol, they are not included in greenhouse gas emissions based on Kyoto Protocol.

2.2.1 CO_2

CO_2 emissions[7] in fiscal 2003 were 1,259 million tons, an increase by 12.2 percent from fiscal 1990, and an increase by 0.9 percent in comparison with the previous year.

[7] CO_2 associated with the LUCF sector has been excluded.

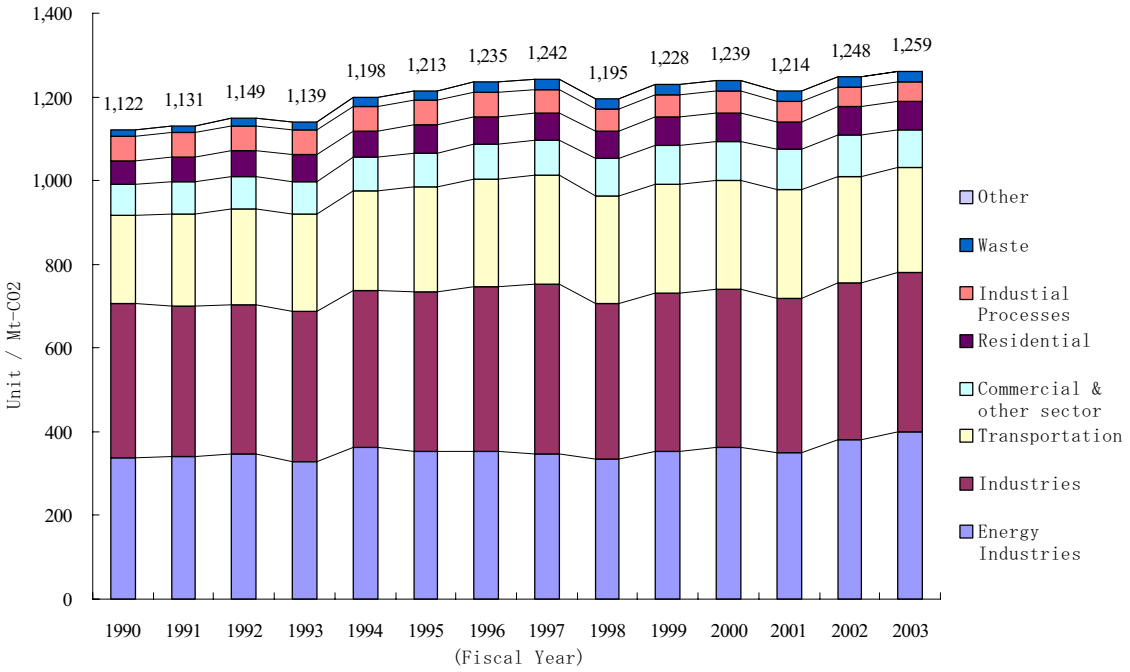

Figure 2.4 Trends in CO_2 Emissions

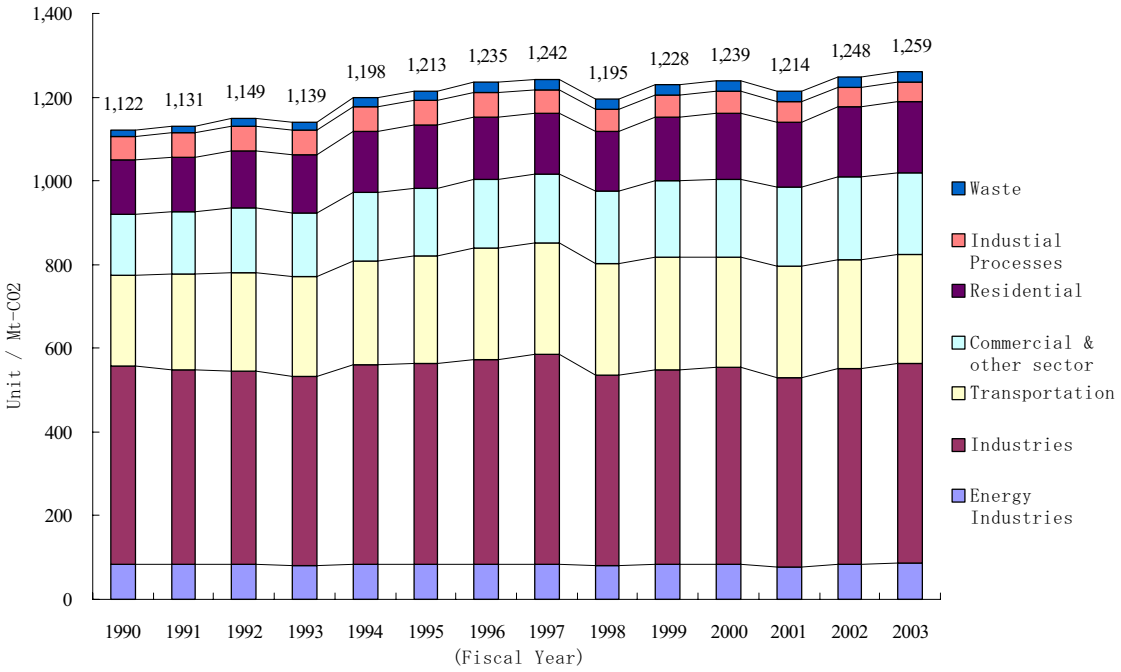

Figure 2.5 Trends in CO_2 Emissions (Allocated)

The breakdown of CO_2 emissions in fiscal 2003 shows that CO_2 emitted as a result of fuel combustion accounted for approximately 94 percent of the total, CO_2 emitted from industrial processes accounted for 3.8 percent, and CO_2 from the waste sector accounted for 1.9 percent. The energy industries sector accounts for 31.7 percent of emissions of CO_2 resulting from fuel combustion, making it the single largest source of emissions followed by the industrial sector at 30.2 percent and the transport sector at 20.1 percent.

Fluctuations in emissions by sector show that CO_2 emissions from the fuel combustion in the energy industries sector, which accounts for 30 percent of CO_2 emissions, increased by 17.8 percent compared to fiscal 1990, and increased by 5.0 percent compared to the previous year. Besides the demand for electricity increasing, the decline in the operating rate of nuclear power plants in 2003 had an effect[8].

CO_2 emissions from fuel combustion in the industrial sector increased by 3.3 percent compared to fiscal 1990 and by 1.3 percent compared to the previous year. Energy demand is increasing due to efforts to respond to market needs such as high-mix low-volume production and greater added value of products, but the increase has been relatively small compared to other sectors partly due to the fact that the economy entered an adjustment phase in the 1990s.

CO_2 emissions from fuel combustion in the transportation sector increased by 20.1 percent compared to fiscal 1990 and they decreased by 0.9 percent compared to the previous year. The energy demand of travelers has greatly increased due to the increase in ownership of private automobiles, the increase in the number of travelers, and the decrease in the use of public transport, but in the last few years it has been stable. Energy consumption for freight transport was increasing slightly, particularly for trucks and aircraft, due to factors such as increasing demand for transportation arising from the increased use of individual home delivery services, but it has been decreasing moderately since the second half of the 1990s.

CO_2 emissions from fuel combustion in the commercial and other sector increased by 22.6 percent compared to fiscal 1990 and they decreased by 7.1 percent compared to the previous year. The main factor behind the increasing trend here is the increase in the total floor area of offices and other commercial buildings.

CO_2 emissions from fuel combustion in the residential sector increased by 15.1 percent compared to fiscal 1990 and they decreased by 3.2% compared to the previous year. These emissions have increased substantially due to changes in social conditions such as the increase in the number of households and lifestyle changes such as more widespread use of electrical products in households and the increasing size and functionality of those products.

Figures 2.5 and others indicate the amount of emissions derived from generation process, etc. of the Energy Industries (1.A.1) allocated to each final consumption division (1.A.2-1.A.4) in the Combustion of Fuel (1.A). These figures represent the amount of carbon dioxide emissions reflecting the actual situation and transitions of the final consumption.

[8] As for the effect caused by a long-term suspension of nuclear power plant, when presuming that the nuclear power plants not affected by a long-term suspension are operated at the scheduled rate (84.1%), it has been estimated that the carbon dioxide emissions would have been roughly reduced to 60 million tons. This amount is equivalent to about 4.9% reduction from the total emissions in the base year under the Kyoto Protocol.

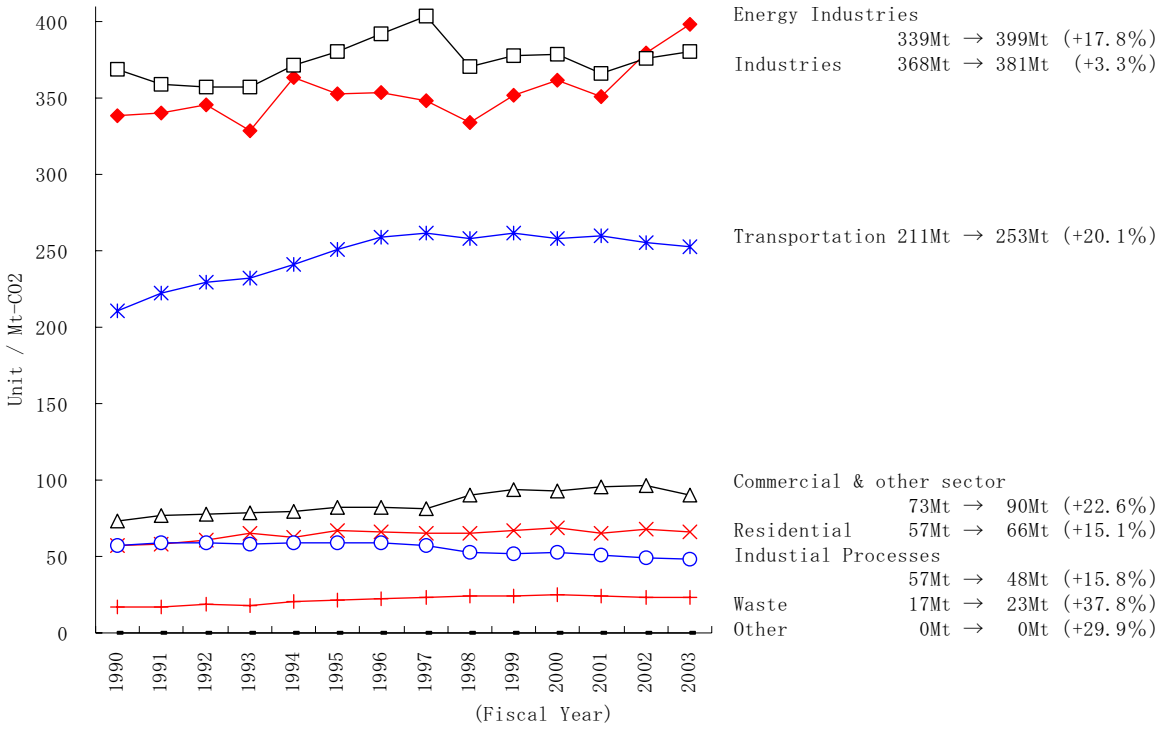

Figure 2.6 Trends in CO_2 Emissions in Each Sector

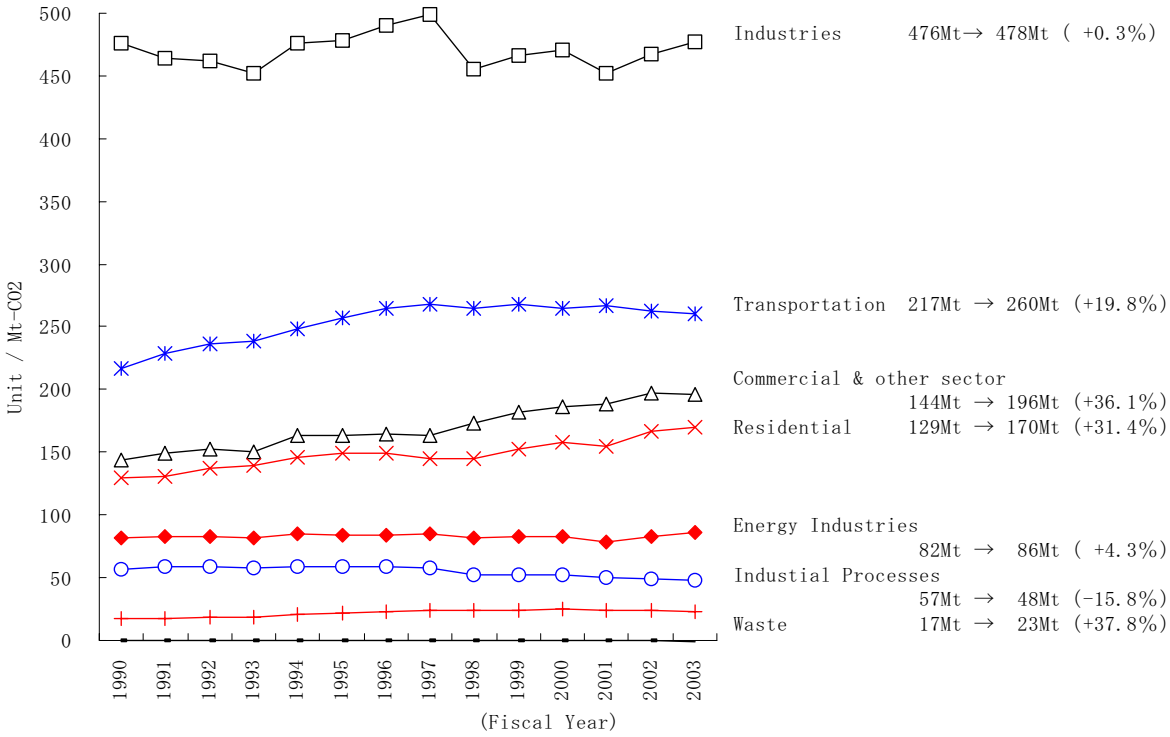

Figure 2.7 Trends in CO_2 Emissions in Each Sector (Allocated)

Table 2.2 Trends in CO_2 Emissions in Each Sector

[Gg CO2]

Category	1990	1995	2000	2002	2003
1A. Fuel Combustion	1,048,332.15	1,132,241.07	1,161,365.77	1,175,509.80	1,188,099.74
Energy Industries	338,571.89	352,633.52	362,159.09	379,656.59	398,776.60
Public Electricity & Heat Production	296,840.62	311,936.88	324,818.69	345,068.47	363,939.61
Petroleum Refining	14,321.90	16,479.79	16,322.87	16,361.12	16,481.43
Manufacture of Solid Fuel and Other Energy Industry	27,409.37	24,216.85	21,017.53	18,226.99	18,355.56
Industries	368,498.95	380,363.21	378,850.21	375,610.06	380,558.86
Manufacturing Industries & Construction	335,046.99	346,464.86	349,059.49	345,819.34	350,768.14
Agriculture, Forestry and Fisheries	33,451.96	33,898.35	29,790.72	29,790.72	29,790.72
Transport	210,663.43	250,654.62	258,059.82	255,290.53	252,930.31
Civil Aviation	7,162.95	10,278.98	10,677.61	10,934.33	11,063.68
Road Transportation	189,204.04	225,179.46	231,897.37	229,236.27	227,177.66
Railways	941.98	828.30	707.44	668.81	628.69
Navigation	13,354.45	14,367.88	14,777.39	14,451.11	14,060.27
Commercial and Residential	130,597.88	148,589.72	162,296.66	164,952.63	155,833.98
Commercial & other sector	73,321.97	81,743.10	93,226.72	96,828.96	89,905.85
Residential	57,275.91	66,846.62	69,069.94	68,123.67	65,928.13
Other	0.00	0.00	0.00	0.00	0.00
1B. Fugitive Emissions from Fuel	0.51	0.60	0.61	0.64	0.67
2. Industrial Processes	57,008.97	59,213.29	52,797.32	48,716.11	47,986.38
Mineral Products	53,465.31	55,588.39	49,403.45	45,791.24	45,368.17
Chemical	3,543.66	3,624.90	3,393.87	2,924.87	2,618.21
6. Waste	16,935.48	21,627.24	24,794.08	23,536.68	23,339.20
Total	1,122,277.11	1,213,082.21	1,238,957.79	1,247,763.22	1,259,425.99

Table 2.3 Trends in CO_2 Emissions in Each Sector (Allocated)[9]

[Gg CO2]

Category	1990	1995	2000	2002	2003
1A. Fuel Combustion	1,048,332.15	1,132,241.07	1,161,365.77	1,175,509.80	1,188,099.74
Energy Industries	82,191.41	84,284.09	82,742.09	82,530.73	85,751.58
Public Electricity & Heat Production	28,790.16	30,778.34	30,711.83	33,542.03	35,779.02
Petroleum Refining	24,756.91	28,004.97	29,760.08	29,846.04	30,632.03
Manufacture of Solid Fuel and Other Energy Industry	28,644.34	25,500.78	22,270.19	19,142.66	19,340.54
Industries	476,080.46	478,475.16	470,164.17	467,387.16	477,564.31
Manufacturing Industries & Construction	441,987.21	443,968.90	439,820.64	436,998.68	447,201.30
Agriculture, Forestry and Fisheries	34,093.25	34,506.26	30,343.53	30,388.48	30,363.01
Transport	217,213.87	257,360.93	264,469.96	262,119.99	260,185.41
Civil Aviation	7,162.95	10,278.98	10,677.61	10,934.33	11,063.68
Road Transportation	189,204.04	225,179.46	231,897.37	229,236.27	227,177.66
Railways	7,492.42	7,534.61	7,117.58	7,498.27	7,883.79
Navigation	13,354.45	14,367.88	14,777.39	14,451.11	14,060.27
Commercial and Residential	273,000.52	312,055.83	343,989.55	363,485.19	365,585.11
Commercial & other sector	143,854.93	162,947.05	185,852.20	197,172.52	195,853.23
Residential	129,145.59	149,108.78	158,137.35	166,312.67	169,731.88
1B. Fugitive Emissions from Fuel	0.51	0.60	0.61	0.64	0.67
2. Industrial Processes	57,008.97	59,213.29	52,797.32	48,716.11	47,986.38
Mineral Products	53,465.31	55,588.39	49,403.45	45,791.24	45,368.17
Chemical	3,543.66	3,624.90	3,393.87	2,924.87	2,618.21
6. Waste	16,935.48	21,627.24	24,794.08	23,536.68	23,339.20
Total	1,122,277.11	1,213,082.21	1,238,957.79	1,247,763.22	1,259,425.99

[9] Amount of emissions derived from generation process, etc. of the Energy Industries (1.A.1) allocated to each final consumption division (1.A.2-1.A.4) in the Combustion of Fuel (1.A).

2.2.2 CH_4

CH_4 emissions in fiscal 2003 were 19.3 million tons (in CO_2 equivalents), a decrease of 22.1 percent compared to fiscal 1990, and by 1.2 percent in comparison with the previous year. The decrease in emissions caused by coal mining greatly contributed to the decrease in emissions from the base year.

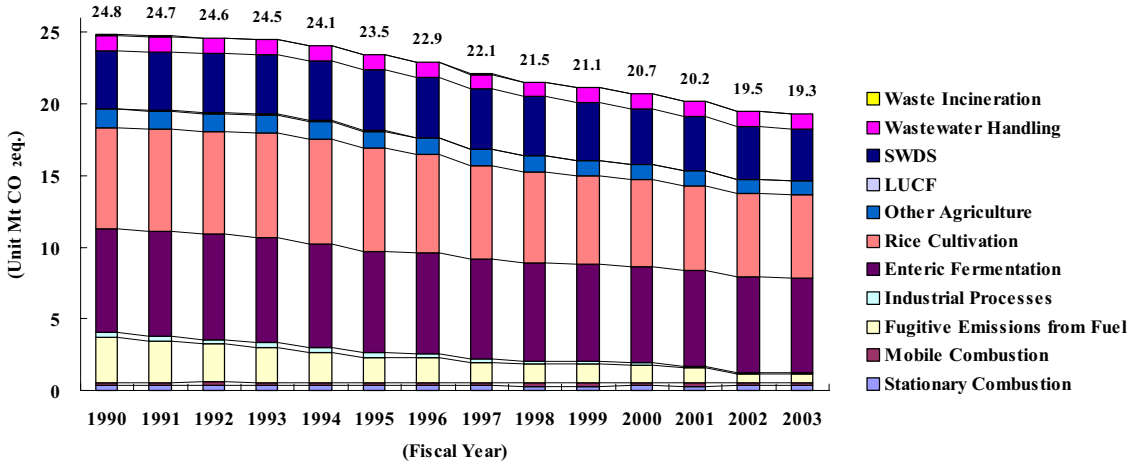

Figure 2.8 Trends in CH_4 Emissions

The breakdown of CH_4 emissions in fiscal 2003 shows that CH_4 emitted from enteric fermentation in livestock accounted for approximately 34 percent of the total, making it the single largest source of emissions. It is followed by CH_4 emissions from rice cultivation at approximately 30 percent and CH_4 emissions from Solid Waste Disposal Sites (SWDS) at approximately 19 percent.

Table 2.4 Trends in CH_4 Emissions

[Gg CO2eq.]

Category	1990	1995	2000	2002	2003
1A. Fuel Combustion	531.75	547.72	537.25	529.37	526.53
1B. Fugitive Emissions from Fuels	3,176.12	1,761.47	1,220.46	603.74	589.17
2. Industrial Processes	337.80	303.30	163.74	124.34	116.72
4. Agriculture	15,568.88	15,478.64	13,829.68	13,484.13	13,417.47
4A. Enteric Fermentation	7,249.10	7,118.91	6,759.12	6,672.13	6,615.72
4B. Manure Management	1,072.55	991.38	927.81	914.99	911.74
4C. Rice Cultivation	7,075.73	7,200.86	6,018.51	5,788.92	5,785.48
4D. Agricultural Soils	3.06	2.72	2.30	2.28	2.29
4F. Field Burning of Agricultural Residue	168.45	164.77	121.94	105.80	102.23
5. LUCF	53.07	86.37	NE	NE	NE
6. Waste	5,154.16	5,280.43	4,969.15	4,769.76	4,635.28
6A. SWDS	4,044.84	4,238.80	3,927.55	3,720.76	3,594.25
6B. Wastewater Handling	1,095.78	1,029.04	1,028.96	1,038.23	1,029.80
6C. Waste Incineration	13.54	12.59	12.63	10.77	11.23
Total	24,768.72	23,371.56	20,720.27	19,511.34	19,285.17

2.2.3 N_2O

N_2O emissions in fiscal 2003 were 34.6 million tons (in CO_2 equivalents), a decrease of 13.9 percent compared to fiscal 1990, and by 0.2 percent in comparison with the previous year. The decrease in emissions caused by adipic acid manufacturing greatly contributed to the decrease in emissions from the base year. In March 1999 N_2O abatement equipment operated in the adipic acid production plant, causing a sharp decline in emissions from industrial processes during the period from fiscal 1998 to fiscal 1999. And the decrease in emission from agricultural soils had a large impact on the decrease in emissions from the previous year.

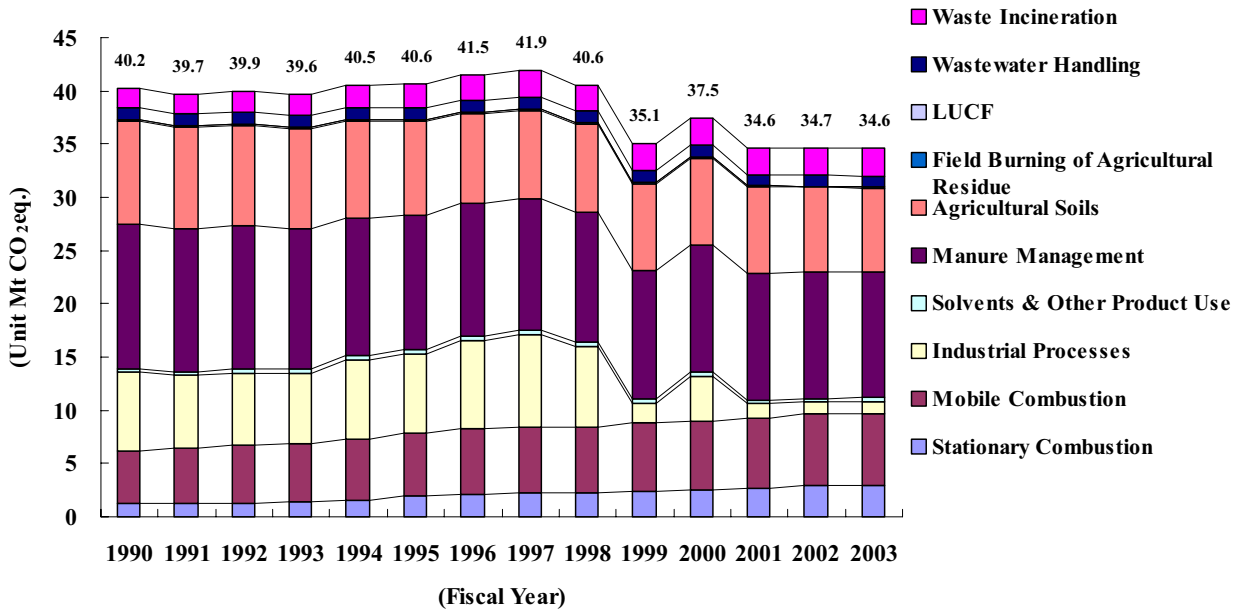

Figure 2.9 Trends in N_2O Emissions

The breakdown of N_2O emissions in fiscal 2003 shows that N_2O emitted from manure management accounted for approximately 34 percent of the total, making it the single largest source of emissions. It is followed by emissions from agricultural soils at approximately 23 percent and emissions from fuel combustion of motor vehicles and other mobile emission sources at approximately 19 percent.

Table 2.5 Trends in N_2O Emissions

[Gg CO2eq.]

Category	1990	1995	2000	2002	2003
1A. Fuel Combustion	6,218.89	7,866.27	8,971.81	9,603.57	9,634.81
1A1. Energy Industries	299.44	720.19	836.94	855.76	847.64
1A2. Industries	845.25	1,214.59	1,562.07	1,987.22	1,986.55
1A3. Transport	5,022.73	5,863.37	6,503.45	6,694.19	6,737.47
1A4. Residential / Institutional	51.46	68.11	69.35	66.40	63.16
1B. Fugitive Emissions from Fuel	0.00	0.00	0.00	0.00	0.00
2. Industrial Processes	7,415.74	7,367.31	4,248.29	1,183.59	1,207.81
3. Solvent & Other Product Use	287.07	437.58	340.99	334.05	320.83
4. Agriculture	23,426.62	21,588.45	20,259.42	19,923.78	19,812.88
4B. Manure Management	13,550.26	12,650.39	12,004.47	11,859.43	11,826.36
4D. Agricultural Soils	9,746.46	8,797.87	8,144.17	7,978.29	7,903.83
4F. Field Burning of Agricultural Residue	129.90	140.19	110.78	86.07	82.68
5. LUCF	5.39	8.77	NE	NE	NE
6. Waste	2,854.11	3,363.21	3,643.72	3,639.64	3,640.90
6B. Wastewater Handling	1,097.88	1,093.37	1,051.81	1,006.93	996.88
6C. Waste Incineration	1,756.22	2,269.84	2,591.91	2,632.71	2,644.03
Total	40,207.81	40,631.58	37,464.23	34,684.64	34,617.24

2.2.4 HFCs

Emissions of HFCs in 2003[10] were 12.3 million tons (in CO_2 equivalents), a decrease by 39.2 percent compared to 1995 and by 4.7 percent in comparison with the previous year. Emissions from by-products of the HCFC-22 manufacturing process are continuing to decline.

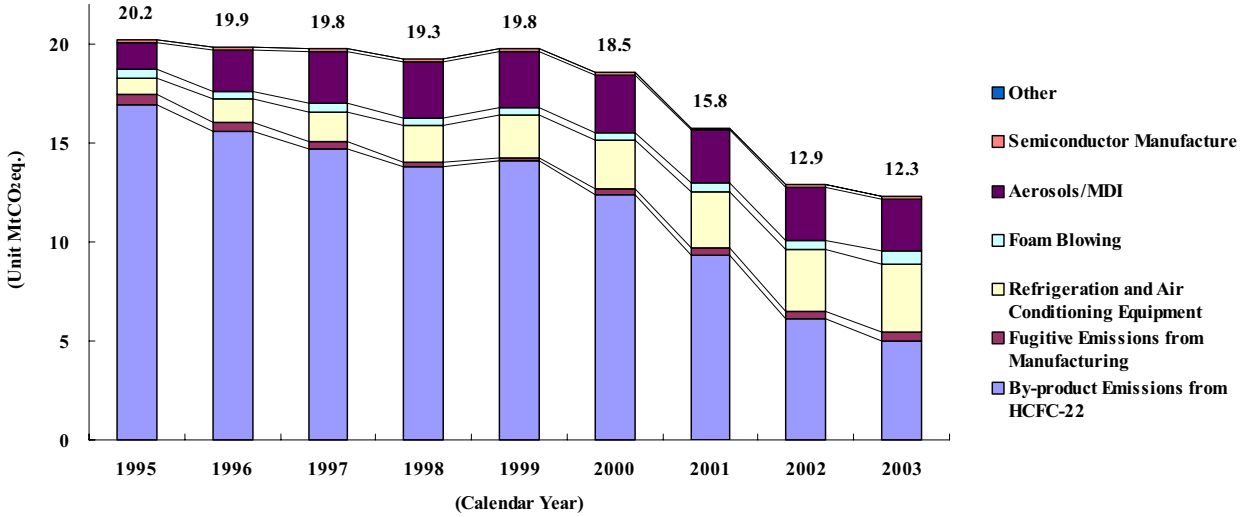

Figure 2.10 Trends in HFC Emissions

The breakdown of HFC emissions in 2003 shows that emissions of the by-product HFC-23 during production of HCFC-22 accounted for approximately 41 percent of the total, followed by emissions related to refrigerants for refrigerators and air conditioning equipment at approximately 28 percent, and emissions from aerosols/MDI at approximately 21 percent.

Table 2.6 Trends in HFC Emissions

[Gg CO2eq.]

Category	1995	2000	2001	2002	2003
2E. Productions of F-gas	17,456.50	12,654.54	9,709.42	6,484.42	5,462.21
2E1. By-product Emissions from Production of HCFC-22	16,965.00	12,402.00	9,336.60	6,095.70	5,022.81
2E2. Fugitive Emissions	491.50	252.54	372.82	388.72	439.40
2F. Consumption of F-gas	2,776.17	5,894.43	6,056.54	6,418.73	6,838.62
2F1. Refrigeration and Air Conditioning Equipment	809.13	2,449.23	2,817.91	3,161.55	3,447.96
2F2. Foam Blowing	456.96	437.71	413.01	446.68	653.12
2F4. Aerosols/MDI	1,365.00	2,849.54	2,702.77	2,692.33	2,624.06
2F6. Semiconductor Manufacture	145.08	157.95	122.85	118.17	113.49
2F8. Other	0.00	0.00	0.00	0.00	0.00
Total	20,232.67	18,548.97	15,765.96	12,903.15	12,300.83

[10] Emissions on a calendar year basis are adopted for HFCs, PFCs and SF_6.

2.2.5 PFCs

PFC emissions in 2003 were 9.0 million tons (in CO_2 equivalents), a decrease by 28.2 percent compared to 1995, and by 8.3 percent in comparison with the previous year. Emissions from the use of cleaners and solvents are continuing to decline from the previous year.

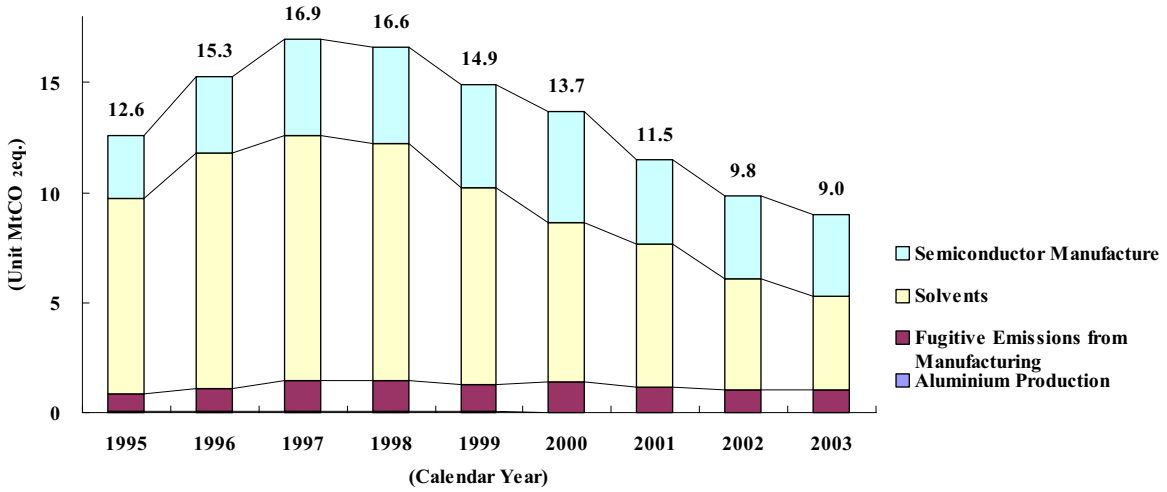

Figure 2.11 Trends in PFC Emissions

The breakdown of PFC emissions in 2003 shows that emission from solvents used in washing metals etc. accounted for approximately 48 percent of the total, followed by emissions from semiconductor manufacturing at approximately 41 percent, and fugitive emissions from manufacturing at approximately 11 percent.

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Table 2.7 Trends in PFC Emissions

[Gg CO2eq.]

Category	1995	2000	2001	2002	2003
2C3. Aluminium Production	72.46	18.29	16.26	15.10	15.10
2E. Productions of F-gas	762.90	1,382.60	1,123.70	1,043.60	1,016.40
2F. Consumption of F-gas	11,737.70	12,284.90	10,360.00	8,786.50	7,995.40
2F5. Solvents	8,880.00	7,211.30	6,497.20	5,002.00	4,288.00
2F6. Semiconductor Manufacture	2,857.70	5,073.60	3,862.80	3,784.50	3,707.40
Total	12,573.06	13,685.79	11,499.96	9,845.20	9,026.90

2.2.6 SF_6

Emissions of SF_6 in 2003 were 4.5 million tons (in CO_2 equivalents), a decrease by 73.6 percent compared to 1995, and by 15.3 percent in comparison with the previous year.

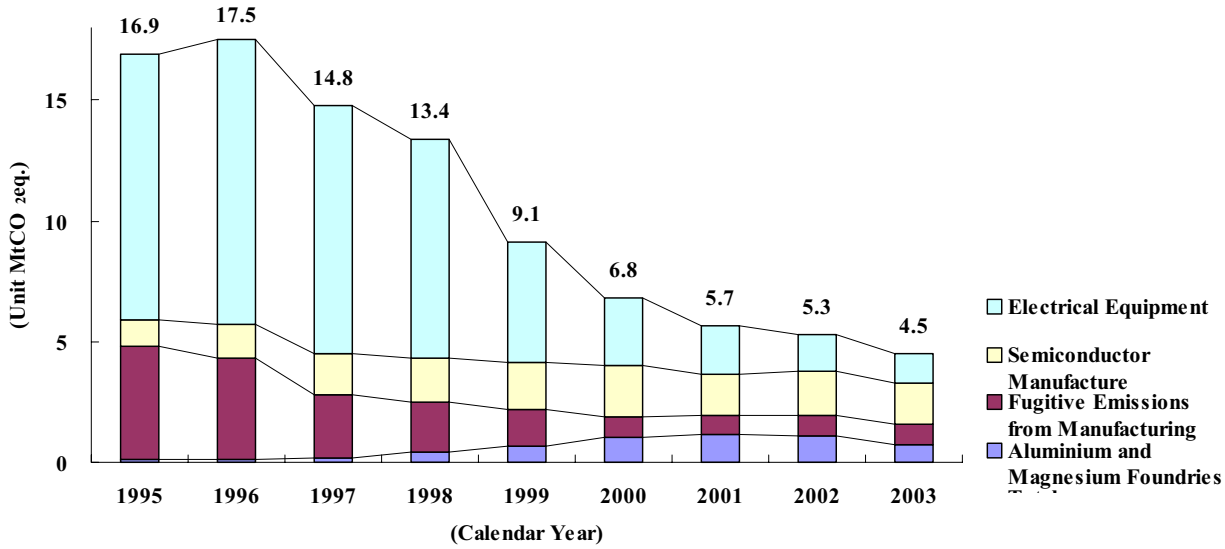


Figure 2.12 Trends in SF_6 Emissions

The breakdown of SF_6 emissions in 2003 shows that emissions from semiconductor manufacture accounted for approximately 38 percent, followed by emissions from the electrical equipment at approximately 27 percent, and fugitive emissions from manufacturing at approximately 18 percent. Emissions from electrical equipment and emissions from magnesium manufacturing are decreasing.

Table 2.8 Trends in SF_6 Emissions

[Gg CO2eq.]

Category	1995	2000	2001	2002	2003
2C4. SF6 Used in Aluminium and Magnesium Foundries	119.50	1,027.70	1,147.20	1,123.30	740.90
2E. Productions of F-gas	4,708.30	860.40	788.70	836.50	812.60
2F. Consumption of F-gas	12,089.40	4,931.94	3,734.74	3,323.35	2,920.32
2F6. Semiconductor Manufacture	1,099.40	2,141.44	1,711.24	1,780.55	1,716.02
2F7. Electrical Equipment	10,990.00	2,790.50	2,023.50	1,542.80	1,204.30
Total	16,917.20	6,820.04	5,670.64	5,283.15	4,473.82

2.3 Description and Interpretation of Emission and Removal Trends by Categories

The breakdown of emissions and removals of greenhouse gases in fiscal 2003 by category[11] shows that the energy sector accounted for 89.5 percent, followed by industrial processes at 5.6 percent, solvent and other product use at 0.02 percent, agriculture at 2.5 percent and waste at 2.4 percent.

Removals by land-use change and forestry in fiscal 1995 were approximately 7.3 percent of total emissions.

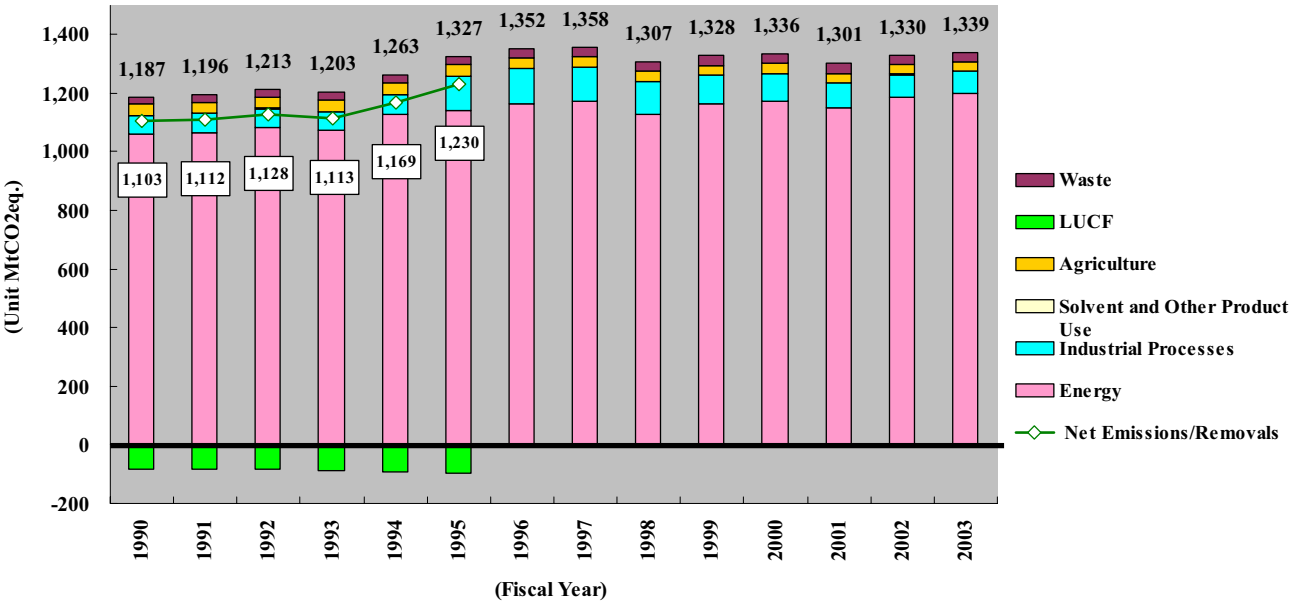


Figure 2.13 Trends in Emissions and Removals of Greenhouse Gases in Each Category

* Values in boxes represent net emissions or removals. No values appear after 1995, however, as CO_2 removals have not been estimated.

[11] This refers to categories indicated in the Revised 1996 IPCC Guidelines and the Common Reporting Format (CRF).

Table 2.9 Trends in Emissions and Removals of Greenhouse Gases in Each Category

[Mt CO_2 eq.]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Energy	1,058.3	1,065.4	1,081.4	1,072.2	1,128.0	1,142.4	1,163.8	1,171.4	1,129.1	1,163.2	1,172.1	1,149.9	1,186.2	1,198.9
Industrial Processes	64.8	65.7	66.1	65.0	66.9	116.6	120.2	118.1	109.5	97.8	96.3	84.9	78.1	75.1
Solvent and Other Product Use	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
Agriculture	39.0	38.8	38.7	38.6	38.0	37.1	36.2	35.4	34.9	34.4	34.1	33.7	33.4	33.2
Land Use Change and Forestry	-83.8	-83.8	-85.5	-90.0	-93.5	-96.6	NE	NE	NE	NE	NE	NE	NE	NE
Waste	24.9	25.5	26.6	26.6	29.3	30.3	31.2	32.3	32.8	32.7	33.4	32.5	31.9	31.6
Net Emissions / Removals	1,103.4	1,111.9	1,127.8	1,112.8	1,169.3	1,230.2	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1
ABS	1,271.1	1,279.5	1,298.8	1,292.8	1,356.2	1,423.4	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1
Emissions	1,187.2	1,195.7	1,213.3	1,202.8	1,262.7	1,326.8	1,351.8	1,357.5	1,306.6	1,328.4	1,336.2	1,301.4	1,330.0	1,339.1

* NE: Not Estimated

2.3.1 Energy

Emissions from the energy sector in fiscal 2003 were 1,199 million tons (in CO_2 equivalents), an increase by 13.3 percent compared to fiscal 1990, and an increase by 1.1 percent in comparison with the previous year.

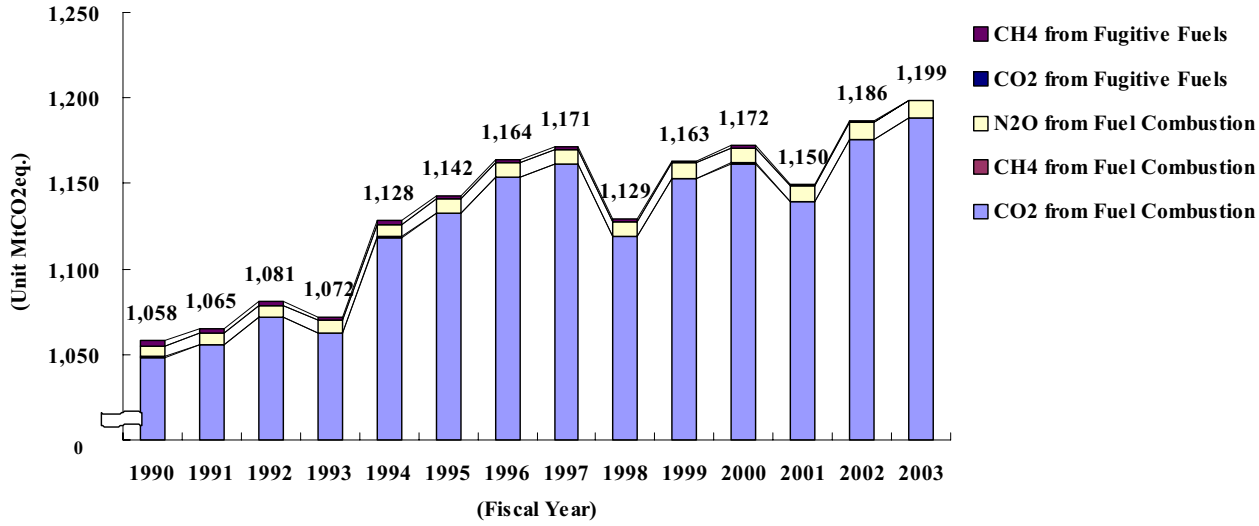


Figure 2.14 Trends in Greenhouse Gas Emissions from the Energy Sector

The breakdown of emissions of greenhouse gases from the energy sector in fiscal 2003 shows that emission of CO_2 accounted for approximately 99 percent, making it the single largest source of emissions.

Table 2.10 Trends in Greenhouse Gas Emissions from the Energy Sector

[Gg CO2eq.]

Source Category	1990	1995	2000	2001	2002	2003
1A. Fuel Combustion	1,055,082.79	1,140,655.07	1,170,874.83	1,148,847.72	1,185,642.74	1,198,261.09
CO_2	1,048,332.15	1,132,241.07	1,161,365.77	1,139,022.67	1,175,509.80	1,188,099.74
CH_4	531.75	547.72	537.25	521.14	529.37	526.53
N_2O	6,218.89	7,866.27	8,971.81	9,303.91	9,603.57	9,634.81
1B. Fugitive Emissions from Fuel	3,176.63	1,762.07	1,221.07	1,025.88	604.38	589.83
CO_2	0.51	0.60	0.61	0.60	0.64	0.67
CH_4	3,176.12	1,761.47	1,220.46	1,025.28	603.74	589.17
Total	1,058,259.43	1,142,417.14	1,172,095.89	1,149,873.60	1,186,247.11	1,198,850.92

2.3.2 Industrial Processes

Emissions from the industrial processes sector in fiscal 2003 were 75.1 million tons (in CO_2 equivalents), an increase by 16.0 percent compared to fiscal 1990, and a decrease by 3.8 percent in comparison with the previous year.

It should be noted that emissions of HFCs, PFCs, and SF_6 have not been estimated (NE) for the period from 1990 to 1994.

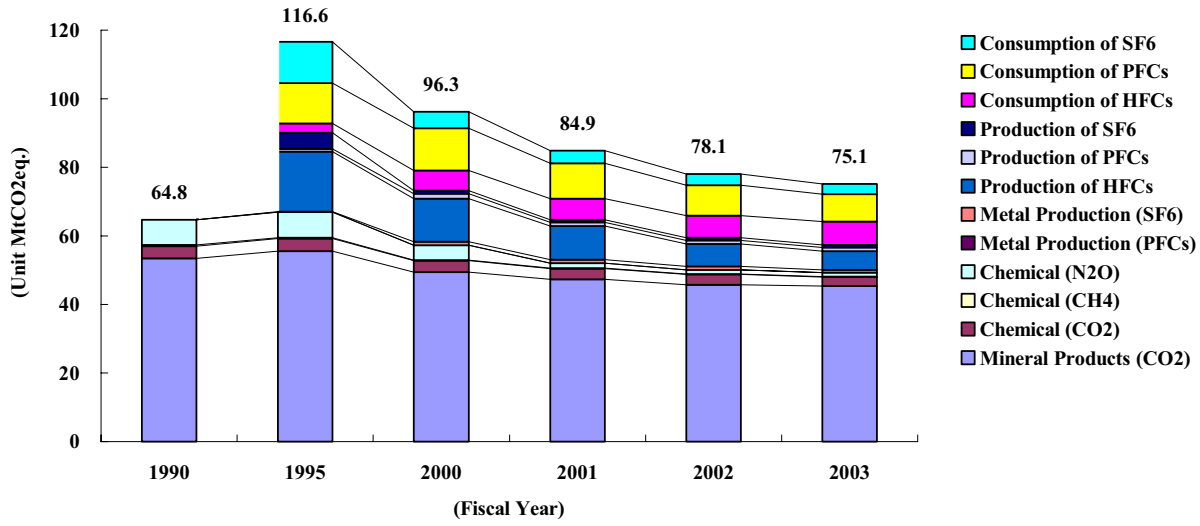


Figure 2.15 Trends in Greenhouse Gas Emissions from the Industrial Processes Sector

The breakdown of emissions of greenhouse gases from the industrial processes sector in fiscal 2003 shows that emissions from mineral products, such as CO_2 emissions from the limestone in cement production account for approximately 60 percent, making it the single largest source of emissions, followed by the emissions from the consumption of PFCs during semiconductor and other manufacturing at approximately 11 percent and emissions from the consumption of HFCs at approximately 9 percent.

Table 2.11 Trends in Greenhouse Gas Emissions in the Industrial Processes Sector

[Gg CO2eq.]

Category	1990	1995	2000	2001	2002	2003
2A. Mineral Products (CO2)	53,465.31	55,588.39	49,403.45	47,333.13	45,791.24	45,368.17
2B. Chemical Industry	11,297.21	11,295.50	7,805.90	4,630.34	4,232.80	3,942.74
CO_2	3,543.66	3,624.90	3,393.87	3,162.03	2,924.87	2,618.21
CH_4	337.80	303.30	163.74	130.98	124.34	116.72
N_2O	7,415.74	7,367.31	4,248.29	1,337.33	1,183.59	1,207.81
2C. Metal Production	0.00	191.96	1,045.99	1,163.46	1,138.40	756.00
PFCs	NE	72.46	18.29	16.26	15.10	15.10
SF_6	NE	119.50	1,027.70	1,147.20	1,123.30	740.90
2E. Production of F-gas	0.00	22,927.70	14,897.54	11,621.82	8,364.52	7,291.21
HFCs	NE	17,456.50	12,654.54	9,709.42	6,484.42	5,462.21
PFCs	NE	762.90	1,382.60	1,123.70	1,043.60	1,016.40
SF_6	NE	4,708.30	860.40	788.70	836.50	812.60
2F. Consumption of F-gas	0.00	26,603.27	23,111.27	20,151.28	18,528.58	17,754.34
HFCs	NE	2,776.17	5,894.43	6,056.54	6,418.73	6,838.62
PFCs	NE	11,737.70	12,284.90	10,360.00	8,786.50	7,995.40
SF_6	NE	12,089.40	4,931.94	3,734.74	3,323.35	2,920.32
Total	64,762.51	116,606.83	96,264.15	84,900.02	78,055.54	75,112.46

2.3.3 Solvent and Other Product Use

Emissions from solvent and other product use in fiscal 2003 were 320 thousand tons (of CO_2 equivalents), an increase by 11.8 percent on fiscal 1990, and a decrease by 4.0 percent in comparison with the previous year.

The only substance included in calculations in this sector is laughing gas (N_2O) used as a general anesthetic in hospitals.

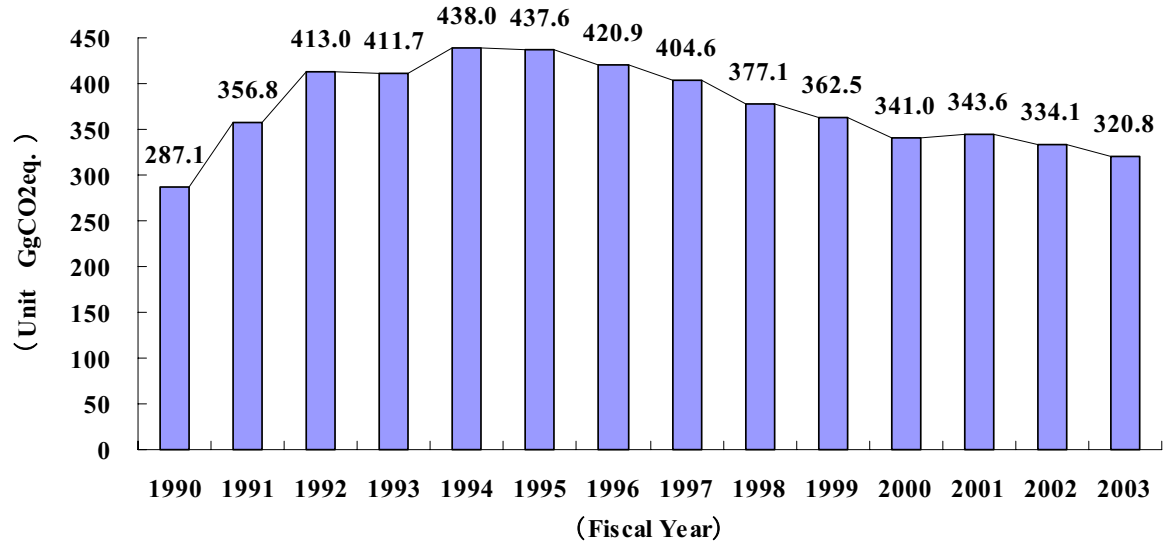


Figure 2.16 Trends in Greenhouse Gas Emissions from the Solvent And Other Product Use Sector

2.3.4 Agriculture

Emissions from agriculture in fiscal 2003 were 33.2 million tons (in CO_2 equivalents), a decrease by 14.8 percent compared to fiscal 1990, and by 0.5 percent in comparison with the previous year.

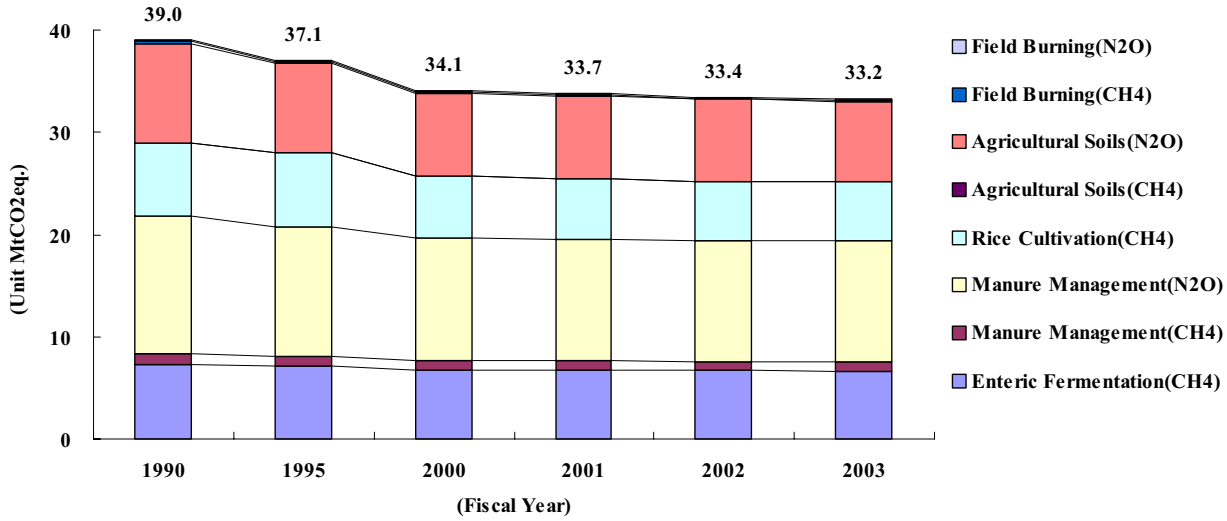


Figure 2.17 Trends in Greenhouse Gas Emissions from the Agriculture Sector

The breakdown of emissions of greenhouse gases from the agriculture sector in fiscal 2003 shows that N_2O emissions from manure management account for approximately 36 percent, making it the single largest source, followed by N_2O emissions from agricultural soils due to nitrogen-based fertilizers at approximately 24 percent, and CH_4 emissions from enteric fermentation at approximately 20 percent.

Table 2.12 Trends in Greenhouse Gas Emissions from the Agriculture Sector

[Gg CO2eq.]

Category	1990	1995	2000	2001	2002	2003
4A. Enteric Fermentation(CH4)	7,249.10	7,118.91	6,759.12	6,712.79	6,672.13	6,615.72
4B. Manure Management	14,622.80	13,641.77	12,932.28	12,841.12	12,774.42	12,738.10
CH_4	1,072.55	991.38	927.81	920.28	914.99	911.74
N_2O	13,550.26	12,650.39	12,004.47	11,920.85	11,859.43	11,826.36
4C. Rice Cultivation(CH4)	7,075.73	7,200.86	6,018.51	5,907.16	5,788.92	5,785.48
4D. Agricultural Soils	9,749.52	8,800.59	8,146.46	8,072.69	7,980.57	7,906.13
CH_4	3.06	2.72	2.30	2.26	2.28	2.29
N_2O	9,746.46	8,797.87	8,144.17	8,070.43	7,978.29	7,903.83
4F. Field Burning of Agricultural Residues	298.35	304.97	232.73	210.85	191.87	184.92
CH_4	168.45	164.77	121.94	113.21	105.80	102.23
N_2O	129.90	140.19	110.78	97.64	86.07	82.68
Total	38,995.50	37,067.09	34,089.10	33,744.62	33,407.91	33,230.35

2.3.5 Land-use Change and Forestry

CO_2 removal in the land-use change and forestry sector in fiscal 1995 was 96.6 million tons, an increase by 15.2 percent on fiscal 1990, and by 3.4 percent in comparison with the previous year. Emissions and removals since fiscal 1996 have not been estimated (NE) because the data was not prepared.

Removals by forests were the biggest removal category and CO2 emissions caused by harvesting timber were the biggest emissions category.

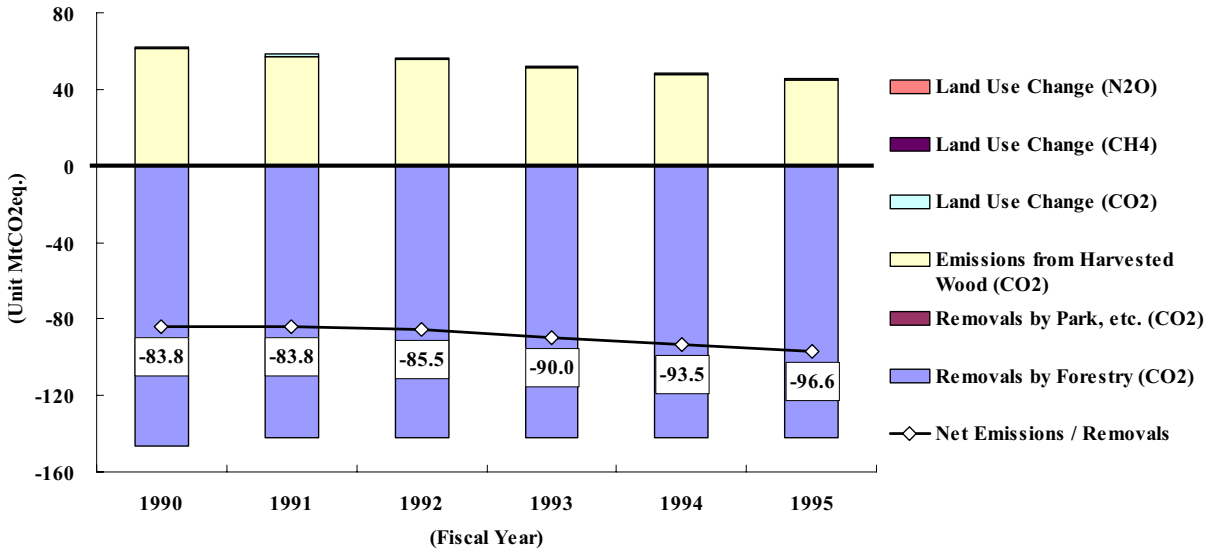


Figure 2.18 Trends in Emissions and Removals of Greenhouse Gas from the LUCF Sector

Table 2.13 Trends in Emissions and Removals of Greenhouse Gas from the LUCF Sector

[Gg CO2eq.]

Category	1990	1991	1992	1993	1994	1995
5A2. Removals by Forestry	-146,056.09	-142,032.48	-142,061.31	-142,090.14	-142,118.97	-142,147.79
5A5. Removals by Park etc.	-90.65	-94.28	-103.41	-106.82	-111.55	-114.49
5A5. Emissions from Havested Wood	61,664.52	57,352.68	55,680.02	51,193.14	47,758.15	44,614.75
5B. Forestry & Grassland Conversion	637.61	999.46	1,007.09	1,014.72	1,022.35	1,037.61
CO_2	579.15	907.83	914.76	921.69	928.62	942.48
CH_4	53.07	83.19	83.83	84.46	85.10	86.37
N_2O	5.39	8.44	8.51	8.57	8.64	8.77
Total	-83,844.62	-83,774.63	-85,477.60	-89,989.10	-93,450.01	-96,609.92

2.3.6 Waste

Emissions from waste in fiscal 2003 were 31.6 million tons (in CO_2 equivalents), an increase by 26.7 percent compared to fiscal 1990, and a decrease by 1.0 percent in comparison with the previous year.

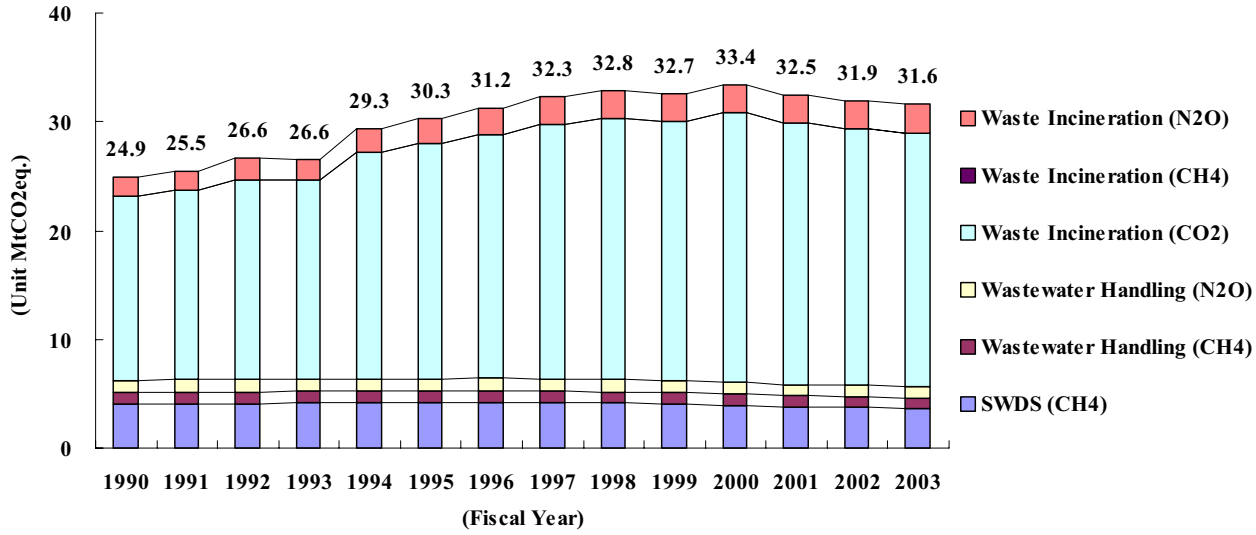


Figure 2.19 Trends in Greenhouse Gas Emissions from the Waste Sector

The breakdown of greenhouse gas emissions from waste in fiscal 2003 shows that CO_2 emissions from waste derived from petrochemicals such as waste plastics and waste oil incineration, accounting for approximately 74 percent, making it the single largest source of emissions, followed by CH_4 emissions from solid waste disposal sites at approximately 11 percent, and N_2O emissions from combustion of waste (including waste products derived from substances other than fossil fuels) at approximately 8 percent.

Table 2.14 Trends in Greenhouse Gas Emissions from the Waste Sector

[Gg CO2eq.]

Category	1990	1995	2000	2001	2002	2003
6A. SWDS (CH_4)	4,044.84	4,238.80	3,927.55	3,797.32	3,720.76	3,594.25
6B. Wastewater Handling	2,193.66	2,122.41	2,080.77	2,053.39	2,045.16	2,026.68
CH_4	1,095.78	1,029.04	1,028.96	1,031.35	1,038.23	1,029.80
N_2O	1,097.88	1,093.37	1,051.81	1,022.04	1,006.93	996.88
6C. Waste Incineration	18,705.24	23,909.66	27,398.63	26,646.44	26,180.16	25,994.45
CO_2	16,935.48	21,627.24	24,794.08	24,087.43	23,536.68	23,339.20
CH_4	13.54	12.59	12.63	12.51	10.77	11.23
N_2O	1,756.22	2,269.84	2,591.91	2,546.50	2,632.71	2,644.03
Total	24,943.75	30,270.88	33,406.95	32,497.16	31,946.08	31,615.38

2.4 Description and Interpretation of Emission Trends for Indirect Greenhouse Gases and SO_2

Under the UNFCCC, it is required to report emissions of indirect greenhouse gases (nitrogen oxide (NO_X), carbon monoxide (CO), non-methane volatile organic compound (NMVOC) and sulfur dioxide (SO_2)), in addition to the 6 types of greenhouse gases (CO_2, CH4, N2O, HFCs, PFCs and SF_6) subject to the Kyoto Protocol. Emission trends of these gases are indicated below.

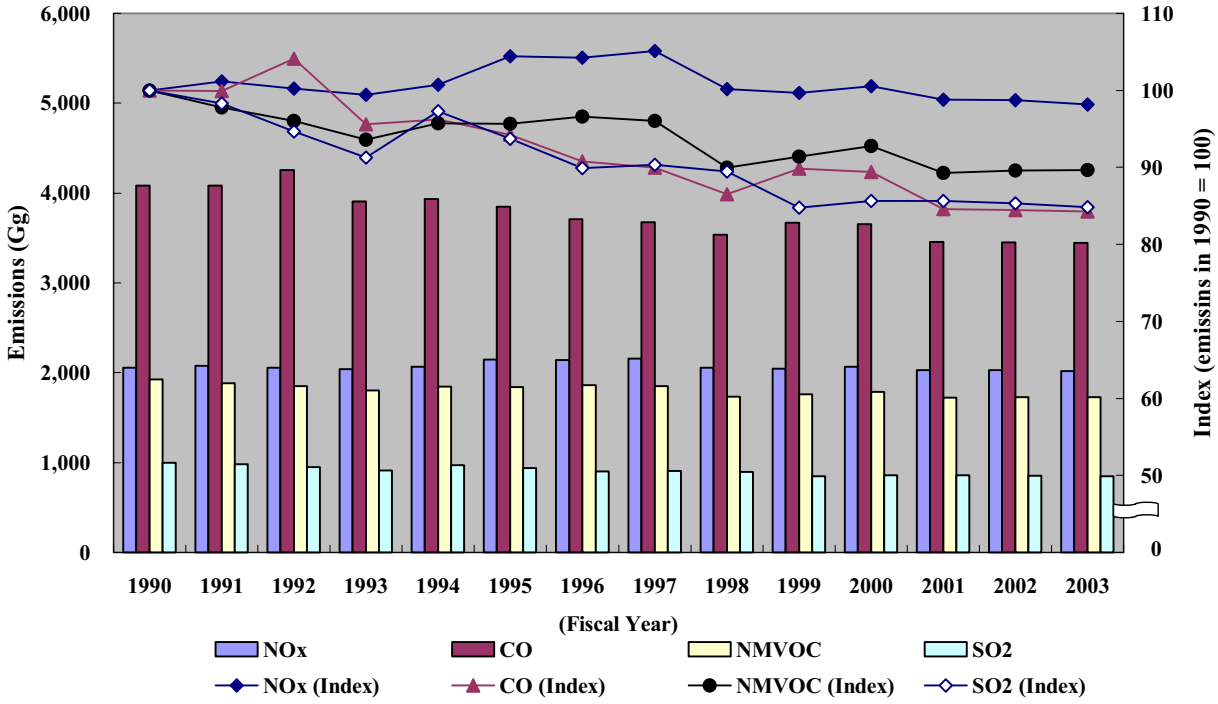


Figure 2.20 Trends in Emissions of Indirect Greenhouse Gases and SO_2

NO_X emissions in fiscal 2003 were 2.015 million tons, a decrease by 1.8 percent compared to fiscal 1990, and by 0.6 percent compared to the previous year.

CO emissions in fiscal 2003 were 3.444 million tons, a decrease by 15.7 percent compared to fiscal 1990, and by 0.2 percent compared to the previous year.

NMVOC emissions in fiscal 2003 were 1.727 million tons, a decrease by 10.4 percent compared to fiscal 1990, and an increase by 0.1 percent compared to the previous year.

SO_2 emissions in fiscal 2003 were 849 thousand tons, a decrease by 15.1 percent compared to fiscal 1990, and by 0.6 percent compared to the previous year.

2.5 Overview of the Methodology for Estimating Emissions

Below is an overview of the methodology for estimating emissions used in the preceding sections. This section presents an overview of the methodology for estimating greenhouse gas emissions in the major emissions sectors in Japan; for more details about the methodology for estimating emissions please refer to Chapters 3-9 of the National Greenhouse Gas Inventory Report of Japan (May 2005).

2.5.1 Energy (CRF Sector 1)

2.5.1.1 Fuel Combustion (1.A.)

(1) CO_2

The Tier 1 Sectoral Approach has been used in accordance with the Decision Tree of the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories report (2000) (hereafter "GPG (2000)") to calculate emissions.

The country-specific values represented as carbon content per unit of calorific value (Gross Calorific Value) have been used for all emission factors.

Final energy consumption data for energy industries sector, industrial sector, commercial and residential sector, and transport sector as depicted in Japan's Energy Balance Table General Energy Statistics were used for activity data. For some fuels, a portion of final energy consumption was used for purposes other than combustion. Therefore, energy consumption indicated in the "Non-Energy" entry of the Energy Balance Table has been deducted.

(2) Stationary Combustion (1.A.1., 1.A.2., 1.A.4.:CH_4 and N_2O)

In accordance with the Decision Tree of the GPG (2000), estimation has been based on Research of Air Pollutant Emissions from Stationary Sources (Ministry of the Environment), hereafter, "MAP Survey."

Regarding emission factors, for facilities emitting soot and smoke and small facilities (commercial and other sector, manufacturing sector) values estimated using data collected from the Reports on Greenhouse Gas Emissions Estimation Methodology (1996) by the Japan Society of Atmospheric Environment were used. For the residential sector, default values from the Revised 1996 IPCC Guidelines, which were expressed in Net Calorific basis, were converted into Gross Calorific basis and used.

Regarding activity data, estimates were made based on the survey results such as MAP Survey.

(3) Mobile Combustion (1.A.3.:CH_4 and N_2O)

Emissions were calculated based on the GPG (2000). Regarding automobiles (1.A.3.b.), emission factors for each type of fuel in each category of vehicle were calculated, and the estimated value of annual driving distance for each type of fuel in each category of vehicle was used as activity data.

Regarding airplanes (1.A.3.a.), vessels (1.A.3.d.) and railroads (1.A.3.c.), the default values given in the Revised 1996 IPCC Guidelines were used, and the number of takeoffs and landings given in the Statistical Yearbook of Air Transport of the Ministry of Land, Infrastructure and Transport, and consumption of each type of fuel in each sector taken from the General Energy Statistics of the Agency for Natural Resources and Energy were used for activity data.

2.5.1.2 Fugitive Emissions from Fuels (1.B.)

(1) Solid Fuels (1.B.1.)

Regarding coal mining, emissions were calculated using the default emission factor and other factors in accordance with the GPG (2000).

(2) Oil and Natural Gas (1.B.2.)

Oil (1.B.2.a) and natural gas (1.B.2.b) were calculated using the default emission factors. However, Japan's country-specific emission factor was used for fugitive emissions from the storing of oil and fugitive emissions from the supply of natural gas.

2.5.2 Industrial Processes

2.5.2.1 Mineral Products (2.A)

(1) Cement Production (2.A.1.)

The country-specific method has been used up to fiscal 2003 for calculating this source of emissions. The volume of limestone used as the raw material in cement was multiplied by the emission factor to calculate the emissions. The emission factor was calculated by multiplying the weight-to-weight ratio of limestone and CO_2 in the chemical reaction, by the purity of the limestone used.

For fiscal 2004 onward, the Clinker Method has been used to calculate emissions according to the GPG 2000.

(2) Lime Production (2.A.2.)

The country-specific method is used for this emission source. The volume of limestone and dolomite used as the raw material for lime is multiplied by the emission factor to calculate emissions.

(3) Limestone and Dolomite Use (2.A.3.)

The volumes of limestone and dolomite used in iron and steel production and as raw materials in soda-lime glass are multiplied by the emission factors to calculate emissions.

(4) Other

Japan cannot deny that CO_2 is emitted from activities such as the manufacturing of asphalt roofing materials (2.A.5.) and road paving with asphalt (2.A.6.), but due to the fact that it is possible to include

these emissions in other sectors and not enough information can be obtained with regard to these activities, their emissions have been reported as “NE.”

2.5.2.2 Chemical Industry (2.B.)

(1) Ammonia Production (2.B.1.)

The volumes of the different types of fuel consumed as raw materials in the production of ammonia were multiplied by the emission factor to calculate the emissions of CO_2.

(2) Nitric Acid Production (2.B.2.) and Adipic Acid Production (2.B.3.)

Emissions of N_2O in this sector were calculated using emissions and emission factors reported from nitric acid and adipic acid production sites using the methodology given in the GPG (2000).

(3) Carbide Production (2.B.4.)

There is not enough data about the current level of CO_2 and CH_4 emissions from the silicon carbide and calcium carbide manufacturing processes so they were reported as “NE.” Emissions of CH_4 resulting from silicon carbide production have already been calculated under Combustion of Fuel (1A).

(4) Other (2.B.5.)

CH_4 emissions from carbon black production, CH_4 and CO_2 emissions from ethylene production, CH_4 emissions from 1,2-dichloroethane production, CH_4 emissions from styrene production and CH_4 emissions from coke production were reported by multiplying the production volume of each product by the country-specific emission factor.

Production volumes of methanol were multiplied by the default emission factor given in the Revised 1996 IPCC Guidelines to report on CH_4 emissions from methanol production. There hasn’t been any domestic methanol production since 1996.

2.5.2.3 Metal Production (2.C.)

(1) Iron and Steel Production (2.C.1.) and Ferroalloys Production (2.C.2.)

The CO_2 generated from iron and steel, pig iron, sinter and ferroalloy production and the CO_2 generated through the oxidization of coke used as a reducing agent has already been calculated under Fuel Combustion Sector (1.A.)

(2) Aluminum Production (2.C.3.)

PFC emissions generated from the refining of aluminum was calculated by multiplying production volumes from primary refining of aluminum by the country-specific emission factor calculated based on the Revised 1996 IPCC Guidelines.

The CO_2 generated from the refining of aluminum has already been calculated under Fuel Combustion Sector (1.A.).

(3) Use of SF_6 in Aluminum and Magnesium Foundries (2.C.4.)

It is thought that SF_6 has never been used in aluminum casting in Japan, but since complete knowledge in relation to use of the substance by individual companies is not easily attainable, it has been reported as "NE."

2.5.2.4 Other Production (2.D.)

(1) Food and Drink (2.D.2.)

It is thought that CO_2 is emitted from food and drink manufacturing processes in Japan, but the CO_2 being used is a by-product gas of petrochemical products, and such emissions have already been incorporated into Fuel Combustion Sector (1.A.)

2.5.2.5 Production of Halocarbons and SF_6 (2.E.)

(1) By-product Emissions of HFC-23: Production of HCFC-22 (2.E.1.-) and Fugitive Emissions (2.E.2.)

Emissions of by-product HFC-23 associated with the production of HCFC-22 and the fugitive emissions from the manufacture of HFCs, PFCs, and SF_6 are reported.

2.5.2.6 Consumption of Halocarbons and SF_6 (2.F.)

(1) Refrigeration and Air Conditioning Equipment (2.F.1.)

HFC emissions from domestic refrigerators, commercial refrigerators, automatic vending machines, stationary air-conditioning (household), and transport refrigerators (car air conditioners) are reported.

Regarding transport refrigeration, since emissions have not been assessed it has been reported as "NE." Industrial refrigeration is included in the total for commercial refrigerators. It is thought that PFCs have not been used much within Japan.

(2) Foam Blowing (2.F.2.)

Emissions of HFCs related to hard foams are reported using figures of HFC-134a emissions from urethane foam production, HFC-134a and HFC-152a emissions associated with polyethylene foam production, and HFC-134a emissions associated with polystyrene foam production.

The foams that use HFCs for foam blowing are all hard foams; there are no soft foams.

(3) Fire Extinguishers (2.F.3.)

There may be actual cases of use within Japan, but as this has not been confirmed. Therefore, emissions have been reported as "NE."

(4) Aerosols/Metered Dose Inhalers (2.F.4.)

HFC-134a and HFC-152a emissions associated with aerosols and HFC-134a and HFC-227ea emissions associated with metered dose inhalers are reported.

(5) Solvents (2.F.5.)

PFC emissions associated with the use of solvents during washing of consumer electronics parts, manufacture of semiconductors, and manufacture of liquid crystals are reported.

(6) Semiconductors (2.F.6.)

PFC emissions associated with the use of solvents during the manufacture of semiconductors and the manufacture of liquid crystals are reported.

(7) Electrical Equipment (2.F.7.)

SF_6 emissions from electrical equipment are reported.

2.5.3 Solvent and Other Product Use

2.5.3.1 Paint Application (3.A.)

Paint solvents are used in Japan, but their application is basically restricted only to mixing and they are assumed not to take part in chemical reactions. Therefore, they do not generate CO_2 or N_2O.

2.5.3.2. Degreasing and Dry-Cleaning (3.B.)

Degreasing is defined as “washing processes that do not involve chemical reactions,” and it is assumed that it does not generate CO_2 or N_2O. Although CO_2 emissions may occur in association with washing methods involving dry ice or carbonic gas, such methods are not thought to be used much in Japan.

There are no processes in dry-cleaning in which chemical reactions may occur, and it is basically assumed that it does not generate CO_2 or N_2O.

2.5.3.3. Other (3.D.)

(1) Use of N_2O for Anesthesia (3.D.-)

In relation to emissions of N_2O from the use of anesthetics (laughing gas), the actual amount of N_2O used as an anesthetic has been reported. It is assumed that all of the N_2O used as a medical gas escapes to the atmosphere.

(2) Fire Extinguishers (3.D.-)

In Japan all of the CO_2 with which the fire extinguishers are filled is the by-product gas generated from petrochemicals or petroleum refining, and has already been incorporated in other sectors. When fire

extinguishers with nitrogen gas are used, there is a possibility that nitrogen gas could be emitted, but sufficient data on the current level of such emissions has not been obtained. Therefore, they were reported as "NE."

(3) Aerosol (3.D.-)

Aerosol products including spray cans which are filled with CO_2 are manufactured in Japan, but the CO_2 used in the aerosol industry is a by-product gas of petrochemical products. These emissions are counted in the Combustion of Fuel sector (1.A.). Aerosol products manufactured in Japan do not use N_2O.

2.5.4 Agriculture

2.5.4.1 Enteric Fermentation (4.A.)

(1) Cattle (4.A.1.)

CH_4 emissions from enteric fermentation in cattle have been calculated using a country-specific method in Japan similar to the Tier 2 method. The emission factor for CH_4 associated with enteric fermentation in cattle has been established based on the results of breath testing of ruminant livestock in Japan (measured data regarding the volume of CH_4 generated from dry matter intake).

(2) Sheep, Goats, Horses & Swine (4.A.3., 4.A.4., 4.A.6., 4.A.8.)

CH_4 emissions associated with enteric fermentation in sheep, goats, horses and swine have been calculated using the Tier 1 method, in accordance with the GPG (2000).

The emission factor for CH_4 associated with sheep and goats has been established in the same way as for cattle, based on the emissions of CH_4 estimated from dry matter intake. The emission factor for swine has been established on the basis of results of research conducted in Japan. The emission factor used for horses is the default value given in the Revised 1996 IPCC Guidelines.

(3) Poultry (4.A.9.)

Since the Japanese literature offers no data on emission factors and default emission factors have not been determined, this category has been reported as "NE."

(4) Buffalo, Camels and Llamas, Mules and Asses (4.A.2., 4.A.5., 4.A.7.) and Other (4.A.10.)

It is thought that these animals are extremely rare in Japan so no calculation has been done.

2.5.4.2 Manure Management (4.B.)

(1) Dairy Cattle, Non-Dairy Cattle, Swine, Hens & Broiler (CH_4, N_2O: 4.B.1., 4.B.8. 4.B.9.)

Emissions of CH_4 and N_2O associated with manure management were calculated by multiplying the volume of CH_4 and N_2O contained in the manure of each type of livestock (dairy cattle, non-dairy cattle, swine, hens, and broilers) by the emission factor for each livestock manure treatment method. The emission

factors are used the values established based on the results of research conducted in Japan for each livestock type and treatment method.

(2) Sheep, Goats & Horses (4.B.3., 4.B.4., 4.B.6.)

CH_4 and N_2O emissions associated with management of the manure of sheep, goats and horses have been calculated using the Tier 1 method in accordance with the GPG (2000). The emission factors are the default values given in the Revised 1996 IPCC Guidelines.

2.5.4.3. Rice Cultivation (4.C.)

(1) Intermittently Flooded (Single Aeration) and Continuously Flooded (4.C.1.-)

CH_4 emissions from intermittently flooded (single aeration) and continuously flooded paddies have been calculated by using emission factors established based on measured values for different organic amendments, in accordance with the GPG (2000).

(2) Rainfed (4.C.2.), Deep Water (4.C.3.), and Other (4.C.4.)

Rain-fed paddy fields and deep water methods do not exist in Japan. A possible source of emissions in the other category is upland crop paddies, but since upland crop paddies are not flooded. Therefore, there will be no generation of CH_4.

2.5.4.4 Agricultural Soils (4.D.)

(1) Direct Soil Emissions (N_2O) (4.D.1.)

N_2O emissions associated with the application of synthetic fertilizers and organic fertilizers (compost fertilizers such as livestock manure, etc.) to agricultural soils (field lands) were calculated using country-specific emission factors, in accordance with the GPG (2000).

(2) Animal Production (4.D.2.)

Emissions of CH_4 and N_2O associated with animal production (CH_4 or N_2O from manure directly excreted onto grazing land or into water troughs by grazing livestock) have been calculated using emission factors based on the results of estimates of CH_4 and N_2O emissions from the manure of grazing livestock in Japan, in accordance with GPG (2000).

(3) Indirect Emissions (4.D.3.)

N_2O emissions associated with atmospheric deposition and nitrogen leaching and run-off have been calculated using default values, in accordance with the GPG (2000).

2.5.4.5. Prescribed Burning of Savannas (4.E.)

There is no equivalent activity in Japan.

2.5.4.6. Field Burning of Agricultural Residues (4.F.)

(1) Rice Straw, Rice Chaff & Straw of Wheat, Barley, Oats and Rye (4.F.1.)

The country specific method based on measured values in Japan has been used to calculate emissions of CH_4 and N_2O in association with the incineration of rice straw, rice chaff & straw of wheat, barley, oats and rye.

(2) Maize, Peas, Soybeans, Adzuki beans, Kidney beans, Peanuts, Potatoes, Sugar beet & Sugar cane (4.F.1., 4.F.2., 4.F.3., 4.F.4.)

Emissions of CH_4 and N_2O associated with the incineration of maize, peas, soybeans, adzuki beans, kidney beans, peanuts, potatoes, sugar beet and sugar cane have been calculated using default values, in accordance with the GPG (2000).

2.5.5 Land-use, Land-use Change and Forestry

2.5.5.1. Forests

(1) Forest Land Remaining Forest Land (5.A.1)

(i) Living Biomass (5.A.1.1)

Carbon stock changes in living biomass in forest land remaining forest land have been calculated using a method in accordance with the *LULUCF-GPG*.

Carbon stock change
= Carbon stock increase - Carbon stock decrease
= {Carbon stock change due to biomass growth - Carbon stock change due to commercial logging, shiitake cultivation and fuel wood gathering - Carbon stock change due to fires - Carbon stock change due to other disturbance} * Carbon fraction

The forest area and accumulation are obtained by using *Handbook of Forestry Statistics* to find the total forest area for intensively managed forests, semi-natural forests, cut-over forests and lesser stocked forests and bamboo.

"Forest land remaining forest land" is defined as forest area that has not been converted during the past 20 years, in accordance with *LULUCF-GPG*. The proportion of land that was unconverted over 20 years is determined by adding the annual proportions of land areas that were not converted from forest to other uses in each of the past 20 years, and the corresponding area in each year is estimated by multiplying this proportion by the area of forest land 20 years earlier.

"Land converted to forest land" is determined by subtracting the unconverted forest area from the total forest area in each year. All of the land that was converted to forest land is assumed to be intensively managed forests.

(ii) Land Converted Forest Land (5.A.2)

Carbon stock change in living biomass in land converted to forest land is calculated using the Tier 2 method in accordance with the LULUCF-GPG.

Carbon stock change
= {Carbon stock change due to biomass growth - Carbon stock change due to land conversion - Carbon stock change due to logging, fuel wood gathering and disturbance} * Carbon fraction

2.5.5.2. Crop Land (5.B)

(1) Crop Land Remaining Crop Land (5.B.1)

The amount of change in biomass in perennial tree crops (fruit trees) is subject to calculation under *LULUCF-GPG*. However, due to the way trees are managed in Japan, carbon accumulation due to growth is not anticipated. Therefore, the annual carbon fixing volume of perennial tree crops in all orchards is stated as 0.

(2) Land Converted to Cropland (5.B.2)

According to *LULUCF-GPG*, only above-ground living biomass is subject to calculation. The Tier 2 method is used for forest land converted to cropland. The Tier 1 method is used for other uses than forest land converted to cropland, using the provisional and default values for the amount of living biomass accumulation.

The Tier 2 method was used to make the calculation for soil. However, since Japan is not considered to have any soil that constitutes organic soil. Therefore, all soil is calculated as mineral soil.

2.5.5.3. Grassland (5.C)

(1) Grassland Remaining Grassland (5.C.1)

According to Tier 1, the carbon stock change in living biomass is reported as “0.”

(2) Land Converted to Grassland (5.C.2)

The Tier 2 method is used for living biomass for forest land and cropland (rice fields) converted to pasture lands. The Tier 1 method is used for other uses than forest land and cropland (rice fields) converted to pasture lands.

The Tier 2 method was used for soil. Since Japan is not considered to have any soil that constitutes organic soil under LUCF-GPG, all soil is calculated as mineral soil.

2.5.5.4. Wetlands (5.D)

(1) Wetlands Remaining Wetlands (5.D.1)

Concerning organic soils managed for peat extraction, in Japan there is no extraction of peat. Therefore, Japan reported “no activity” for this category. The Tier 1 method was used for flooded land remaining flooded land.

(2) Land Converted to Wetlands (5.D.2)

Concerning land converted to flooded land, changes in biomass stock are calculated for land that has been converted to dams. No calculations are performed with regard to soil because no relevant method is indicated in *LULUCF-GPG*.

2.5.5.5. Settlements (5.E)

(1) Settlements Remaining Settlements (5.E.1)

The amount of change in the carbon stock of trees in urban parks and greenery conservation zones, etc. is calculated using the Tier 1a method.

(2) Land Converted to Settlements (5.E.2)

For settlements, only the carbon stock change in living biomass was calculated and only the area converted to settlements from forest land and cropland was determined.

2.5.5.6. Other Land (5.F)

(1) Other Land Remaining Other Land (5.F.1)

According to *LULUCF-GPG*, change in carbon stocks and non-CO_2 emissions and removals are not considered.

(2) Land Converted to Other Land (5.F.2)

The calculation was done for land converted to other land. According to the method used in Land Converted to Cropland, the Tier 2 method was applied. Only the area converted from forest land and cropland to other land use categories was determined.

2.5.5.7. Non-CO_2 Gases

(1) Direct N_2O emissions from N fertilization (5.(I))

It is assumed that volume of nitrogen-based fertilizer applied to forest soils is included in demand for nitrogen-based fertilizers in the agriculture sector although it is thought that fertilizer is rarely applied to forest soils in Japan.

(2) N_2O Emissions from Drainage of Soils (5.(II))

Data on drainage of forest soils and wetlands is not available. Therefore, these sources have been reported as “NE.”

(3) N_2O Emissions from Disturbance Associated with Land-use Conversion to Cropland (5.(III))

According to *LULUCF-GPG*, the Tier 1 method was used.

For the emission factor the default values were used and for the activity data the area of land converted to cropland and carbon emissions from soils due to this conversion were used.

(4) CO_2 Emissions from Agricultural Lime Application (5.(IV)7.8.4.)

Data on lime application which is not associated with agricultural activity is not available. Therefore, these sources have been reported as "NE."

(5) Biomass Burning (5.(V))

For CH_4, CO, N_2O, NO_X emissions due to fires, the Tier 1 method was used.

For activity in forest land, the timber volume damaged by forest fire is used. For the remaining five categories, activity is determined based on CO_2 emissions in conjunction with conversion from forest land, on the assumption that a certain proportion is burned.

2.5.6 Waste

2.5.6.1. Solid Waste Disposal on Land (6.A.)

CH_4 and CO_2 emitted from this source have been calculated using the country-specific method. Emissions have been calculated by multiplying the emission factor by the volume of carbon which was biologically decomposed in the relevant year from the carbon included in waste in landfill in the past.

2.5.6.2. Wastewater Handling (6.B.)

(1) Industrial Wastewater (6.B.1.)

Emissions have been derived by multiplying the BOD burden of industries with large BOD burdens by CH_4 emissions per BOD obtained from CH_4 emission data in sewage treatment plants.

(2) Domestic and Commercial Wastewater (6.B.2.)

Emissions of CH_4 and N_2O from sewage treatment plants have been calculated using the country-specific method, in accordance with the GPG (2000). The emission factor was obtained from the measured values in domestic research projects and emissions were derived by multiplying the volume of sewage treated at sewage treatment plants by the emission factor.

CH_4 and N_2O emitted from domestic sewage treatment facilities (mainly septic tanks) were calculated using the country-specific method in accordance with the GPG (2000). Emissions for CH_4 and N_2O have

been calculated for each type of domestic sewage treatment facility, including community plants, gappei-shori johkasou, tandoku-shori johkasou, and vault toilets.

CH_4 and N_2O emitted from human waste treatment plants have been calculated using the country-specific method, in accordance with the GPG (2000).

Emissions for CH_4 were calculated by multiplying the volume of domestic wastewater treated at human waste treatment plants by the emission factor. Emissions for N_2O were calculated by multiplying the volume of nitrogen treated at human waste treatment plants by the emission factor.

2.5.6.3. Waste Incineration (6.C.)

In Japan, waste is categorized into municipal solid waste and industrial waste by law. Given the fact that some data are counted in different categories in the waste statistics, different methodologies for estimating were provided for municipal solid waste and industrial waste in the relevant categories.

(1) Municipal Solid Waste Incineration (6.C.-)

Emissions of CO_2 from this source were calculated using Japan's country-specific emission factor, derived by multiplying the carbon content in waste plastics by the rate of incineration of waste plastics at incineration plants, and the volume of waste plastic incinerated, in accordance with the GPG (2000).

Emissions of CH_4 and N_2O from this source were derived using the emission factors for each type of incineration plant, calculated based on statistical surveys of each type of incineration plant and furnace model, and the volume of municipal solid waste incinerated for each type of waste incineration plant.

(2) Industrial Waste Incineration (6.C.-)

Emissions of CO_2 have been derived in accordance with the GPG (2000) using the country-specific emission factor, calculated by multiplying the carbon content in waste oil and waste plastic from fossil fuels by the rate of incineration of waste oil and waste plastic from fossil fuels in incineration facilities, and the volume of waste oil and waste plastic incinerated.

Emissions of CH_4 have been derived by multiplying the volume of industrial waste incinerated by the country-specific emission factor based on existing statistical surveys.

N_2O emitted from this source has been derived by multiplying the volume of industrial waste incinerated by Japan's country-specific emission factor. Emission factors for sewage sludge are established by each flocculant and incinerator. Emission factors for incineration of polymer-added sludge in fluidized bed furnace are established according to combustion temperature.

In addition to municipal solid waste and industrial waste, CO_2 emissions from non-biogenic emissions have been calculated in the calculation file for CO_2 emissions associated with the incineration of industrial waste.

Emissions of CO_2 from biomass have been reported as a reference, without being included in Japan's total emissions, in accordance with the Revised 1996 IPCC Guidelines.

2.5.7 Other (CRF sector 7)

2.5.7.1. CO_2, CH_4, N_2O, HFCs, PFCs and SF_6

The national inventory submitted this year does not include emissions and removals of gases targeted under the Kyoto Protocol (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) from sources and sinks which are not included in the IPCC Guidelines.

2.5.7.2. NO_X, CO, NMVOC and SO_2

The inventory submitted this year includes CO emissions from smoking as emissions of indirect greenhouse gases (NO_X, CO, NMVOC and SO_2) from sources and sinks which are not included in the IPCC Guidelines.

2.6 State of Development of a National System Based on Article 5.1 of the Kyoto Protocol

2.6.1 The Government Institution Responsible for Japan's Greenhouse Gas Emissions and Removals Inventory

The government institution responsible for creating Japan's greenhouse gas emissions and removals inventory and its contact information are as follows.

○ Name of state institution: Ministry of the Environment

○ Contact: (Department) Climate Change Policy Division, Global Environment Bureau

(Address) 1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo-to

(Telephone, FAX) +81-3-5521-8339, +81-3-3580-1382

(E-mail) chikyu-ondanka@env.go.jp

○ Responsible person: Head of the Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment

2.6.2 Institutional Arrangement and Process for the Creation of Japan's Greenhouse Gas Emissions and Removals Inventory

2.6.2.1 Institutional Arrangement for the Creation of the Greenhouse Gas Emissions and Removals Inventory

In Japan the Law Concerning the Promotion of Measures to Cope with Global Warming stipulates that the government must create an emissions and removals inventory. Specifically, the Ministry of the Environment (MOE) has annually compiled and submitted the national greenhouse gas inventory to the UNFCCC secretariat under the UNFCCC in cooperation with relevant ministries, governmental agencies and organizations (Figure 2.21).

The MOE has overall responsibility for the emissions and removals inventory. In order to respond to the international requirements and to reflect the latest scientific knowledge in the emissions and removals inventory, the MOE has convened and the Committee for the Greenhouse Gas Emissions Estimation Methods to study improvements to the emissions and removals inventory. Based on the results of the committee's deliberations, the MOE calculates greenhouse gas emissions and removals, analyzes key categories[12], and performs uncertainty assessments. The actual work involved in calculating emissions and removals, preparation of the Common Reporting Format (CRF) and National Inventory Report (NIR) is

[12] The *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003)*, which was welcomed in COP9, extends the key source analysis to LULUCF categories. In the latest UNFCCC reporting guidelines (FCCC/SBSTA/2004/8), the term "key source category" was revised to "key category." Japan adopts the term "key category" according to these guidelines, although it has not conducted key category analysis covering the LULUCF categories.

carried out by the Greenhouse Gas Inventory Office of Japan (GIO)[13] of the Center for Global Environmental Research of the National Institute for Environmental Studies.

The relevant ministries, governmental agencies and organizations provide activity data and emission factors, etc., through methods such as the publication of relevant statistics. They also offer cooperation in the preparation of the emissions and removals inventory, for example, by providing information necessary for the assessment of uncertainty.

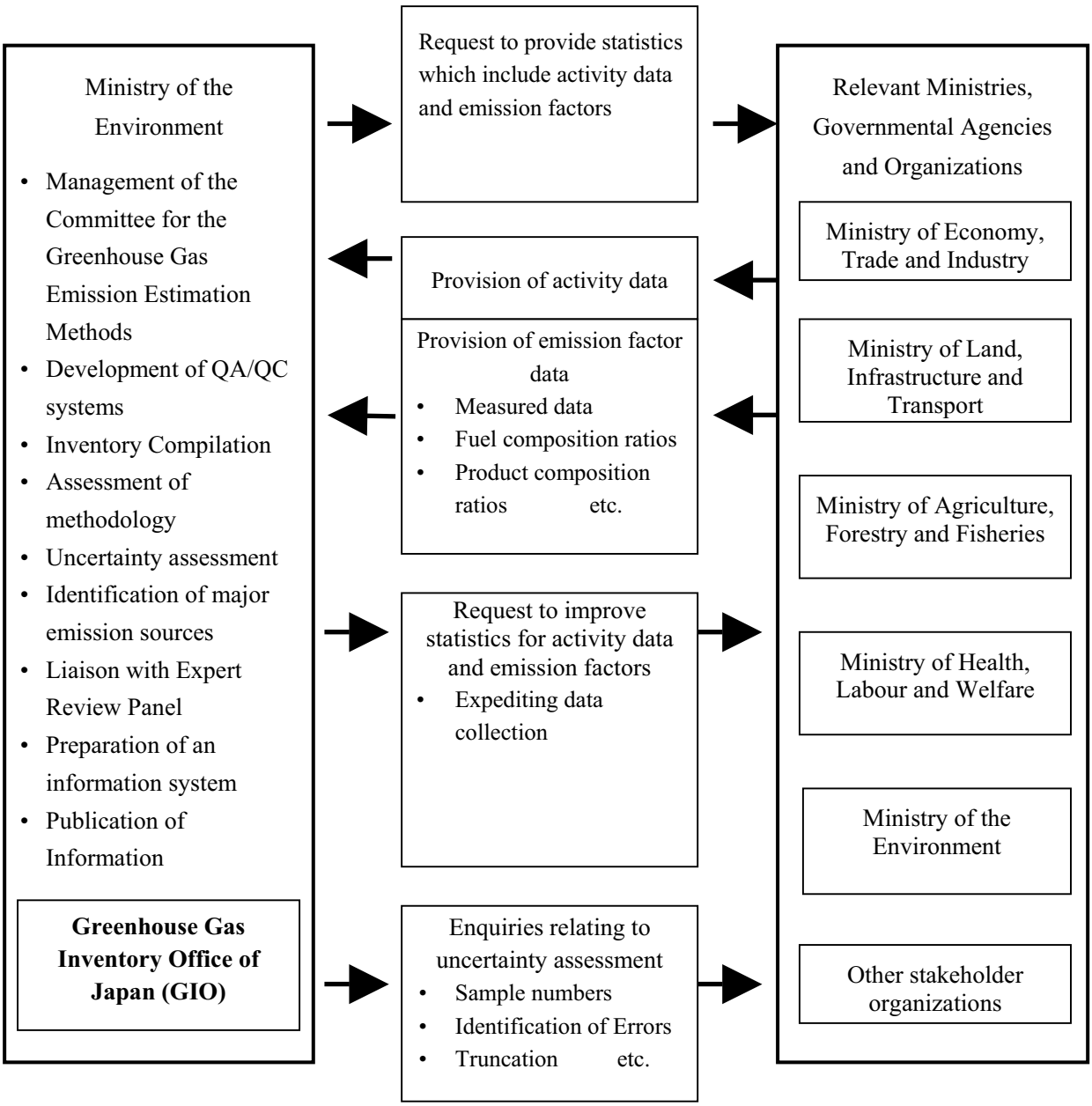


Figure 2.21 Institutional Arrangement for Emissions and Removals Inventory Preparation in Japan

[13] GIO has consigned a part of task to private consultants.

2.6.2.2 Process for the Creation of the Greenhouse Gas Emissions and Removals Inventory

Japan has compiled an emissions and removals inventory by following the steps shown in Figure 2.22, in order to ensure and improve quality control regarding the completeness, accuracy and consistency of the inventory.

As shown in Figure 2.22, Japan has implemented QC activities, such as checking estimation accuracy and archiving documents, in each step of the inventory compilation process in accordance with *GPG (2000)* to manage the quality of the inventory. Japan has implemented Step 2 [Expert review of previous inventories (Committee for the Greenhouse Gas Emissions Estimation Methods)] as QA activities, and in that step, it reviews data quality taking into account scientific knowledge and data availability.

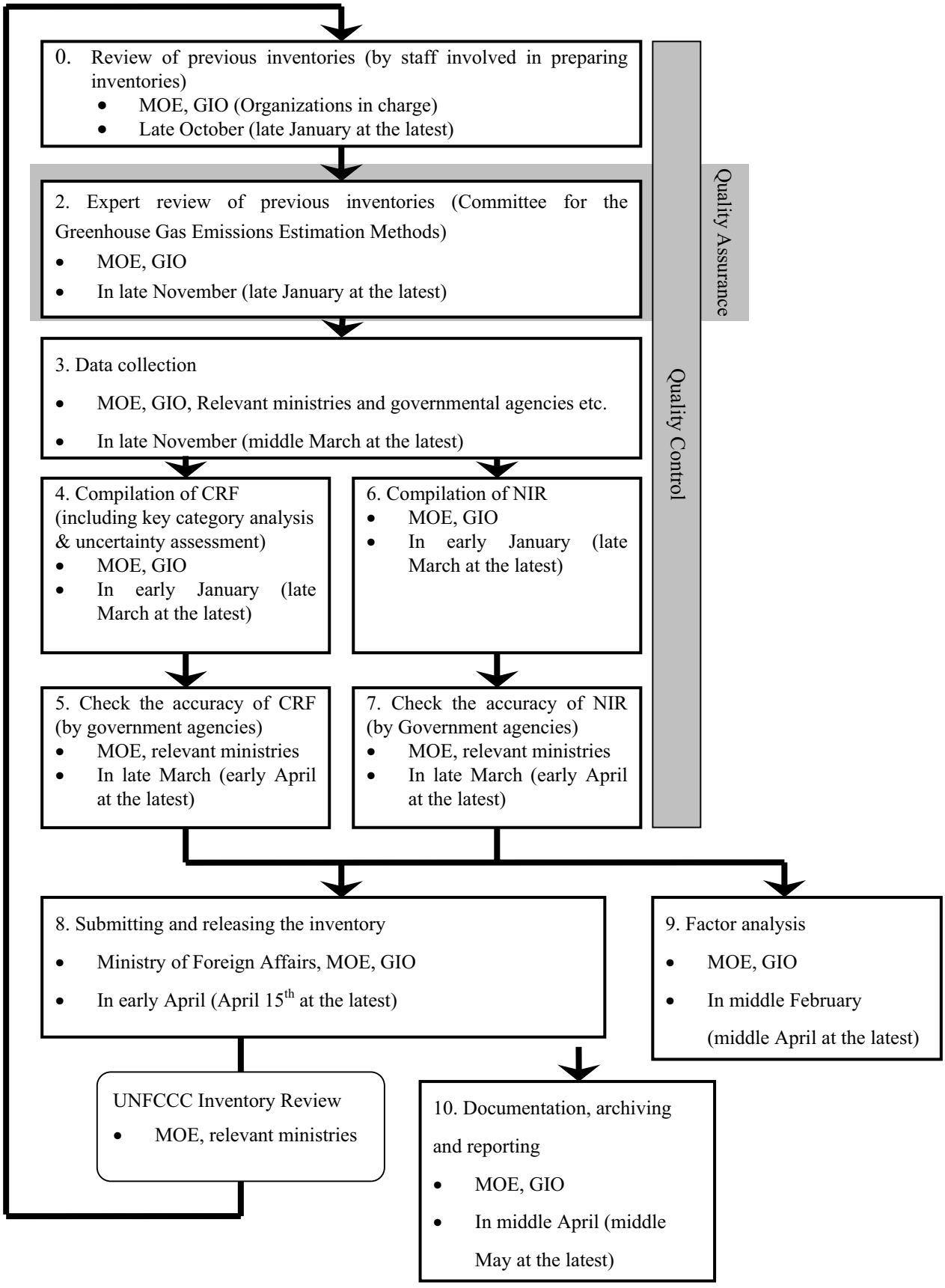


Figure 2.22 Process for Compilation of the Emissions and Removals Inventory

2.6.3 Collection of Activity Data, Selection of Emission Factors and the Calculation Method, the Emission Estimation Improvement Process

2.6.3.1 The Activity Data Collection Process

The activity data necessary for the calculation is gathered as necessary from published materials if it can be obtained from them. Data that has not been released as published materials is requested by the Ministry of the Environment from the government ministries and agencies with jurisdiction over it and the ministry gathers the activity data after receiving the provision of the said information.

2.6.3.2 The Selection Process for Emission Factors and the Calculation Method

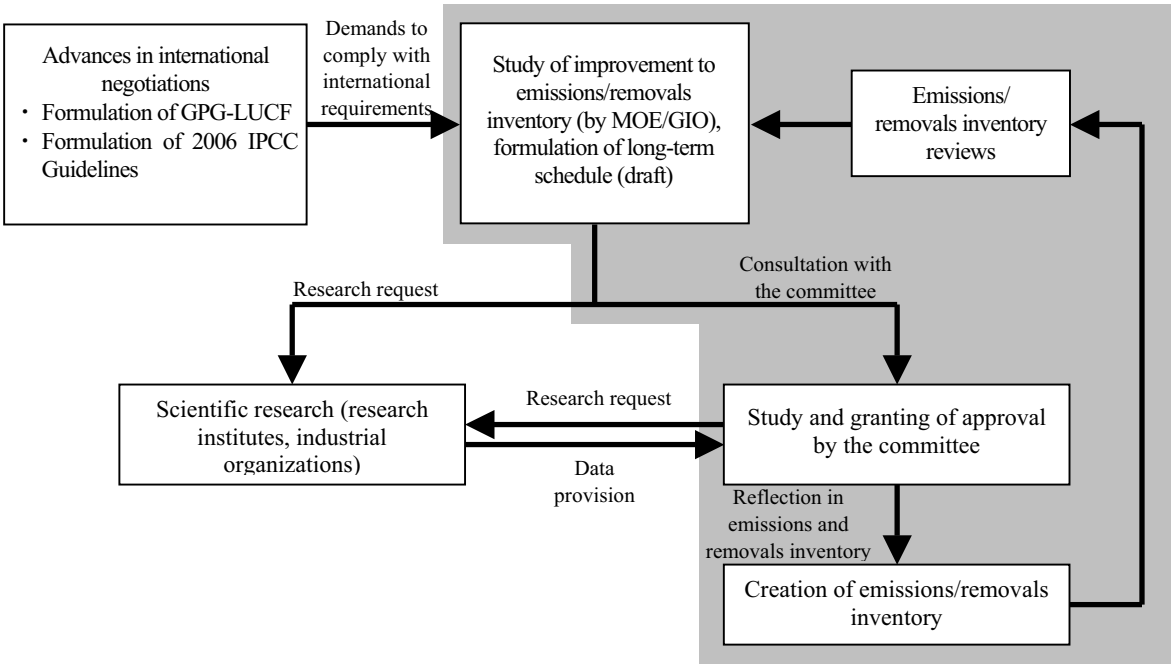
Concerning Japan's emissions and removals calculation method, the Revised 1996 IPCC Guidelines, GPG (2000) and GPG-LUCF stipulate the study of calculation methods tailored to actual conditions in Japan in all of the activity categories necessary for calculation of Japan's greenhouse gas emissions and removals.

There are two methods for obtaining emission factors: using the default values from the Revised 1996 IPCC Guidelines, the GPG (2000) and the GPG-LUCF, and obtaining Japan's country-specific emission factor based on the results of measurements taken within Japan. In cases where there is measured data in Japan and the result of that data is thought to appropriately reflect the actual state of emissions in Japan, the country-specific emission factor is obtained. On the other hand, in cases where there is no measured data or there is measured data, but it is thought that a more detailed study is necessary, the aforementioned default values are used.

After the calculation methods and emission factors have been debated and studied in the Committee for the Greenhouse Gas Emissions Estimation Methods, they are officially selected methods or values to be used in the emissions and removals inventory.

2.6.3.3 The Emission Estimation Improvement Process

If improvements of the emissions and removals inventory are specified based on advances in international negotiations, emissions and removals inventory reviews, and experiences of preparation of emissions and removals inventories, Japan conducts studies of progressive emissions improvements as necessary. Studies of emission estimation improvement plans are conducted through scientific research and the Committee for the Greenhouse Gas Emissions Estimation Methods, and the results of those studies are reflected in the emissions and removals inventory. The emissions and removals inventory improvement process is shown in the concept diagram below.



* The area shaded in grey shows the emissions and removals inventory preparation process.

Figure 2.23 Concept Diagram of the Emissions and Removals Inventory Improvement Process

2.6.4 Identification of Key Categories

2.6.4.1 Key Category Identification Process

Annex I Parties shall identify their national key categories for the base year and the latest reported inventory year, as described in GPG (2000), using three analyses: the Tier 1 level assessment, the Tier 1 trend assessment and a qualitative assessment.

The identification of the key categories with the Tier 1 level assessment and the Tier 1 trend assessment is carried out using an Excel spreadsheet for key category analysis (a ksa file). Using the ksa file, emissions in the base year and latest reported inventory year in each category for which the GPG (2000) determined that a key category analysis should be conducted are directly linked from the calculation spreadsheet (Excel) that is conducting the emissions estimate, and a list of emissions in each category is prepared. When preparing this list of emissions in each category, a comparison is conducted of the cumulative values of total emissions by sector and emissions of each sub-category within that sector, and in the case that Japan's country-specific sub-categories and emissions categories are rearranged into categories conforming to the IPCC Guidelines, confirmation is also made that no duplications or omissions have occurred.

With the level assessment method, emissions for each category are summed together in descending order of magnitude, and the categories that add up to more than 95 percent of total emissions are identified as key categories. With the trend assessment method, the difference between the change in emissions in a

given category and the change in total emissions is calculated and this is multiplied by the contribution to emissions of the category in question to obtain the value of the trend assessment in that category. These values are added up beginning with the categories with the highest proportion of the total value and all the categories until the overall sum reaches 95 percent are identified as key categories. All of the test data for the analysis is saved as a spreadsheet within the ksa file.

Under the qualitative assessment, emissions categories for which emissions and removals have been newly estimated and categories in which estimation methods have been changed are identified as key categories.

In the identification of key categories, in order to prepare the emissions and removals inventory to be submitted in fiscal 2006, in addition to the former key category analysis in the sources sector, studies are under way aimed at the implementation of a key category analysis in the sinks sector. Identification of key categories with a Tier 2 analysis has not been implemented due to the fact that priority has been given to improvement of the calculation method, and this has been identified as a future challenge in Japan.

2.6.4.2 Results of the Key Category Analysis (Fiscal 2003 Emissions)

(1) Key Categories

The key categories in fiscal 2003, as determined by a key category analysis conducted using the methods above, are shown in Table2.15.

Table 2.15 Japan's Key Categories

	A IPCC Source Category		B Direct GHGs	Level	Trend	Qualitative Analysis
#1	1A Stationary Combustion	Solid Fuels	CO2	#1	#2	
#2	1A Stationary Combustion	Liquid Fuels	CO2	#2	#1	
#3	1A3 Mobile Combustion	b. Road Transportation	CO2	#3	#4	
#4	1A Stationary Combustion	Gaseous Fuels	CO2	#4	#3	
#5	2A Mineral Product	1. Cement Production	CO2	#5	#7	
#6	6C Waste Incineration		CO2	#6	#10	
#7	1A Stationary Combustion	Other Fuels	CO2	#7		
#8	1A3 Mobile Combustion	d. Navigation	CO2	#8		
#9	4B Manure Management		N2O	#9	#14	●
#10	1A3 Mobile Combustion	a. Civil Aviation	CO2	#10	#12	
#11	2A Mineral Product	3. Limestone and Dolomite Use	CO2	#11	#16	
#12	4A Enteric Fermentation		CH4	#12		
#13	1A3 Mobile Combustion	b. Road Transportation	N2O	#13		
#14	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs		#5	
#15	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Electrical Equipment	SF6		#6	
#16	2B Chemical Industry	3. Adipic Acid Production	N2O		#8	●
#17	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs		#9	
#18	2E Production of Halocarbons and SF6	2. Fugitive Emissions	SF6		#11	
#19	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH4		#13	
#20	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning Equipment	HFCs		#15	
#21	4C Rice Cultivation		CH4		#17	
#22	1A3 Mobile Combustion	a. Civil Aviation	CH4			●
#23	1A3 Mobile Combustion	a. Civil Aviation	N2O			●
#24	6B Wastewater Handling		N2O			●
#25	6C Waste Incineration		N2O			●

(2) Level Assessment

The Tier 1 level assessment of the latest emissions for fiscal 2003 gives the 13 sub-categories shown in Table 2.16 as the key categories.

Table 2.16 Results of Level Assessment

	A IPCC Source Category		B Direct GHGs	D Current Year Estimate (Gg CO_2eq.)	F % Contribution to Level	Cumulative
#1	1A Stationary Combustion	Solid Fuels	CO2	409,345.00	30.6%	30.6%
#2	1A Stationary Combustion	Liquid Fuels	CO2	343,628.60	25.7%	56.2%
#3	1A3 Mobile Combustion	b. Road Transportation	CO2	227,177.66	17.0%	73.2%
#4	1A Stationary Combustion	Gaseous Fuels	CO2	164,272.33	12.3%	85.4%
#5	2A Mineral Product	1. Cement Production	CO2	30,766.37	2.3%	87.7%
#6	6C Waste Incineration		CO2	23,339.20	1.7%	89.5%
#7	1A Stationary Combustion	Other Fuels	CO2	17,923.51	1.3%	90.8%
#8	1A3 Mobile Combustion	d. Navigation	CO2	14,060.27	1.0%	91.9%
#9	4B Manure Management		N2O	11,826.36	0.9%	92.7%
#10	1A3 Mobile Combustion	a. Civil Aviation	CO2	11,063.68	0.8%	93.6%
#11	2A Mineral Product	3. Limestone and Dolomite Use	CO2	10,363.60	0.8%	94.3%
#12	4A Enteric Fermentation		CH4	6,615.72	0.5%	94.8%
#13	1A3 Mobile Combustion	b. Road Transportation	N2O	6,429.71	0.5%	95.3%

(3) Trend Assessment

The Tier 1 trend assessment of the latest emissions for fiscal 2003 gives the 17 sub-categories shown in Table 2.17 as the key categories.

	A IPCC Source Category		B Direct GHGs	C Base Year Estimate (Gg CO_2eq.)	D Current Year Estimate (Gg CO_2eq.)	H % Contribution to Trend	Cumulative
#1	1A Stationary Combustion	Liquid Fuels	CO2	418,458.47	343,628.60	30.6%	30.6%
#2	1A Stationary Combustion	Solid Fuels	CO2	298,298.93	409,345.00	24.1%	54.7%
#3	1A Stationary Combustion	Gaseous Fuels	CO2	103,223.76	164,272.33	14.7%	69.3%
#4	1A3 Mobile Combustion	b. Road Transportation	CO2	189,204.04	227,177.66	6.2%	75.5%
#5	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs	16,965.00	5,022.81	3.7%	79.3%
#6	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Electrical Equipment	SF6	10,990.00	1,542.80	2.9%	82.2%
#7	2A Mineral Product	1. Cement Production	CO2	37,006.41	30,766.37	2.6%	84.8%
#8	2B Chemical Industry	3. Adipic Acid Production	N2O	6,650.04	404.20	1.9%	86.7%
#9	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs	8,880.00	4,288.00	1.5%	88.1%
#10	6C Waste Incineration		CO2	16,935.48	23,339.20	1.4%	89.5%
#11	2E Production of Halocarbons and SF6	2. Fugitive Emissions	SF6	4,708.30	812.60	1.2%	90.7%
#12	1A3 Mobile Combustion	a. Civil Aviation	CO2	7,162.95	11,063.68	0.9%	91.7%
#13	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH4	2,785.23	83.03	0.8%	92.5%
#14	4B Manure Management		N2O	13,550.26	11,826.36	0.8%	93.3%
#15	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning Equipment	HFCs	809.13	3,447.96	0.7%	94.0%
#16	2A Mineral Product	3. Limestone and Dolomite Use	CO2	11,406.30	10,363.60	0.6%	94.5%
#17	4C Rice Cultivation		CH4	7,075.73	5,785.48	0.5%	95.1%

Table 2.17 Results of Trend Assessment

(4) Qualitative Analysis

In Japan, under the qualitative assessment, emissions categories for which emissions and removals have been newly estimated and categories in which estimation methods have been changed are identified as key categories. Categories which have been determined to be key categories by the qualitative analysis in the emissions and removals inventory submitted in 2005 are as follows:

○ Categories for which emissions and removals have been newly estimated

- 1.A.3.a. CH_4 and N_2O emissions from civil aviation (aviation gasoline)
- 4.B.3., 4.B.4., 4.B.6. N_2O emissions from manure management (sheep, goats and horses)

○ Categories in which estimation methods have been changed

- 6.B. N_2O emissions from wastewater handling
- 6.C. N_2O emissions from waste incineration

2.6.5 Recalculations

Recalculations of previously reported emissions and removals are recommended in the cases of 1) application of a new methodology for estimating, 2) addition of new categories, and 3) data refinement.

The application of a new calculation method is carried out as necessary. In the emissions and removals inventory submitted in 2005, recalculation was conducted in the waste sector category for which the calculation method had changed. The calculated method changed because of the change in the classification of the statistics used as activity data, the reflection of the actual state of emission factor changes due to technological progress, and the change into a calculation method cable of reflecting efforts to reduce greenhouse gas emissions.

New emission source categories were also sequentially added, in the preparation of the emissions and removals inventory submitted in 2005, a review on categories previously reported as "NE" was carried out as well as adding notation keys to categories that were reported as emissions "0." As a result of such across-the-board review of the emissions and removals inventory, new emissions categories were added and the recording of the level of emissions was refined.

Concerning the refinement of activity data, in Japan generally the activity data for the most recent year at the time the emissions and removals inventory is reviewed the next year for the purpose of obtaining information that was not submitted by the time of the publication of financial year values or the survey deadline. In the emissions and removals inventory submitted in 2005, the activity data in 2002 was reviewed for many emissions categories. As a result emissions in the year in question were recalculated. Changes in the activity data are continually-revised, and finally in the process of requesting data for the most recent year from ministries and agencies, lateral communication concerning changes in the past data is also exchanged simultaneously.

For a list of categories which were recalculated for the emissions and removals inventory submitted in 2005, the justifications of the recalculations refer to Table 8(b) Recalculation-Explanatory Information in the CRF and Chapter 10 of the NIR.

2.6.6 Quality Assurance/Quality Control

2.6.6.1 The Quality Assurance/Quality Control Plan

(1) Basic Structure of the Quality Assurance/Quality Control Plan

The basic structure of Japan's Quality Assurance/Quality Control Plan is the institutional arrangement for emissions and removals inventory preparation in Japan shown in Figure 2.21 and the process for compilation of the emissions and removals inventory shown in Figure 2.24 (and previously shown in Figure 2.22).

In Japan, when preparing the emissions and removals inventory, in line with the provisions of the GPG (2000), in each process QC (quality control) activities (accuracy check of calculation, storage of documents, etc.) are implemented, and the quality of the emissions and removals inventory is managed. Furthermore, Step 2 (convening of the Committee for the Greenhouse Gas Emissions Estimation Methods [assessment

and study of the calculation method by experts]) is positioned as a QA (quality assurance) activity, and the data quality is verified and assessed in terms of scientific knowledge and data availability.

(2) Emissions and Removals Inventory Preparation Schedule

The process for compilation of the emissions and removals inventory shown in Figure 2.24 shows a general schedule established based on past emissions and removals inventory renewals because the emissions and removals inventory will be submitted on April 15. Looking at the detailed work schedule, the inventory is formulated taking into account conditions in that year such as the refinement of statistics, the progress of study of calculation methods, additional emissions and removals inventory preparation requirements resulting from advances in international negotiations, etc. and reviews are conducted as necessary based on the state of progress of the emissions and removals inventory preparation.

2.6.6.2 Implementation of Quality Assurance/Quality Control Activities

The quality control/quality assurance activities being implemented in each part of the process of emissions and removals inventory preparation are shown below.

(1) Study of Improvements of the Emissions and Removals Inventory

Japan conducts studies based on improvements identified during emissions and removals inventory reviews, past results of deliberations by the Committee for the Greenhouse Gas Emissions Estimation Methods, and needed corrections discovered in other processes and then reflects the results in the emissions and removals inventory from the next year onwards.

Concerning the needed corrections specified during the emissions and removals inventory preparation work (input errors, link errors, etc.), the Emissions and Removals Inventory Corrections List is renewed and information is recorded throughout the year in order to manage the inventory in an integrated manner and to correct all errors in the emissions and removals inventory without omissions.

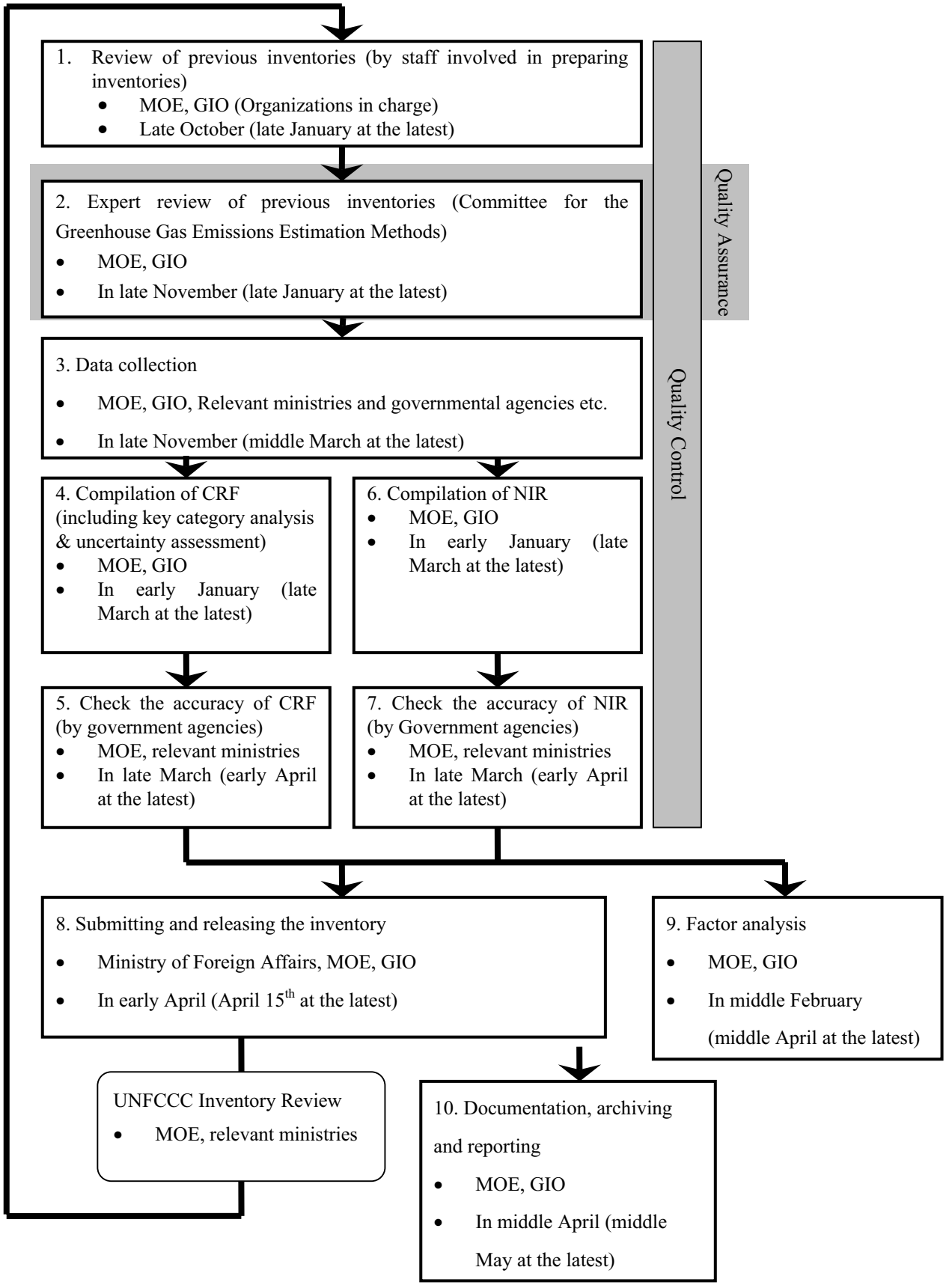


Figure 2.24 Process for Compilation of the Emissions and Removals Inventory (as previously mentioned)

(2) Committee for the Greenhouse Gases Emissions Estimation Methods

The Ministry of the Environment invites the participation of domestic experts from a wide range of sectors to hold meetings of the Committee for the Greenhouse Gas Emissions Estimation Methods (below, "Committee") in order to study issues regarding the calculation of greenhouse gas emissions and removals requiring specialized assessment and study and changes to calculation methods that might have an impact on emissions. In addition to the incorporation of discussion results into the emissions and removals inventory for the next year, the documents used by the Committee for especially noteworthy matters are released as an Annex of NIR which helps improve the completeness and transparency of the inventory. Committee meetings are not held regularly, but there has been one held nearly every year since 1999 in conjunction with advances in international negotiations and enhancement of the domestic regime through legislation. The documents and minutes of the Committee are stored together as records related to greenhouse gas emissions calculation in the GIO.

Assessment and study of the calculation method in the Committee for the Greenhouse Gas Emissions Estimation Methods is positioned as Japan's quality assurance activity as a third party assessment and review process for the domestic emissions and removals inventory.

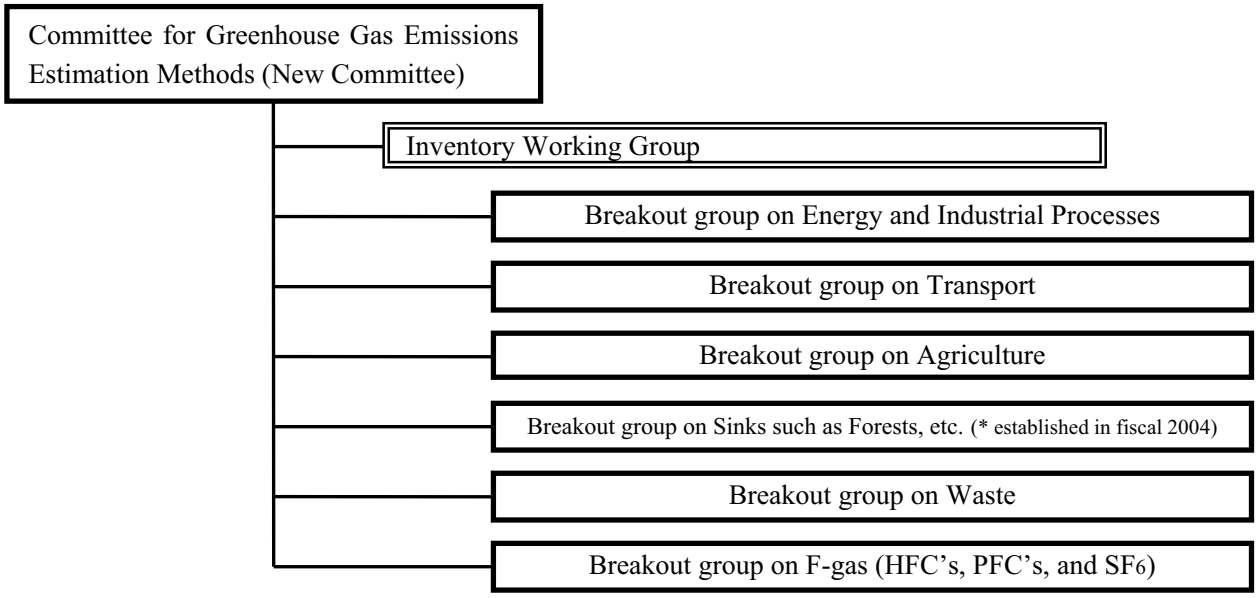


Figure 2.25 Organization of Committee for the Greenhouse Gas Emissions Estimation Methods

(3) Data Collection

Most statistics for preparing Japan's inventory are gathered from government sources available commercially. Data not found in these sources are obtained from government agencies and related organizations. Japan's data gathering process is described below.

(i) Gathering Data from Government Statistics Available Commercially

1. [GIO, private consultants] Obtain the government statistics needed to prepare the emissions and removals inventory
2. [Private consultants] Make hard copies of pages containing data used, bind into prescribed files, and preserve.

(ii) Gathering Data from Government Agencies and Related Organizations

1. [GIO, private consultants] Letters requesting data and files for entering them are prepared.
2. [Ministry of the Environment, GIO] Data request letters and data input files are attached to electronic mails and sent to government agencies and related organizations.
3. [Government agencies and related organizations] The requested data are attached to electronic mails, entered in the files and returned to the Ministry of the Environment or GIO.

(4) Compilation of the CRF (Including Key Category Analysis and Uncertainty Assessment)

Based on the estimation equations for emission and removals, Japan carries out data entry and the estimation of emission and removals together by using estimation files that have a linked structure. The key category analysis and uncertainty assessment are linked to emissions and removals estimation, and therefore are carried out nearly simultaneously with the estimation.

Japan makes estimation files consisting of activity data input files, emission factor input files, and background data files (files for estimating emissions and removals, including emission/removal estimation sheets and CRF link sheets; see Figure 2.24).[14] Activity data input files and emission factor input files are linked to background data files, which are linked to CRF link files, which are linked to the CRF. The arrangement is structured so that when values are entered into the activity data input files and emission factor input files, the estimation of emissions and removals and updating of the CRF occur automatically (see Figure 2.25 in the NIR submitted in 2004 and Annex 9: Hierarchical Structure of Japan's National Greenhouse Gas Inventory File System).

Because the estimation file structure is basically the same every year, the estimation files of any one year are based on copies of the previous year's files. But when the methodology for estimating or other changes are made, other actions might be necessitated such as scrapping or merging files, or changing the link structure.

In addition to estimation files, CRF link files and the CRF, Japan creates files that make reference to the emission/removal estimation sheets of background data files (verification files), and estimates the emissions and removals. Verification files are used to compute total emissions with a system and estimation method different from those of CRF link files or the CRF. For that reason, if the total emissions of the CRF and the verification files match, it is determined that there were no errors such as in data entry, inter-file links, or double counting of emission and removals.

[14] No emission coefficient input files are created for the agriculture sector due to the difficulty of separating the emission factor and activity amount.

2.A.1. Cement Production

Time Series

Equation

Estimation

E= EF× A
A = Aw × (1 - Rw)
EF = MW_co2 / MW_lime × P_lime

		[Unit]	1990	1991	1992	1993	1994	1995	1996
Aw	Consumption of Limestone (wet)	[t]	92,511,000	96,345,000	99,392,000	98,441,000	100,898,000	100,632,000	101,524,000
Rw	Moisture content	[%]	3.4%	3.3%	3.2%	3.3%	3.2%	3.3%	3.2%
A	Consumption of Limestone (dry)	[t]	89,365,626	93,165,615	96,211,456	95,192,447	97,669,264	97,311,144	98,275,232
MW_lime	Molecular weight of CaCO3	[g]	100.09	100.09	100.09	100.09	100.09	100.09	100.09
MW_co2	Molecular weight of CO2	[g]	44.01	44.01	44.01	44.01	44.01	44.01	44.01
R_co2		—	0.440	0.440	0.440	0.440	0.440	0.440	0.440
P_lime	Purity of limestone	[%]	94.2%	94.2%	94.3%	94.4%	94.4%	94.5%	94.6%
EF	Emission Factor	[t CO2/ t limestone]	0.414	0.414	0.415	0.415	0.415	0.415	0.416
E	Emissions	[t CO2]	37,006,413	38,605,596	39,894,161	39,497,789	40,552,325	40,430,377	40,857,940
		[Gg CO2]	37,006	38,606	39,894	39,498	40,552	40,430	40,858

Figure 2.26 Example of a Background Data File (Emission/Removal Estimation Sheet)

(2.A.1 Cement Production)

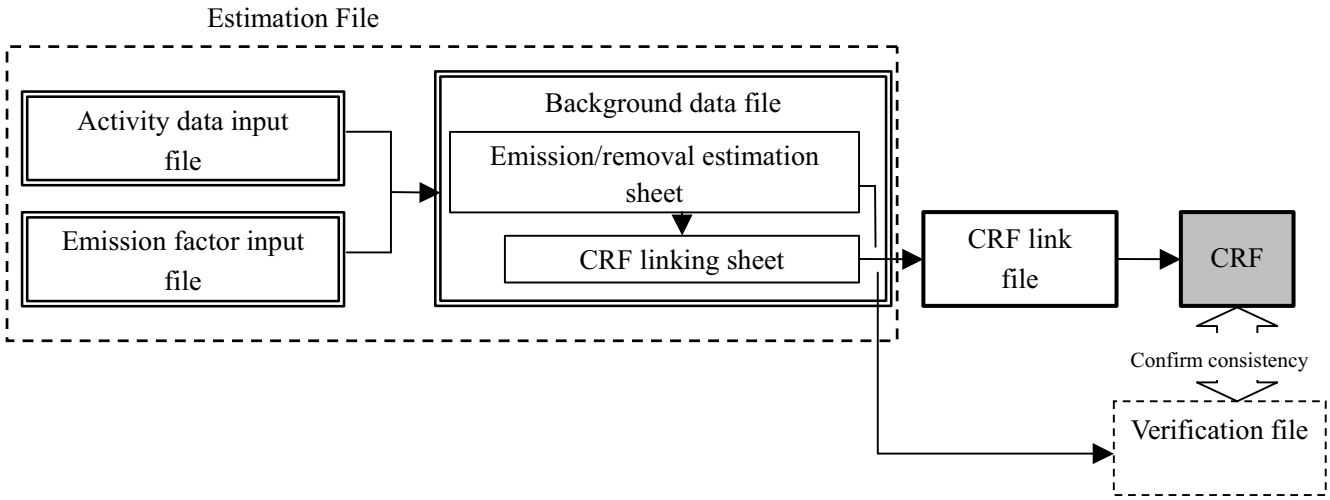


Figure 2.27 Structure of Links among Estimation File, CRF Link File, the CRF, and the Verification File

(5) Check the Accuracy of Draft CRF (Finalization of Emissions and Removals through an Adjustment by Ministries and Agencies)

When preparation of the draft CRF has been completed, CRF electronic files (estimation files, CRF link files, CRF files) and the in-country documents that give calculated values for CRF emissions and removals are sent to the relevant government agencies to have them check the content. When the adjustment by

ministries and agencies has been completed, the CRF (emissions and removals) is finalized and as a rule no further changes in the values are made after that.

The content of the check implemented during the adjustment by ministries and agencies is as follows:

○ Checking the accuracy of data entry

What is checked

- Calculation files

How check is performed

- Each government agency verifies that the statistics and data it has provided are properly entered into the calculation files.

○ Checking the accuracy of calculated values for emission and removals

What is checked

- The documents for domestic publication showing the estimated values of emissions and removals in the CRF

How check is performed

- Determine if emissions and removals are accurately calculated in the CRF.

(6) Compilation of Draft NIR

Japan has prepared an NIR every year since 2003. Since 2004, the structure set forth in Annex I of the UNFCCC reporting guidelines on the annual inventories (FCCC/SBSTA/2004/8) has been followed.

(7) Check the Accuracy of Draft NIR (implementation of adjustment by ministries and agencies)

When preparation of the draft NIR has been completed, the computer NIR files are sent to the relevant government agencies to have the accuracy of the text verified. When the adjustment by ministries and agencies has been completed, the NIR is finalized, and as a rule no further changes in the text are made after that.

(8) Submitting and Releasing the Inventory

Upon completion of the CRF and NIR, the inventory is submitted to the UNFCCC secretariat, and the electronic files (CRF files, estimation files, and NIR files, excluding secret data) are posted on the GIO website (http://www-gio.nies.go.jp/index.html).

2.6.6.3 Internal and External Assessment and Review Process in the National System

As stated above, Japan's emissions and removals inventory preparation process undergoes internal assessments through adjustments among the related ministries and agencies, and external assessments and reviews through the Committee for the Greenhouse Gas Emissions Estimation Methods.

2.6.7 The Official Study and Approval Process for the Greenhouse Gas Emissions and Removals Inventory

As noted above, study of the preparation of the greenhouse gas emissions and removals inventory is being advanced through sharing of information among related ministries and agencies. In the case that changes in the estimate are made, study is carried out in the Committee for the Greenhouse Gas Emissions Estimation Methods.

The prepared greenhouse gas emissions and removals inventory, including the sheets containing the estimate, are circulated among the related ministries and after they have all confirmed and approved the inventory, the figures for emissions and removals are determined to be official values. The above process is Japan's official study and approval process, and when necessary, a report is also made to the Global Warming Prevention Headquarters.

Chapter 3
Policies and Measures

3.1 Establishment of Kyoto Protocol Target Achievement Plan

The Japanese Government has been promoting global warming countermeasures through the Action Program to Arrest Global Warming (October 1990), Outline for Promotion of Efforts to Prevent Global Warming (June 1998) and the revised version of the Outline for Promotion of Efforts to Prevent Global Warming (March 2002).

A step-by-step approach that regularly evaluates the progress of countermeasures, policies, and emission statuses and implements any additional requisite measures and policies was adopted in the Outline of 2002. Specifically, the period between 2002 and the end of the first commitment period was divided into three steps between 2002-2004, 2005-2007 and 2008-2012, and the reviewing of countermeasures and policies were to be implemented in 2004 and 2007.

Discussion on the evaluation and revision of the Outline were held in 2004, resulting in the Cabinet approval of the Kyoto Protocol Target Achievement Plan. This Plan comprehensively included countermeasures and policies necessary for Japan in achieving the target six percent reduction commitment under the Kyoto Protocol.

In formulating this Plan, technical examinations were implemented by the Central Environmental Council of the Ministry of the Environment, the Industrial Structure Council and the Advisory Committee on Natural Resources and Energy of the Ministry of Economy, Trade and Industry, and the Panel on Infrastructure Development and the Council of Transport Policy of the Ministry of Land, Infrastructure and Transport. Specifically, examinations on the evaluation of current progress in countermeasures and policies, outlook on greenhouse gas emissions, and the contents regarding additional countermeasures and policies, were implemented for about one year from the beginning of 2004.

In examining such, public opinion was reflected through the implementation of hearings from the industry, local public organizations, and NGO's as well as public comment proceedings. In addition, besides permitting the public to attend the conferences, conference documents and summaries of proceedings were disclosed to ensure the transparency in debates.

Proposals were summarised as a draft plan later in March 2005 by the Global Warming Prevention Headquarters comprised of the entire Cabinet. Public comment proceedings were implemented, and two "town-meetings" were hosted with the Minister of the Environment and the Minister of Economy, Trade and Industry personally listening to public opinions on the draft plan. 1925 opinions were submitted primarily from the industry and NGO's through the public comment proceedings.

Following these procedures on the draft plan, The Kyoto Protocol Target Achievement Plan was approved by the Cabinet in April 2005. Japan's measures and policies stipulated in the Plan regarding global warming will be described in this chapter.

3.2 Basic Direction of Promotion of Global Warming Countermeasures

3.2.1 Direction of Japan's Global Warming Countermeasures

Japan will steadily achieve its 6 percent reduction commitment under the Kyoto Protocol. In addition, Japan will further aim at long-term and continuous reduction of emissions.

The 21st century is known as the "century of the environment" and responding to the global warming issue is becoming an important issue shared by all humans. In this context, Japan, as a leading environmentally advanced nation that is a model for other countries, will take the role of leading the world with respect to the global warming issue.

1. Steady Achievement of the 6 percent Reduction Commitment under the Kyoto Protocol

Japan is promoting the measures necessary to achieve its commitment under the Kyoto Protocol to reduce its total greenhouse gas emissions by 6 percent from the level of the base year in the first commitment period (2008-2012).

There are already only three years remaining until the commencement of the first Kyoto Protocol commitment period. The slower Japan is to take countermeasures, the more it will have to formulate measures to achieve large reductions over a short period in order to achieve the 6 percent reduction commitment. Thus, Japan intends to steadily reduce emissions by promptly implementing the countermeasures and policies that are feasible to be introduced at the present stage.

2. Further Long-term and Continuous Reduction of Greenhouse Gas Emissions on a Global Scale

Achievement of the reduction commitments of developed countries stipulated in the Kyoto Protocol is a significant step toward achieving the ultimate objective of the Framework Convention on Climate Change: stabilization of the atmospheric concentration of greenhouse gases. Japan will work to achieve its 6 percent reduction commitment under the Kyoto Protocol and will further take the lead on long-term and continuous reduction of emissions.

From this perspective, Japan will position countermeasures and policies to achieve the 6 percent reduction

commitment among its medium- and long-term measures, and will aim to build a society which incorporates reduction of greenhouse gas emissions while ensuring the consistency of efforts to achieve the Kyoto Protocol commitment and medium- and long-term measures. Through this process, Japan will aim to develop a vigorous and sustainable socioeconomy and advance the development and dissemination of technology for medium and long-term global warming countermeasures, the development of social infrastructures, etc.

Furthermore, because the causes and impacts of global warming are on a global scale, Japan will continue efforts to ensure international collaboration on global warming countermeasures.

3.2.2 Basic Philosophy of Global Warming Countermeasures

The emission of greenhouse gases is closely related to economic activities and the lives of the citizens. Therefore, Japan will boldly implement global warming countermeasures founded on the basic philosophy of "compatibility between the environment and the economy."

Aiming to be an environmental nation that leads the world, Japan will promote technological innovation, encourage the participation and collaboration of central and local governments, corporations and citizens, ensure the transparency necessary to achieve it, and share information.

Japan will promote countermeasures utilizing diverse policy instruments and steadily achieve the 6 percent reduction commitment by carrying out quantitative evaluations and reviews of countermeasures. Japan will also ensure international collaboration on global warming countermeasures.

1. Compatibility between the Environment and the Economy

In order for efforts to achieve the 6 percent reduction commitment under the Kyoto Protocol to also lead to Japan's economic revitalization, employment creation, etc., Japan will take full advantage of technological innovation and its originality and ingenuity to develop and build mechanisms that contribute to compatibility between the environment and the economy.

Specifically, to realize sound economic development with a small environmental burden and a high quality of life for the citizens while at the same time reducing the emission of greenhouse gases, Japan will develop and disseminate energy-conserving equipment, improve the efficiency of energy use, further accelerate technology development, and raise environmental awareness. In addition, Japan will boldly implement global warming countermeasures which entail wide-ranging transformations to socioeconomic systems.

2. Promotion of Technological Innovation

In order to achieve the Kyoto Protocol commitment and also the long-term and continuous reduction of emissions with a view to becoming a "society that exits from inducing global warming," ultimately it is

necessary to reduce our dependency on fossil fuels.

In order to work toward compatibility between the environment and the economy and achieve these targets, Japan will accelerate technological innovations such as energy conservation, utilization of unused energy, etc., work to disseminate efficient equipment and cutting-edge systems, and aim to be an environmental nation which leads the world.

3. Promotion of the Participation and Collaboration of all Stakeholders and Ensuring of Transparency and Sharing of Information to that End

The global warming issue is deeply involved with all aspects of socioeconomic activities and the lives of the citizens, so it is necessary for all stakeholders including central and local governments, corporations, and citizens to participate and collaborate in efforts on this issue.

For this reason, the Government of Japan will promote the active participation of all stakeholders in countermeasures and policies, and strengthen collaboration between each stakeholder by actively providing and sharing information concerning the progress of global warming countermeasures.

The Government of Japan will actively provide and share, in as visible a manner as possible, knowledge about the increasingly serious global warming issue, the specific actions for which enormous efforts are needed in order to achieve the 6 percent reduction commitment, and information about what each individual must do, as well as carry out public relations and dissemination activities on these topics in order to improve the awareness of households and businesses and rouse them to take action.

4. Utilization of Diverse Policy Instruments

In order to meticulously take into account the conditions in each sector, realize the potential for emissions reductions as much as possible, fully mobilize all types of policy instruments, and work toward effective and efficient limitation, etc. of greenhouse gases, the Government of Japan will consider the fairness of the cost burden on each stakeholder and will effectively utilize diverse policy instruments, such as voluntary methods, restrictive methods, economic methods, informational methods, etc., while taking advantage of their special characteristics.

Furthermore, in order to ensure wide-ranging emission limitation effects, the Government of Japan will place importance on incentive policies utilizing economic methods which encourage technology development which overcomes cost constraints and the introduction of countermeasures.

5. Placing of Importance on the Evaluation and Review Process (PDCA)

In fiscal 2007, the year before the commencement of the first commitment period, the Government of Japan will comprehensively evaluate the progress of countermeasures and policies stipulated in the Kyoto Protocol Target Achievement Plan and the level of emissions, etc. and will implement the necessary

countermeasures and policies for the first commitment period from fiscal 2008.

Furthermore, in order to constantly assess the effectiveness of the Kyoto Protocol Target Achievement Plan and make it reliable, the Government of Japan will strengthen the policies as necessary by checking each year after implementation of the plan, with reference to the evaluation indicators of the measure, the progress, etc. of policies formulated by the government for each countermeasure.

The fiscal 2007 comprehensive evaluation and review must evaluate the preconditions at the time the Kyoto Protocol Target Achievement Plan was formulated, the projected greenhouse gas emissions, countermeasures and policies, etc., and carry out a comprehensive review.

For this reason, the Kyoto Protocol Target Achievement Plan clearly specifies targets for greenhouse gases and in other categories, individual countermeasures and their evaluation indicators, the expected extent of greenhouse gas emissions reduction, the roles and measures to be taken by each stakeholder for the countermeasures, and the policies of the central and local governments.

6. Ensuring of International Collaboration on Global Warming Countermeasures

Since the causes and impacts of global warming are on a global scale, it is essential for all countries to endeavor to reduce greenhouse gases in order to ensure the effectiveness of the global warming countermeasures. Not only efforts by each country but also further efforts through international coordination are indispensable. For this reason, Japan will unceasingly continue to put in its utmost efforts to make it possible for common rules to be built that will be participated in by all countries, including the United States and developing countries.

Moreover, carbon dioxide emissions are projected to rapidly increase as a result of future increases in the world population and economic development. Therefore, Japan, which has outstanding technological capabilities and has accumulated a lot of experience in environmental conservation, will take a leading role in the world’s efforts to combat global warming through international cooperation.

3.3 Countermeasures and Policies to Achieve the Targets

3.3.1 Basic Roles of Central and Local Governments, Corporations, and Citizens

The central government has the role of comprehensively promoting global warming countermeasures and implementing measures undertaken on its own initiative. Local governments, corporations, and citizens are expected to undertake roles appropriate for their respective positions.

Concerning the promotion of global warming countermeasures, the central government is to have the following basic role and local governments, corporations and citizens are expected to undertake the following roles.

If all the stakeholders are aware of their roles and closely collaborate with each other to promote the countermeasures, it is expected that synergistic results exceeding those of efforts by each stakeholder alone can be obtained.

1. Basic Role of the Central Government

(1) Comprehensive Promotion of Global Warming Countermeasures that Mobilize Diverse Policy Instruments

Taking into account the fact that in order to reduce the emission of greenhouse gases, etc. it is essential to reconsider socioeconomic activities and lifestyles that involve large volumes of production, consumption and waste, the central government has the role of forming the overall framework of Japan's global warming countermeasures and comprehensively implementing global warming countermeasures through promotion of the Kyoto Protocol Target Achievement Plan. Furthermore, all central government agencies are to promote the countermeasures by sufficiently collaborating in line with the overall framework and mobilizing diverse policy instruments including the utilization of measures such as voluntary methods, restrictive methods, economic methods, informational methods, environmental impact evaluation, development of social capital, etc.

In addition, when implementing policies for which the major objective is not prevention of global warming, all central government agencies are to design the policies so that they contribute to the limitation, etc. of the emission of greenhouse gases.

(2) Implementation of Measures Undertaken on the Central Government's Own Initiative

The central government shall take the lead in implementing measures to reduce the emission of greenhouse gases and to conserve and strengthen the removal effect for its own administration and projects while placing importance on dissemination and promotion of measures to society as a whole.

2. Basic Role of Local Governments

(1) Implementation of Countermeasures Tailored to the Characteristics of the Regions

Local governments shall endeavor to formulate and implement comprehensive and well-planned policies tailored to the natural and social conditions in their area to reduce the emission of greenhouse gases, etc.

For example, local governments will develop pioneering, highly original, and ingenious countermeasures tailored to the natural and social conditions in their regions including CO_2-saving[1] town planning, promotion of the use of public transport systems and bicycles, and the introduction of new forms of energy including biomass energy, etc.

(2) Implementation of Measures Undertaken on the Initiative of Local Governments

Local governments themselves are expected to be a model for the regions by carrying out measures on their own initiative. To this end they will formulate and implement a plan of action for their administration and projects based on the Law Concerning the Promotion of Measures to Cope with Global Warming.

(3) Information Provision and Activities Promotion for Local Residents, etc.

When prefectural centers for the promotion of activities to stop global warming, volunteers to promote activities to mitigate global warming, and global warming countermeasures regional councils have been designated, commissioned, and organized, local governments shall endeavor to utilize them to provide education and support for private organizations, introduce pioneering measures, and provide advice.

3. Basic Role of Corporations

(1) Highly Original and Ingenious Measures

Each corporation shall utilize its originality and ingenuity in order to autonomously and actively implement appropriate, effective and efficient global warming countermeasures in a wide range of sectors based on the nature of its business activities, etc. Each corporation shall promote measures contributing to the limitation, etc. of the emission of greenhouse gases of other stakeholders to the extent possible. Such measures include development of CO_2-saving products, reduction of the amount of waste, etc.

(2) Measures Based on the Social Role of Corporations

Corporations are members of society and, individually or in cooperation with others, shall autonomously formulate plans and examine their state of implementation. Furthermore, they shall provide environmental education to employees and collaborate with labor unions, consumer groups and community groups, etc. to work toward the limitation, etc. of greenhouse gases. In addition, they shall cooperate with the policies of

[1] In the Kyoto Protocol Target Achievement Plan, CO2-saving refers to the limitation and reduction of carbon dioxide emissions through countermeasures on the energy demand side, such as promotion of energy conservation, etc. or countermeasures on the energy supply side such as promotion of nuclear power,

central and local governments.

(3) Reduction of the Environmental Burden through the Life Cycle when Providing Products and Services

Corporations providing final-consumption products shall monitor greenhouse gas emissions, etc. throughout the life cycle of products and services, and provide products and services that contribute to the reduction of these environmental burdens. Moreover, they shall provide information concerning the reduction of greenhouse gases through their products and services.

4. The Basic Role of Citizens

(1) Limitation of the Emission of Greenhouse Gases in Daily Life

Citizens need to be aware that the increase in greenhouse gas emissions in recent years is closely related to the lives of the citizens, namely households and transport (passenger cars for personal use), and must actively work toward reforming lifestyles that involve large volumes of consumption and waste.

Specifically, citizens should monitor their own energy consumption and greenhouse gas emissions, and choose a CO_2-saving lifestyle. For example they should install heat insulation in their homes, switch to energy-conserving equipment, promote the use of public transport systems and bicycles, etc.

Citizens should also carry out meticulous measures such as using standby electric power and adopting other power saving measures, refraining from non-essential automobile use, etc.

(2) Participation in Global Warming Countermeasures Activities

Citizens should further deepen their understanding of the global warming issue and implement measures in collaboration with all stakeholders, such as endeavoring to actively participate in recycling campaigns, forest-building and other tree-planting campaigns, and other global warming countermeasures activities.

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introduction of new forms of energy, etc.

3.3.2 Global Warming Countermeasures and Policies

1. Countermeasures and Policies Concerning Reduction, Removal, etc. of Greenhouse Gas Emissions

(1) Countermeasures and Policies Concerning Reduction of Greenhouse Gas Emissions

1) Energy-originated Carbon Dioxide

The Government of Japan will implement all of the countermeasures and policies based on the following five basic philosophies.

○ Shift from patchwork measures to an integrated approach

The Government of Japan will continue to promote previous countermeasures for individual energy-related equipment and workplaces, and at the same time will rethink Japan's energy supply and demand structure from an integrated, wide-ranging perspective in order to change the structure itself into a CO_2-saving structure. In other words, it will maximize CO_2-saving through such measures as reform of Japan's socioeconomic structure, including the structure of cities and regions and public transport infrastructure, the design of CO_2-saving cities and transport systems, etc.

○ Transcend the individual boundaries of each stakeholder

Each stakeholder involved in energy supply and demand should be appropriately aware of their own role and aim to further improve energy efficiency in collaboration with other suppliers and users of energy, not just within the areas they directly manage, and should work to limit carbon dioxide emissions in as wide a range of sectors as possible. For example, industry could actively contribute to a switch to a CO_2-saving approach in commercial and residential, and transport sectors.

○ Combined supply and demand side approaches placing the priority on demand countermeasures

In order to effectively implement CO_2-saving countermeasures it is necessary to take measures on both the energy supply and demand sides. However, if the countermeasures are to produce results by the first commitment period, first of all, the Government of Japan must place the priority on countermeasures on the energy demand side and set a target for Japan to become a "world's model nation of energy conservation." Although a certain amount of time is required for infrastructure development and reform, the Government of Japan will make every effort to continue steady promotion of energy supply side countermeasures.

○ Approaches placing priority on improvement of basic units

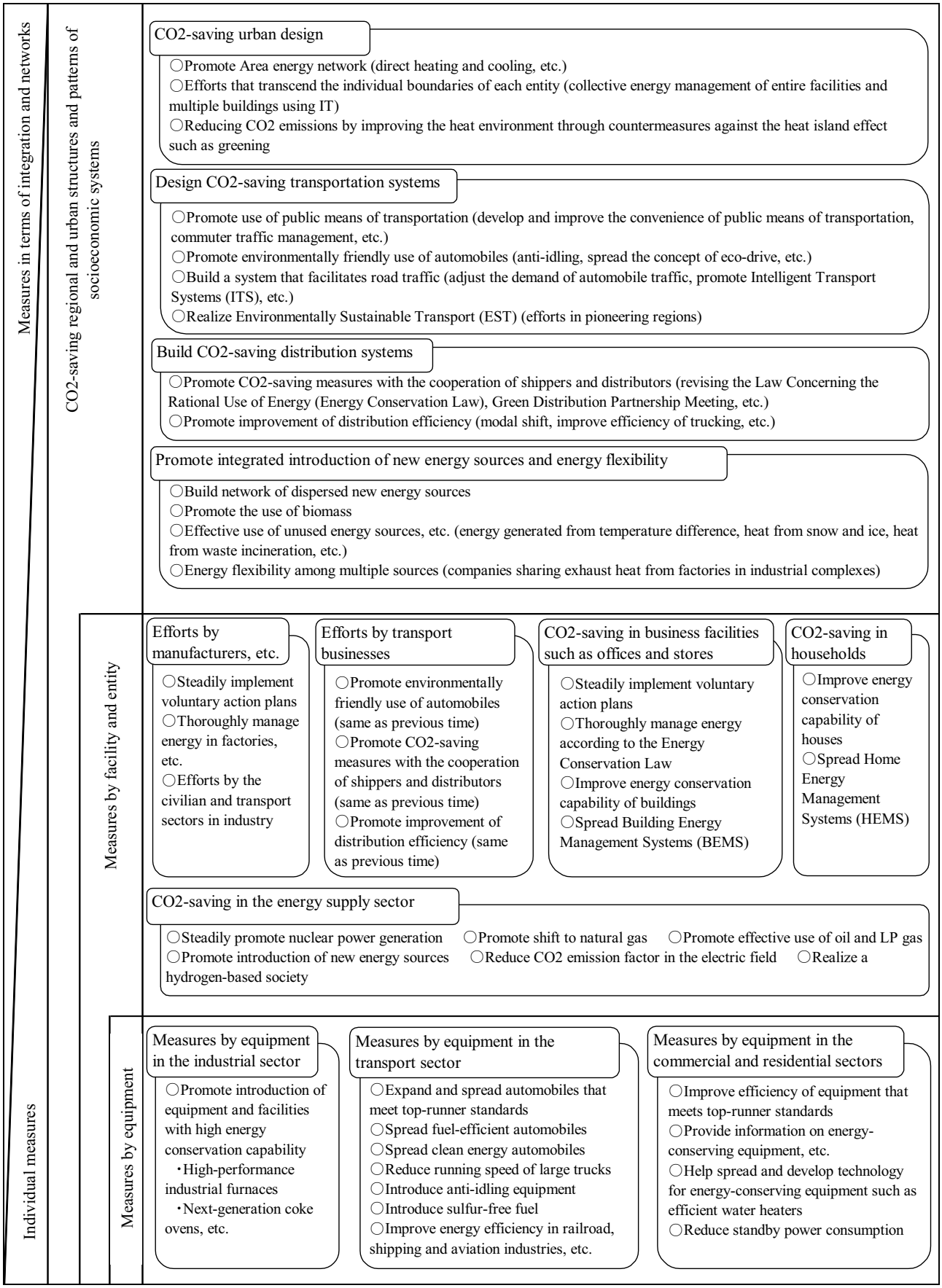
In order to steadily advance CO_2-saving countermeasures, the Government of Japan will place priority on improving the energy consumption basic unit and the carbon dioxide emission per unit of energy consumption basic unit by increasing the efficiency of energy use.
Specifically, it will work on the autonomous action plans of industry, the utilization of a framework such as the Energy Conservation Law, the Top-runner Program, the dissemination of energy-conserving equipment and automobiles, the introduction of architectural structures and homes with high energy efficiency, traffic flow countermeasures and measures to make distribution more efficient, the mutual energy interchange at the regional level, etc.

In order to improve the carbon dioxide emission basic unit in the energy supply sector, the Government of Japan will steadily advance promotion of nuclear power and the introduction of new forms of energy, etc.

○ Effective measures to respond to the factors behind increases in emissions

Looking at carbon dioxide emissions trends by sector, although emissions from the industrial sector, which accounts for approximately 40 percent of emissions on the demand side, and from the transport (trucks and public transport systems, etc.) sector, which accounts for approximately 10 percent, did not show much change, emissions greatly increased from the commercial and other sector (offices and other business facilities), which account for approximately 20 percent, the residential sector, which accounts for approximately 10 percent, and the transport (passenger cars for personal use) sector, which accounts for approximately 10 percent. For this reason, the Government of Japan will steadily promote countermeasures in the industrial sector and the transport (trucks and public transport systems, etc.) sector and will place priority on formulating effective countermeasures in the commercial and other sector (offices and other business facilities), the residential sector and the transport (passenger cars for personal use) sector.

Table 3.1 Overview of Measures Concerning Energy-originated Carbon Dioxide Sources



A. Forming CO_2-saving Regional and Urban Structures and Socioeconomic Systems

Through sweeping reviews of regional and urban structures and transport systems, and reviews of socioeconomic systems through collaboration, etc. among energy consumption entities, structural incorporation of efficient energy use has a profound impact.

Therefore, the Government of Japan will work toward building a "society that exits from inducing global warming" by commencing the transformation of regional and urban structures and socioeconomic systems from a medium- and long-term perspective at the earliest possible time.

In particular, the form of cities has a big impact on global warming and so, while taking into account the aims of the Urban Renaissance Project, the Government of Japan will promote sweeping and structural countermeasures with urban renaissance as a turning point.

Furthermore, the Government of Japan will formulate and improve policies taking into account regional voices through special zones for structural reform and the process of calling for public submissions concerning revitalization of the regions.

a. CO_2-saving Urban Design

As improving energy use efficiency in urban areas with highly concentrated energy demand is very effective, the Government of Japan will improve the energy environment of cities and promote the creation of CO_2-saving regions through the integrated use of energy, heat island countermeasures, etc.

○ Promotion of the Integrated Use of Energy

Efficient, integrated use of energy includes the supply of efficient energy to multiple facilities and buildings, energy interchange between facilities and buildings, utilization of unused energy, etc. and can be expected to produce large CO_2-saving benefits in regions. The Government of Japan will therefore actively introduce and disseminate environmentally outstanding region-wide air conditioning, etc. while keeping in mind the characteristics of each region, the promoting entity, feasibility, etc.

For this reason, the Government of Japan will implement policies such as those indicating regions in which integrated use is feasible, implementing pioneering model projects, utilizing the city planning system, and reviewing the operation of the Heat Supply Business Law to encourage energy conservation awareness in users. This will be done with a view to promoting collaboration among a wide range of stakeholders including central and local governments, energy supply corporations, regional development corporations, etc., the selection by the regions of efficient energy based on evaluations from the perspectives of the global environment, city environment, etc., and on the consumer side improving the understanding and promoting the cooperation of users of architectural structures, etc.

○ Measures Transcending the Individual Boundaries of Each Entity

In order to promote CO_2-saving in general buildings such as buildings and housing complexes, etc., the Government of Japan will take more vigorous measures transcending the individual boundaries of each entity involved, namely, building owners, tenants and energy supply corporations.

For this reason, the Government of Japan will utilize IT to promote measures such as energy management

for entire facilities and collective management of energy for multiple architectural structures.

○ Promotion of CO_2-saving by Improving the Thermal Environment through Urban Greening and Other Heat Island Countermeasures

The Government of Japan will promote CO_2-saving through improvements to the thermal environment of cities by utilizing the knowledge obtained from scientific observations, studies and research concerning the heat island phenomenon to implement comprehensive heat island-related policies.

To this end, the Government of Japan will work to reduce the amount of heat artificially emitted from air conditioning units, automobiles, etc. by promoting highly efficient energy consuming equipments, etc. and promoting the use of unused energy, etc. In addition, it will improve city lifestyles and working styles in order to alleviate the heat island phenomenon, for example, by adjusting the temperature of cooling and heating units to more appropriate levels, etc.

As a larger proportion of the earth's surface is covered by artificial materials, the evapotranspiration effect is declining and the surface temperature is increasing. From the perspective of preventing this and improving the situation, the Government of Japan will take measures to improve the coverage of land throughout the cities, including ensuring green areas through the creation of urban parks, etc., greening of public spaces and at facilities including public offices, etc., greening in the premises of architectural structures through utilization of the greening region system, etc., utilization of spring water, reclaimed wastewater, etc., utilization of road paving materials that are very effective in reducing road surface temperatures, conservation of agricultural land, etc.

In addition, with a view to forming and utilizing green islands that are sources of cold air and ensuring passages for wind from green areas and water surfaces, etc., the Government of Japan will improve the form of cities by conserving the green areas remaining in cities, creating urban parks, and promoting the formation of a water and greenery network through collaboration among projects such as parks, roads, rivers, *sabo* (erosion and sediment control), ports, sewage systems, etc., and promoting the building of cities with a small environmental burden.

b. Design of CO_2-saving Transportation Systems

In order to increase the efficiency of transportation systems, etc., the Government of Japan will not only implement measures for automobiles; it will also implement comprehensive countermeasures including the development of traffic safety facilities such as traffic signals, etc., introducing Transportation Demand Management (TDM) and promotion of the use of public transport systems, etc.

○ Promotion of the Use of Public Transportation

The Government of Japan will make ongoing efforts to develop public transportation systems such as new railway lines, medium-capacity transit systems[2], Light Rail Transit (LRT)[3], etc., promote informatization

[2] These are iron tracks of new transport systems, etc. with a carrying capacity midway between that of

through the introduction of IC cards, etc., improve transit, and improve service and convenience through park and ride schemes, etc. and will also promote measures toward the realization of seamless public transport.

In addition, the Government of Japan will promote independent measures such as commuter transit management by corporations collaborating with the above policies and the implementation of car sharing using low-emission vehicles, etc. and will use enlightenment activities for citizens to promote a move away from passenger cars for personal use in passenger transport and a switch to public transport systems such as railways, buses, etc. Furthermore, in order to promote these kinds of independent measures by businesses, the Government of Japan will launch councils at the nationwide level and regional level made up of people from transport corporations, the business world, etc., and advance specific measures.

○ Promotion of Environmentally-friendly Use of Automobiles

The Government of Japan will disseminate and promote eco-drive, which includes anti-idling of stationary vehicles, and driving at a safe and constant speed appropriate for the traffic conditions, etc.

To this end, the Government of Japan will raise the awareness of citizens through public relations activities, etc. led by the Eco-drive Dissemination Liaison Meeting of four related government ministries and agencies[4], and develop the environment for the dissemination of eco-drive.

In order to promote eco-drive with business use automobiles, etc., the Government of Japan will build and disseminate Eco-drive Management Systems (EMS)[5] for transportation companies, etc.

In addition, the Government of Japan will continue to provide support, etc. for the introduction of anti-idling equipment, and develop the environment by encouraging automakers, etc. to increase the number of models fitted with such equipment and make efforts to promote sales of those models, etc. Furthermore, the central and local governments will take the lead in introducing this equipment.

○ Building of a System to Realize Smooth Road Traffic

As improving traveling speeds by smoothing the traffic flow improves effective fuel consumption and reduces carbon dioxide emissions from automobiles, the Government of Japan will promote the development of trunk road networks such as ring roads, etc., the construction of continuous flow intersections using an overpass or underpass, improvements of railroad crossings through construction of successive two-level crossing, etc., and implement traffic flow measures including management of the demand for automobile traffic, promotion of Intelligent Transport Systems (ITS) and provision of traffic

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railways and buses.

[3] Next-generation tram system which is friendly to people and the environment and has the characteristics of being easy to geton and off, and being outstanding with respect to punctuality, speed, carrying capacity, comfort, etc., achieved through improvements in the running space and vehicle performance.

[4] The National Police Agency, the Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure and Transport, and the Ministry of the Environment.

[5] Measures to implement well-planned and continuous eco-drive of automobiles and evaluate and provide guidance in an integrated manner.

information and measures to promote proper parking on roads, reduction of road constructions, and development of traffic safety facilities.

○ Realization of Environmentally Sustainable Transport (EST)

To limit excessive dependence on passenger cars for personal use which is a major cause of increases in carbon dioxide emissions in the passenger sector, and to realize Environmentally Sustainable Transport (EST), the Government of Japan will recruit pioneering regions aiming to promote EST, and take measures focused on support for promotion of the use of public transport systems, measures to improve traffic flow, promotion of the introduction of low-emission vehicles, and dissemination and enlightenment, etc. Related ministries and agencies will collaborate to strengthen policies for specific ambitious measures tailored to the characteristics of the regions.

c. Building of CO_2-saving Distribution Systems

In order to promote the greening[6] of the overall distribution system, the Government of Japan will strengthen and expand measures based on cooperative efforts among shippers and distributors and will promote modal shifts[7], greater efficiency in trucking, etc.

○ Promotion of CO_2-saving through the Cooperative Efforts of Shippers and Distributors

The Government of Japan will promote the greening of the entire distribution system by strengthening collaboration between shippers who request delivery and distributors who undertake delivery, and by expanding measures related to global warming countermeasures.

For this reason, the Government of Japan will provide support to advanced model projects in which shippers and distributors collaborate on modal shifts and greater efficiency of trucking through the Green Distribution Partnership Meeting[8]. In order to facilitate collaboration between shippers and distributors, the government will formulate integrated methods (guidelines) for the calculation of carbon dioxide emissions in the distribution sector that can be utilized jointly by both parties to enable them to objectively evaluate the effects of each measure.

In addition, the Government of Japan has established the Law Concerning the Promotion of the Integration and Efficiency of Distribution Operations and is supporting integrated and efficient implementation of transportation, storage, distribution processing and other distribution operations through the introduction of

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[6] This refers to building a distribution system which imposes a smaller burden on the environment through modal shifts, improving efficiency of trucking, the integration and improved efficiency of distribution operations, improving the low-emission of transportation systems, etc.

[7] "Modal shift" means a change (shift) in transportation system (mode) through utilization of railway freight transport and domestic shipping, which is the mass transit systems with a small environmental burden, for freight transport.

[8] The Green Distribution Partnership Meeting is an organization established to promote autonomous measures by industry toward the greening of distribution, and consisting of shipping businesses, distribution businesses, the government, and the concerned member businesses and groups. It is operated through cooperation with the Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure and Transport, and concerned groups.

3rd Party Logistics (3PL)[9] projects, a switch to joint transportation and delivery, utilization of IT, etc.

In combination with this, the Government of Japan has amended the Energy Conservation Law and has introduced countermeasures in the transport sector which include imposing an obligation on freight transport businesses, passenger transportation businesses and shippers above a certain size to formulate an energy conservation plan and report the amount of energy used, etc.

○ Promotion of Greater Efficiency in Distribution through Modal Shifts, Improving Efficiency of Trucking, etc.

In order to promote the greening of the entire distribution system, the Government of Japan will promote a switch of transportation from trucking to using domestic shipping and railways which produces low carbon dioxide emissions.

As a part of these efforts, in order to increase the competitiveness of domestic shipping, which is essential to this approach, the Government of Japan will cut transportation costs and improve services through the development of domestic trade terminals able to handle combined multimodal transportation, and develop and disseminate new technologies with good energy efficiency, such as next generation domestic vessels (super eco-ships), etc., and review regulations, etc. Furthermore, the government will make efforts to electrify and improve the efficiency of cargo-handling equipment, etc. in port terminals, which are centers of distribution, for example, by studying the development of land-based facilities for supplying electricity to ships in port, etc.

In the same way, in order to increase the competitiveness of railway freight transport, the Government of Japan will improve the convenience of freight railways by expanding and enhancing transportation capabilities and reducing the costs of terminal transportation, etc. through expansion of the carrying capacity of railway transportation, development of better train schedules, and enhancement of transportation equipment and materials such as containers, etc.

The Government of Japan will also promote greater efficiency in trucking. To this end, it will promote a switch from trucks for personal use to business use trucks and the use of bigger trucks with more trailers, and will advance the development of roads able to handle the bigger vehicles. In combination with this, it will improve loading efficiency through elimination of congested transportation, and ensure back-hauling, etc.

In addition, the Government of Japan will promote the development of international marine container terminals, the development of multipurpose international terminals, and the development of infrastructure that deepens collaboration among each mode, etc. in core and hub international ports that contribute to reducing the over-land transportation distances of international freight.

[9] 3PL is a high-quality service which consistently undertakes distribution from shippers.

d. Promotion of Integrated Introduction of New Energy and Energy Interchange

The Government of Japan will aim at CO_2-saving in the regions as a whole through the efficient utilization of distinctive energy resources, such as biomass resources and unused energy sources, etc., for local production.

○ Building of a Network of Dispersed New Energy Sources

In order to introduce new energy sources, the Government of Japan will combine multiple dispersed power sources such as wind power, biomass, photovoltaic power generation, cogeneration systems (systems with high energy efficiency), fuel cells, etc. with IT control units, etc. to create a network, and introduce small-scale systems (micro-grids) designed for efficient energy use taking into account technological challenges, etc. related to connection to the existing network. Through this approach, the government will promote the introduction of new energy sources, etc. in the regions as a whole and realize CO_2-saving energy systems. To this end, the Government of Japan will implement leading model projects and will advance the development and demonstration, etc. of technology.

○ Promotion of the Use of Biomass

In order to build biomass towns possessing systems that efficiently and comprehensively utilize the various biomass resources with which the regions are endowed for thermal and electric power, fuel, materials, etc., the Government of Japan will provide information and promote regional activities, while at the same time developing facilities for utilization of biomass resources and technology for conversion, use, etc. of biomass energy.

○ Effective Use of Unused Energy Sources, etc.

The Government of Japan will provide an efficient energy supply in the regions by taking full advantage of the characteristics of the regions to promote the use of unused energy sources (energy using the differences in temperature such as sea water and sewage, heat from snow and ice, etc.) and the use of heat from waste incineration, etc.

○ Energy Interchange Among Multiple Entities

In order to promote energy interchange through the collaboration of multiple entities, including the interchange among businesses of factory exhaust heat in areas with a high concentration of industry, such as industrial complexes, etc., the Government of Japan will develop an environment that encourages collaboration among entities and will provide support to collaborative projects with large energy conservation effects.

B. Measures by Facility and Entity

Each entity that consumes energy, including businesses, individuals, etc. will take various measures aimed at limiting the overall levels of carbon dioxide emitted in relation to their own activities.

In doing so, each entity shall be appropriately aware of its own responsibilities and role, and the measures it can take. Power-consuming entities can contribute to the limitation of carbon dioxide emissions in a wide range of sectors. Such measures include measures for the commercial and residential, and transport sectors by manufacturers and the provision of information to consumers by retailers, etc.

Furthermore, in the energy supply sector as well, energy-consuming entities will utilize energy sources with a small carbon dioxide emission basic unit and improve the efficiency of supply.

a. Efforts in the Industrial Sector (Manufacturers, etc.)

Carbon dioxide emissions in the industrial sector were 1.7 percent lower in fiscal 2002 than in fiscal 1990 and *Keidanren* Voluntary Action Plan on the Environment and other countermeasures will continue to be steadily promoted. In combination with this, businesses in this sector will contribute to CO_2-saving in the commercial and residential, and transport sectors.

○ Steady Implementation of *Keidanren* Voluntary Action Plans on the Environment

In the industrial and energy industries sectors, in 1997 the *Keidanren* took the lead in formulating *Keidanren* Voluntary Action Plans on the Environment, and established the target of limiting carbon dioxide emissions in fiscal 2010 to under ±0 percent of fiscal 1990 levels. To date 34 industries have formulated voluntary action plans on the environment establishing quantitative targets for each industrial classification. These action plans now cover approximately 80 percent of the industrial and energy industries sectors.

* Each industrial classification voluntarily decides which of four indicators—energy basic unit, energy consumption, carbon dioxide emission basic unit, carbon dioxide emissions—it will select as targets of the voluntary action plan for their own industrial classification.

These voluntary action plans by businesses have currently produced results and are occupying a central role in countermeasures in the industrial and energy industries sectors. The advantages of these voluntary methods include the ability of each entity to use its originality and ingenuity to select outstanding countermeasures, the likelihood of incentives to attempt to reach more difficult targets, and having no procedural costs for both the government and the implementing entity. It is expected that these advantages will be further exploited in voluntary action plans by businesses.

In order for Japan to achieve its reduction commitment under the Kyoto Protocol, it is extremely important for industry to advance efforts to limit emissions, including efforts to improve the energy consumption basic unit and the carbon dioxide emission basic unit, so that these targets of voluntary action plans in the industrial and energy industries sectors are achieved. Therefore, concerning the targets and content of

voluntary action plans of industry, while taking into account the fact that the voluntary nature of the plans must be respected, it is also important that they meet social demands and fully achieve *Keidanren* voluntary action plan targets, that individual industrial classifications are encouraged to make active efforts toward achievement of their own voluntary targets, and that the transparency, reliability, and probability of achieving the targets is improved. The Government of Japan will thus continue to regularly conduct follow-ups in related councils, etc.

It is expected that businesses that have not yet formulated such voluntary action plans will formulate one and take effective CO_2-saving countermeasures tailored to their own special characteristics.

○ Thorough Management of Energy in Factories, etc.

In addition to the above voluntary measures, measures are being taken in the industrial sector to strengthen the voluntary management of energy through measures based on the Energy Conservation Law.

In order to encourage more thorough and meticulous voluntary management of energy in future, it is necessary to amend the Energy Conservation Law and adopt comprehensive energy conservation countermeasures for both heat and electricity.

○ Measures by Industry in the Commercial and Residential, and Transport Sectors

Industry will contribute to CO_2-saving in the commercial and residential, and transport sectors through the development of lighter and more functional materials, etc., providing products that are highly energy-efficient and have greater efficiency in distribution by moving away from personal use trucks to business use trucks and modal shifts, etc. It will also contribute to CO_2-saving in those sectors through promotion of the use of public transport systems, etc. for the daily commute of company employees.

In particular, in order to strengthen measures in the transport sector, the Government of Japan will amend the Energy Conservation Law and introduce countermeasures in the transport sector which include imposing an obligation on shippers above a certain size to formulate an energy conservation plan and report the amount of energy used, etc.

b. Efforts by Transport Businesses

Carbon dioxide emissions in the transport sector have increased by approximately 20 percent over fiscal 1990 levels, but in recent years emissions from the transport (trucks and public transport systems, etc.) sector have been on a declining trend. In order to make this a steadier trend, the Government of Japan will promote the greening of transportation. For example, it will promote the limitation of carbon dioxide emissions through cooperative efforts by shippers and distributors, etc.

Furthermore, the Government of Japan will promote the dissemination of the Green Management Certification System which certifies transport businesses implementing certain levels of outstanding environmental measures, such as measures to improve fuel consumption, etc.

In addition, the Government of Japan will improve the efficiency of operation of business use automobiles by promoting the introduction of systems making the efficient dispatch and operation of taxis, etc. possible through utilization of information technology such as GPS, etc.

○ Promotion of Environmentally-friendly Use of Automobiles (Same as last time)

○ Promotion of CO_2-saving Through the Cooperative Efforts of Shippers and Distributors (Same as last time)

○ Promotion of Greater Efficiency in Distribution through Modal Shifts, Improving Efficiency of Trucking, etc. (Same as last time)

c. CO_2-saving in Business Facilities such as Offices and Stores, etc.

Carbon dioxide emissions in the commercial sector of offices, etc. (including members of the service industry such as stores, etc.) have increased by approximately 40 percent over fiscal 1990 levels along with the increase in floor area. The Government of Japan will limit these emissions through steady implementation of energy management and voluntary action plans according to the Energy Conservation Law.

○ Steady Implementation of Voluntary Action Plans

Efforts to formulate environmental voluntary action plans on the environment that establish targets for each classification have also been expanded to 10 classifications in the commercial sector, other than the industrial and energy industries sectors. Concerning the targets and content of voluntary action plans, while taking into account the fact that the voluntary nature of businesses must always be respected, it is extremely important to meet social demands and to improve the transparency, reliability, and probability of achievement of targets, so it is necessary to regularly conduct follow-ups in related councils, etc.

In classifications in commercial sector that have not yet formulated environmental voluntary action plans, such as private hospitals, private schools, etc., it is expected that voluntary action plans will be formulated, and effective CO_2-saving countermeasures tailored to the characteristics of each sector will be taken.

○ Thorough Management of Energy According to the Energy Conservation Law

In order to encourage energy management in office buildings and other buildings with high energy consumption, the regulations of the Energy Conservation Law were strengthened in April 2003 and an obligation was imposed on such buildings to make a regular report and formulate a medium- and long-term plan for energy use.

In future, in order to further encourage energy management, it will be necessary to amend the Energy Conservation Law and adopt comprehensive energy conservation countermeasures for both heat and electricity.

In order to ensure further measures in offices, etc., comprehensive examinations, etc. by the central

government will be implemented.

○ Improvement of the Energy Conservation Capability of Buildings

As the energy conservation capability of buildings has a large impact over the long term on carbon dioxide emissions from the commercial and other sector through energy consumption, the Government of Japan will continue to advance energy conservation countermeasures at the time a new building is constructed and in addition promote improvement in energy conservation by improving the energy conservation capability of the existing stock of buildings.

To this end the Government of Japan will amend the Energy Conservation Law and take measures such as imposing an obligation to notify the responsible government agency of the energy conservation measures taken when newly constructing, extending, or reconstructing buildings above a certain size or when carrying out large-scale repairs, etc.

Furthermore, the Government of Japan will provide support through financing, etc., develop and disseminate the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE[10]), promote the provision of information concerning the design, construction, etc. of energy conservation features in buildings such as energy conservation improvement, etc., provide support to model projects aiming at the collaboration of building owners and tenants on energy conservation countermeasures, promote the development of green government buildings[11], promote green assemssments and renovations[12], and carry out thorough and appropriate operation and management of existing government office facilities, etc.[13]

In addition, the Government of Japan will promote the introduction of energy-conserving equipment and facilities utilizing ESCO[14], etc.

○ Spread of Building Energy Management System (BEMS)

In order to spread BEMS, an energy demand management system which utilizes IT to display the state of

[10] CASBEE is a comprehensive environmental capacity assessment system for houses and buildings which gives an overall assessment in a unified manner of the improvement of comfort of houses (indoor environment) and energy conservation countermeasures and other efforts to reduce the environmental burden, etc. in terms of comprehensive environmental capability and presents the results as easy-to-understand indicators.

[11] Green government buildings are government office facilities that aim to reduce the environmental burden throughout the life cycle of a building from planning, construction and operation to abolishment.

[12] Green assessments are diagnostics to assess the environmental efficiency of existing government office facilities. Green renovations aim to reduce the environmental burden throughout the life cycle of a building from therenovation plan to the renovation, operation, and abolishment.

[13] When using heat insulation materials in order to achieve energy conservation in houses and buildings, heat insulation materials containing chlorofluorocarbons tend to increase total greenhouse gas emissions rather than decrease them when the greenhouse effect of the chlorofluorocarbons is taken into account. Thus, it is necessary to promote the use of heat insulation materials that do not contain chlorofluorocarbons.

[14] ESCO stands for Energy Service Company, a type of business that offers a comprehensive energy conservation service.

use of energy in real time and ensures the most appropriate operation of lighting, air conditioning, etc. based on the indoor conditions, the Government of Japan will support its introduction.

d. CO_2-saving in Households

Carbon dioxide emissions in the residential sector have increased by approximately 30 percent over fiscal 1990 levels even though the increase in the number of households is gradually slowing down due to the increase in energy consumption resulting from the increase in the number of household appliances, etc.

For this reason, the Government of Japan will work to improve the energy conservation capability of houses, etc. and will encourage citizens to think of the global warming issue as their own issue, constantly review their lifestyles, and endeavor to take energy conservation countermeasures.

○ Improvement of the Energy Conservation Capability of Houses

The energy conservation capability of houses has a large impact over the long term on the carbon dioxide emissions of the residential sector through energy consumption, so in addition to thorough implementation of energy conservation measures at the time a new building is constructed, the Government of Japan will promote energy conservation renovation work that improves the energy conservation capability of the existing stock of houses.

To this end the Government of Japan will amend the Energy Conservation Law and take measures such as imposing an obligation to notify the responsible government agency of the energy conservation measures taken when newly constructing, extending, or reconstructing houses above a certain size or when carrying out large-scale repairs, etc., the same obligations as for buildings.

Furthermore, the Government of Japan will provide support through financing, etc., develop and disseminate the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) for houses, etc., promote the provision of information concerning energy conservation improvement and building facilities by enhancing energy conservation standards, etc., support the development of leading technology by private businesses, etc., and provide support for the introduction of model houses which combine the introduction of heat insulation materials and the installation of photovoltaic power generation systems, etc.[15]

In addition, in order to encourage the wider use of window glass and sashes with a high energy conservation capability, the Government of Japan will establish a system under which manufacturers, etc. have to state the energy conservation capability of their products on product labels and will thoroughly publicize the energy conservation effects of products utilizing all forms of media.

In addition, the Government of Japan will provide information to the residents of stand-alone houses concerning the advantages of introducing energy-conserving equipment, facilities and building materials tailored to their state of use of energy and will promote the introduction of energy-conserving equipment,

facilities and building materials utilizing leases and ESCO in housing complexes.

○ Spread of Home Energy management System (HEMS)

In order to spread HEMS, an energy demand management system which utilizes IT to display the state of use of energy in real time and ensures the most appropriate operation of lighting, air conditioning, etc. based on the indoor conditions, the Government of Japan will conduct experiments to test the system.

e. CO_2-saving in the Energy Supply Sector

Although a certain amount of time is required for infrastructure development and reform in the energy supply sector, the Government of Japan will commence countermeasures at the earliest possible time, work toward utilization of energy sources with a small carbon dioxide emission basic unit, and improve the efficiency of supply by working toward the environmentally conscious use of fossil fuels while also keeping in mind the stable supply of energy.

○ Steady Promotion of Nuclear Power Generation

Nuclear power does not produce carbon dioxide in the generation process, so it occupies an extremely important position with respect to the promotion of global warming countermeasures. In future, with the assurance of safety as the major premise, the Government of Japan will work toward the further utilization of nuclear power generation and will steadily promote public sector-private sector cooperation for nuclear power generation as a mainstay power source for the nation. When doing so, the Government of Japan will steadily advance the establishment of the domestic nuclear fuel cycle within Japan as the fundamental principle of the country with a view to further improvement in the characteristic features of nuclear power generation such as its outstanding supply stability, etc.

In addition to the 53 plants currently in operation, the Government of Japan is following up on the efforts of the businesses to ensure the three new plants under construction (Tomari Unit 3, Higashidori Unit 1 (Tohoku), Shika Unit 2) will steadily go into operation by fiscal 2010.

The Government of Japan will develop an investment environment in order to ensure investment in nuclear power generation (rules to ensure power transmission capacity which make the operation of long-term and stable nuclear power generation feasible, etc.)

With a view to steady implementation of the nuclear fuel cycle, the Government of Japan will develop laws for the external funding for the spent fuel reprocessing. It will also provide active support to ensure that the reprocessing, the utilization of MOX fuels in LWRs, the high-level radioactive waste final disposal projects, etc. being advanced by businesses are steadily promoted.

The Government of Japan will realize scientific and rational operation and management of nuclear power plants with the assurance of safety as the major premise.

[15] Refer to footnote 22.

○ Promotion of the Introduction of New Energy

As new energy utilizing sunlight, wind power, biomass[16], etc. makes a big contribution to global warming countermeasures and contributes to improvement of the energy self-sufficiency ratio, the Government of Japan will promote its introduction.

* Heat sector
The Government of Japan will take measures including promotion of the formulation, implementation and evaluation of comprehensive plans for the introduction of new energy by local governments, strengthening of the promotion of the use of biomass heat in collaboration with the promotion of the Biomass Nippon Strategy, promotion of the use of solar heat (development with cutting-edge technology using solar heat, etc.), and promotion of the use of heat from waste incineration, etc.

Furthermore, concerning the use of fuel derived from biomass for transportation-use fuel (gasoline and diesel oil), the Government of Japan will respond to challenges related to fuel economy, safety, the impact on the atmospheric environment and stable supply, and continue testing of these types of fuel as well as study the most appropriate methods of introducing them taking into account these challenges in order to facilitate their smooth introduction.

* Power Generation Sector
The Government of Japan will take measures including expanded introduction of new energy in the public services, development of photovoltaic power generation and other technology which promotes the reduction of costs and improved efficiency, carry out smooth coordination of network connection countermeasures for wind power generation and all types of land use regulations, promotion of the introduction of power generation from waste, steady implementation of the Renewables Portfolio Standard (RPS) Law[17], etc.

○ Promotion of a Shift to Natural Gas

Natural gas is a clean form of energy which has a relatively small environmental burden compared to other fossil fuels and the earth is endowed with plentiful supplies of natural gas dispersed widely throughout all its regions, including the Middle East. Therefore, the Government of Japan will promote an acceleration in the shift to natural gas while taking into account the balance with other energy sources such as nuclear power, etc.

* In order to revitalize domestic gas distribution, the Government of Japan will comprehensively promote the development of an environment for the building of a natural gas supply infrastructure by private entities.
* The Government of Japan will advance the fuel conversion of industrial-use boilers, etc. to natural gas, and the conversion of the type of gas of urban gas businesses to natural gas.
* In order to promote the efficient use of natural gas, the Government of Japan will improve the

[16] The carbon dioxide emissions of renewable energy including biomass are not counted under the Framework Convention on Climate Change.
[17] The law requiring Japanese electric power companies to use electricity of new energy sources for a certain percentage of their sales.
(Promulgated in June 2002, came into full force in April 2003.) RPS stands for Renewables Portfolio Standard.

efficiency of gas turbines and gas engines and promote the introduction of highly efficient gas air conditioning that also contributes to natural gas cogeneration and measures for electrical load leveling.
* The Government of Japan will promote the development of technology related to Gas-to-Liquid (GTL)[18], which uses natural gas, etc. as its raw material, Dimethyl ether (DME)[19], and methane hydrate, and advance the introduction of these technologies.

○ Improvement of the Carbon Dioxide Emission Basic Unit in the Electric Power Sector

It is important to reduce the carbon dioxide emission basic unit in the power generation sector, which accounts for a large part of Japan's energy-originated carbon dioxide emissions, and the Government of Japan will take the countermeasures below.

* Follow-up on the achievement of the autonomous targets of the business efforts, etc. listed below.
→ Improvement of the nuclear power plant's capacity factor through realization of scientific and rational operation and management.
→ Further improvement of the heat efficiency of thermal power generation, adjustment of the operational methods of thermal power sources that consider environmental characteristics, etc.
→ Obtaining of credits under the Kyoto Protocol (volume of emissions reduction) through utilization of the Kyoto Mechanisms by businesses.
* Promotion of measures for electrical load leveling that result in CO_2-saving by disseminating and promoting thermal storage systems, etc.
* Steady enforcement of the RPS Law and promotion of the conversion of obsolete coal thermal power generation to natural gas (same as last time).

○ Promotion of the Efficient Use of Petroleum

Petroleum will continue to be an energy source occupying an important position in the primary energy supply in future, and the Government of Japan will use it efficiently while considering the environment.

For this reason, the Government of Japan will disseminate and promote petroleum systems with a smaller environmental burden, such as petroleum cogeneration systems, highly efficient boilers with low NO_X, etc. as energy conservation systems that contribute to CO_2-saving.

○ Promotion of the Efficient Use of LPG

The Government of Japan will promote the use of LPG, which has a relatively low environmental burden and is a clean energy along with natural gas. To this end, the government will promote the highly efficient use of LPG systems such as LPG cogeneration systems, gas engine boilers, etc.

[18] Gas-to-Liquid: new substitute fuels such as diesel oil, etc. are manufactured using synthetic gas made from natural gas, etc.
[19] Dimethyl ether: a fuel gas manufactured using synthetic gas made from natural gas, etc. It has similar properties to liquefied petroleum gas (LPG) and can be liquefied easily. In the wider sense it is one type of GTL product.

○ Realization of a Hydrogen Society

Hydrogen is an energy medium which does not emit carbon dioxide at the use stage and as manufacturing from non-fossil fuels is also possible, it is a desirable secondary energy from the energy security perspective.

For this reason, the Government of Japan will promote technology development of fuel cells and hydrogen manufacturing, key technologies of the hydrogen society, formulate codes and standards, review regulations, etc. and will also promote the leading introduction of the technologies and make efforts to disseminate them.

C. Measures by Equipment

Energy conservation capability for all types of equipment, including refrigerators, air conditioning equipment, equipment related to the supply of hot water, etc., is dramatically improving, but the Government of Japan will work to further improve energy conservation capability in future and will introduce and disseminate a wide range of equipment with a high energy conservation capability.

a. Industrial Sector

○ Introduction and Promotion of Equipment and Facilities with a High Energy Conservation Capability

In addition to the introduction of various kinds of energy-conserving equipment based on the voluntary action plans, in order to promote the dissemination of high capability industrial furnaces, etc. which make a wider range of energy conservation possible than with conventional equipment, the Government of Japan will give priority to measures to support them and will provide support for the introduction of next-generation coke ovens.

Furthermore, the Government of Japan will promote the reduction of CO_2 emissions from the construction works. For example, it will promote the dissemination of fuel-efficient construction machinery by encouraging the use of fuel-efficient construction machinery and actively utilizing such machinery in public construction projects, etc.

b. Transport Sector

(a) Automobile Sector

The majority of energy consumption in the transport sector is accounted for by the automobile sector, so the Government of Japan will promote measures such as further improvements in fuel consumption technology of a world-class standard, and as automobile-based countermeasures the dissemination of automobiles with outstanding fuel efficiency and vehicles with anti-idling equipment installed.

○ Expansion and Dissemination of Models Conforming to Top-runner Standards

Top-runner standards were introduced in fiscal 1998 based on the Energy Conservation Law and the scope of the law has been successively expanded. For example, in fiscal 2003 LPG passenger automobiles became subject to the provisions of the law. As a part of that process, heavy vehicles (trucks with a total body weight exceeding 2.5 tons and passenger automobiles with a passenger capacity of 11 persons or more) also became subject to top-runner standards.

As of fiscal 2003 approximately 80 percent (shipment basis) of gasoline passenger automobiles had already achieved the top-runner standards for gasoline passenger vehicles of fiscal 2010 due to active efforts by major domestic automakers, etc. to achieve the standards ahead of schedule and the effects of the automobile green tax, etc.

Taking this into account, in order to further improve fuel efficiency, the Government of Japan will formulate top-runner standards for new gasoline passenger automobiles after fiscal 2010 taking into account future trends, etc.

○ Dissemination of Automobiles with Outstanding Fuel Efficiency

In addition to models conforming to top-runner standards, in order to promote the dissemination of automobiles with outstanding fuel efficiency, the Government of Japan will take measures such as tax incentives and the utilization of an evaluation and public disclosure system concerning automobile fuel efficiency.

Furthermore, the Government of Japan will advance the building of mechanisms to provide appropriate information concerning energy conservation to retailers, who are the link between manufacturers and consumers.

In addition, diesel automobiles are more fuel-efficient than gasoline automobiles, so in future when clean diesel passenger automobiles possessing emission gas capability no worse than that of gasoline passenger automobiles are developed, the Government of Japan will study the dissemination of those automobiles.

○ Spread of Clean Energy Vehicles (CEV)

In order to promote the dissemination of Clean Energy Vehicles (CEV)[20] that contribute to CO_2-saving, such as hybrid automobiles, natural gas automobiles, etc., the Government of Japan will take support measures including a subsidy system and tax incentives, etc.

○ Limitation of the Traveling Speed of Large Trucks

The Government of Japan will work to achieve CO_2-saving through improved fuel consumption efficiency by imposing an obligation to install speed-limiting device for large trucks and limiting their maximum speed on highways.

○ Promotion of Environmentally-friendly Use of Automobiles (Same as last time: section related to the introduction of anti-idling equipment)

○ Introduction of Sulphur-free Fuel

Taking into account the introduction of sulphur-free (sulphur content of no more than 10ppm) petroleum fuel, the Government of Japan will work to improve fuel consumption efficiency through the most appropriate combination with automobile technology.

[20] Here CEV is a general name for electric automobiles, hybrid automobiles, fuel cell automobiles, natural gas automobiles, methanol automobiles, and automobiles using LP gas instead of diesel fuel.

(b) Railway, Ship and Aviation Sectors

In the railway sector, the Government of Japan has introduced vehicles with good energy efficiency. For example, it has introduced light vehicles and vehicles equipped with VVVF equipment[21]. The government will continue to promote the introduction of these types of vehicles.

In the ship sector, the Government of Japan has worked to construct ro-ro ships[22], container ships, etc. that contribute to modal shifts. In addition to these, in future it will promote the dissemination of ships introducing new technology, such as electrical propulsion ships and ships equipped with electronically-controlled engines[23], etc.

In the aviation sector, the Government of Japan has supported the airline's introduction of new energy-efficient aircraft as a result the targets of the environmental voluntary action plans of the industry and of the government's the Outline for Promotion of Efforts to Prevent Global Warming had already been achieved as of fiscal 2002. The Government will continue to promote the introduction of these energy-efficient aircraft.

c. Commercial and Other Sector, and Residential Sector

Attempts are being made to limit energy consumption in the commercial and other sector, and the residential sector by improving the efficiency of equipment used in households, offices, etc. and disseminating more energy-efficient equipment. The Government of Japan will promote further improvements in the energy efficiency of equipment by aiming for the world's highest standard of energy efficiency.

○ Improvement of Efficiency of Equipment that Meets Top-runner Standards

Top-runner standards were introduced in fiscal 1998 based on the Energy Conservation Law and to date 18 types of equipment have been designated under the Top-runner Program. In order to further improve the efficiency of individual types of equipment in future the Government of Japan will expand the range of products subject to top-runner standards and expand the range of applications, and toughen up the standards for types of equipment already designated.

(Reference: The 18 types of equipment designated under the Top-runner Program)
Air conditioners, fluorescent lights, video cassette recorders, TVs, copy machines, electronic calculators, magnetic disk units, electric refrigerators, electric freezers, space heaters, gas cooking appliances, gas water heaters, oil water heaters, electric toilet seats, vending machines, transformers, passenger vehicles, and freight vehicles

[21] Vehicles equipped with VVVF equipment are vehicles equipped with a mechanism that efficiently controls the revolutions per minute of the motor without using electrical resistance.
[22] "Ro-ro ships" is an abbreviation for roll-on, roll-off ships. These are ships using a freight-handling method in which trailer chasses and vehicles for sale are automatically driven onto and off the ship.
[23] Electronically-controlled engines are diesel engines that optimize combustion by electronically controlling the timing, etc. of initial injection of air into the cylinders, fuel injection, and opening and closing of the air release valve after combustion.

○ Provision of Information Concerning Energy-conserving Equipment, etc.

The Government of Japan will encourage industry to supply equipment that contributes to energy conservation and will sufficiently provide information and methods related to energy conservation to users of energy-conserving equipment.

To this end, in addition to the Energy Conservation Labeling System introduced in fiscal 2000 to enable consumers to easily identify the energy efficiency of equipment, etc., the Government of Japan will disseminate and enhance the System for Evaluation of Businesses Selling Energy-Conserving Products and will promote the purchase and use of products with low energy consumption through dissemination and enlightenment, etc. such as holding Energy-conserving Home Appliances Dissemination Lectures, etc., in order to promote the active sale of energy-conserving products by retailers.

In combination with this, the Government of Japan will amend the Energy Conservation Law to promote the active provision of energy conservation information to consumers by retailers of home appliances, gas appliances, oil appliances, etc. and energy supply businesses.

○ Support for Dissemination and Technological Development of Energy-Conserving Equipment such as Efficient Water Heaters, etc.

In the hot water supply sector, which accounts for approximately 30 percent of energy consumption in households, equipment with particularly outstanding energy conservation capability compared to traditional types of equipment such as CO_2 refrigerant heat pump water heaters, latent heat recovery type water heaters and gas engine water heaters are being developed and commercialized. In order to accelerate the dissemination of these new types of equipment, the Government of Japan will support their introduction, promote their further dissemination by businesses and promote technological developments such as miniaturization of the new types of water heater or facilitating their installation.

Furthermore, recent years have seen the development of highly-efficient commercial-use air conditioners utilizing heat pump technology[24], commercial-use water heaters and low temperature natural refrigerant freezer units that do not use chlorofluorocarbons and are highly energy-efficient, as well as integrated systems combining energy-efficient refrigerators and freezers, and air conditioning for the use of small- and medium-scale retail stores that consume a lot of energy, such as convenience stores. The Government of Japan will work to accelerate the dissemination of these appliances in the commercial-use sector through measures to support their introduction, etc.

In addition, by introducing energy-efficient lighting utilizing light emitting diodes (LEDs) it is possible to achieve major energy conservation compared to traditional incandescent and fluorescent lights, so the Government of Japan will promote technological development toward further improvements in the efficiency of these kinds of lights and work to accelerate their dissemination.

[24] Heat pump technology is technology that exchanges heat between the outside air and the indoor air by condensing and evaporating the refrigerant.

○ Reduction in Standby Power Consumption

In order to reduce standby power consumption, to date the Government of Japan has provided technological development support for voluntary measures by industry. The targets of industry (1W or less: audio components, televisions, air conditioners, etc.; 0W: clothes washing machines, microwave ovens, etc.) are being achieved as per the initial plan, but the Government of Japan will continue to follow up on the voluntary measures of industry.

2) Non-energy-originated Carbon Dioxide

To date the Government of Japan has implemented various measures for promoting the expanded use of blended cement which generates fewer carbon dioxide emissions in the production process, the reduce, reuse and recycle of wastes, the effective use of timber which has a smaller impact on the environment as a reproducible raw material or biomass energy source, the cultivation of green manure on farmland, recycling through composting, the use of biomass plastics, etc., among others.

Emissions of carbon dioxide from industrial processes such as consumption of limestone and manufacturing of ammonia in fiscal 2002 (49 million t-CO_2) were 14.0 percent lower than fiscal 1990 emissions in the same sector. Factors responsible for this reduction include the 16.7 percent reduction in the volume of production of cement in fiscal 2002 compared to fiscal 1990.

Moreover, fiscal 2002 emissions of carbon dioxide resulting from the combustion, etc. of waste (waste oil, waste plastics), which accounts for approximately 2 percent of carbon dioxide total emissions (24 million t-CO_2), were approximately 1.4 times higher than emissions in the same sector in fiscal 1990.

○ Expanded Use of Blended Cement

The Government of Japan will expand the production ratio and use of cement which blends clinker, an intermediate product of cement, with blast-furnace slag, etc.

In addition, the Government of Japan will promote the use of blended cement, for example, by taking the lead in using blended cement in public construction projects carried out by the central government and other entities through promotion of leading use based on the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and other Entities (Law No. 100 of fiscal 2000, hereafter “Green Purchasing Law”).

○ Promotion of Measures to Reduce Carbon Dioxide Emissions Deriving from Waste Incineration

The Government of Japan will promote measures toward the achievement of the waste volume reduction targets based on the Waste Disposal and Public Cleansing Law (Law No. 137 of fiscal 1970, hereafter “Waste Disposal Law”) and the targets determined in the Basic Plan for Establishing the Recycling-based Society (hereafter “Recycling Plan”) approved in a Cabinet Decision in March 2003 under the Basic Law for Establishing the Recycling-based Society (Law No. 110 of fiscal 2000, hereafter “Basic Framework Law”). Specifically, the Government of Japan will promote the reduce, reuse and recycle of wastes, and advance the reduction of carbon dioxide emissions resulting from incineration, by implementing measures based on the individual recycling laws and evaluating and studying them, providing support to projects such as the development of facilities that contribute to global warming countermeasures, and formulating guidelines, etc. for separated garbage collection and a switch to paid garbage collection in municipalities.

3) Methane and Nitrous Oxide

A. Methane

To date the Government of Japan has promoted the reduce, reuse and recycle of wastes, upgraded combustion in waste incineration facilities through such measures as the promotion of the introduction of continuous furnaces, improved management of cultivated fields and improved livestock manure treatment methods, among other measures.

Emissions of methane in fiscal 2002 (20 million t-CO_2) were 21.1 percent lower than in fiscal 1990. A big contributor to this was the reduction of emissions from coal mining.

○ Reduction in Amount of Final Disposal of Waste, etc.

The Government of Japan will promote measures toward the achievement of the waste volume reduction targets based on the Waste Disposal Law and the targets determined in the Recycling Plan under the Basic Framework Law. Specifically, the Government of Japan will promote the reduce, reuse and recycle of wastes, and advance the reduction of methane emissions resulting from direct burial of waste in landfills by implementing measures based on the individual recycling laws and evaluating and studying them, providing support to projects such as the development of facilities that contribute to global warming countermeasures, and formulating guidelines, etc. for separated garbage collection and a switch to paid garbage collection in municipalities. Furthermore, the Government of Japan will promote the upgrading of combustion in general waste incineration facilities.

B. Nitrous Oxide

To date the Government of Japan has promoted measures for emissions reductions in industrial processes and has advanced the upgrading of combustion in incineration facilities for waste, sewage sludge, etc. through the promotion of the introduction of continuous furnaces, etc., along with other efforts.

Emissions of nitrous oxide in fiscal 2002 (35 million t-CO_2) were 11.9 percent lower than in fiscal 1990. The introduction of equipment to decompose nitrous oxide in manufacturing processes in workplaces manufacturing adipic acid, a raw material for some chemical products, largely contributed to this result.

○ Installation of Equipment to Decompose Nitrous Oxide in the Adipic Acid Manufacturing Process

Equipment to decompose nitrous oxide will continue to be introduced to recover and destroy the nitrous oxide that is emitted as a by-product when adipic acid is manufactured.

○ Upgrading Combustion in Sewage Sludge Incineration Facilities

The Government of Japan will reduce the emission of nitrous oxide resulting from incineration of sewage sludge by upgrading the combustion in incineration facilities. To this end, the government will establish standards concerning the upgrading of combustion of sewage sludge and promote the thorough

implementation of these standards.

○ Upgrading Combustion in General Waste Incineration Facilities, etc.

The Government of Japan will advance the upgrading of combustion in general waste incineration facilities by providing support to projects such as the development of facilities that contribute to global warming countermeasures and promoting the installation of incineration facilities with continuous furnaces by broadening waste disposal coverage. The government will also promote the reduce, reuse and recycle of wastes, and advance the reduction of nitrous oxide emissions resulting from waste incineration in order to achieve the waste volume reduction targets based on the Waste Disposal Law and the targets determined in the Recycling Plan under the Basic Framework Law.

4) Three Fluorinated Gases

The three fluorinated gases account for approximately 2.1 percent of total greenhouse gas emissions (fiscal 2002 carbon dioxide equivalent). There are now a number of factors that are increasing the emissions of these gases. For example, it is prospected that HFC emissions will increase as they are substituted for ozone-depleting substances (CFCs and HCFCs are outside the scope of the Kyoto Protocol but these gases also have a strong greenhouse effect) whose production and consumption is being reduced under the Montreal Protocol. The Government of Japan will move to limit the increase in emissions of these gases.

○ Promotion of Planned Efforts Made by Industry

In response to the February 1998 Guidelines for Measures to Limit Emissions of HFCs, etc. by Industry (Ministry of International Trade and Industry notification), as of the present date, voluntary action plans have been formulated by 22 organizations in eight sectors. The Government of Japan will continue to follow up on the progress of the voluntary action plans of industry in the Industrial Structure Council and work to improve the transparency and reliability of the action plans and improve the certainty of target achievement.

Furthermore, the government will take measures to support efforts made by businesses to limit emissions and will urge commercial sectors that have not yet formulated action plans to do so and to publicize them.

○ Promotion of Development, etc. of Substitute Materials and Use of Substitute Products

The Government of Japan will promote the use of new substitute materials for the three fluorinated gases, technologies that do not use the three fluorinated gases, and technologies and products for recovering and destroying the three fluorinated gases.

To this end, the government will carry out research and development of new substitute materials and substitute technologies.

Furthermore, taking into account safety, economy, energy efficiency, etc., the Government of Japan will provide information concerning technology and products using substitute materials and those products using the three fluorinated gases which have a smaller impact on global warming. The government will disseminate these products and technology, and educate the public about them.

In particular, it is expected that measures to improve the energy conservation capability of buildings and houses will result in increased use of heat insulation materials and from the beginning of 2004 the production and import of a major HCFC (HCFC-141b), which was formerly used as a foaming agent, was restricted and this has led most businesses to switch to HFCs. Therefore, as the emissions into the atmosphere of HFCs used as foaming agents in heat insulation materials is prospected to increase, the Government of Japan will formulate policies to limit these emissions, for further promoting the use of foaming and heat insulation materials which do not contain fluorinated gases.

Moreover, as it is prospected that SF_6 emitted when magnesium solutions are made and HFCs emitted as a result of the use of aerosol products using HFCs will increase, the Government of Japan will promote the development of substitute materials and substitute technology in these sectors, disseminate these materials and technology, and educate the public about them.

○ Recovery of HFC Charged as Refrigerant in Equipment in Accordance with Laws, etc.

The Government of Japan will thoroughly implement the recovery and destruction of HFCs in the refrigerant sector through appropriate operation of laws including the Law for Recycling of Specified Kinds of Home Appliances (Law No. 97 of 1998, also known as the Home Appliances Recycling Law), the Law for Ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Specified Products (Law No. 64 of 2001, also known as the Fluorocarbons Recovery and Destruction Law) and the Law for the Recycling of End-of-Life Vehicles (Law No. 87 of 2002, also known as the End-of-Life Vehicle Recycling Law).

Furthermore, as manufacturers of commercial-use refrigeration and air conditioning appliances in particular are increasingly substituting HFCs for HCFCs for the refrigerant and the fluorocarbons refrigerant recovery rate at disposal remains low, it is prospected that HFC emissions will rapidly increase in future. Therefore, the Government of Japan will take countermeasures to improve the recovery rate, including a drastic review of systematic aspects concerning recovery of fluorocarbons refrigerant from industrial-use refrigeration and air conditioning appliances.

(2) Greenhouse Gas Sink Measures

1) Forest Sink Measures

The Forests and Forestry Basic Plan was approved in a Cabinet Decision in October 2001 under the Forests and Forestry Basic Law (Law No. 161 of 1964). It is estimated that if the plan's targets are achieved with respect to full utilization of multiple functions of forests and to supply and use of forest products, it will be possible to ensure removal close to the upper limit of the amount of removal by Japan's forest management in all forests subject to Article 3, Paragraph 3 and 4 of the Kyoto Protocol (47.67 million t-CO_2, approximately 3.9 percent compared to the total emissions volume of the base year).

The amount of removal by forests is an estimate based on the Forests and Forestry Basic Plan, and careful examination and study is necessary in future as to the calculation methodologies, etc. Furthermore, if the estimate is calculated for the case in which forest management and conservation and the supply and use of timber, etc. remains close to current levels, it is expected that the amount of removal that could be ensured will be much lower than 3.9 percent of the total emissions of the base year.

In order to ensure removal at the upper limit of the amount to be obtained through Japan's forest management, it is important to further manage and conserve forests, etc. Therefore, the current challenge is to come up with measures to achieve this, and united efforts of the government, including studies of cross-sectoral policies, and cooperation and strenuous efforts of all entities, including local governments, forest owners, businesses in the forestry and timber industries and citizens, etc. are necessary.

To this end, taking into account the progress of studies on cross-sectoral policies, through the policies shown below the Government of Japan will make united efforts to steadily and comprehensively manage and conserve forests, timber supply, effective use of timber, etc. necessary for achieving the targets of the Forests and Forestry Basic Plan, and will continue to develop systems for reporting and verifying the amount of removal.

○ Development of Sound Forests

A. Promotion of efficient and effective thinning of forests by strengthening collective thinning operations and promoting greater use of thinned wood, etc.
B. Engineering a shift toward forests with longer cutting cycles and multistoried forests
C. Countermeasures to eliminate the land allowed to be left denuded
D. Programs to secure and foster essential personnel responsible for forest development

○ Promotion of Appropriate Management and Conservation, etc. of Protection Forests, etc.

A. Appropriate operation of the land use conversion regulations and logging regulations and planned designation of protection forests under the protection forests system, as well as promotion of appropriate forest conservation management under the protected forest system, etc.

B. Planned promotion of forest conservation projects in mountain regions with a high disaster risk and denuded forests in the hinterland, etc.
C. Promotion of countermeasures to prevent and control damage caused by pine weevils and other forest pests and wild birds and animals; promotion of countermeasures to prevent forest fires
D. Expansion and enhancement of natural parks and nature conservation areas and strengthening of conservation management within these areas

○ Promotion of Forest Establishment with the Participation of Citizens, etc.

A. Promotion of forest establishment activities by a wider range of actors, including promotion of the participation of corporations, etc. in forest creation
B. Improvement of the skills of forest volunteers, etc. and upgrading of safety systems
C. Promotion of forest environmental education
D. Promotion of the green worker program in national parks, etc. that aims to protect flora and fauna, including forests

○ Promotion of the Use of Timber and Wood Biomass

In order to contribute to the promotion of sustainable forest management and to work toward the active utilization of reproducible timber that will contribute to the reduction of the carbon dioxide emissions by limiting the amount of fossil fuels used, the Government of Japan will promote the following measures.
A. Promotion of utilization of locally supplied timber in houses, public facilities, etc.
B. Promotion of consumer-focused programs to expand the user base for locally supplied timber, which will lead to actual demand
C. Development of production, distribution and processing systems closely coordinated from forestry to consumers, to make them capable of meeting consumer needs
D. Promotion of the utilization of low-grade timber and wood biomass for energy and products

2) Promotion of Urban Greening, etc.

Urban greening, etc. are the sink measures that have the most impact on the daily lives of the citizens of Japan. Promotion of such measures is not only effectual as an actual sink measure but also very effective for educating the public on the purpose of the global warming countermeasures.

Furthermore, urban greening, etc., could add to the amount of removal as “revegetation” subject to Article 3, Paragraph 4 of the Kyoto Protocol Article 3, Paragraph 4, outside the framework of the upper limit of the amount of removal to be obtained through Japan’s forest management (47.67 million t-CO_2, approximately 3.9 percent of the total emissions volume of the base year).

To this end, concerning urban greening, etc., the government will continue to actively promote the creation of urban parks, the greening of roads, rivers, *sabo* (erosion and sediment control) facilities, harbors and other public facilities, the conservation of existing privately owned green areas, and the creation of new green space, such as on the rooftops or wall surfaces of buildings, etc. based on comprehensive central and

local government plans for the conservation and creation of greenery such as the Green Policy Outlines and the green basic plan drawn up by the municipalities.

Furthermore, as a part of these efforts, the government will educate all sectors and strata of society on the value and effects of urban greening, etc., and will actively promote support, etc. for the creation of new greenery in urban areas, etc. enlisting different actors and approaches, including urban greening with wide-ranging participation including citizens, corporations, NPOs, etc., conservation of privately owned green areas, utilization of the Greening Region System and multi-level city parks system.

It is estimated that if these countermeasures are implemented according to plan, an annual average removal volume of about 0.02 percent of the total emissions volume of the base year (280,000 t-CO_2) will be ensured in the first commitment period.

This is an estimate based on the plan for planting trees in the urban greening, etc. program; careful examination and study is necessary in future as to the calculation methodologies, etc. in conformity with the Good Practice Guidance for Land Use, Land-Use Change and Forestry that was decided at the Tenth Conference of the Parties to the United Nations Framework Convention on Climate Change (COP10) held in December 2004.

Furthermore, the government will continue to promote in a planned manner development of a system for reporting and verification of the amount of removal in the urban greening programs, etc.

(3) Measures and Policies Related to the Kyoto Mechanisms

○ Value of Promotion and Utilization of the Kyoto Mechanisms

In order to achieve the reduction commitments and at the same time to prevent warming on a global scale and support the sustainable development of developing countries, the Kyoto Protocol approves the Kyoto Mechanisms[25] (Joint Implementation (JI), the Clean Development Mechanism (CDM) and emissions trading) to be utilized[26] as flexible mechanisms that enable a party to this Protocol to use a part of greenhouse gas emission reduction or removal in another party or the emissions quota of another party toward achievement of their own reduction commitments.

In order to certainly and cost-effectively achieve the Kyoto Protocol commitment, it is necessary to appropriately utilize the Kyoto Mechanisms while bearing in mind the general rule that the Kyoto Mechanisms are supplementary to domestic measures.

Furthermore, given that greenhouse gas emissions in developing countries, etc. are expected to dramatically increase in the future, it is important for Japan to promote and utilize the Kyoto Mechanisms with a view to contributing to prevent warming on a global scale.

1) Government Efforts toward the Promotion and Utilization of the Kyoto Mechanisms

○ Approach to Achieve Commitments

All sectors of society will have to make every effort to achieve the Kyoto Protocol commitment on the basis of the domestic measures for reduction of greenhouse gas emissions countermeasures and domestic sink measures (hereafter “domestic measures”). These efforts notwithstanding, Japan will fall short of achieving its Kyoto Protocol commitment by 1.6 percent of the total emissions volume of the base year. It will be necessary to make up for this difference by utilizing the Kyoto Mechanisms while respecting the general rule that the Kyoto Mechanisms are supplementary to domestic measures.

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[25] Joint Implementation (JI) is a mechanism under which greenhouse gas emissions reduction or removal resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in developed countries, etc. can be received as emission reduction units (ERUs) by project participants from other developed countries, etc. that contributed to the project. The Clean Development Mechanism (CDM) is a mechanism under which greenhouse gas emissions reduction or removal resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in developing countries can be received as certified emissions reductions (CERs) by project participants from developed countries, etc. that contributed to the project. Emissions trading is a mechanism under which trading of assigned amount units (AAUs) issued to each developed country, etc. under the protocol and/or, removal units (RMUs) for forests subject to the protocol, etc. is carried out. One form of emissions trading which is conducted under the condition that funds resulting from the transfer of assigned amount units, etc. are used for emissions reduction or other environmental policy objectives is called the Green Investment Scheme (GIS). (Hereafter emission reduction units, certified emissions reductions, assigned amount units and removal units will be referred to by the general name of “credits”.)

[26] “Utilization” of the Kyoto Mechanisms means obtaining credits generated by CDM, JI and such projects and credits of developed countries, etc. and counting them toward achievement of the Kyoto Protocol commitment (transferring them to the retirement account of the national registry).

When utilizing the Kyoto Mechanisms, it is necessary to proceed while taking the following into account. First, if utilization of the Kyoto Mechanisms is commenced after 2013 when the final confirmation of any shortfalls in the achievement of the Kyoto Protocol commitment will be made, the risk that the amount of credits necessary to achieve the commitment cannot be obtained is very high. Second, it takes three to five years for CDM and JI projects, which contribute to incremental greenhouse gas emissions reduction and removal, and similar projects under the Green Investment Scheme (GIS), which is an emissions trading mechanism linked to specific environmental countermeasures (hereafter "CDM/JI, etc.") to progress from planning to implementation and obtainment of credits. In addition, other countries, in which achievement of the Kyoto Protocol commitment through domestic measures alone is expected to be difficult, have already commenced utilization of the Kyoto Mechanisms and are advancing the selection, etc. of high-quality projects in a systematic manner with a view to ensuring that they obtain the credits necessary to achieve their own commitments. It is important for Japan to monitor the status of such efforts in other countries.

Taking all this into account, the government will endeavor to fully utilize the Kyoto Mechanisms from fiscal 2005 and systematically take the necessary measures in order to make the utmost effort toward achievement of the Kyoto Protocol commitment.

A. Support for the Forming of Projects, etc.

It is important to make efforts placing the priority on the implementation of a large number of specific emission limitation, reduction and removal projects, such as CDM/JI, etc. projects to increase the amount of credits Japan could obtain in the future.

Specifically, the Government of Japan will advance development of a foundation for the promotion and utilization of the Kyoto Mechanisms, as well as efforts to support the discovery of projects and project formation.

a. Development of a Foundation

Japan will develop the foundation necessary for utilizing the Kyoto Mechanisms and will advance efforts to make it possible for CDM/JI, etc. projects to be implemented in a broad range of countries, regions and project sectors, etc.

* The Government of Japan will continue to give approval for CDM and JI projects as necessary based on the provisions of the Kyoto Protocol. Furthermore, in order to be qualified to utilize the Kyoto Mechanisms from 2008, the year the first commitment period begins, the Government of Japan will develop the national registry system for the monitoring and recording of the transfer of credits, etc., and the domestic system for calculating greenhouse gas emissions and removal. The government aims to report the outline of these systems, etc. to the United Nations Framework Convention on Climate Change secretariat by the summer of 2006. In addition, the Government of Japan will appropriately operate Japan's national registry based on international agreements, etc.

* In order to make the international rules related to CDM/JI, etc. versatile and rational, the Government of Japan will actively contribute to improving their formulation and operation. Furthermore, the Government of Japan will deepen understanding of the Kyoto Mechanisms in host countries through the holding of intergovernmental talks and seminars, etc., as well as technical cooperation, etc., and will provide support for the development of structures related to domestic systems, etc. so that host countries can meet the qualifying standard for participation in the Kyoto Mechanisms.

Table 3.2 National Registry

This table is to describe national registry that provides supplementary information as stated in the Article 7.2 of the Kyoto Protocol. The following information is based on Decision 13/CP.10 ANNEX II para 1[27]

Item	Content
(a) The name and contact information of the registry administrator designated by the Party to maintain the national registry	[Name] ・ Toshihiro Nikai, Minister of Economy, Trade and Industry ・ Yuriko Koike, Minister of the Environment [Contact information] ・ Makoto Saito, Global Environment Affairs Office, Environmental Policy Division, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry (TEL: +81-3-3501-1679, E-mail: kyomecha-tourokubo@meti.go.jp) ・ Yoshiaki Okada, Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment (TEL: +81-3-5521-8330, E-mail: kyomecha-registry@env.go.jp)
(b) The names of other Parties with which the Party cooperates by maintaining their national registries in a consolidated system	None relevant
(c) Description of the database structure and capacity of the national registry	[Database structure] The database incorporates identifier tables and registered user/administrator information table besides the table described in the Chapter 7 of Data Exchange Standards for Registry Systems Under the Kyoto Protocol—Draft Technical Specifications (Version 1.0, Draft #7). [Capacity] The database possesses sufficient data capacity based on assumed workload, with expandable disc arrays.

[27] FCCC/CP/2004/10/Add.2, p.p.15-16

Item	Content
(d) A description of how the national registry conforms to the technical standards for data exchange between registry systems for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development mechanism registry and the transaction log	A pseudo transaction log has been structured based on the Data Exchange Standards for Registry Systems Under the Kyoto Protocol—Draft Technical Specifications (Version 1.0, Draft #7), and implemented the simulation test case described in the Chapter 9 Registry Initialization Specifications. Expected results were gained for all test items in the Registry Initialization Specifications.
(e) A description of the procedures employed in the national registry to minimize discrepancies in the issuance, transfer, acquisition, cancellation and retirement of ERUs, CERs, tCERs, lCERs, AAUs and/or RMUs, and replacement of tCERS and lCERs, and of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions	[Means to minimize discrepancies] The following checklist will be implemented in the registry. (1) Data type validity for data keyed manually (e.g.: numbers, alpha-numerics) (2) Values complying validity with types of Kyoto unit. (e.g. :whether an expiration date is set for tCERs) (3) Status of designated Kyoto units in transferred accounts in time of transaction. [Forced termination when notified of discrepancy] The transaction will be automatically terminated in a transaction when notified of discrepancy. [The steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions] The registry records log information of failed transactions. The registry administrator should periodically check the log and solve the problem when the registry becomes officially in operation.
(f) An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error and of how these measures are kept up to date	・The SSL technology and VPN communication are adopted based on the Data Exchange Standards for Registry Systems Under the Kyoto Protocol—Draft Technical Specifications (Version 1.0, Draft #7). ・The access of registry administrator is limited by the use of dedicated line connection as well as limiting users capable of operating the national registry administrator's terminal PCs by fingerprint authentication. ・The information security of the current national registry was audited by a corporation that acquired the BS7799/ISMS certification which is the security management of international standard. ・Operation is undergone in an internet data center with a 24 hour surveillance system. ・Virus pattern files are automatically updated periodically as well as having all client PCs and servers install virus detection software.
(g) A list of the information publicly accessible by means of the user	・Account information (by tabulation year and account type).

Item	Content
interface to the national registry	・Sum of Kyoto units for each calendar year（amount issued and total holdings by every unit type. ・Sum of total holding of Kyoto units for every calendar year and every account (by tabulation year and account type).
(h) The Internet address of the interface to its national registry	http://www.registry.go.jp/
(i) A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	[Safeguarding data] The national registry is set at an internet data center (IDC) with following characteristics: ・ The building structure of the IDC is excellent in antiseismic performance ・ The IDC is equipped with electric facilities that can secure over 24 hours of continuous operation in times of power failures. ・ The IDC has fire resistance and secures a gas fire-extinguishing system. [Maintaining data] Storage is backed up once a day as well implementing redundant configuring of duplicates. [Recovering data] The registry has been completed the desk-reviewing of the system recovering procedures manual that is prepared for times of software and hardware failure.
(j) The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of Decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	The initialization test that is to be implemented with the start-up of ITL operation is not complied with.

b. Support for Discovery of Projects and Project Formation

The Government of Japan will promote the discovery and formation of CDM/JI, etc. projects and will advance efforts to ensure that Japan can obtain credits from these CDM/JI, etc. projects.

* The Government of Japan will support human resources development, etc. to ensure that Japan's private businesses, etc. can be designated as CDM/JI independent entities or operational entities. Furthermore, concerning CDM/JI, etc. projects, the government will work to discover promising energy and environmental technology and projects, enhance feasibility studies, etc. and promote their implementation. In addition, the government will make efforts to hold negotiations with the host country government and

form agreements, and work to transfer credits to Japan.

* Through such means as intergovernmental talks and support for structural development in the host country, the Government of Japan will work to strengthen relations with the host country and monitor priority sectors. At the same time, the Government of Japan will advance the development of conditions to facilitate the smooth transfer of credits to Japan from the host country as necessary, for example, by concluding, as necessary, agreements, etc. with the government and other entities of the host country.

B. Full Utilization of the Kyoto Mechanisms

It is expected that even if the best possible efforts are made through domestic measures, there will still be a shortfall of 1.6 percent. In order for Japan to make utmost effort toward achievement of its Kyoto Protocol commitment, it is necessary for the public and private sectors to collaborate appropriately and effectively utilize a variety of methods to obtain credits through the Kyoto Mechanisms.

To this end, from fiscal 2005 the public and private sectors will cooperate to steadily promote support projects for the promotion of CDM/JI, etc. projects implemented by private businesses, etc. in order to facilitate smooth obtaining of credits.

In addition, in order to appropriately advance the obtaining of credits for the achievement of Japan's Kyoto Protocol commitment, it is necessary to study and build specific mechanisms for the smooth obtaining of credits, at the earliest possible time in the second step period. The concerned ministries and agencies are to collaborate to conduct studies with a view to implementation from fiscal 2006 and promptly take the necessary measures. In doing so, consideration will be given to cost-effectively obtaining the necessary number of credits.

Furthermore, when promoting and utilizing the Kyoto Mechanisms, the Government of Japan will advance the effective utilization of ODA in conformity with international rules and on the premise of the agreement of the recipient country. In addition, the government will advance the effective utilization of other public funding.

C. Development of a Structure for Promotion and Utilization of the Kyoto Mechanisms

It is important for all of the concerned ministries and agencies within the government to unite to make efforts for measures and policies concerning promotion and utilization of the Kyoto Mechanisms. The Government of Japan will develop the structures of internal government agencies and government-affiliated organizations in order for concerned ministries and agencies to cooperate to efficiently advance their efforts.

In order to strengthen collaboration among concerned ministries and agencies for the promotion and utilization of the Kyoto Mechanisms and to promote the measures and policies to be implemented, the current Liaison Committee for Utilization of the Kyoto Mechanisms, which has the objective of giving

government approval to CDM/JI projects, will be reorganized and promptly reestablished as the Council for Promotion and Utilization of the Kyoto Mechanisms (provisional name) which will be composed of the concerned ministries and agencies with the objective of comprehensive promotion and utilization of the Kyoto Mechanisms.

The council will promptly study the ideal form of mechanisms to smoothly obtain credits, the division of roles among concerned ministries and agencies, and other modes with the aim to work out specific policies for the period from fiscal 2006.

The concerned ministries and agencies will actively and at their own initiative advance their respective efforts, particularly in the following sectors.

(Ministry of the Environment)
* For achieving Japan's Kyoto Protocol commitment, the Ministry of the Environment, as a Deputy-Chief of the Global Warming Prevention Headquarters, will make independent efforts with regard to all aspects of promotion and utilization of the Kyoto Mechanisms by the government.

* With a view to promoting efforts toward project formation by private businesses, etc., and contributing to the sustainable development of the host country through CDM/JI, etc. projects, among other aims, the Ministry of the Environment will make independent efforts for promotion and utilization of the Kyoto Mechanisms.

(Ministry of Economy, Trade and Industry)
* For achieving Japan's Kyoto Protocol commitment, the Ministry of Economy, Trade and Industry, as a Deputy-Chief of the Global Warming Prevention Headquarters, will make independent efforts with regard to all aspects of promotion and utilization of the Kyoto Mechanisms by the government.

* With a view to promoting efforts toward project formation by private businesses, etc., disseminating Japan's energy and environmental technology worldwide, and alleviating energy use restrictions, among other aims, the Ministry of Economy, Trade and Industry will make independent efforts for promotion and utilization of the Kyoto Mechanisms.

* The Ministry of Economy, Trade and Industry will make independent efforts for promotion and utilization of the Kyoto Mechanisms utilizing ODA in conformity with international rules and on the premise of agreement of the recipient country.

(Ministry of Foreign Affairs)
* With a view to complying with international treaties, the Ministry of Foreign Affairs will make independent efforts for achieving Japan's Kyoto Protocol commitment with regard to all aspects of promotion and utilization of the Kyoto Mechanisms by the government.

* The Ministry of Foreign Affairs will make independent efforts with regard to coordinating negotiations and formation of agreements, etc. with foreign governments necessary for promoting and utilizing the Kyoto Mechanisms, building cooperative relations with foreign governments concerning the Kyoto Mechanisms, implementing the necessary studies, and promoting and utilizing the Kyoto Mechanisms through participation in international organizations, etc.

* The Ministry of Foreign Affairs will make independent efforts for promotion and utilization of the Kyoto Mechanisms utilizing ODA in conformity with international rules and on the premise of agreement of the recipient country.

(Ministry of Land, Infrastructure and Transport)
* The Ministry of Land, Infrastructure and Transport will make independent efforts for promotion and utilization of the Kyoto Mechanisms in the transport sector and the social capital development sector.

(Ministry of Agriculture, Forestry and Fisheries)
* The Ministry of Agriculture, Forestry and Fisheries will make independent efforts for promotion and utilization of the Kyoto Mechanisms in the forest sector.

(Ministry of Finance)
* The Ministry of Finance will make independent efforts for promotion and utilization of the Kyoto Mechanisms from the perspective of international financing. For example the ministry will support the vigorous activities of multilateral development banks and utilize the Japan Bank for International Cooperation.

* The Ministry of Finance will make independent efforts for promotion and utilization of the Kyoto Mechanisms utilizing ODA in conformity with international rules and on the premise of agreement of the recipient country.

Furthermore, government-affiliated organizations, etc. responsible for implementing measures and policies for the promotion and utilization of the Kyoto Mechanisms, such as independent administrative institutions, government-affiliated financial institutions and diplomatic missions abroad, are to collaborate in making united efforts for the promotion and utilization of the Kyoto Mechanisms.

2) Utilization of the Kyoto Mechanisms by Private Businesses, etc.

Efforts by private businesses, etc. to limit domestic greenhouse gas emissions in order to achieve their voluntary action plans and other targets, and their voluntary utilization of the Kyoto Mechanisms at their own expense can be positively evaluated from the perspective of emissions reduction on a global scale using outstanding technology and from a cost-benefit perspective.

In order to promote such utilization of the Kyoto Mechanisms by private businesses, etc., in addition to the measures in 1) above, the Government of Japan will carry out policies including the development of human resources, provision of consultations and information, development of instruction manuals, etc. on the use of the Kyoto Mechanisms, provision of support at the project discovery and project formation stage, effective utilization of systems of lending for the formation of so-called carbon funds, etc., measures to facilitate the obtaining of credits, and development of the institutional base for voluntary repayment of credits, among others.

Reference: Accounting and Tax Treatment of Private Businesses, etc. when Utilizing the Kyoto Mechanisms

The accounting and tax treatment of private businesses, etc. when voluntarily utilizing the Kyoto Mechanisms is as follows.

1) Accounting Treatment of Corporations
Based on Working Report No. 15 of the Accounting Standards Board of Japan Current Treatment Concerning Account Processing for Emissions Trading (November 30, 2004), credits are counted as "intangible fixed assets" or "investments and other assets" when they are obtained and are processed as "selling costs and general management costs" in the fiscal year in which they are redeemed.

2) Treatment under the Corporation Tax Law
Taxable income, unless otherwise stipulated by law, "is to be calculated in compliance with the standards of accounting processes generally recognized to be fair and reasonable" (Corporation Tax Law (Law No. 34 of 1965) Article 22, Paragraph 4). Concerning the tax treatment of credits, in principle, they are to be handled in compliance with the above accounting standards.

2. Cross-Sectoral Policies

(1) Systems for Calculation, Reporting and Public Disclosure of Greenhouse Gas Emissions

The Government of Japan will promote the building of a foundation for efforts by citizens of all levels toward voluntary global warming countermeasures by having entities that emit greenhouse gases calculate their emissions themselves. In addition, with a view to increasing incentives and motivation for the promotion of voluntary measures by all citizens and corporations through the publication and visibility of emissions information, the government will introduce a system under which entities that emit a certain volume of greenhouse gases or above are obliged to report their emissions to the central government responsible for collating and publishing the reported information. In so doing, in order to further advance understanding of the published emissions information, the Government of Japan will allow entities that emit greenhouse gases to report information related to the published emissions information if they so wish.

To this end, the Government of Japan has revised the Law Concerning the Promotion of Measures to Cope with Global Warming in June 2005.

(2) Promotion of Environmental Consideration in Business Activities

The Government of Japan will promote efforts by businesses to voluntarily and actively engage in environment-conscious business activities.

Based on the stipulation in the Law Concerning Promotion of Business Activities that Consider the Environment by Specified Businesses, etc. through Promotion, etc. of the Provision of Environmental Information (Law No. 77 of 2004), large corporations are to endeavor to publish environmental reports. Taking this into consideration, among other things, the Government of Japan will promote the use of environmental information by businesses and citizens and work to develop the conditions for environment-conscious business activities to be highly evaluated by society and the market, among other measures.

Furthermore, the Government of Japan will promote the inclusion of information about greenhouse gas emissions and progress on efforts to limit emissions in the environmental report. Concerning the small- and medium-sized enterprises as well, the government will promote environment-conscious efforts, such as monitoring of carbon dioxide emissions.

(3) Development of National Campaigns

In order to promote the understanding of all sectors of society, including businesses, citizens, etc. and to make the realization of specific warming prevention actions certain, the government will collaborate with

the business circle, NPOs, the labor circle, researchers, etc. to disseminate knowledge and develop national campaigns.

Furthermore, the Government of Japan will further strengthen the role of the Japan Center for Climate Change Actions, the prefectural centers for promotion of activities to stop global warming, the Global Warming Countermeasures Regional Councils, the volunteers to promote activities to mitigate global warming and other organizations, etc. promoting global warming prevention activities.

1) Provision of Information and Education of the Public

The Government of Japan will encourage voluntary actions by each individual citizen by strongly appealing to the awareness of citizens through the appropriate provision of information using diverse methods. In doing so, the government will work to foster a sound sense of crisis through the provision of the latest scientific knowledge, and to provide information and educate the public concerning what specific actions or purchases will contribute to the limitation of greenhouse gas emissions or the promotion of sink measures.

○ Presentation of the Actions and Standards Expected of Citizens

Currently the central and local governments as well as businesses are establishing targets in their respective action plans and voluntary action plans, etc. and are advancing specific measures. It is thought that informing each individual citizen of the specific actions and standards expected, in other words specifically what kinds of efforts they are expected to make and to what degree, is also effective for encouraging efforts to reduce greenhouse gases.

As a part of this process, with a view to encouraging each individual citizen to constantly review their lifestyle and working style, the Government of Japan will formulate and present the specific actions expected of citizens and other details such as the amount of energy consumption including electric power, gas and petroleum expected of each household taking into account the characteristics of the regional climate, the number of people in the household, etc. as standards of actions of citizens and endeavor to educate the public about them.

In addition, the Government of Japan will implement the following measures.

* Promote green purchasing efforts by businesses and citizens through such means as the provision of information concerning environmental products, etc.
* Promote the practice in offices, etc. during the summer season of wearing light clothes that are more suitable in hot weather.
*Promote information provision and public education activities by the private sector for the private sector, such as public relations activities by corporations.
* Require electric power businesses and gas businesses to publicize on the implementation of energy conservation promotion projects and their progress, such as providing information on the promotion of the dissemination of highly-efficient devices and the state of energy use.
* Promote voluntary restraint from non-essential use of passenger cars for personal use and dissemination of eco-drive.
* Spread public education activities to promote cooperative efforts among transport businesses, the business circle, etc. concerning promotion of the use of public transport systems.
* Spread public education activities to promote cooperative efforts between shippers and distributors.
* Spread public dissemination and education activities to raise awareness of railway freight transport that is friendly to the environment.
* Develop citizen participation greening campaigns including national greening campaigns in Greenery Week, Urban Greening Month, etc. and the promotion of private sector forest establishment and greening activities through the utilization of charity collections for greenery and urban greening funds, etc., in order to widely disseminate and educate the public on the importance of greening as a sink measure.
* Develop public dissemination and education activities concerning the value of utilizing wood products, etc.

2) Environmental Education, etc.

In order to ensure that the awareness and understanding of the citizens of the importance of the global warming issue and that citizens take habitual actions to prevent global warming, the Government of Japan will promote environmental conservation activities and environmental education based on the Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education (Law No. 130 of 2003) as well as taking into account the United Nations Decade of Education for Sustainable Development commenced in 2005.

Specifically, the Government of Japan will promote policies concerning environmental education, human resources development and development of centers, etc. being advanced in collaboration among all entities in various locations such as schools, regions, workplaces, etc.

In particular, the Government of Japan will promote the implementation of hands-on environmental education and energy conservation activities in school facilities that play a central role in regions, through such measures as renovations including the introduction of heat insulation materials and the use of locally harvested timber, etc. that would contribute to global warming countermeasures and the introduction of new energy devices, etc., and will utilize the Internet, etc. to promote support for global warming countermeasures, etc. in households.

In combination with these measures, the Government of Japan will continue to advance the development of teaching materials and programs that would encourage understanding and actions by citizens in collaboration with concerned entities such as NPOs.

Furthermore, the Government of Japan will promote various hands-on activities, etc. in forests, parks and green areas, etc. in order to deepen understanding of the role of forests in preventing global warming, necessity of forest development and cyclical use of timber resources and the value of urban greening, among others.

(4) Basic Items of Measures to be Undertaken on the Initiative of Public Institutions

1) Measures to be Undertaken on the Central Government's Own Initiative

The government intends to formulate a new government action plan to succeed the "Plan for Measures the Government Must Implement in Order to Limit, etc. the Emission of Greenhouse Gases in its Work and Projects" (hereafter "Government Action Plan") approved in a Cabinet Decision in July 2002. The new Government Action Plan incorporates the following content in addition to the measures described in the former plan.

The progress of the Government Action Plan will be examined annually in a meeting of the Global Warming Prevention Headquarters, and the results will be published.

Furthermore, for the period after fiscal 2006 as well, which is the target fiscal year of the Government Action Plan, the Government of Japan will promptly formulate a plan for the implementation of measures to be undertaken on its own initiative bearing in mind the first commitment period (fiscal 2008-fiscal 2012).

In addition, the central government will take the initiative in procuring environmental products, etc. based on the Green Purchasing Law in order to encourage a switch to demand for products that contribute to reduction of greenhouse gas emissions and other environmental products, etc.

○ Promotion of CO_2-saving Model Projects in the Kasumigaseki Government Office Area

The Government of Japan will work to form a "CO_2-saving government office area" around Kasumigaseki through taking the initiative in introducing new technology and systems and organic collaboration with individual ministries and agencies.

Specifically, the government will advance the following items, etc.

* Accelerated introduction of fuel cells
* Further introduction of new energy, etc. such as photovoltaic power generation and wind power generation.
* Selection of energy sources that contribute to CO_2-saving
* Introduction of thermal storage systems and gas air conditioning, etc. that contribute to electric power load leveling
* Introduction of water-retaining materials, etc. for pavements upon their replacement in government office sites
* Thorough implementation of appropriate operation and management of facilities
* Upgrading of common-use bicycle systems
* Further promotion of greening

○ Formulation of Implementation Plans by Each Ministry and Agency

Each ministry and agency will formulate an implementation plan which stipulates the measures it will implement to reduce the emission of greenhouse gases and conserve and strengthen the removal effect. The implementation plans formulated by the ministries and agencies are to establish fiscal 2006 as the target fiscal year and incorporate the following targets.

* In all ministries, implement a feasibility study on the introduction of ESCO projects and introduce them as widely as possible.
* Based on the green assessments, focus on implementing energy conservation renovations by the end of fiscal 2006. Furthermore, thoroughly implement appropriate operation and management of facilities that contribute to CO_2-saving.
* Introduce photovoltaic power generation, efficient water heaters, highly-efficient air conditioning, fuel cells, etc. as widely as possible in government offices and housing for government workers.
* Promote the use of public transport systems such as railways and buses for commute and work-related travel.
* Maintain 100 percent use of low-emission vehicles for general official vehicles. For official vehicles other than general official vehicles as well, establish numerical targets for switching to the use of low-emission vehicles.
* Install Electronic Toll Collection (ETC) devices in official vehicles using toll roads.
* Introduce a purchasing method that considers CO_2-saving factors when purchasing electric power for use by government offices.
* Formulate and implement “rules for CO_2-saving actions,” for example, for everyone to turn off the lights during lunch breaks.
* Solicit employees for ideas that contribute to CO_2-saving (eco-ideas), and implement the effective ones.
* Achieve a reduction of 7 percent compared to fiscal 2001 through the above measures, etc.

In the implementation plans each ministry will clearly specify the department responsible for formulation, evaluation and examination and will introduce the PDCA (plan-do-check-action) cycle. Furthermore, responsible departments in each ministry are to share CO_2-saving experience, know-how and technology with one another. With a view to ensuring transparency, the government will publish the results of the examination, evaluating not only total emissions but also the efforts in comparison with target values and

past recorded figures, etc. concerning the progress on each item and in each organization, with all this information included.

2) Plans of Action, etc. of Local Governments

Based on Article 21 of the Law Concerning the Promotion of Measures to Cope with Global Warming, prefectures and municipalities are obliged to formulate a Plan Concerning Measures to Reduce the Emission of Greenhouse Gases and Conserve and Strengthen the Removal Effect in its Work and Projects (hereafter "Local Government Action Plan").

Local governments must formulate these plans with reference to a manual formulated by the central government and in compliance with the provisions of the Government Action Plan. In particular, they are expected to keep the following points in mind.

○ Targets
* The plan should specify quantified targets concerning total emissions of greenhouse gases and deadlines for achieving them.
○ Scope
* For local governments, not only energy consumption in government offices, etc. but also emissions from waste treatment operations, water supply and sewege systems, local government-managed public transport systems, the operation of public schools and public hospitals, etc. and other operations sometimes account for a large proportion of total emissions. For this reason, these kinds of operations should also be included within the scope of the plan.
* In particular, local governments should work toward CO_2-saving with respect to electric power use in government offices, etc.
○ Evaluation Structure
* A regular examination of the status of implementation should be carried out and the results of the examination published.
* When publishing the results of the examination, the local government should evaluate not only total emissions but also the efforts in comparison with target values and past recorded figures, etc. concerning the progress on each item and in each organization, and will publish all this information together.

With a view to ensuring transparency, the central government is to compile the results published by the local governments and publish them in the form of a list.

In addition, the local governments are to work on green purchasing efforts based on the Green Purchasing Law, such as drawing up guidelines for the promotion of procurement of environmental products, etc.

3) Promotion of Actions Undertaken on the Initiative of Public Institutions Other than Central and Local Governments

The central and local governments are to provide information to public institutions such as independent administrative institutions concerning effective global warming countermeasures tailored to the characteristics of that institution and are to encourage efforts undertaken on the initiative of such

institutions. The central government is to regularly monitor the status of these efforts to the extent possible.

(5) Introduction of Daylight Saving Time

The Government of Japan will work to encourage a public debate concerning the introduction of summer time (daylight saving time), including the ideal form of lifestyles and working styles, and will endeavor to foster environmental awareness and reach public consensus.

(6) Utilization of a Policy Mix

In order to advance the effective and efficient reduction of greenhouse gas emissions, and to reduce the cost burden on the nation as a whole as much as possible while taking fairness into consideration and achieving the multiple policy objectives of environmental conservation and economic development at the same time, the Government of Japan will utilize the policy mix approach of fully mobilizing all policy methods, including voluntary methods, restrictive methods, economic methods and informational methods, taking advantage of their respective characteristics and organically combining them. The Government of Japan will comprehensively study the most appropriate form for this approach while monitoring the progress of the measures and policies of the Kyoto Protocol Target Achievement Plan.

(6-1) Economic Methods

Economic methods rely on market mechanisms and provide economic incentives to induce actions for emission limitation, etc. based on the economic rationality of each entity. They are expected to be effective as economic support policies for global warming countermeasures as well. When utilizing economic methods it is important to maximize their effects and minimize the burden on citizens and the administrative and fiscal costs in line with the policy mix approach. When providing fiscal support, the Government of Japan will endeavor for efficient utilization of the budget, etc. while taking into account the cost-benefit performance.

(6-2) Environment Tax

The environment tax, which is being discussed in related councils, etc. as a method for imposing a tax according to the amount of carbon dioxide emissions or consumption of fossil fuels, is one of the economic methods. Studies are being carried out from various perspectives in related councils, etc. with a view to tax leading to a wide range of entities being encouraged to take warming countermeasures through price incentives and as a source of funds to implement carbon dioxide emissions reduction measures, forest sink measures, etc., among other aims.

Since the environment tax would impose a burden on wide range of citizens, it is an issue for which comprehensive studies must be seriously advanced. In so doing, efforts must be made to obtain the understanding and cooperation of citizens, companies, etc., while keeping in mind studies of the various policy methods related to global warming countermeasures conducted in related councils and elsewhere,

and taking into account the specific position of the tax within overall global warming countermeasures, its effects, its impact on national economy and the international competitiveness of the industry as well as the current state of warming measures in foreign countries, etc.

(6-3) Domestic Emissions Trading System

In order to accumulate knowledge and experience concerning cost-efficient emissions reductions and trading, etc., the Government of Japan provides economic incentives for the corporations that make efforts to achieve reduction targets they have determined themselves and will implement voluntary participation domestic emissions trading utilizing the trade of emissions quotas.

The domestic emissions trading system is an issue that must be comprehensively studied about the wide range of discussion points includes a comparison of the domestic emissions trading system with other methods and their effects and the impact on industrial activities and the national economy.

* The domestic emissions trading system is the system that first set the total emissions quotas to be issued, then allocates emissions quotas to individual entities and allows such options as trading of emissions quotas with other entities and utilization of Kyoto Mechanism credits.

3. Basic Policies

(1) Development of a Domestic Framework for Calculating Greenhouse Gas Emissions and Removal Based on the United Nations Framework Convention on Climate Change and the Kyoto Protocol

The Kyoto Protocol includes an obligation to develop domestic systems for the calculation of greenhouse gas emissions and removal by one year before the first commitment period. Therefore, the Government of Japan will promptly develop a domestic framework for calculating emissions and removal in compliance with the guidelines of the plan to be decided in the First Conference of the Parties of the protocol (COP 1).

Specifically, the related ministries will cooperate, led by the Ministry of the Environment, to put in place structures for the prompt submission of a greenhouse gas emission and removal catalog by the stipulated deadline, quality control of data, the catalog study and approval process, the response to examinations of expert study teams to be dispatched based on the Kyoto Protocol, etc.

Furthermore, when calculating emissions, the Government of Japan will advance studies and research concerning the development of statistics used as volume of activities, calculation of the energy consumption basic unit and carbon dioxide emission basic unit, greenhouse gas measurement methods, etc., promote standardization (development of Japanese Industrial Standards (JIS)) based on the results of these studies and work to further refine the calculation of greenhouse gas emissions and removal. This is to more accurately monitor the state of emissions for each sector and to meticulously examine the methods of evaluating implementation of countermeasures by each entity.

On the other hand, when measuring, monitoring and reporting removal by carbon sinks (in some cases emissions), the Government of Japan will establish methods that are transparent and have a high degree of scientific verifiability in conformity with the Good Practice Guidance for Land Use, Land-Use Change and Forestry that was adopted at COP10. In order to carry out continuous measurement, monitoring and reporting, the government will promote the development of information concerning the volume of activities and land use changes, as well as studies and research concerning greenhouse gas removal and emission mechanisms in forests, etc.

(2) Promotion of the Development of Global Warming Countermeasures Technology

It could be expected that development of technologies will help achieve compatibility between the environment and the economy and that their wide dissemination will greatly contribute to the reduction of greenhouse gases into the future. Taking into account the Council for Science and Technology Policy's Promotion of Technical Research and Development for Prevention of Global Warming (decision and opinion offered of April 21, 2003) and global warming research initiatives, etc., the related ministries and agencies will collaborate to comprehensively promote technology development through cooperation among the government, industry and academia.

○ Promotion of the Practical Application and Commercialization of New Technologies

Realizing technology development will lead to further improvement of the efficiency, cost reduction and miniaturization, etc. and make it possible to promote carbon dioxide emissions reduction countermeasures such as the introduction and dissemination of new energy and highly-efficient devices. However, whether the benefits of technology development lead to a reduction in greenhouse gases within the first commitment period will depend on how quickly the new technology can be practically applied and commercialized.

For this reason, through collaboration among the government, industry and academia, the Government of Japan will strongly promote:

* Clear specification and sharing of a road map for commercializing the results of research and development
* Development and demonstration of technology that promotes practical application
* Support for pioneering efforts toward commercialization

In so doing, the Government of Japan will work in conjunction with policies, etc. for the dissemination of development results in the market.

○ Promotion of Cross-sectoral Efforts

As can be seen in the case of the battery technology supporting hybrid automobiles, innovative and promising global warming countermeasures technologies are being practically deployed through the application of elemental technologies of a certain sector to other sectors and through joint work across the boundaries of commercial sectors. In order to increase the number of such success stories as much as possible, the Government of Japan will strongly promote efforts through cross-sectoral collaboration among the government, industry and academia.

○ Promotion of Technology Development from a Medium- and Long-term Perspective

Concerning global warming countermeasures, even if benefits of the technology development should take a long time to appear, the Government of Japan will take the medium- and long-term view from an early stage and provide sufficient support for the development if sustained benefits can be expected from that development.

For example, it is necessary to break the cycle in which economic growth and improved quality of life results in increased energy demand and therefore increased carbon dioxide emissions by reforming the energy supply and demand structure, etc. To that end, the Government of Japan will support breakthrough energy conservation technologies, technologies utilizing the vast unused energy sources, carbon dioxide capture, storage and sequestration technologies that capture carbon dioxide emitted through the use of fossil fuels and reduce emission of carbon dioxide into the atmosphere, etc. from an early stage.

Furthermore, the Government of Japan will focus on promoting technology for encouraging reform of regional and urban structures and reform of socioeconomic systems to form the foundation for medium- and long-term global warming countermeasures and technology for the provision of cross-sectoral

underlying support for all kinds of countermeasures.

In addition, the Government of Japan will promote basic research in universities contributing to global warming countermeasures also from the perspective of continuously developing human resources in sectors in which Japan possesses strength, while at the same time respecting the voluntary efforts in universities.

The Government of Japan will moreover meticulously promote warming countermeasures technologies in various sectors, including development of substitute materials for the three fluorinated gases and other emissions limitation technologies and greenhouse gas emissions limitation technology, etc. in the agriculture, forestry and fisheries sectors.

(3) Promotion of Research on Climate Change and Strengthening Systematic Observation and Monitoring

Concerning research on global warming, the Government of Japan will promote research to elucidate the climate change mechanism, monitor the present state of global warming and make future projections, evaluate the impact of global warming on the environment, society and the economy, and to develop policies for greenhouse gas reduction and policies to adapt to global warming, among other ends, taking into account global warming research initiatives, etc. in the Council for Science and Technology Policy. It will promote such research strategically and in a focused manner while working to cooperate with the international community.

Concerning systematic observation and monitoring of global warming, the Government of Japan will strengthen the comprehensive scientific observation and monitoring systems to monitor greenhouse gases, climate change and their impacts, etc., taking into account the Global Earth Observation System of Sytems (GEOSS) 10-Year Implementation Plan endorsed at the Third Earth Observation Summit (February 2005, Brussels) and the Council for Science and Technology Policy's Earth Observation Promotion Strategy (decision and opinion offered of December 27, 2004), etc.

In particular, Japan's efforts will include observations of atmospheric, continental and marine greenhouse gases primarily in the Asia and Oceania region, observations of the continental and marine carbon cycle and ecosystems and observations of the impact of warming in regions vulnerable to climate change such as snow and ice zones and coastal zones as well as the integration of observational data and socioeconomic data.

(4) Ensuring of International Partnership on Measures against Global Warming and Promotion of International Cooperation

Long-term efforts to reduce greenhouse gas emissions by not only by Japan but also by the entire world working together are indispensable for implementation of measures against global warming. The Kyoto Protocol is an important first step and it is necessary for the entire world to steadily implement it.

To that end, Japan will continue to call on the the ratification of the countries that have not yet concluded the protocol. At the same time, the Government of Japan will play a leading role in the global efforts by utilizing our outstanding technological capabilities and accumulated experience of environmental conservation to carry out a wide range of international cooperation with developing countries, including the transfer of environmentally-appropriate technology and know-how, through such means as implementation of the Kyoto Initiative,[28] conservation and restoration of forests, as well as holding of various meetings and seminars, and by endeavoring to meet the Kyoto Protocol commitments in a way that would minimize negative impacts on society, the environment and the economy of developing countries.

Furthermore, in order to achieve the ultimate target of the United Nations Framework Convention on Climate Change, it is absolutely necessary for the Parties to the Convention to certainly achieve their Kyoto Protocol commitments. At the same time, it is also considered necessary for world greenhouse gas emissions to subsequently shift from an increasing trend to a decreasing trend at an early stage, and to reduce emissions to below half their current levels and maintain them at that level.

To this end, it is important to establish a balanced and effective framework (the so-called commitments for the subsequent periods) beyond 2012, the year of the completion of the first commitment period of the Kyoto Protocol, and to build common rules for the participation of all countries including the US and developing countries in the framework, taking into account the principle in the United Nations Framework Convention on Climate Change stating that the Parties should protect the climate system in accordance with their common but differentiated responsibilities and respective capabilities.

Article 3, Paragraph 9 of the Kyoto Protocol provides that consideration of the commitments for subsequent periods is to be initiated this year. Japan will show leadership concerning consideration of the future framework, for example, by holding international conferences to promote dialogue among the countries concerned.

Furthermore, the Government of Japan will continue to provide support for appropriate measures against global warming, etc. in vulnerable countries with a low capacity to respond to it, such as island countries and least developed countries.

[28] The Kyoto Initiative is a package of measures to support the measures against global warming of developing countries which was announced by Japan at the Third Conference of the Parties to the United Nations Framework Convention on Climate Change (December 1997). It consists of three pillars: (1) cooperation for human resources development (3,000 people trained over five years beginning in fiscal 1998), (2) yen loans provided under concessional terms, and (3) utilization and transfer of Japan's technology and experience.

3.3.3 Domestic and Regional Planning, Legislative Proceedings, and Execution and Management Procedures

The outline of Japan's major legal and other systems necessary for implementing global warming countermeasures is provided below.

Name of legal and other systems	Outline
Law Concerning the Promotion of the Measures to Cope with Global Warming	[History] Formulation: 1998; Revision: 2002, 2005 [Major measures] - Establishment of Centers for Climate Change Actions (national and regional) (1998) - Formulation of the Kyoto Protocol Target Achievement Plan (2002) - Establishment of the Global Warming Prevention Headquarters inside the Cabinet (2002) - Systems for calculation, reporting and public disclosure for greenhouse gas emissions (2005) [Major organizations involved in its execution] - Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment (MOE) - Office management division of each office and ministries (calculation, reporting and public disclosure systems) - Environmental departments and bureaus of local public organizations
Law Concerning the Rational Use of Energy (in short, the "Energy Conservation Law")	[History] Formulation: 1979; Major revisions: 1993, 1998, 2002, 2005 [Major measures] - Enactment of criteria for energy conservation at factory plants, designation of plants designated for energy management using thermal and electric power above a certain scale, make mandatory the selection of manager(s) for energy use and recording of energy use situation, enactment of criteria for energy conservation at housings and other buildings, enactment of criteria on energy consumption efficiency rate of machinery and appliances, and make mandatory the labeling of energy consumption efficiency rate (1979) - Enactment of the Basic Principles Concerning the Rational Use of Energy, and make mandatory the periodic reporting on the energy use situation at plants

	designated for energy management (1993) - Expansion of plants designated for energy management (the conventional plants designated for energy management will be determined as plants designated to manage Type 1 energy sources, while newly establishing plants designated to manage Type 2 energy sources), make mandatory the submission of medium- and long-term plans on energy conservation for plants designated to manage Type 1 energy sources, adoption of the top-runner approach regarding the energy consumption efficiency rate of machinery and appliances (1998) - Enhancement of countermeasures taken by the commercial sector through expansion of plants designated for energy management (elimination of the restrictions on target business types for plants designated to manage Type 1 energy sources) and make mandatory the submission of energy conservation measures at buildings (non-housing) above a certain scale (2002) - Enhancement of energy management through integrated thermal and electric power management at factory plants, enactment of criteria for energy conservation for transport service providers and cargo owners, designation of transport service providers and cargo owners above a certain scale, make mandatory the submission of plans on energy conservation and periodic reporting on the energy use situation, and make mandatory the submission of energy conservation measures at housings above a certain scale (2005) [Major organizations involved in its execution] - Energy Efficiency and Conservation Division, Agency for Natural Resources and Energy, Ministry of Economy, Trade, and Industry (METI) - Environment and Ocean Division, Policy Bureau, Ministry of Land, Infrastructure and Transport (MLIT) - Housing Production Division and Building Guidance Division, Housing Bureau, MLIT - Regional bureaus of the responsible office and ministries - Responsible departments and bureaus of local public organizations

Law Concerning Special Measures for the Use of New Energy, etc. by Electric Utilities (In short, the “RPS Law”)	[History] Formulation: 2002 [Major measures] - Require and make mandatory for electric utilities to use a certain amount of electricity generated by new energy, etc. [Major organizations involved in its execution] - New and Renewable Energy Division, Agency for Natural Resources and Energy, METI
Law Concerning the Promotion of the Integration and Efficiency of Distribution Operations (In short, the “Comprehensive Distribution Efficiency Law”)	[History] Formulation: 2005 [Major measures] - Formulation and recognition of a Comprehensive Efficiency Plan for integration and efficiency of distribution operations, and in relation to this, establishment of assistance for business approval and fund procurement, etc. [Major organizations involved in its execution] - Cargo Facilities Division, Policy Bureau, MLIT - Regional bureaus of the office and ministries in charge - Responsible departments and bureaus of local public organizations
Approval system for Kyoto Mechanism projects	[History] Formulation: 2002 [Major measures] - Give approval to individual projects of the Kyoto Mechanism (CDM/JI) [Major organizations involved in its execution] - Council for Promotion and Utilization of the Kyoto Mechanisms (composed of the Cabinet Secretariat, MOE, METI, the Ministry of Foreign Affairs, the Ministry of Agriculture, Forestry and Fisheries, MLIT, etc.)

3.3.4 Items Expected of Local Governments in Particular

In order to promote global warming countermeasures it is important to bring out the initiative of local governments, the bodies responsible for environmental administration in the regions. It is expected that local governments will promote measures conceived in the regions and most suited to the conditions there.

1. Implementation of Comprehensive and Well-planned Policies

Local governments are expected to formulate and implement comprehensive and well-planned policies tailored to the natural and social conditions of their area (regional promotion plans) based on Article 20 of the Law Concerning the Promotion of Measures to Cope with Global Warming and taking into account the basic philosophy concerning global warming countermeasures in the Kyoto Protocol Target Achievement Plan.

Specifically, it is expected that each region will exercise its originality and ingenuity to advance the building of cutting-edge model regions (global warming countermeasures cutting-edge model regions) that can serve as examples for other regions and that incorporate regional development such as development of cities, etc. that contribute to the reduction of greenhouse gas emissions, development of social capital, introduction of new energy, etc. utilizing the local region's resources. It is expected that they will also contribute to the promotion of the active use of timber resources, etc., conservation and development of forests, use of timber and woody biomass, and the promotion of greening campaigns, etc. and that these policies will spread to other regions. In making these efforts, it is expected that each region will incorporate utilization of the Special Zone for Structural Reform system and the regional revitalization plan system.

Local governments, as the part of the public sector most accessible to businesses and residents, are expected to advance policies closely tied to the regions such as education and dissemination of information for local residents, and support for the activities of private organizations.

When promoting policies they are expected to appropriately ensure the cooperation and participation of businesses, private organizations and residents.

When local governments formulate policies it is expected that they will base them on respect for the voluntary nature of each local government, collaborate with the policies of the central government in this Kyoto Protocol Target Achievement Plan, and contribute to the reduction of greenhouse gas emissions on a national scale while considering improvements to the effective energy efficiency on a national scale of businesses.

2. Items Expected of Prefectures in Particular

In particular prefectures, as a part of the local public sector covering a wider area, are mainly expected to

promote wide-area large-scale regional global warming countermeasures such as traffic flow countermeasures and promotion of efforts by commercial buildings and businesses in that area, and to provide support for efforts by municipalities including support for formulation of the action plans, in cooperation with the prefectural centers for promotion of activities to stop global warming, the Global Warming Countermeasures Regional Council and the volunteers to promote activities to mitigate global warming.

The prefectures are to utilize the Regional Committees on Energy Supply and Demand and Prevention of Global Warming (refer to Chapter 4, Section 3) established in regional blocks throughout Japan to back up the global warming prevention efforts of local governments and other regional entities.

3. Items Expected of Municipalities in Particular

In particular municipalities, as the part of the public sector in the region most accessible to the businesses and residents in that area, are mainly expected to cooperate with the Global Warming Countermeasures Regional Council, analyze the natural and social conditions of their region and advance policies more closely tied to the region and most effectively tailored to the characteristics of the region such as education and dissemination of information for local residents, support for the activities of private organizations, projects to study and introduce new energy utilizing the resources of the local region, etc. in collaboration with the central government, prefectures, regional businesses, etc.

3.3.5 Items Expected of Businesses with High Emissions in Particular

In businesses with significantly high total emissions of greenhouse gases the types of greenhouse gases, greenhouse gas sources, and emission limitation countermeasures are diverse. In order to promote effective countermeasures taking this fact into account, such businesses are expected to individually or jointly formulate plans that include quantitative targets for measures for emission limitation, etc.

Although the content of the plans is left independent to the businesses, they are expected to pay attention to the following points in order to make their best effort to exercise their originality and ingenuity to create a plan.

○ As the target of specific efforts, limit emissions by advancing improvement of the energy consumption basic unit and carbon dioxide emission basic unit and carry out analyses of performance.

○ Carry out an international comparison of the basic unit taking into account the characteristics of each business sector.

○ To the extent possible incorporate measures in the plan to contribute to the limitation, etc. of the greenhouse gas emissions of other entities, such as the development of products with low greenhouse gas emissions, reduction of the volume of waste, etc. and carry out a quantitative evaluation of their contribution to emissions limitation in the commercial and other sector, the residential sector and the transport sector, etc.

○ Businesses that have formulated a plan shall publish it and shall endeavor to publish the status of implementation of measures taken based on it.

○ Businesses shall endeavor to improve the transparency and reliability of their plan by undergoing an objective evaluation of the plan by a related council of the government or a third-party institution and shall endeavor to make efforts toward improving the probability of accomplishing the plan, taking into account the results of the evaluation.

Chapter 4
Projections and the Total Effect of Policies and Measures

4.1 Basic Approach

Several outlooks have been proposed regarding Japan's future greenhouse gas emission and energy consumption. Out of these, the future target presented in the Kyoto Protocol Target Achievement Plan indicates most explicit relevance to the implemented policies and measures, involves broad and numerous organizations in its formulation, and is based on the most recent information. This future target will be described here as future outlook, due to its indication of Japan's future development in greenhouse gas emission, as well as the overall effectiveness of the policies and measures currently adopted and those planned for the future.

Japan has been implementing various global warming countermeasures based on the Outline for Promotion of Efforts to Prevent Global Warming revised in fiscal 2002. When the Outline was evaluated and re-examined in fiscal 2004, the outlook of total greenhouse gas emission by fiscal 2010 (hereafter "existing countermeasures scenario"), if countermeasures and policies that are already or those predetermined will be continually implemented under the current domestic situation, was estimated to be 1.311 billion t-CO_2, a six percent increase compared to the base year.

Consequently, the implementation of countermeasures for the additional emission reduction of 12 percent as well as policies promoting these countermeasures will be necessary on top of the conventionally implemented countermeasures and policies for Japan to achieve its six percent reduction commitment under the Kyoto Protocol. The Kyoto Protocol Target Achievement Plan is what formulates and examines these additional countermeasures and policies. This Plan indicates the total emission outlook (hereinafter "enhanced countermeasures scenario") of greenhouse gas by fiscal 2010 if additional countermeasures and policies were implemented.

Table 4.1 Setup of Cases in the Estimation of Future Outlook

Cases	Meaning
Existing countermeasures scenario (With measures)	Future forecast premised on the implementation of policies and measures (Outline for Promotion of Efforts to Prevent Global Warming) decided prior to the time of assessment
Enhanced countermeasures scenario (With additional measures)	Future forecast premised on additional policies and measures planned after the time of assessment (Kyoto Protocol Target Achievement Plan)

This outlook was estimated based on the latest information available in fiscal 2004 when the Outline for Promotion of Efforts to Prevent Global Warming was evaluated and re-examined. The latest available information was used for other information besides the inventory information from fiscal 2002. In addition, the subject prediction year is fiscal 2010, the medium year of the first commitment period.

Although accounts on both cases will be indicated in the next section, the table below displays the overall picture.

Table 4.2 Future Outlook and Results by Category of Greenhouse Gas Emission

(Unit : Million t-CO_2)

	Base year	Achievement in fiscal 2002		With measures in fiscal 2010		With additional measures in fiscal 2010	
	Million t-CO_2	Million t-CO_2	Ratio to base year total emissions*1	Million t-CO_2	Ratio to base year total emissions*1	Million t-CO_2	Ratio to base year total emissions*1
Energy-originated CO_2	1,048	1,174	10.2%	1,115	5.4%	1,056	0.6%
Industrial sector	476	468	-0.7%	450	-2.1%	435	-3.3%
Commercial and Residential sector	273	363	7.3%	333	4.9%	302	2.3%
(Commercial and other sector)	144	197	4.3%	178	2.8%	165	1.7%
(Residential sector)	129	166	3.0%	155	2.1%	137	0.6%
Transport sector	217	261	3.6%	259	3.4%	250	2.7%
Energy industries sector	82	82	0.0%	73	-0.8%	69	-1.1%
Non-energy-originated CO_2, CH_4, N_2O	139	128	-0.9%	130	-0.8%	124	-1.2%
Non-energy-originated CO_2	74	73	-0.1%	74	0.0%	70	-0.3%
CH_4	25	20	-0.4%	20	-0.3%	20	-0.4%
N_2O	40	35	-0.4%	35	-0.4%	34	-0.5%
Three fluorinated gases	50	28	-1.7%	67	1.4%	51	0.1%
HFC	20	13	-0.6%	46	2.1%	34	1.1%
PFC	13	10	-0.2%	9	-0.3%	9	-0.3%
SF_6	17	5	-0.9%	12	-0.4%	8	-0.7%
Greenhouse gas emissions	1,237	1,331	7.6%	1,311	6.0%	1,231	-0.5%

Source of Greenhouse Gas Removal -3.9%*2

Utilization of the Kyoto Mechanism -1.6%*3

Total -6.0%

*1 Base year total emissions ratio = (emissions for each case in each area - base year emissions in each area) / base year total emissions

*2 If the estimate is calculated for the case in which forest development and the supply and use of timber, etc. remains close to current levels, it is expected that the volume of removal that could be ensured will be much lower.

*3 The Kyoto Mechanism is applied to determine the difference between the reduction commitment

amount under the first commitment period of the Kyoto Protocol, and the actual greenhouse gas emission (emission of greenhouse gas after exclusion of removal amount).

Chapter 3 of this report describes the countermeasures and policies considered in both cases and the individual effects that can be expected. This chapter indicates the future outlook anticipating the overall effects caused by these countermeasures and policies.

In addition, the classification applied here varies from the classification in Chapter 2. This classification is commonly employed in Japan for the purpose of performing the evaluation of divisional progress and the reexamination of countermeasures and policies in a steady manner, while taking into account the activities of each organization and the application of statistics. Special attention should be paid regarding energy-originated carbon dioxide as it indicates emission of carbon dioxide involved in the generation of electricity and heat distributed to each final consumption divisions. All divisional emissions in this chapter are indicated in the form of indirect emission distributed to the final divisions.

4.2 Future Outlook

Japan's base year emissions of all greenhouse gases (hereafter "base year total emissions") were 1.237 billion t-CO_2. In order to achieve the six percent reduction commitment, it is necessary to reduce annual average total emissions to 1.163 billion t-CO_2 per year in the first commitment period.

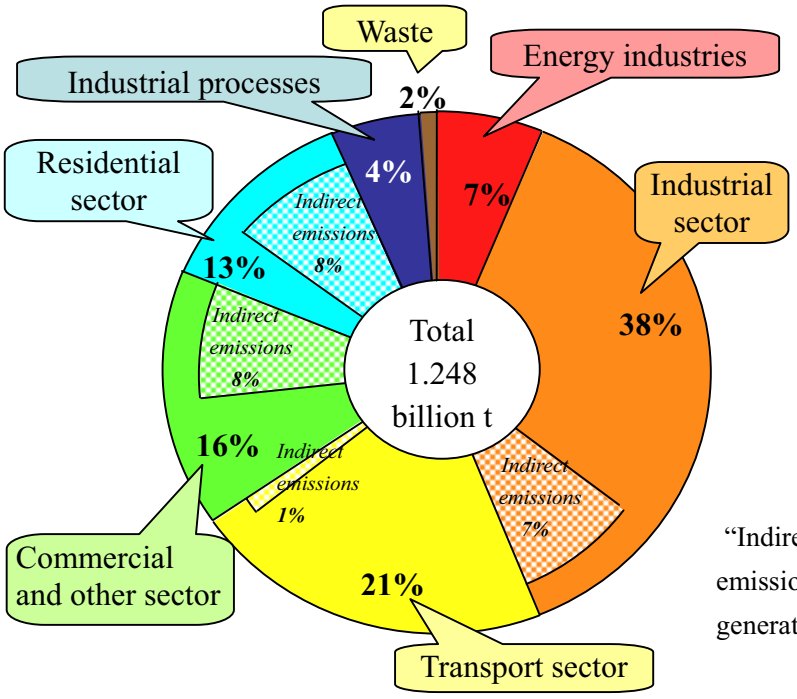
On the other hand, Japan's total emissions of greenhouse gases in fiscal 2002 were 1.331 billion t-CO_2, a 7.6 percent increase over the base year, so that Japan now has to reduce emissions by 13.6 percent to achieve its reduction commitment.

This happened because even though there has been progress in the reduction of non-energy-originated carbon dioxide, methane, nitrous oxide and the three fluorinated gases, emissions of energy-originated carbon dioxide, which account for approximately 90 percent of Japan's greenhouse gas emissions, greatly increased (an increase of 10.2 percent over the base year total emissions by fiscal 2002). Factors behind the increase in emissions of energy-originated carbon dioxide include the cessation of nuclear power generation in the second half of 2002 and other one-off factors, the transformation of the industrial structure, an increase in energy consumption in offices and households due to factors such as increase in the floor area of office buildings, etc., and increased numbers of personal computers, home appliances, etc. In addition, due to an increase in passenger demand, etc., although emissions from the industrial sector, which accounts for approximately 40 percent of carbon dioxide emissions, and from the transport (trucks and public transport systems, etc.) sector, which accounts for approximately 10 percent, did not show much change, emissions greatly increased from the commercial and other sector, which account for approximately 20 percent, the residential sector, which accounts for approximately 10 percent, and the transport (passenger cars for personal use) sector, which accounts for approximately 10 percent.

Carbon dioxide emissions in fiscal 2002 by sector are shown in Figure 4.1.

The projection of total emissions of greenhouse gases as of fiscal 2010, if the Government of Japan continues to implement the various countermeasures to date in the same way based on the Outline for Promotion of Efforts to Prevent Global Warming, is approximately 1.311 billion t-CO_2, an increase of approximately six percent over the base year. (Refer to Table 1 for the projections of emissions by type of greenhouse gas and emissions of energy-originated carbon dioxide by sector.)

Therefore, in order to achieve its six percent reduction commitment under the Kyoto Protocol, it is necessary for Japan to implement countermeasures based on the Kyoto Protocol Target Achievement Plan and policies, and to promote these countermeasures in addition to the countermeasures and policies it has already been implementing, if it wants to achieve a further incremental emissions reduction of approximately 12 percent (approximately 148 million t-CO_2) (Figure 4.2).



"Indirect emissions" refers to emissions resulting from power generation by power suppliers, etc.

Figure 4.1 Japan's Carbon Dioxide Emissions by Sector (fiscal 2002)

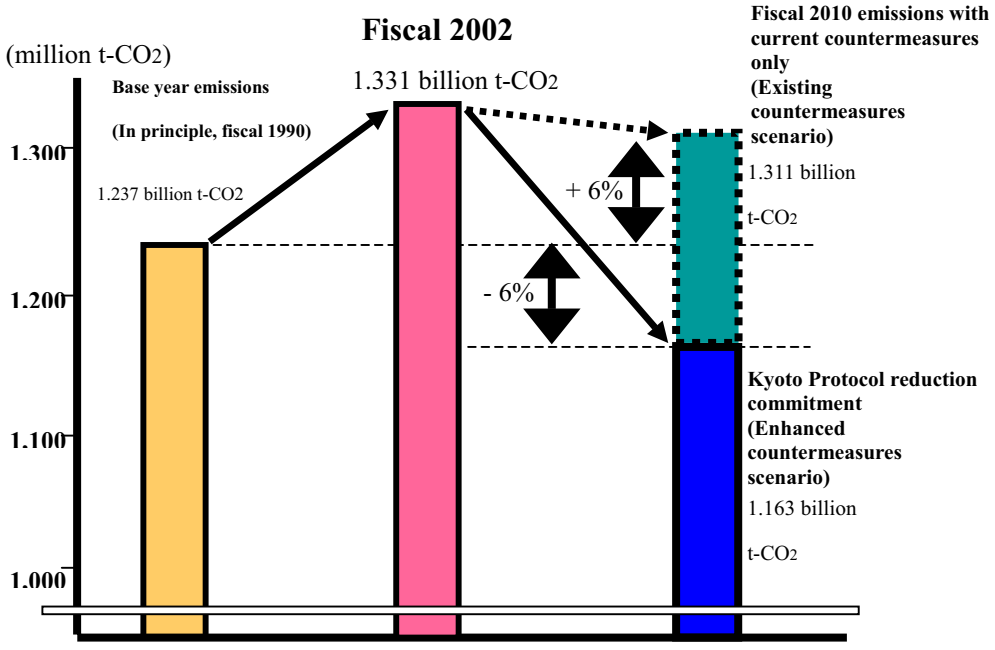


Figure 4.2 Japan's six percent Reduction Commitment under the Kyoto Protocol and Japan's Greenhouse Gas Emissions

4.2.1 Future Outlook for Energy-originated Carbon Dioxide

The target for energy-originated carbon dioxide[1] is a level of total emissions relative to the base year of +0.6 percent from the fiscal 1990 level (approximately 1.056 billion t-CO_2).

Emissions of energy-originated carbon dioxide, which accounts for 90 percent of Japan's greenhouse gas emissions, in statistical terms can be divided into five sectors: the industrial sector[2], the commercial and other sector[3], the residential sector, the transport sector, and the energy industries sector[4]. It is also possible to look at the effects of countermeasures and policies in each of these sectors. The targets in each of these sectors are as in Table 3, but these targets have been established as approximations that provisional calculations show can be achieved if Japan records the currently forecast level of economic growth[5], countermeasures on the energy supply side produce the anticipated results, and countermeasures in each sector on the energy demand side also produce the anticipated results.

Note: It is expected that if countermeasures and policies are not formulated, emissions will increase through economic growth and other major factors. Thus, the targets provisionally calculated and established in each sector will be realized through countermeasures and policies to reduce emissions from fiscal 2002 levels by 33 million t-CO_2 in the industrial sector, 31 million t-CO_2 in the commercial and other sector, 29 million t-CO_2 in the residential sector, 11 million t-CO_2 in the transport sector, and 13 million t-CO_2 in the energy industries sector.

[1] Energy-originated carbon dioxide refers to carbon dioxide generated as a result of the use of energy.
[2] Factories, etc.
[3] Office buildings, retail stores, hospitals, schools, etc.
[4] Self-consumption such as power plants, petroleum processing facilities, etc.
[5] January 21, 2005 Cabinet Decisions *Economic Outlook for fiscal 2005 and Basic Economic and Fiscal Management Measures* and *Structural Reform and Medium-Term Economic and Fiscal Perspective - fiscal 2004 Revision.*

Table 4.3 Targets in Each Sector for Energy-originated Carbon Dioxide

(Enhanced Countermeasures Scenario)

Estimated results	Base year (fiscal 1990)	Fiscal 2002 level of emissions		Targets in each sector for fiscal 2010		<Reference> Difference between the fiscal 2010 targets and the fiscal 2002 level of emissions
	A	B	(B-A)/A	C	(C-A)/A	
	million t-CO_2	million t-CO_2	(Percentage change relative to base year in each sector)	million t-CO_2	(Percentage change relative to base year in each sector)	
Energy- originated CO_2	1,048	1,174		1,056		
Industrial sector	476	468	(-1.7%)	435	(-8.6%)	It is expected that if countermeasures and policies are not formulated, emissions will increase through increases in the volume of production resulting from economic growth, etc. Provisional calculations show that emissions can be reduced by 33 million tons from fiscal 2002 levels through countermeasures and policies.
Commercial and Residential sector	273	363	(+33.0%)	302	(+10.7%)	
(Commercial and other sector)	144	197	(+36.7%)	165	(+15.0%)	It is expected that if countermeasures and policies are not formulated, emissions will increase through increases in the floor area in buildings, etc. Provisional calculations show that emissions can be reduced by 31 million tons from fiscal 2002 levels through countermeasures and policies.

		(Residential sector)	129	166	(+28.8%)	137	(+6.0%)	It is expected that if countermeasures and policies are not formulated, emissions will increase through increases in the number of households and the per household device ownership rate, etc. Provisional calculations show that emissions can be reduced by 29 million tons from fiscal 2002 levels through countermeasures and policies.
	Transport sector		217	261	(+20.4%)	250	(+15.1%)	It is expected that if countermeasures and policies are not formulated, emissions will increase through increases in the number of automobiles owned, etc. Provisional calculations show that emissions can be reduced by 11 million tons from fiscal 2002 levels through countermeasures and policies.
	Energy industries sector		82	82	(-0.3%)	69	(-16.1%)	This is self-consumption such as at power plants, petroleum processing facilities, etc. Provisional calculations show that by continuing to steadily develop efficient energy use in these facilities, etc., emissions can be reduced by 13 million tons from fiscal 2002 levels.

Note: Due to rounding, the totals in the table above may not match the sum of the columns.

Table 4.4 Actual emissions and future outlook for Energy-originated Carbon Dioxide

(unit: million t-CO_2)

Sector	Actual emissions			2010 projection	
	Base year	2003	% Change	With measures	With additional measures
Energy-originated Carbon Dioxide	1,048	1,188	13.3%	1,115	1,056

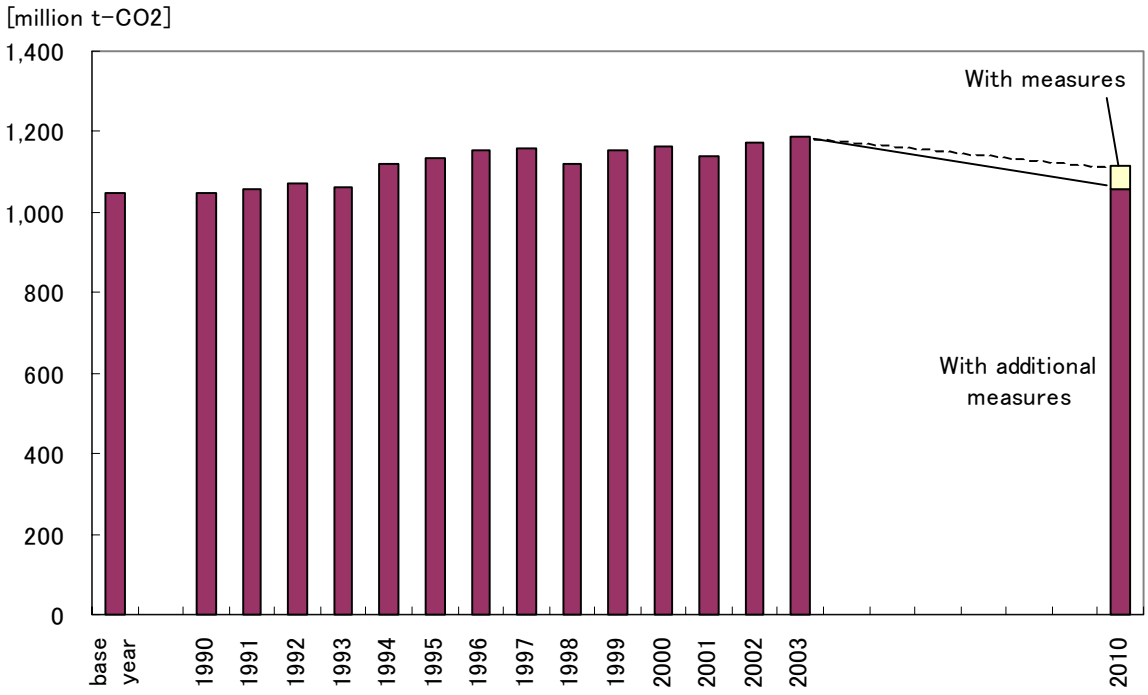


Figure 4.3 Actual emissions and future outlook for Energy-originated Carbon Dioxide

4.2.2 Future Outlook for Non-energy-originated Carbon Dioxide

The target for non-energy-originated carbon dioxide is a level of -0.3 percent from the fiscal 1990 level as the ratio to the base year total emissions (approximately 70 million t-CO_2).

Table 4.5 Actual emissions and future outlook for Non-energy-originated Carbon Dioxide

(unit: million t-CO_2)

Sector	Actual emissions			2010 projection	
	Base year	2003	% Change	With measures	With additional measures
Industrial processes	57.0	48.0	- 15.8%	45.9	45.9
Waste (Waste incineration)	16.9	23.3	37.8%	28.3	23.8
Total	73.9	71.3	- 3.5%	74.2	69.7

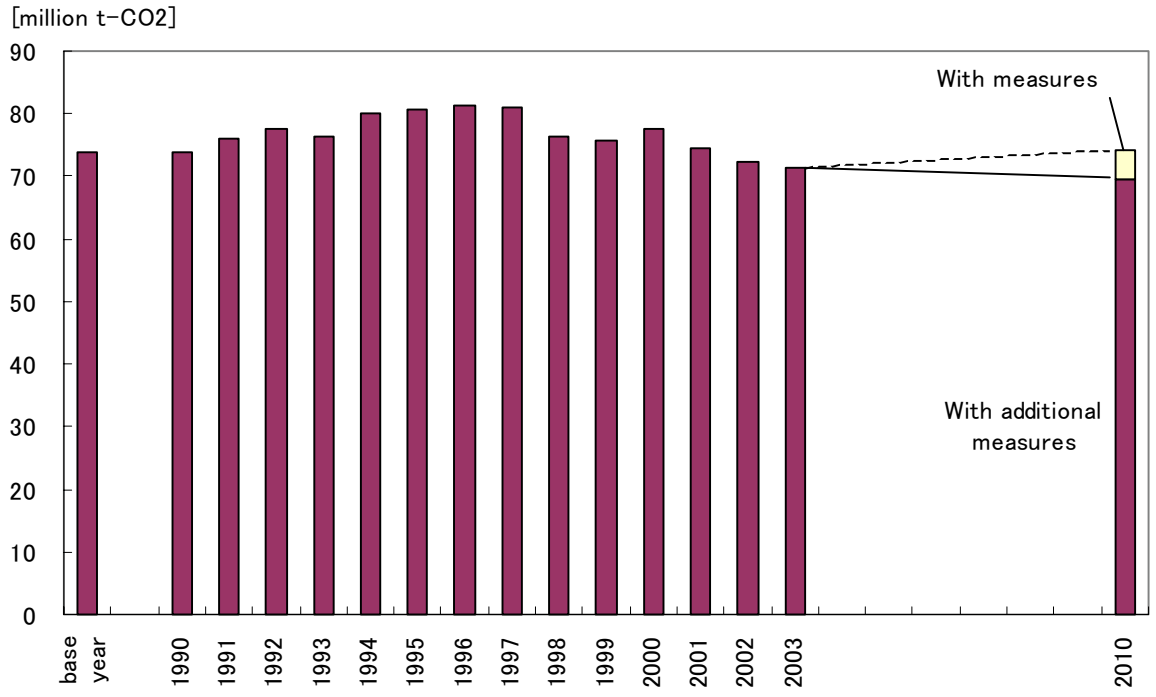


Figure 4.4 Actual emissions and future outlook for Non-energy-originated Carbon Dioxide

4.2.3 Future Outlook for Methane Emissions

The target for methane is at a level -0.4 percent from the fiscal 1990 level (approximately 20 million t-CO_2) as the ratio to the base year total emissions.

Table 4.6 Actual emissions and future outlook for Methane Emissions

(unit: million t-CO_2 equiv.)

Sector	Actual emissions			2010 projection	
	Base year	2003	% Change	With measures	With additional measures
Fuel combustion activities	0.5	0.5	- 1.0%	0.8	0.8
Fugitive emissions from fuels	3.2	0.6	- 81.5%	0.6	0.6
Industrial process	0.3	0.1	- 65.4%	0.1	0.1
Agriculture	15.6	13.4	- 13.8%	14.3	14.3
Waste	5.2	4.6	- 10.1%	4.6	4.2
Total	24.8	19.3	- 22.1%	20.4	20.1

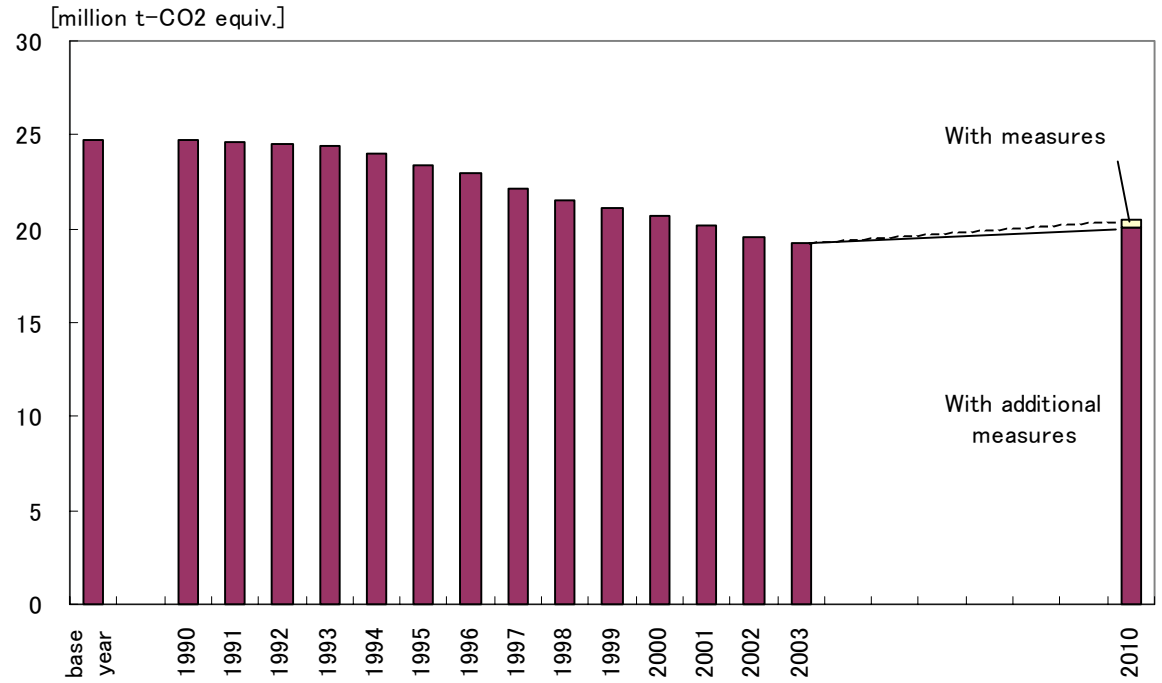


Figure 4.5 Actual emissions and future outlook for Methane Emissions

4.2.4 Future Outlook for Nitrous Oxide Emissions

The target for nitrous oxide is a level of -0.5 percent from the fiscal 1990 level (approximately 34 million t-CO_2) as the ratio to the base year total emissions.

Table 4.7 Actual emissions and future outlook Nitrous Oxide Emissions

(unit: million t-CO_2 equiv.)

Sector	Actual emissions			2010 projection	
	Base year	2003	% Change	With measures	With additional measures
Fuel combustion activities	6.2	9.6	54.9%	9.8	9.8
Industrial process	7.4	1.2	- 83.7%	1.3	1.3
Solvent and other product use	0.3	0.3	11.8%	0.2	0.2
Agriculture	23.4	19.8	- 15.4%	19.4	19.4
Waste	2.9	3.6	27.6%	4.2	3.0
Total	40.2	34.6	- 13.9%	34.9	33.7

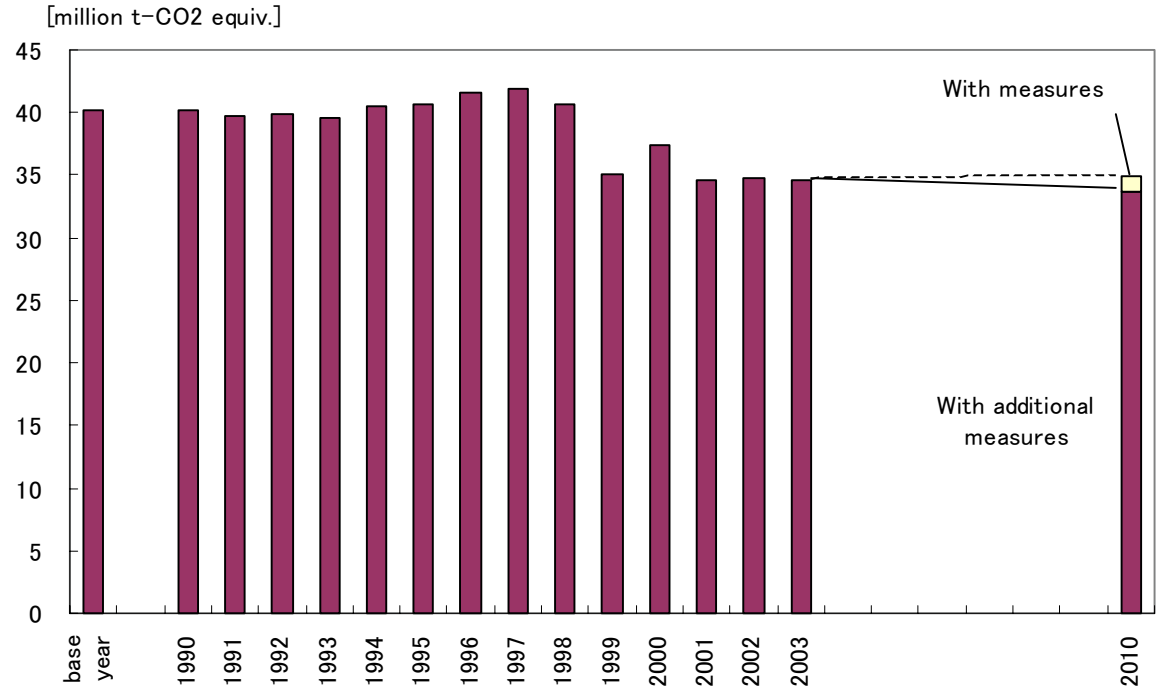


Figure 4.6 Actual emissions and future outlook for Nitrous Oxide Emissions

4.2.5 Future Outlook for Three Fluorinated Gases

The target for the three fluorinated gases (HFC, PFC, SF_6) is a level of total emissions relative to the base year of +0.1 percent from the base year (1995) level (approximately 51 million t-CO_2).

In some cases, these three fluorinated gases are interchangeable, and because countermeasures and policies are sometimes implemented for all of these three gases, it is appropriate to combine countermeasures and policies according to technology and market conditions that minimize the social cost while at the same time obtaining the maximal results. For this reason, the figures shown for each gas are shown as the rough breakdown to more steadily achieve the target of "+0.1 percent" for the three fluorinated gases collectively, on the assumption of technology and market conditions, etc. at the present time. It is necessary to keep in mind the fact that these figures would fluctuate depending on future changes in these conditions.

Table 4.8 Actual emissions and future outlook for Three Fluorinated Gases

(unit: million t-CO_2 equiv.)

Sector	Actual emissions			2010 projection	
	Base year	2003	% Change	With measures	With additional measures
HFCs	20.2	12.3	- 39.2%	45.7	34.3
PFCs	12.6	9.0	- 28.2%	8.7	8.7
SF_6	16.9	4.5	- 73.6%	12.1	8.0
Total	49.7	25.8	- 48.1%	66.6	51.0

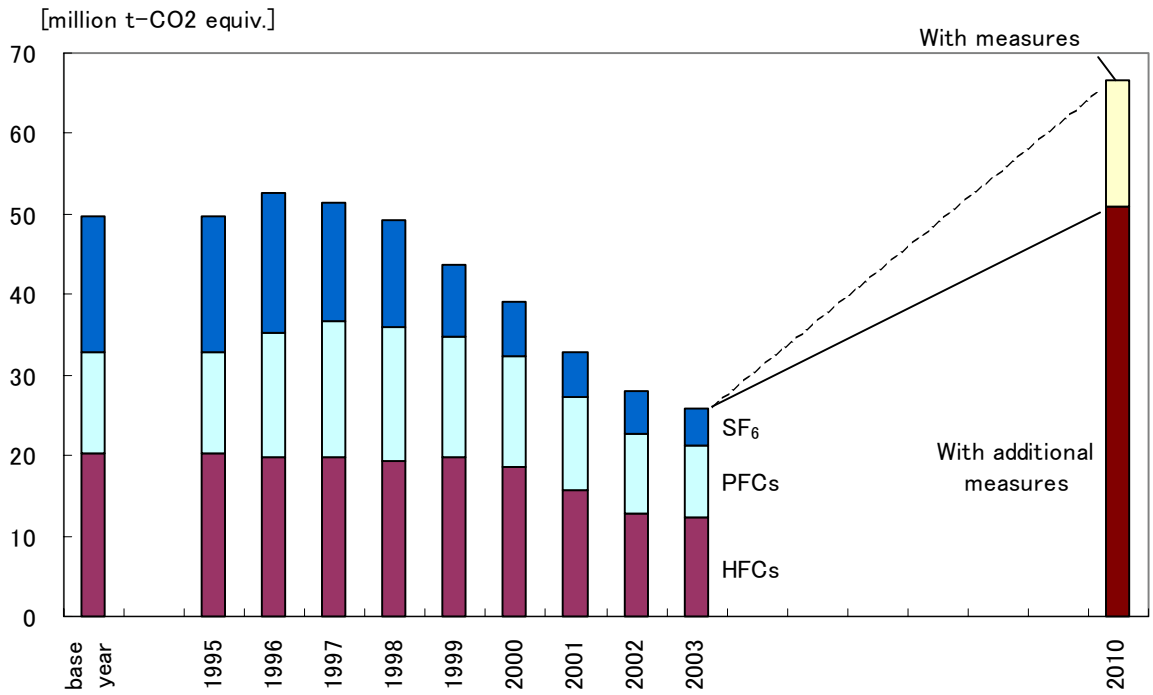


Figure 4.7 Actual emissions and future outlook for Three Fluorinated Gases

4.2.6 Future Outlook for Greenhouse Gas Carbon Sinks

The target of the Government of Japan is to ensure removal of the 13 million t-C (47.67 million t-CO_2, approximately 3.9 percent compared to the total emissions of the base year), agreed to at the Seventh Conference of the Parties to the UN Framework Convention on Climate Change (COP7) as the amount of removal by Japan's forest management, by all forests subject to Article 3, Paragraphs 3 and 4 of the Kyoto Protocol.

4.2.7 Kyoto Mechanisms

Concerning the difference between emissions equivalent to the reduction commitment in the first commitment period of the Kyoto Protocol and actual greenhouse gas emissions (this refers to emissions after deduction of greenhouse gas removal) in the same period, the target is to utilize the Kyoto Mechanisms.

Even if any of the targets for greenhouse gases and greenhouse gas carbon sinks are confidently expected to be achieved in the first commitment period, the Government of Japan will not rest but rather will continue to steadily promote countermeasures.

Note: If it is based on the emissions projections for each gas from the results of each kind of

countermeasure being undertaken at the present time, the difference is 1.6 percent of total emissions in the base year, but fluctuations may occur due to the results of various countermeasures and policies, economic trends, etc.

4.2.8 Targets of Individual Countermeasures

In order to give an overall picture of countermeasures with a specific grounding to achieve the six percent reduction commitment under the Kyoto Protocol, the Kyoto Protocol Target Achievement Plan addresses the individual countermeasures to achieve the targets for each greenhouse gas and for other categories and approximate targets for each sector for energy-originated carbon dioxide described in Section 2. It stipulates nationwide countermeasures evaluation indicators, expected emissions reductions, national policies to promote countermeasures, and examples of policies that local governments are expected to implement, and shows this information in tabular form for each sector and category. (Refer to Appendix 1-5.)

Countermeasures evaluation indicators are stipulated as targets of individual countermeasures designed to achieve targets for each greenhouse gas and approximate targets for each sector of energy-originated carbon dioxide.

The expected reduction in greenhouse gas emissions (carbon dioxide equivalent) resulting from countermeasures is calculated by combining factors other than the results of the countermeasures in question. By clarifying the premise of calculation at the time of the formulation of the Kyoto Protocol Target Achievement Plan, it becomes possible to carry out ex-post verification.

4.3 Method of Estimation

4.3.1 Energy-originated Carbon Dioxide

1) Overview of Models

To estimate energy-originated carbon dioxide emission, a combined model group of Macroeconometric Model, Optimum Power Generation Model, Bottom-up Model, and Distributed Generation Technologies Capacity Introduction Model were used as sub models of the Energy Supply-Demand Model (Econometric Model) based on the energy balance table. The overview of the models is shown below.

Although we indicated estimate results using the KEO Model (General Equilibrium Model) in the previous report, this time we recruited the Econometric Model.

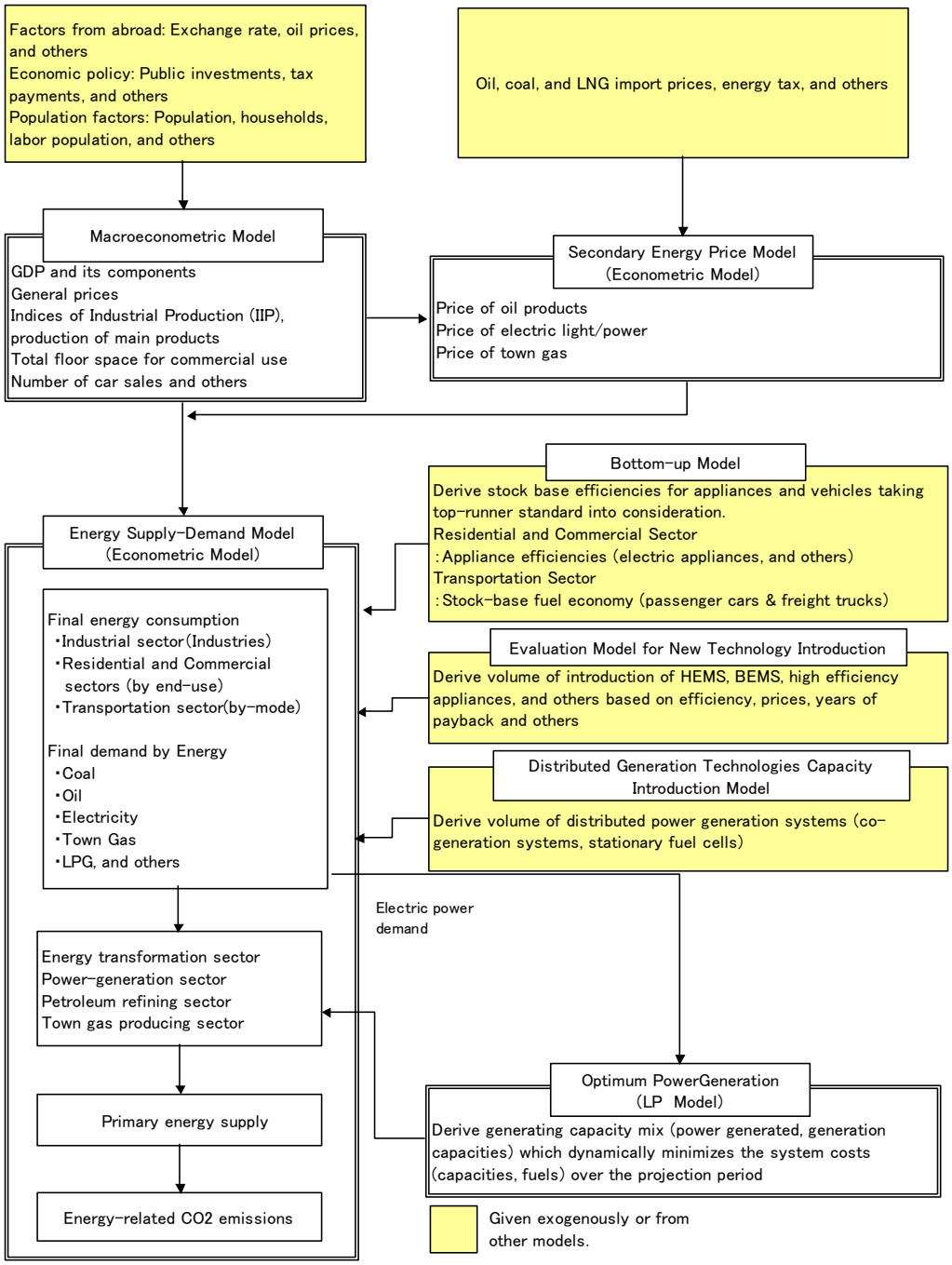


Figure 4.8 Overview of the Models

[Macroeconometric Model]

The model derives economic activity index that directly and indirectly affects the energy demand by calculating macro frames with integral balance between income distribution, industrial markets, labor markets and general prices.

- GDP and its components, production, IIP, total floor space for commercial use, and automobile sales volume, etc.

[Secondary Energy Price Model]

The model derives the energy purchase price that affects choice behavior and energy demand from the general domestic price index as well as import prices of petroleum, LNG, and other energies.

- Price of oil products, price of electric light/power, and price of town gas.

[Optimum Power Generation Model]

The model derives the economically rational and optimal power source mix (power generated, generation capacities) by dynamically minimizing the total system costs (equipments, fuels) of assumed electricity demand at discounted present value over the projection period.. It utilizes Linear Programming Model for optimization.

- Power source mix (generation capacities, power generated)

[Bottom-up Model]

The model derives energy conservation indicators such as automobile fuel efficiency and household appliance efficiency, in order to explicitly incorporate the efficacy of the top-runner standard difficult to process with a regression macro model.

- Stock-base fuel economy in transportation sector and appliance efficiencies in the commercial and residential sector.

[Evaluation Model for New Technology Introduction]

The model derives volume and effectiveness of introduction of HEMS, BEMS, efficient water heater, and others that are expected to be introduced in the future based on introduction rate by incorporating price decline led by diffusion, years of payback and others.

- HEMS and BEMS penetration rate and number of efficient water heaters and others introduced.

[Distributed Generation Technologies Capacity Introduction Model]

The model derives the market size, which fuel cells and industrial, commercial and residential co-generation system are introduced, from competitive energy price, heat demand and past results.

- Distributed power generator mix (generator capacities, power generated, heat quantity)

[Energy Supply-Demand Model]

The model derives the energy demand in each final sector from economic activity index, price index, and energy conservation indicators gained from the models above. Then, it derives the primary energy supply by undergoing energy transformation from the electricity generation sector. The model also derives the amount of carbon dioxide emission based on primary energy consumption of each energy source.

- Sectoral final energy consumption, primary energy supply by energy source, and carbon dioxide emission, etc.

2) Outlook on Macro Frame

The macro frame is defined as seen below. This definition is commonly employed in each case.

(i) Population and Labor Force

The population is assumed to decline after its peak in fiscal 2006, based on the "medium variant" population projection publicized by the National Institute of Population and Social Security Research in January 2001.

The unemployment rate will improve from current level (approximately five percent).

Fiscal Year	1990	1995	2000	2005	2010
Total population (10,000 people)	12,361	12,557	12,693	12,771	12,747
Labor force (10,000 people)	6,414	6,672	6,772	6,759	6,709

Note 1: Total population reaches to a peak of 127.74 million people in fiscal 2006.
Labor force reached to a peak of 67.93 million people in fiscal 1997.

(ii) Standard Currency Exchange Rate

The exchange rate is assumed to remain at ¥120=US$1, based on the results from the past five years.

(iii) Energy Prices

The energy price is assumed to remain stable between fiscal 2000–2010 referring to the prospects of the International Energy Agency (IEA) and the United States Department of Energy (DOE).

(In real terms)

	Fiscal 2000	→	Fiscal 2010
Petroleum	: $28/b	→	$21/b
LNG	: $252/t	→	$179/t
Coal	: $35/t	→	$39/t

(Figures for fiscal 2010 is based on dollar value in fiscal 2000)

(iv) Economic Growth

Based on the prospects indicated in the Structural Reform and Medium-term Economic and Fiscal Perspectives (approved by the Cabinet on 21 January 2005) and its reference (created by the Cabinet Office) the real GDP growth rate by fiscal 2010 is assumed to transition as below.

Fiscal Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Real GDP Growth Rate (%)	0.8	1.9	2.1	1.6	1.5	1.5	1.6	1.5	1.6	1.6	1.5

Note: Fiscal 2002 and 2003 are based on actual results

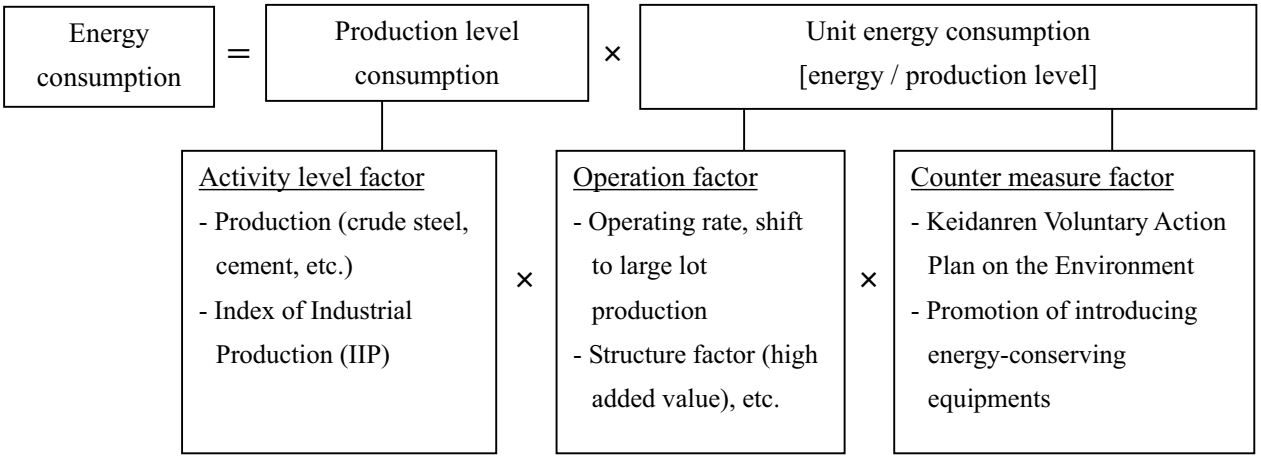
(v) Final Demand Components（Macro Components）

The future economy is assumed to see growth led by private demand as in private consumption and corporate investment. The public sector, on the other hand, is assumed to see restrain in expenses, taking into account the Structural Reform and Medium-term Economic and Fiscal Perspectives.

3) Trends and Calculation Methodology by Sector

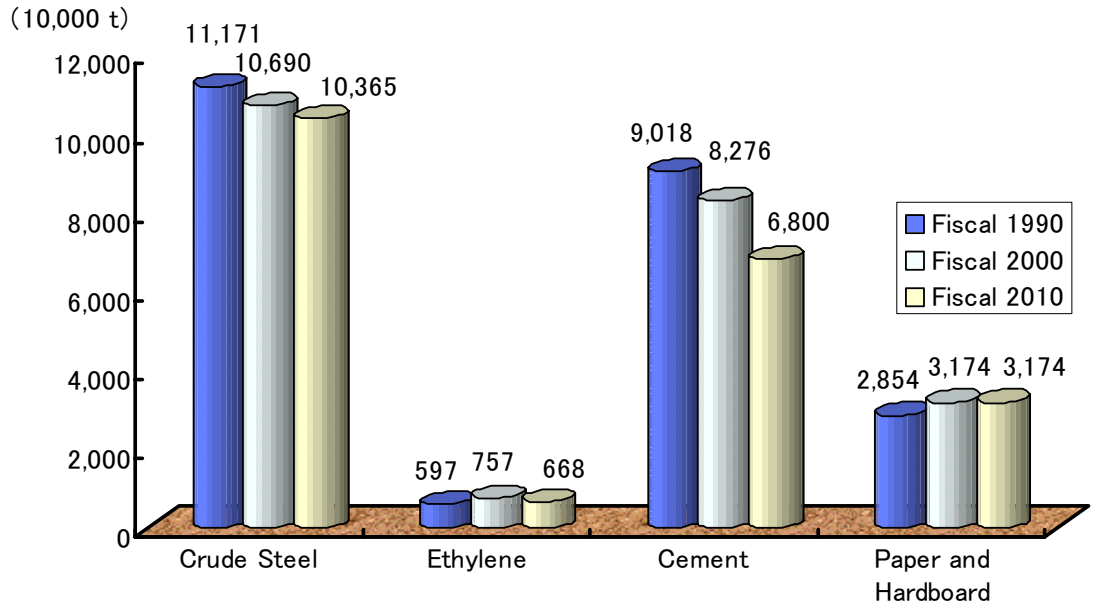
(i) Industrial Sector

[a] Basic Structure



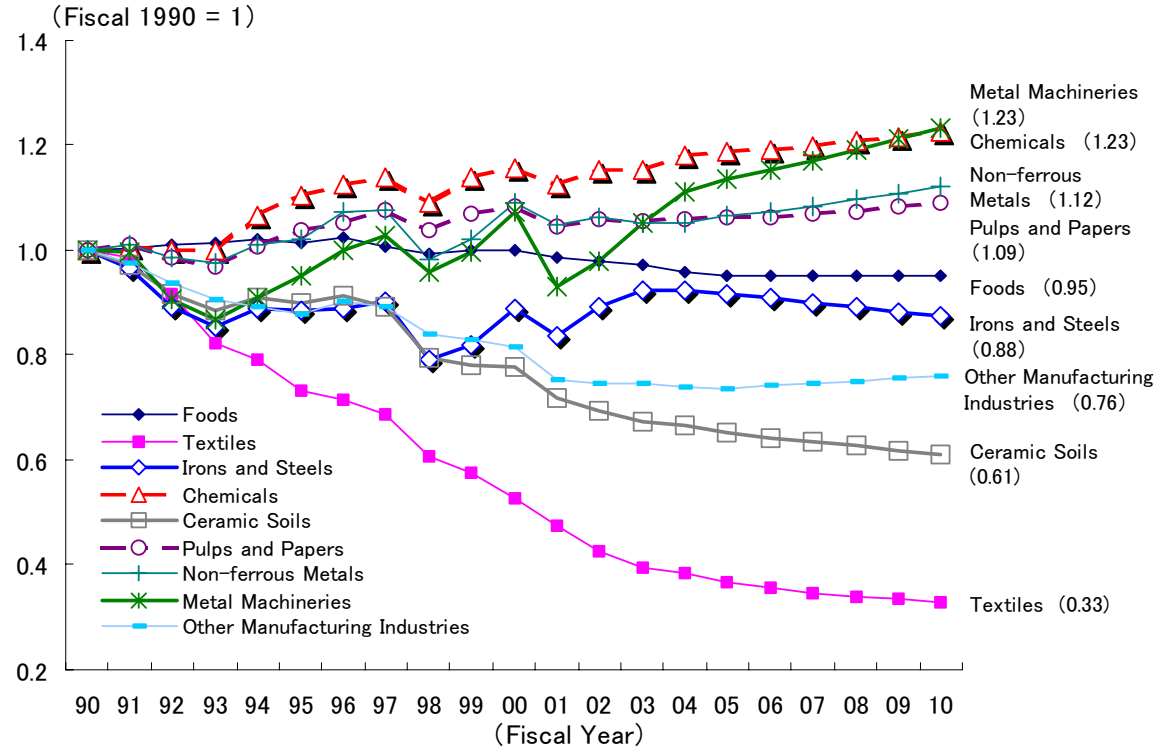
[b] Activity Level Factor (Production Level) and Operation Factor

In the manufacturing industry in general, activity of the metal and machine industry and others will expand, and the material industry will shift more to a processing and assembly industry. On the other hand, although foreign demands as such countries as China and others will support the energy-intensive industry, the overall production level will tend to decrease toward fiscal 2010 due to slackened growth of domestic demands caused by the decline in public investment and the reinforced production capacity in China. At the same time, the Index of Industrial Production (IIP) will in general increase due to progress in the tendency to heighten the added value.



Note 1: Figures for cement production are a sum of structural cement production and export cement clinker.
Note 2: Figures for fiscal 2010 are estimated on certain premises and thus should be acknowledged with some margins.

Figure 4.9 Production Estimate on Four Major Energy Consuming Industries



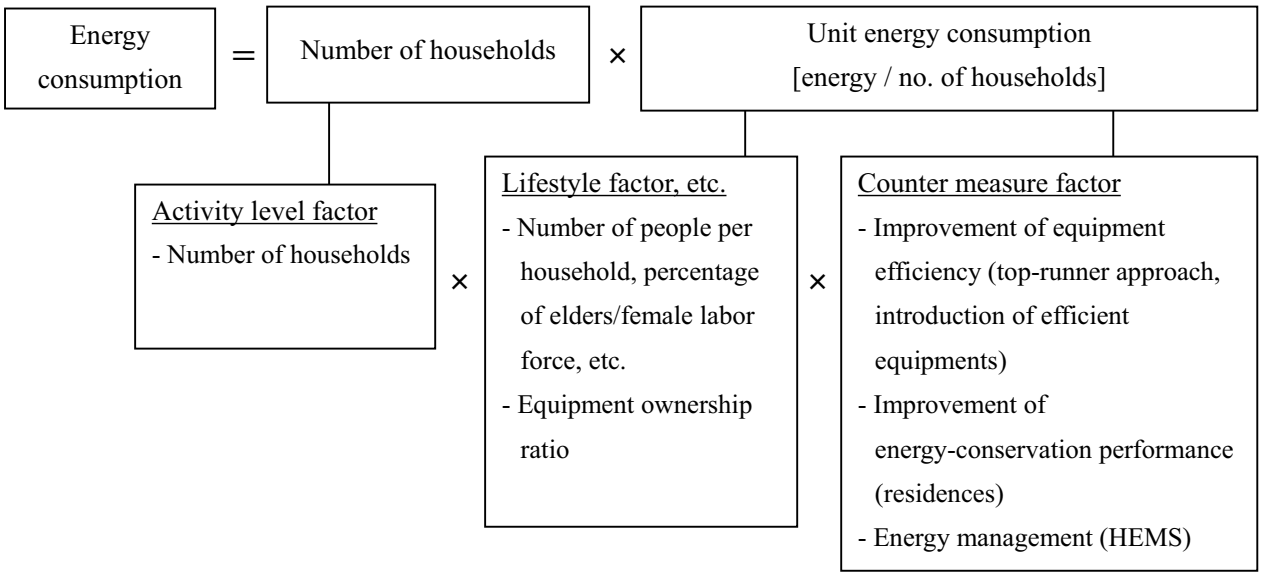
Note: Figures are estimated on certain premises and thus should be acknowledged with some margins.

Figure 4.10 Estimate on Index of Industrial Production (2000 Base)

(ii) Commercial and Residential Sector

Residential Sector

[a] Basic Structure



[b] Number of Households and Lifestyle Factor

- With the decrease in population, the increase in the number of households will tend to slow down.
- The equipment ownership ratio (number of equipment owned per household) will increase while the growth in size and the tendency to heighten the added value will progress.

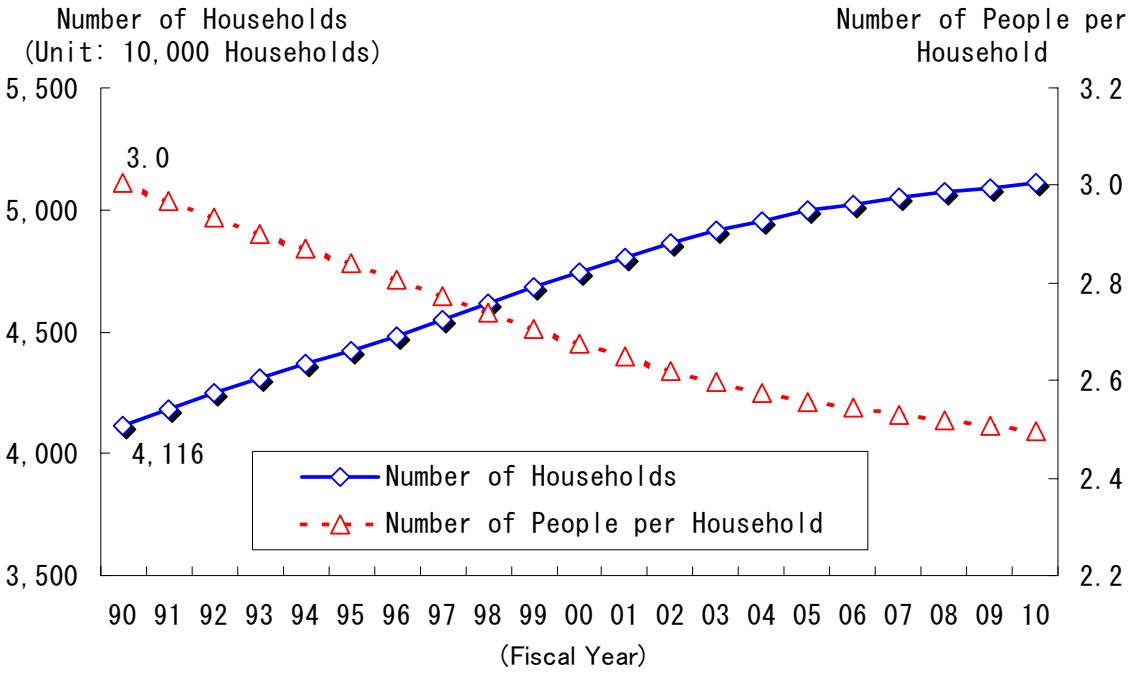


Figure 4.11 Number of Households and Number of People per Household

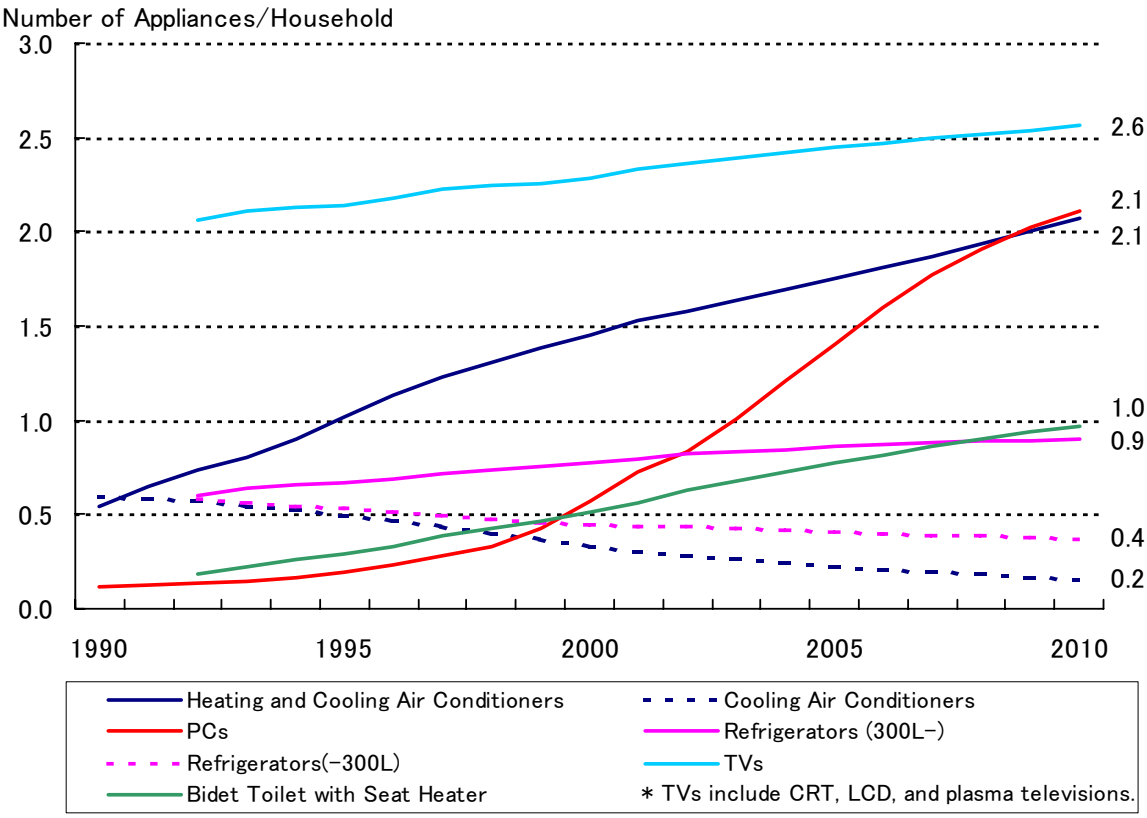
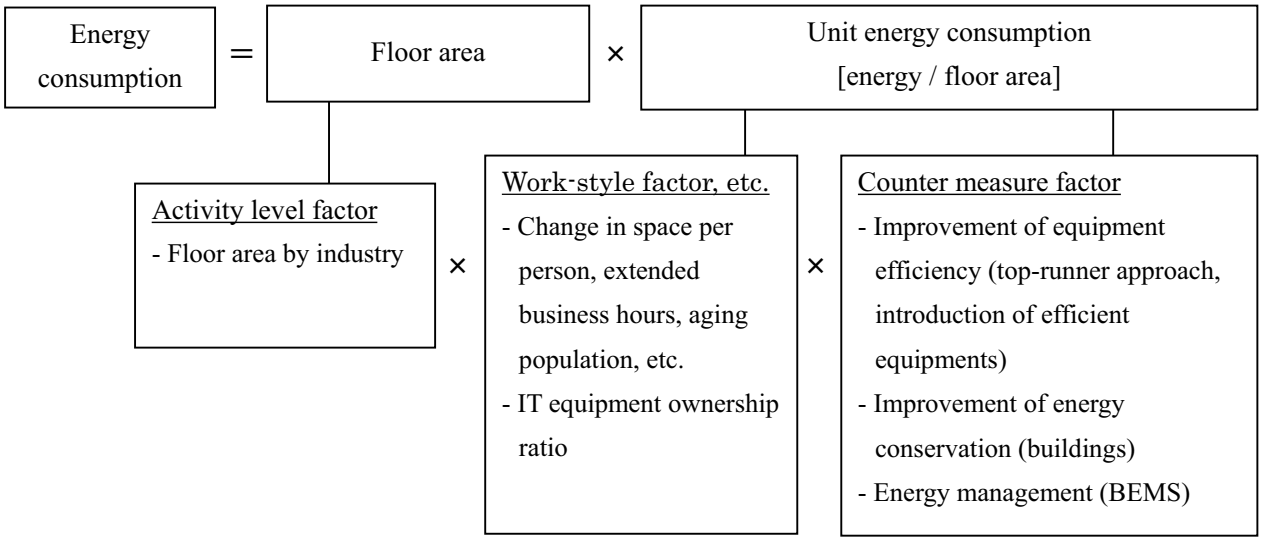


Figure 4.12 Home Appliance Ownership Ratio per Household

Commercial and other Sector

[a] Basic Structure



[b] Floor Area and Work-style Factor

- With the trend toward a service economy, floor area will increase mainly in the office buildings, and with the aging of the population, medical and welfare areas will show firm growth.

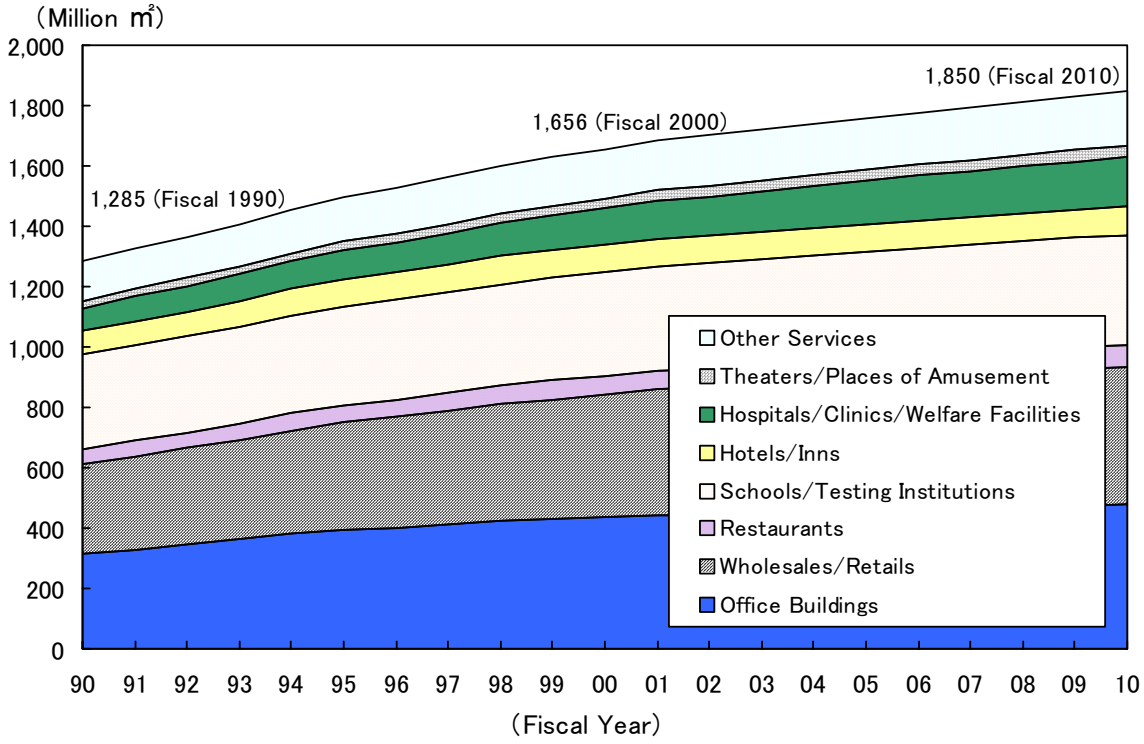


Figure 4.13 Estimate on Commercial Floor Area

(iii) Transport Sector (Passenger and Cargo)

[a] Basic Structure of the Transport Sector

Energy consumption = Transport volume × Unit energy consumption [energy / transport volume]

Activity level factor
- Passenger: person kilo
- Cargo: ton kilo

×

Lifestyle, work-style, and usage factors
- Ownership ratio, mix of owned vehicles
- Usage pattern (average no. of passenger, loads, etc.)

×

Counter measure factor
- Improvement of fuel efficiency (top-runner approach), and railroad/ship efficiency
- Clean-energy vehicles (hybrid/natural gas vehicles, etc.)
- Transport countermeasures (traffic, public transportation, modal shift, etc.)

[b] Transport Volume and Number of Automobiles Owned

- Passenger transportation will increase. Cargo transportation will tend to decrease due to slacking in economic activity growth and promotion of distribution efficiency.
- The number of passenger automobiles owned will steadily increase while commercial vehicles are expected to decrease due to slacking in economic activity growth and promotion of distribution efficiency.

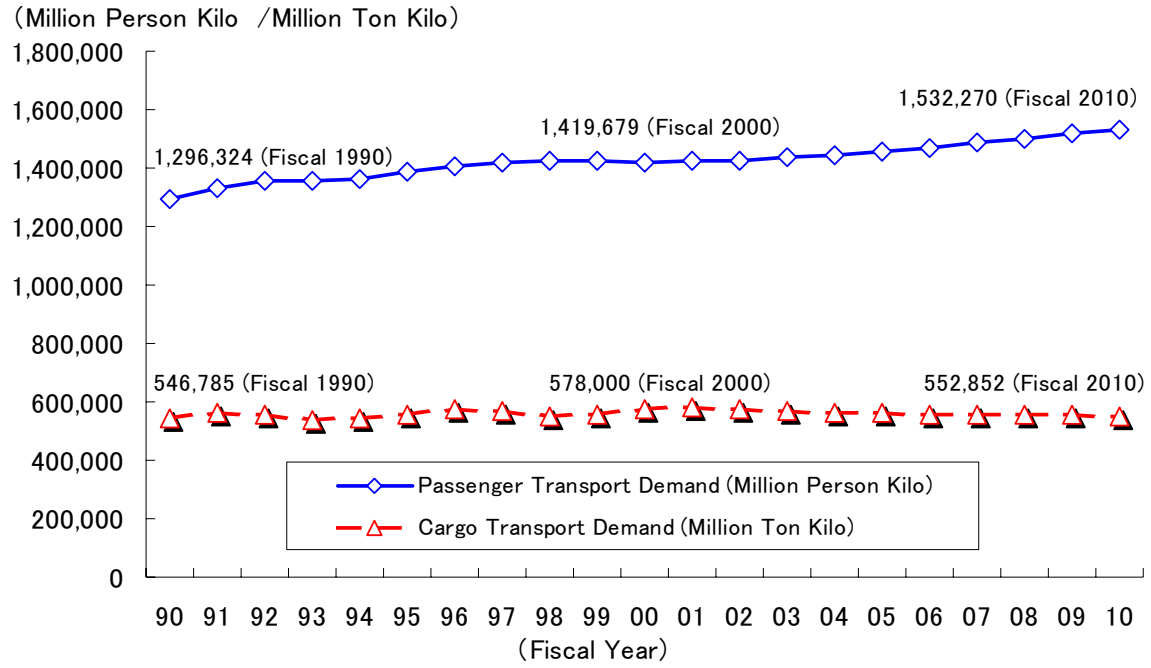


Figure 4.14 Transition of Transport Demand

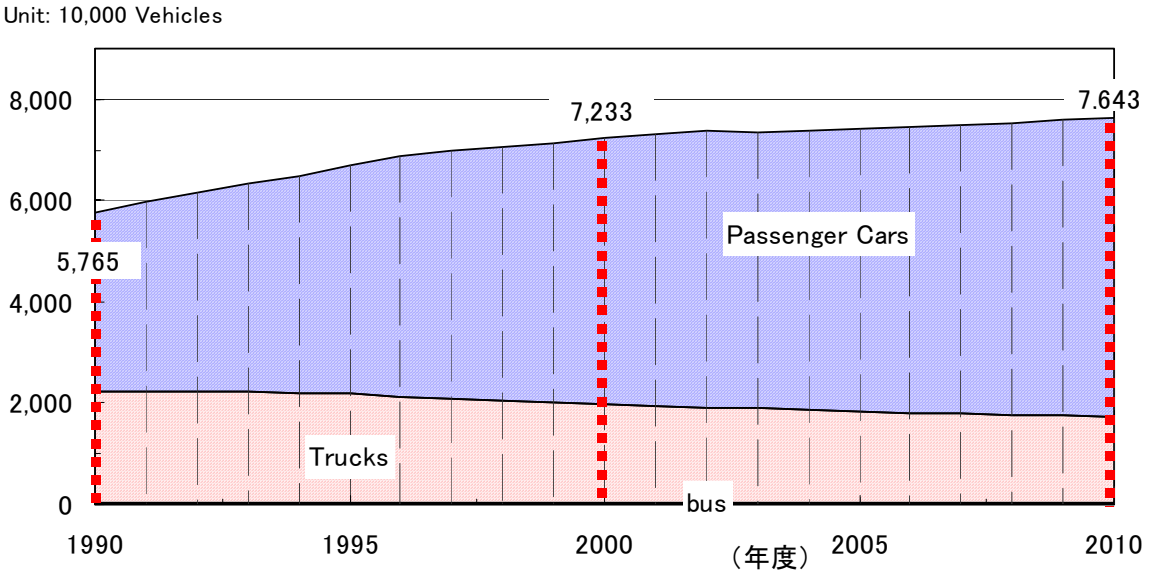


Figure 4.15 Prospect in Number of Automobiles Owned

4.3.2 Non-energy-originated Carbon Dioxide, Methane, and Nitrous oxide

The target values for fiscal 2010 are determined for non-energy-originated carbon dioxide, methane and nitrous oxide. At the same time, since emission sources such as industrial process, waste, and agriculture fluctuates individually, their future prospects were estimated while taking into account the premise of estimates for the future prospect of energy-originated carbon dioxide.

1) Non-energy-originated Carbon Dioxide

- Expansion of Blended Cement Utilization
  Emission associated in cement production = limestone usage (dry weight) × emission coefficient
- Promotion of Countermeasures for Emission of Carbon Dioxide Derived from Waste Incineration
  Emission associated in waste incineration = amount of incineration by category × emission coefficient by category

2) Methane

- Reduction in Volume of Final Disposal Waste

[1] Methane emission associated in landfill of general and industrial waste:

Emission associated in landfill = volume of waste decomposing during the computation period by category × emission coefficient by category

[2] Methane emission associated with incineration of general waste:

Emission associated to incineration = volume of incinerated waste by incineration method× emission coefficient by incineration method

3) Nitrous Oxide

- Installation of a Nitrous Oxide Decomposer in the Manufacturing Process of Adipic Acid
  Emission associated with manufacture of adipic acid = production volume of adipic acid × emission coefficient
- Upgrading Combustion in Sewage Sludge Incineration Facilities
  Emission from incineration of polymer-added sewage sludge in fluidized bed furnace = volume of polymer-added sewage sludge incinerated in fluidized bed furnace× emission factor by temperature
- Upgrading Combustion in General Waste Incinerator
  Emission associated to incineration = volume of general waste incinerated by incineration method × emission coefficient by incineration method

Table 4.9 Premise Utilized in Estimating Future Prospects

		Unit	Performance Value				Target Value
			Fiscal 1990	Fiscal 1995	Fiscal 2000	Fiscal 2002	Fiscal 2010
Cement production		1,000 t	90,177	97,204	82,755	75,097	68,004
Paddy planting area		1,000 ha	2,055	2,106	1,763	1,683	1,860
Number of feeding livestock	Dairy cow	1,0000	207	193	173	172	180
	Beef cow	10,000	281	290	281	281	317
	Swine	10,000	1,134	990	979	973	929
Waste landfill volume (enhanced countermeasure)		1,000 t	1,637	1,406	926	853	582
Incinerated waste volume (enhanced countermeasure)		1,000 t	6,473	8,030	9,175	8,790	8,752
Volume of treated wastewater		million m^3	9,857	10,392	12,519	12,757	15,143

Cement production volume: calculation based on 'Statistical Yearbook for the Ceramics and Building Materials Industries' and 'Annual Trade Statistics.'

Paddy planting area:

Performance value 'Statistics on Cultivated Land and Planted Area.'

Estimated value: linearly supplemented basing on 'Targets of the Basic Plan for Food, Agriculture and Rural Areas(fiscal 2010).'

Note 1: Waste landfill volume: Kitchen waste, paper, cloth, wood, bamboo, and straw of both general and industrial waste.

Note *2: Incinerated waste volume: Plastic waste from general waste, and waste oil and plastic waste from industrial waste.

4.3.3 Three Fluorinated Gases

Emission of the three fluorinated gases such as HFC are individually estimated and calculated utilizing the suitable method either bottom-up or top-down, to each category while referring to the data submitted by the industry.

Since the three fluorinated gases such as HFC are substitutes for ozone depleting substances which production and consumption is on reduction based on the Montreal Protocol, when countermeasures are not implemented, a substantial degree of increase (five percent increase compared to total emission in the base year) will be expected.

Through the promotion of a systematic measure by industries and countermeasures such as the development of alternative substance (see 3.4.4), it was estimated that by 2010, there will be a reduction of 34 million t-CO_2 and a two percent increase compared to total emission in the base year. This plan was revised in fiscal 2004, with a new goal set to reducing a total of 56 million t-CO_2 and suppressing the increase of total emission in the base year to 0.1 percent by implementing additional countermeasures.

4.3.4 Carbon Dioxide in Land-Use Change and Forestry Sector

Calculation methods for the volume of carbon removals of forests are under development based on the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry formulated in 2003. This preliminary estimation is based on the numerical targets for 2010 in the Basic Plan on Forest and Forestry. This is calculated by subtracting the losses by felling and land-use conversion from the amount of total annual increment of forests assumed as subject to activities under Article 3 paragraph 3 and 4 of the Kyoto Protocol, and then multiplying this by the coefficient and converting this to the amount of carbon dioxide. Further consideration on methods is necessary, while taking into account the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, aiming for the establishment of calculation methods by the end of 2006.

Table 4.10 Premise Value Used in Preliminary Estimation of the Prospected Removal Volume

(Enhanced Countermeasures Scenario)

Forest area（2010）	25.1 million ha
Timber supply（2010）	25 million m^3
CO_2 conversion coefficient	1.25 t-CO_2/m^3

4.4 Future Prospects of Carbon Dioxide Generated from International Bunker Oil Sold in Japan

A prediction of carbon dioxide emissions in 2010 attributed to international aviation fuels sold in Japan has been made.
The following hypotheses were used in the prediction.

[a] Assuming that Japan's economic growth rates by 2010 are annually 2.2 percent (high-case) and 1.8 percent (low-case), the volume of international aviation air-transport landing and taking off from Japan for each case is predicted in the following table.

Table 4.11 Actual Figures from 1995 and Predictions for 2010 Regarding the Volume of International Air-Transport Landing and Departing from Japan.

	Number of passengers (10,000 people)	Cargo volume (1,000t)
1995	4,357	2,126
Low-case	6,944	3,463
High-case	7,818	4,009

Source: Council for Transport Policy – 'Basic Direction of the Comprehensive Transport Policy in the Early 21st Century'

[b] Utilize the average distance of air-transport actually traveled between 1990 and 2002 as the average distance of air-transport of passengers and cargo.

[c] Utilize the average volume actually emitted between 1990 and 2002 for the carbon dioxide emission per ton of air-transport.

The predicted carbon dioxide emission in 2010 generated from the international aviation fuel sold in Japan based on the preceding hypotheses is approximately 28-32 (million t-CO_2).

Regarding the above prediction, it is necessary to remember that the numbers bear uncertainty due to the following reasons.

[a] The predicted value may change depending on the setting of the premised conditions. These are due to the fact that the prediction of air-transport volume is premised by the predicted annual economic growth rate of 2.2 percent or 1.8 percent, which in itself bears uncertainty, as well as using the past average values since although the decrease of carbon dioxide emission (per ton of air-transport) due to future advance in technology is possible, the degree of advancement or actual figures are difficult to predict.

[b] The air-transport volume used in calculating the prediction is the air-transport volume of international

flights that land and depart from Japan. Therefore the effect of domestic arrivals of international flights that is assumed to be refueled overseas cannot be completely excluded from when calculating the amount of carbon dioxide emission of international flights generated from international flight fuel sold in Japan.

On the other hand, the relationship between the various indicators regarding oceangoing shipping arriving and departing Japan to the volume of sales of marine bunker fuel in Japan could not be found. This is thought because oceangoing ships refuel not only at ports of arrival and departure, but at any point on there shipping route where fuel prices are cheap. Thus it is not possible to report on the predicted value of carbon dioxide emission generated from marine bunker fuel sold in Japan.

Table 4.12 Actual Figures and Future Prospects of Carbon Dioxide Generated from International Bunker Oil Sold in Japan

(Unit: Million t-CO_2)

Classification	Results			Future Prospects
	1990	2003	Rate of increase or decrease	2010
International flights	13.1	20.4	+55 %	28-32
Oceangoing shipping	17.5	17.1	-2.5 %	-

(Created by: Ministry of Land, Infrastructure and Transportation)

Chapter 5

Vulnerability Assessment, Climate Change Impacts and Adaptation Measures

This chapter is a summary of the present knowledge and understanding regarding the projected impacts of climate change in Japan. Specifically, this chapter reviews the results of research being conducted on climate change in Japan (please refer to Chapter 7) and presents quantitative evaluations of the projected impacts.

Research to date indicates that climate change may have a major effect on Japan's agriculture, forestry, fisheries, water resources, coastal management, natural ecosystems, and human health. For example, it is estimated that, due to global warming, the number of typhoons will decrease and their maximum intensity will increase slightly. In terms of rice cultivation in paddy fields, it is estimated that the production volume will increase in upper latitudes while problems may occur with growth due to higher temperatures in lower latitudes. It is thought that demand for water supply will increase by 1.2 to 3.2 percent per 3°C increase in temperature. Furthermore, it is thought that heat stress will increase due to higher temperatures in summer, with effects also seen on human health due to increased vectors and improved growth conditions for pathogenic organs and parasites.

Meanwhile, several important items are considered to be issues for future research but are not addressed in this report. These include forecasting climate changes by region, and indirect effects on Japan's socioeconomic system such as problems with importing foodstuffs, energy, and other resources. It is also clear that climate changes will have a massive effect on natural ecosystems, but at present it is extremely difficult to quantitatively assess such an effect.

Thus, among the vast and diverse impacts of global warming, this chapter only addresses a small number of items for which concrete research results have already been obtained. Accordingly, in using this report for evaluating performance under Article 4.1 (b) and (e) of the Framework Convention on Climate Change, it is important to recognize that there could be serious impacts from global warming that are not discussed herein.

5.1 Impacts on Japan's Climate

5.1.1 Impacts on Temperature

The potential impacts of global warming on Japan's climate is evaluated based on projections made from the High-Resolution Coupled Ocean Atmosphere Climate Model (K-1 model) implemented by the joint research team comprised of the Center for Climate Research Studies (CCSR) of University of Tokyo, the National Institute for Environmental Studies (NIES), and the Frontier Research Center for Global Change (FRCGC) while utilizing the Earth Simulator, as well as projections made from the High-Resolution MRI Regional Climate Model 20 (MRI-RCM20 model) implemented by the Japan Meteorological Agency and the Meteorological Research Institute.

In the projections based on the K-1 model, two of the SRES scenarios introduced in the IPCC Third Assessment Report were used for its calculation: (1) Scenario A1B where internationalization of the world will advance with more importance attached to the economy, and (2) Scenario B1 where internationalization will advance with more importance attached to the environment. The results were that, compared to the average daytime summer temperature in Japan (June, July and August) between the years of 1971 and 2000 and between the years of 2071 and 2100 on average was3.0°C higher for Scenario B1 and 4.2°C for Scenario A1B. Likewise, the maximum daytime summer temperature in Japan for Scenario B1 is higher by 3.1°C and for Scenario A1B 4.4°C. Furthermore, the results stated that precipitation during the summer in Japan would increase on average due to global warming (When comparing the average between the years of 2071 to 2100 to that between 1971 and 2000, 17 percent increase for Scenario B1 and 19 percent increase for Scenario A1B).

Also, when considering the projections based on the MRI-RCM20 model, calculation was made while employing Scenario A2 from the SRES scenarios which presume that the future world will attach more importance to the economy and regional-oriented tendencies will intensify. The results were that, the average annual temperature will rise across Japan, and that the temperature is expected to rise by approximately 2°C to 3°C in about a century from now.

5.1.2 Impacts on Meteorological Characteristic of Japan

Changes as listed below are expected from the latest projections based on the K-1 and MRI-RCM20 models, etc.

- Reduction in the number of frost days (minimum temperature is below 0°C) across Japan.
- Increase in the number of tropical nights (minimum temperature is above 25°C) across Japan.
- Increase in the number of days of heavy rainfalls with daily precipitation of over 100mm across Japan.
- Drastic decrease in the amount of snowfall from Hokkaido to the Sanin region mainly on the Japan Sea side.
- Considerable fluctuation in the amount of precipitation with an increase in the amount of annual rainfall. Also, increase in the number of days with no precipitation.

The abovementioned projections do not contradict with the scientific findings shared in the IPCC Third Assessment Report.

5.2 Impacts on Agriculture, Forestry and Fisheries

5.2.1 Impacts on Agriculture

Blessed with a mild climate and abundant precipitation averaging 1,800 mm per year, Japanese agriculture has supported a large population, primarily through the production of rice, despite the nation's relatively small land resource. Since 1950, Japan's agricultural technology has progressed rapidly through the development of new varieties, fertilizers, agricultural chemicals, and agricultural machinery. The advance of agriculture has also been supported by farm land consolidation. As a result, contemporary Japanese farming takes place under highly sophisticated management. Nevertheless, agricultural production is already significantly influenced by climate change, and future global warming is projected to have a severe effect on the nation's agriculture in general.

Rice is staple crop in Japan, accounting for more than 90 percent of the total grain production, most of which is cultivated in paddy fields. Nine million tons of rice is produced on roughly 1.7 million hectares of paddy fields. It is expected in general that production will increase in relatively high latitude due to global warming, while problems will occur at lower latitudes due to high temperatures. In order to maintain the same amount of production as at present, the cultivation period will need to be brought forward in the Tohoku and Hokkaido regions, and delayed in other regions.

Recent studies have evaluated the effects of increased carbon dioxide finding that the number of days from seeding to the heading for the current varieties will be reduced by about 5 percent if the density of carbon dioxide is doubled, and the weight of dried products and harvested crops will increase by about 25 percent. However, some negative effects are anticipated when various factors are considered, for example, the increase in sterility due to high temperature when carbon dioxide density is high.

The effects on crop cultivation other than rice are as follows. With wheat, the length of time until the heading is shorter when cultivated at higher temperature. As a result, for wheat sown in winter, the maturity period (period during which the seeds grow) is in early spring when the temperature rapidly changes, so it is thought that risks related to low temperature cultivation are high. As for soybeans, it has been proven that their growth is restricted if the ground temperature around their roots increases. It has also been proved that for corn, there is a risk of sterility if temperature is too high during the latter half of its growth period.

5.2.2 Impacts on Forestry

Even though the percentage of non-forest land such as agricultural, industrial and residential has increased, Japan is covered with forest of 248,680 km^2, or 66 percent of the national land area, which is far more than

the international average of 29 percent. In terms of the effects of global warming, if we consider Sugi (Japanese cedar: *Cryptomeria japonica*) as a representative example of tree species, higher temperatures and longer periods of sunshine may offer some advantageous effects, but worse water-related conditions resulting from increased temperatures may cause reduction of growth rate and death of old trees generally due to dehydration. Furthermore, increased temperature may cause an expansion in areas blighted by diseases and pests.

Although numerous points concerning the effects on forestry have not been analyzed yet, it may have an effect on forestry as an extremely long period of time is required to nurture forestry resources, and function for the public benefits from forests such as conservation of headwaters may be hindered as a result.

5.2.3 Impacts on Fisheries

The subtropical Japan Current *(Kuroshio)* and the subarctic Kurile Current *(Oyashio)* meet in Japan's coastal waters, which provide the habitat for a rich variety of fish and make for some of the most productive fishing areas on Earth. The most direct effect from global warming is projected to be changes in epipelagic fish resources. Japan's future fishery production will mostly depend upon changes in the course and flow of the Japan Current caused by global warming.

As for phytoplankton, it is expected that species that used to live in the lower latitudes will appear in seas nearer Japan in line with increased water temperatures. When the stratification is strengthened in line with increased water temperatures and the supply of nutrients from such stratification becomes more difficult, a transition from large diatoms to small flagellum alga is expected. Furthermore, it is expected that the production capability of the Sea of Okhotsk will degenerate as the amount of ice algae attached to ice in the sea declines in line with the reduction in the actual amount of ice in the sea.

It is expected that zooplankton will be smaller in line with any increase in water temperature. If warmer winters continue in line with increases in the water temperature, the number of jellyfish that can survive the winter increases, and the fishery value of coastal waters may decline due to competition with sardines, which are rivals at the effective stage of the food chain.

5.2.4 Impacts on Food Security

If Japan's food security is to be threatened, the followings may occur in Japan. New harmful insects will rapidly be produced in line with any warming, abnormal weather will become more frequent, and rainfall patterns will change markedly. However, accurate forecasting is difficult based on existing data. It is thought that drought will occur due to global warming, and the harvests failures will be seen in major countries and areas from which food is exported. That has the possibility to cause a very great influence on Japan in which the self-sufficiency ratio is low.

5.3 Impacts on Hydrological Conditions and Water Resources

5.3.1 Impacts on Hydrological Conditions and Water Resources

Despite abundant precipitation, Japan has difficulty in fully utilizing its water resources due to its geographic conditions. The precipitation varies greatly by time and place, and rivers are short and steep, and its basin area is small.

It is prospected that the amount of annual precipitation will increase due to impacts of global warming, but according to the estimation made on the flow and other characteristics of Tone River, increase in the amount of annual rainfall does not necessarily lead to improve stability of the water resources. As further climate change in the future, increase in the number of days with no precipitation and decrease in the amount of snowfall are prospected, making water shortage more frequent in some regions. It is thought that occurrence of floods and droughts due to change in the amount of precipitation and rainfall intensity, as well as fluctuation in the water quality due to changes in water temperature and its amount are some of the impacts on hydrological conditions and water resources caused by global warming. Consequently, it is concerned that water cycle in the river basins will incur serious impacts from climatic change. Many projections on the impact of global warming on hydrological conditions and water resources have been made through research utilizing warming scenarios and long-term outflow models. In order to achieve projections of high accuracy regarding the impact of global warming on hydrological conditions and water resources, it is necessary to resolve a number of issues including the realization of a climate model with even higher resolution. It is important to analyze the relationship between water demand caused by various human activities, and natural water resource systems, and artificial water resource systems such as dams to consider the effects on water resources.

5.4 Impacts on Social Infrastructure and Economy

5.4.1 Characteristics and Impacts on Coastal Zone in Japan

Japan is an island nation with long coastlines, and the nation’s population and economic activities are concentrated in the coastal zone. Accordingly, there is great concern about the possible effects of rising sea levels and increasingly frequent storm surges on the nation’s natural environment and socioeconomic system. The existing social infrastructure and socioeconomic system has been optimized for the present climate conditions. With global warming, it is thought that the effects from higher sea levels and temperatures and from changing precipitation and typhoon patterns would be serious and wide-ranging.

The functions and stability of shore protection facilities (facilities and equipments for countermeasures against disaster) will be degraded in the event of raised sea levels. Waves will pound harder on embankments, and revetments will need to be higher while overtopping quantity will also increase. Some research results indicate that in order to maintain safety at the current level, coastal embankments will need to be raised by 2.8 meters per one-meter increase in sea level, while quaywalls within bays will need to be

raised by 3.5 meters. It is anticipated that global warming would have a deleterious effect on all types of social infrastructures located in the coastal zone including harbors, fishing port facilities, man-made islands, reclaimed land, inland water drainage and sewerage systems, etc.

In particular, rising subterranean water tables may lower the loading strength and liquefaction resistance of the subsoil. Many social infrastructure facilities and buildings are concentrated on weak ground in the coastal areas, so any increase in the risk of loading strengths and liquefaction resistance of subsoil in the event of an earthquake would cause serious problems for urban safety.

According to a research conducted in 1992, about two million people reside on the 861 km^2 of Japanese land which is located below the high water level, and 54 trillion yen of assets have accumulated in these areas. If sea levels rise by one meter (slightly higher than the 88 cm projected for the global mean rise in 2100 under the highest case scenario of the IPCC Third Assessment Report), the land area below the high water level will increase by more than 2.7 times to 2,339 km^2. The susceptible population and assets will grow to 4.1 million people and 109 trillion yen.

5.4.2 Economic Assessment on Social Infrastructure in Coastal Zone

Potential damage through flooding in harbor areas in Japan, and the fees to maintain the functions and stability of port and harbor facilities as well as the coastal structures have been estimated. A total of 11.5 trillion yen, with the breakdown of 7.8 trillion yen to maintain port and harbor facilities, and 3.6 trillion yen to maintain coastal structures, will be required if sea levels were to rise by one meter, which is close to the 88 centimeters projected as the global mean rise in 2100 under the highest case scenario of the IPCC Third Assessment Report.

5.4.3 Impacts on Industries and Energies

According to an analysis, one direct effect on human habitation is that the consumption mechanism will change. It is estimated that if the average temperature between June and August increases by 1°C, consumption of summer-related goods will increase by about 5 percent.

Air conditioner usage accounts for 40 percent of electricity demand in summer. When the temperature goes up by 1°C, electrical demand increases by about 5 million kW (equivalent to normal use in 1.6 million typical households). It is estimated that demand for electricity in summer will increase in line with increases in factory operations resulting in increased production of summer-related goods and thus an increase in demand for air conditioners in the cities.

Global warming also has various other effects on electricity supply. Changes in the amount of snowfall and precipitation will have significant effect on the generation of hydropower. Furthermore, it is estimated that changes in river and sea water temperature will have an impact on the operational efficiency of power generators at thermal and nuclear power plants where such water is used as a coolant.

5.5 Impacts on Nature

5.5.1 Vulnerability of Japan's Natural Environment

Japan is blessed with a great variety of natural environments. The nation's forest ecosystems occupy diverse climate zones that range from subtropical to subarctic and are located in close proximity to one another. If global warming results in an average temperature rise of 3°C over the next 100 years, existing ecosystems will have to move approximately 500 kilometers to the north or to altitudes about 500 meters higher than at present. This is equivalent to an annual movement of five kilometers or an altitude gain of five meters per year, respectively. It is not possible to make a simple projection of how the ecosystems will respond to this change because each species has a different environmental tolerance and a different capacity for migration, and because of the competition with existing ecosystems. Moreover, there are numerous obstacles that may interfere with the migration of ecosystems. Japan is geographically complex, with many intricate mountain folds, and also geologically diverse. Other obstacles include ocean straits, cities, roads, and railroads. These may represent major restrictions when biota and ecosystems try to adapt to global warming. Species which are isolated in small habitats may find it impossible to migrate and become extinct. Lake, marsh, and coastal ecosystems located adjacent to densely inhabited districts are already subject to stress from human activities, and experts have noted that such ecosystems are highly sensitive to the additional stresses that will be brought about by global warming. For all of these reasons, it is currently nearly impossible to conduct a macro-scale quantitative evaluation of the effects of global warming on Japanese ecosystems.

5.5.2 Impacts on Mountainous Ecosystems

One of the major factors in deciding the blooming period for many alpine plants is when the snow melts. Changes in the amount of snowfalls due to global warming have not yet been determined, but if temperatures increase when the snow melts, it is anticipated that this will affect the timing of any future blooming.

Recently, the outer fringes of *'Hai-matsu'* pine tree branches have died off in early spring mainly in the Chubu mountainous region as well as in Hokkaido. One reason that has been suggested for this is that the diminished protection offered by the snow in line with the reduced snowfall.

5.5.3 Impacts on Forest Ecosystems

Japan lies in the monsoon region of East Asia between latitudes 25 degrees and 45 degrees north, extending 3,000 kilometers from north to south. The quantity of precipitation in Japan is sufficient for the establishment of forests. One characteristic of Japan is that changes in snowfall resulting from global warming would have a significant effect on the spread of forests and the composition of species as well as a direct effect on the temperature.

Buna (beech: *Fagus crenata*) forests, typical in cool-temperate zone, are located in cool, moist areas or

those with lots of snow. On the other hand, Mizunara (Japanese oak: *Quercus crispula*) forests are located in drier areas or regions with less snow. However, as a result of global warming, even in areas which will remain relatively cool in temperature terms, the climate will be drier with reduced snowfall due to the general increase in temperature, and the buna (beech) forests may be replaced by other type of forest such as mizunara (Japanese oak) forests, while the southern limits of buna (beech) forests may change to evergreen broad-leaved forests. For example, it is expected that most of the beech forests in western Japan will be outside the appropriate area.

Movement of insects to higher latitudes and altitudes has already been recognized as a result of global warming. Under such circumstances, the existing environment will be fundamentally altered and – as the movement of plants is comparatively difficult – so the extinction of insects in unique environments (such as high in the mountains), and species whose distribution is restricted by temperature give cause for concern, such as increased damage of the Pine wilt disease caused by the pine wood nematode (*Bursaphelenchus xylophylus*) resulting from the expanding inhabiting area of the Japanese Pine Sawyer (*Monochamus alternatus*).

Areas inhabited by larger mammals such as Sika Deer, Japanese macaque, and wild boar have recently been expanding. It is thought that this is mainly because the amount of snow falling and the duration of its cover have been reduced due to climate changes. In little snow conditions, due to rising the survival rate of wildlife, their numbers will increase and their habitat will expand. This may result much damage to agriculture and forestry.

5.5.4 Impacts on Grasslands

Most natural grasslands in Japan have been subjected to natural or artificial pressures in some way. Thus, the relationship between grassland vegetation and climatic factors were unknown until now. Therefore, vegetation zone classification has been studied based on the relationship with climatic factors, and the results were standardized based on temperature and snowfall measurements. Changes in the vegetation zone at the global warming stage created based on such criteria were estimated.

According to the estimate, subarctic zone vegetation will become extinct in the Ishikari lowlands or southern area within about 50 years, and vegetation typical of cool temperate regions will become extinct in Kyushu, Shikoku, and the Kii peninsula, while subtropical vegetation will appear at the southern tip of Kyushu. After 100 years, subarctic vegetation will become extinct everywhere except in mountainous areas of Hokkaido, cool temperate vegetation will be reduced to only mountainous areas in Honshu, warm temperate vegetation will occupy most of Honshu, and subtropical vegetation will expand to low-lying plains in Kyushu, Shikoku and southern Honshu.

5.5.5 Impacts on Biodiversity

In particular, there is concern that global warming will affect species whose distribution is geographically

restricted in Japan. For example, this applies to many species of yakutanegoyo (*pinus armandii var amanminana*) found only on the Yakushima and Tanegashima islands, most of which are struggling to survive. It is considered that plants unique to the temperate zone in the southwestern islands and other small islands may face a critical situation due to global warming.

5.5.6 Impacts on Coral Reefs

Japan's coral reefs are at the northern extremity of global distribution. Higher water temperatures from global warming will have a positive effect on coral growth.

However, the maximum rate of coral growth in the past has been about 4 meters per 1,000 years. If the rate of sea level rise exceeds 40 centimeters per 100 years, coral growth cannot keep pace, and it too may wither. The optimal water temperature for hermatypic coral to grow is between 18 and 28°C, so if the water temperature peaks at 30°C or higher, the coral will die and bleach out. Just before and after the El Nino phenomenon occurred in 1997 to 1998, large-scale destruction of coral reefs – as evidenced by its whitening – was seen in most seas throughout the world, including those around the Okinawan islands.

5.5.7 Impacts on Mangroves

Mangrove ecosystems, whose north limit is at Kiire in Kagoshima Prefecture, are located along shorelines, and they neutralize the interaction between sea and land. If the rate of sea level rise is 50 centimeters or less per 100 years, their ecosystems can be maintained through the accumulation of their own corrosion and so on. In the case of tides, there is at least a 2-meter difference between high and low tides, so even if the sea level rises by about 50 centimeters per 100 years, most of the area will be at a depth above the average sea level, so mangroves can be maintained. Large-scale mangrove distribution around Iriomote Island will shift in line with raised sea levels in the near future, and it is anticipated that vegetative distribution within the forest will also change.

5.5.8 Impacts on Desertification

There is currently no danger of desertification in Japan. However, climatic change caused by desertification on the Eurasian continent may indirectly affect the climate in Japan.

5.6 Impacts on Human Health

Global warming may directly affect human health via the increased heat stress from high temperatures during the summer months. The indirect effects on human health may include conditions promoting the growth of parasites, pathogens, and creatures that function as carriers of infectious diseases. Global warming may also harm human health via the increase of photochemical air pollution.

5.6.1 Direct Impacts from Increased Heat Stress

The direct effects on human health from increased heat stress include higher incidences of heat stroke and thermoplegia, and research is being conducted in these fields.

Studies show that the number of heat stroke and pneumonia patients amongst the elderly (65 and older) whose capability to handle heat is lower will increase in line with the rise in maximum temperatures recorded in summer in a relationship between high-risk ailments, maximum daily temperatures, and air pollution. It has already been clarified that there is a V-shaped relationship between the maximum daytime temperature and the mortality rate amongst the elderly. Studies have shown that the V shape shifts in the higher temperature direction in line with increases in temperature.

5.6.2 Indirect Impacts from the Spread of Infectious Diseases via Animal Vectors

Global warming will expand the habitat and activity periods of animals that serve as carriers of infectious diseases. This may result in increases in the number of cases of malaria, dengue fever, and other infectious diseases carried via animal vectors. The areas where these diseases occur may expand.

In Japan, the northern limit of the habitat of the anopheles, the mosquito which carries malaria, is said to be Miyako Island and Isigaki Island. However, as their habitat will move up north and their activity will become active as a result of global warming, it will have the possibility of increasing malaria in subtropical zone of Japan.

5.7 Adaptive Measures

While various measures, including the restriction of greenhouse gas emissions, are being implemented to arrest global warming, the Framework Convention also calls for measures to mitigate the adverse effects of climate change and for adaptive measures that will facilitate adaptation to climate change. With this in mind, Japan is studying adaptive measures related to coastal zones, social infrastructure and agricultural production.

5.7.1 Countermeasures for Coastal Zone and Social Infrastructure

As proposed by the IPCC, there are three countermeasures, namely, deliberate withdrawal, adaptation, and

prevention. In Japan, where coastal land is used to the maximum, adaptation and prevention on assumption of continuous use of risky areas must be considered the main priority. There are a variety of strategies from software-related ones such as planning and systems to hardware-related ones such as physical structures, so studies must be promoted with a view to the future to minimize any effects.

In order to better understand the trend of increasing sea levels for ports, harbors, and coasts, continuous monitoring must be undertaken by each organization, and the observation results must be evaluated regularly.

5.7.2 Countermeasures for Agriculture

It is anticipated that global warming will have an effect on future domestic agricultural production. As a countermeasure, development of varieties better suited to the changed climate, as well as change in crop types and cultivation methods so to adapt to any environmental changes are considered.

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Chapter 6

Financial Resources and Transfer of Technology

In August 2003, the Cabinet adopted Japan's Official Development Assistance Charter (the ODA Charter), which spells out the philosophy and principles of Japan's official development assistance. The ODA Charter identifies addressing global issues, including environmental problems, as one of the priority issues of ODA and states as a principle of ODA implementation that "environmental conservation and development should be pursued in tandem." Japan's Medium-term Policy on ODA announced in February 2005 also makes addressing global issues, including environmental problems, a priority issue. In this way the Government of Japan is trying to realize sustainable development on a global scale by supporting the ownership of developing countries.

While bearing the above points in mind, Japan's environmental cooperation follows Environmental Conservation Initiative for Sustainable Development (EcoISD) announced in August 2002 at the World Summit on Sustainable Development (WSSD). In particular concerning the global-warming issue, which threatens sustainable development on a worldwide scale, the Government of Japan announced the Kyoto Initiative on aid for anti-global warming programs in developing countries during the Third Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3) held in Kyoto in December 1997. Under the initiative the Government of Japan provides active support for anti-global warming programs and projects.

The Basic Environment Law stipulates that the government must endeavor to take all necessary measures to promote international cooperation for the conservation of the global environment and the Basic Environment Plan (2000, drawn up based on the Basic Environment Law) stipulates that Japan must develop international initiatives suitable to its position in the international community and promote international efforts for global environmental conservation. Also, the Kyoto Protocol Target Achievement Plan (2005) specifies the promotion of international cooperation on global warming countermeasures.

6.1 Measures Concerning New and Additional Financial Resources Pursuant to Article 4.3 of the Convention

6.1.1 Comprehensive Assistance for Preventing Global Warming

- Cooperation with the Global Environment Facility (GEF)

Japan contributed US$410 million (out of total funding of US$2.02 billion) to the first phase of GEF (1994-1998, GEF-1) and US$410 million (out of total funding of US$2.06 billion) to the second phase (1998-2002, GEF-2). We are currently in the third phase (2002-2006, GEF-3). The total funding for GEF-3 is US$2.28 billion, and Japan is planning to contribute US$420 million of this amount by the end of the phase.

- Cooperation with IPCC

Japan has provided the IPCC with SFr. 180,000 annually since 1997. Furthermore, it has handled the organization of technical support for the inventory task force that was established in 1999 and has funded its operational costs (2002: ¥163.604 million; 2003: ¥161.402 million). In addition, Japan cooperates with the IPCC in terms of human resources such as Mr. Taka Hiraishi co-chairing the IPCC Inventory Task Force Bureau, as well as three people taking role as coordinating lead author, 21 people as lead author, and 5 people as review editor in writing the reports.

- The Kyoto Initiative (December 1997-)

The Government of Japan announced the Kyoto Initiative consisting of strengthened environmental support that focuses on assisting developing countries to combat global warming at the COP3 held in Kyoto in December 1997. The initiative will be implemented mainly through the Government of Japan's ODA program.

The Kyoto Initiative is based on three philosophies, namely, 1) global human security; 2) ownership and partnership; and 3) sustainable development. Assistance is provided based on the three pillars of 1) cooperation in capacity building; 2) ODA loans with the most concessional terms (annual interest rate: 0.75%; repayment period: 40 years); and 3) Effective use and transfer of Japanese technology and know-how.

In more specific terms, about 13,000 people have already been fostered during the seven years from fiscal 1998 to fiscal 2004 through training courses in Japan and third-country training, and by the experts and Japan Overseas Cooperation Volunteers (JOCV) members dispatched by Japan.

Furthermore, in the period from December 1997 to March 2005 the Government of Japan provided a total of 83 concessional loans related to measures to cope with global warming, worth a total of approximately 1.9 trillion yen.

6.2 Assistance to Developing Countries Particularly Vulnerable to Adverse Effects of Climate Change

6.2.1 Japan's Action on Adaptation: Building Capacity and Ownership (December 2004-)

With the critical importance of sustainable development in developing countries in mind, the government of Japan will provide comprehensive assistance on adaptation measures in these countries by taking advantage of Japan's knowledge and expertise in the adaptation sector, focusing mainly on the following three pillars.

6.2.1.1 Assistance through Promotion of Development Projects

- Bilateral ODA

  Loan aid and grant aid ODA mainly through the Kyoto Initiative: Japan's ODA from fiscal 1997 to fiscal 2003 in the adaptation measures, including measures against natural disasters, amounted to approximately 180 billion yen.

- Assistance for Developing Countries and Measures for Adaptation in the Areas of National Land Development and Environmental Issues

<Disaster Reduction and National Land Development>
Initiative for Disaster Reduction through ODA: at the United Nations World Conference on Disaster Reduction held in Kobe in January 2005, Japan announced its aid policies and concrete actions concerning international cooperation on disaster reduction through ODA.

<Water Issues>
Initiative for Japan's ODA on Water and Sanitation: As part of Japan's ODA in the field of water, assistance of the following areas was announced in 2003: 1) providing drinking water and sanitation to poor countries and regions, 2) addressing the needs to provide large-scale financing to urban areas, and 3) assisting capacity building.

<Forests>
Asia Forest Partnership (AFP): a partnership, launched in 2002, with the purpose of promoting actions towards sustainable forest management in Asia through cooperation among Asian countries (primarily ASEAN countries), developed countries, inter-governmental organizations and civil society organizations in such activities as combat against illegal logging and its associated trade, management of forest fire, and rehabilitation and reforestation of degraded forests and lands.

< Global Environmental Issues including Desertification>
Environmental Conservation Initiative for Sustainable Development (EcoISD): This initiative includes

assistance in the areas of the management of nature reserves, forest-related issues, prevention of desertification, and natural resources management, as one of the four priority areas of the Action Plan (Japan's international cooperation on environmental issues mainly through ODA) would be to support developing countries announced by the Government of Japan at the WSSD in 2002.

<Agricultural Issues>
New Rice for Africa (NERICA) Project: NERICA projects aim to develop and disseminate high yielding upland rice varieties suitable for semi-arid regions, by cross-breeding of African rice, which is resistant to diseases, weeds and drought, and Asian rice, which has high yield potential. Japan has been extending financial assistance to the research on NERICA since 1997 Consultative Group on International Agricultural Research (CGIAR) and the UNDP Human Development Fund.

- Contributions to the GEF Trust Fund

  Japan is one of the largest donors to the GEF Trust Fund which implements capacity building in the adaptation sector in the form of projects commissioned to international organizations such as the UNDP. (To date Japan has contributed US$1.21 billion on a payment basis (in the pilot phase (from July 1991)) to the end of November)

6.2.1.2 Capacity Building for Government Officials in Developing Countries

- Japan International Cooperation Agency (JICA) Training Courses

  JICA provides a variety of training courses relevant to climate change adaptation such as disaster prevention, water resources management, forest resources management, river management, and national land development. JICA will continue providing these courses in the future as well.

- Development of Strategies on Climate Change

  Based on the Kyoto Initiative JICA has been conducting training courses on measures against global warming since 1997, including a course entitled Development of Strategies on Climate Change. A total of 123 government officials from developing countries have completed the courses since they were inaugurated. JICA will continue providing these courses in the future as well.

- Capacity Building for Project Staff regarding Kyoto Mechanism

  JICA implemented a training course entitled "Capacity Building for Project Staff regarding Kyoto Mechanism" in order to achieve the goals stipulated in the Kyoto Protocol.

  The course is provided for the capacity building of government project staff mainly in the areas of their understanding of the rules and the roles to be played by the developing countries provided in the Kyoto Mechanism. This course will continue to be provided to ten personnel from ten countries per year.

6.2.1.3 Promotion of Climate Change Research and Human Resources Development in Modeling Activities

- Asia-Pacific Seminar on Climate Change

Much effort has been made to cope with climate change in the Asia-Pacific region. The Ministry of the Environment has been organizing the annual Asia-Pacific Seminar on Climate Change since 1991 with the participation of administrators and experts from countries in the Asia-Pacific region and international organizations. The seminar aims to contribute to the promotion of efforts to address climate change in the Asia-Pacific region through the sharing of information, experiences and views concerning the global warming issue in countries in this region.

During the 15th Seminar held in September 2005, countries actively shared opinions and reached deeper understanding concerning co-benefits from policies for greenhouse gas mitigation, the Clean Development Mechanism (CDM), and measures for adaptation to climate change.

In addition, lively discussions were exchanged on the topics of communication of information about climate change, awareness campaigns, and education in the Asia-Pacific region at the Asia-Pacific Regional Workshop on Article 6 of the Convention held concurrently with the seminar.

- Asia-Pacific Network for Global Change Research (APN)

The APN is an inter-governmental network which has the major objectives of promoting research projects on global changes in the Asia-Pacific region, increasing the participation of developing countries in research, and enhancing collaboration between scientific research and policy making. Japan actively supports the activities of the APN. APN improves the capacity of researchers by hosting workshops, providing support for the participation of researchers in international research meetings, and training researchers. The study on climate change is one of its key research areas for project assistance is the study on climate change.

- Climate Variability and Change and Sea-level Rise in the Pacific Islands Region – A Resource Book for Policy and Decision Makers, Educators and other Stakeholders

The South Pacific island countries are most vulnerable to the impacts of global warming, and therefore international support is particularly essential to implement appropriate adaptation measures. For this reason the Ministry of the Environment implemented a cooperative study for the South Pacific island countries (Pacific-Japan Project) from fiscal year 1999 to 2001 with a view to promoting implementation of adaptation measures in those countries. A publication entitled Climate Variability and Change and Sea-level Rise in the Pacific Islands Region–A Resource Book for Policy and Decision Makers, Educators and other Stakeholders was prepared in cooperation with SPREP, based on the results of the former study, and is currently being distributed to countries in the Asia-Pacific region.

- Japan's Climate Change Initiative

The Government of Japan announced its Climate Change Initiative at the G8 Gleneagles Summit. The initiative calls for the people to engage in efforts to promote the CDM and review its system at the meetings of the CDM Future Committee in order for these efforts to contribute to achieving the UN Millennium Development Goals (MDGs) through providing assistance in the dissemination of technologies related to energy saving and the environment to developing countries. At the same time, it advocates the establishment of an internationally comparable standard of energy efficiency by industry as well as promotion of research study by Japan providing additional assistance to IEA in order to advance the dissemination of technologies related to energy saving. The initiative also aims to enhance the capacity of developing countries to deal with global warming and promote monitoring and evaluation of the effects of climate change in the Asia-Pacific region and the provision of information to G8 governments. In addition, the initiative aims to promote global change research and to develop the capacity of experts from developing countries by utilizing the framework of APN, which has 21 participant countries from the Asia-Pacific region.

6.2.2 Other Specific Assistance

- Development Studies

The Government of Japan supports the formulation of development plans for sustainable development in developing countries and in the process transfers plan formulation methods and survey/analysis techniques, etc. to counterparts in those countries. In particular, development studies in the environmental field are being actively conducted on topics such as environment management projects for rivers, lakes and marshes; waste disposal and air pollution-related measures, and conservation projects for marine creatures.

Specific examples of cooperative projects being implemented by the Government of Japan are the Study on Capacity Development for Jeneberang River Basin Management in Indonesia and the Feasibility Study for "Upgrade and Expansion of Data Communication/ Transmission Network of Flood Forecasting and Warning Services" in Bangladesh.

- Loan Aid

Financial assistance and transfers of technology are provided for adaptive measures (including countermeasures against flooding and riparian works) taken by developing countries via low-interest, long-term yen loans (average repayment period: 35.2 years; average grace period: 9.8 years; average interest rate: 0.94% (fiscal 2004)) offered by the government as part of its development assistance.

Specifically, cooperative action is being carried out for flood prevention projects in Indonesia, Vietnam and other countries.

- Grant Aid

  Financial assistance and transfers of technology are provided for adaptive measures (including forest conservation, afforestation, and flood prevention work) taken by developing countries, through grant aid provided by the government as part of its development assistance.

  Specifically, assistance has been afforded for the construction of conservation forest in the coastal regions of Senegal

- Project-type Technical Cooperation

  To improve adaptation technology in developing countries, Japan cooperates in projects related to adaptation measures by participating in project-type technical cooperation conducted by combining dispatch of experts, acceptance of trainees and provision of equipment.

  Specifically, cooperative activities geared towards forest preservation and recovery have been implemented in various countries, including the Forest Fire Prevention Management Project in Indonesia, and the Science and Technology Center for Forest Tree Improvement Project in China.

- Dispatch of Experts and Acceptance of Trainees

  Training has been held in both Japan and third countries, in addition to which experts and JOCV members have been sent abroad to train personnel in global warming-related fields (air pollution, waste, energy conservation, forest conservation and afforestation).

  Specifically, workers from emergency assistance organizations in each country are accepted as trainees, and training courses are held to contribute to improved disaster prevention countermeasures in each trainee's country. The trainees are taught about Japan's own international emergency assistance system and countermeasures against disasters.

6.3 Financial Resources Related to the Implementation of the Convention

Refer to the tables shown later.

6.4 Measures Related to Transfer of Technology

6.4.1 Government Measures for the Promotion, Facilitation and Financing of the Transfer of Technology

6.4.1.1 The Kyoto Initiative (December 1997-) (as previously mentioned)

6.4.1.2 Other Specific Assistance

- Loan Aid

  Financial assistance and transfer of technology is provided for global warming countermeasures taken by developing countries via low-interest, long-term yen loans (average repayment period: 35.2 years; average grace period: 9.8 years; average interest rate: 0.94% (fiscal 2004)) offered by the government as part of its development assistance.

  Specifically, cooperation is being carried out for wind power generation projects in the Philippines and Egypt.

- Grant Aid

  In order to resolve water and global environmental issues, Grant Aid for Water Resources and the Environment was established as an aid category within General Project Grant Aid and support is being provided in the energy-related and afforestation fields which contribute to the reduction and limitation of greenhouse gas emissions. Specifically, cooperation is being afforded to the construction of bank protection in the central river basin of the Yellow River in China and to afforestation projects in the arid regions of central Myanmar.

- Asia-Pacific Seminar on Climate Change (as previously mentioned)

- Japan Kyoto Mechanisms Acceleration Programme (JKAP)

  As a flexible international measure for countries to achieve their respective targets in reducing greenhouse gas emissions, and to prevent global warming as well as to promote sustainable development in developing countries, the Kyoto Protocol authorizes the use of the Kyoto Mechanisms which permit the utilization of a portion of the emission cuts of greenhouse gas from other countries.

  Taking into account the principle that the Kyoto Mechanisms are supplemental to domestic measures, Japan is primarily utilizing the Clean Development Mechanism (CDM) and Joint Implementation (JI), and is also utilizing the Green Investment Scheme (GIS) a mechanism which links emissions trading to specific environmental measures. (Hereafter these three approaches will be referred to as “CDM/JI, etc.”)

As a program to promote CDM/JI cooperation in Japan and host countries, the Ministry of Foreign affairs, the Ministry of Economy, Trade and Industry, the Ministry of the Environment, and related institutions established the Japan Kyoto Mechanisms Acceleration Programme (JKAP). [Related institutions: the Global Environmental Center (GEC), the Institute for Global Environmental Studies (IGES), the Japan Bank for International Cooperation (JBIC), the Japan External Trade Organization (JETRO), the Japan International Cooperation Agency (JICA), the New Energy and Industrial Technology Development Organization (NEDO), Nippon Export and Investment Insurance (NEXI), the Overseas Environmental Cooperation Center (OECC), and Japan Carbon Finance (JCF).]

This program aims to implement a variety of support measures that have previously been implemented by individual institutions in a more effective and user-friendly manner through the JKAP network. The major support projects in this program are as follows.

- Building the Capacity of Host Countries

With the objective of development of human resources related to the Kyoto Mechanisms in host countries, JKAP holds a variety of training seminars and workshops for government officials and private business owners in the host countries, supports the development of CDM/JI, etc. project approval systems by the governments of the host countries, and conducts a variety of public information campaigns to promote the implementation of such projects. (2003-)

- Provision of Information and Counseling Support

JKAP has created a web page (the Kyoto Mechanisms Information Platform) in order to provide information to private companies in Japan and the host countries that are working on CDM/JI, etc. projects and to the host country governments. The site provides information about the various support measures implemented by the Government of Japan through the JKAP network, the latest developments concerning CDM/JI, etc. projects in the host countries, and the latest information concerning the rules of the Kyoto Mechanisms and debates at CDM board meetings. In addition, individual questions are answers and consultations provided through e-mail. (2004-)
(URL: http://www.kyomecha.org/e/index.html)

- CDM/JI Feasibility Studies

In order to discover projects that are highly effective at preserving and enhancing greenhouse gas emission limitation and removal effects and to accumulate knowledge that contributes to creating domestic and international rules for the CDM/JI mechanisms, the Government of Japan is conducting CDM/JI feasibility studies. Specifically, the government gets private companies and NGOs to tender for projects and conducts studies of the most feasible projects related to waste management, biomass use, energy conservation, and renewable energy. (1998-)

- CDM/JI Facility Subsidization Project

This project supports the implementation of CDM/JI, etc. projects by partially subsidizing the expenses necessary for CDM/JI projects that are deemed practical or cost-efficient by the feasibility study. Some of the credits gained from the project are returned to the Japanese Government in proportion to the amount of the subsidy originally granted. (2003-)

- Climate Technology Initiative (CTI)

New Earth 21 was proposed to the world based on an agreement at the Council of Ministers for Global Environmental Conservation's Houston Summit in 1990. The Technology Renaissance for Environment and Energy (TREE) concept was proposed at the Tokyo Summit in 1993 to establish comprehensive concrete strategies for New Earth 21. In the same year, a scoping study was carried out into the implementation of joint international research and development concerning environmental energy technologies at a conference for promoting the development of environmental energy technology.

Twenty-three IEA/OECD member countries and the EC proposed the establishment of the Climate Technology Initiative (CTI) at the 1st United Nations Framework Convention on Climate Change in 1995. The CTI has made a new start as an Implementing Agreement of the IEA in 2003.

The CTI has provided international cooperation such as the dissemination and promotion of technology that contributes to the reduction of greenhouse gases, market promotion of such technology, and promotion of the transfer of innovative technology development ever since its establishment. In fiscal 2004, nine seminars and workshops aimed at the dissemination of technology for global warming prevention were held, contributing to the transfer of technology to developing countries. The CTI celebrated its 10th anniversary from its establishment at the end of 2005. A total of 31 trainings and seminars and a total of 19 seminars were held, which hosted a total of 1,600 and 1,900 participants respectively in the past decade.

- Asia-Pacific Network for Global Change Research (APN) (as previously mentioned)

- Green Aid Plan (GAP)

In the areas of energy saving and environment, Japan is engaging in efforts to promote the Green Aid Plan (GAP) which aims to enhance the awareness of the governments of the Asian countries on environmental measures through engaging in policy dialogues with the partner countries, and to construct systems, etc. which reflect the situation of each country. Simultaneously, this project aims to facilitate the dissemination of Japan's environmental and energy saving technologies through which sustainable development may be achieved by the developing countries while realizing a harmonious coexistence with the environment.

- Countermeasure Project for Rationalization of International Energy Use

  With the aim to promote the establishment and dissemination and to prove the effectiveness of technologies for effective use of energy (e.g. energy-conserving and oil substitute energy technologies) and countermeasure technologies for use of coal, the Government of Japan implements model projects, etc. to exploit and transfer Japanese technology and know-how. To date, 62 projects have been implemented in the developing countries in the Asia Pacific region.

- Support for the International Tropical Timber Organization (ITTO)

  Aiming to combine the appropriate and efficient utilization and conservation of tropical forests, ITTO has administered 148 projects concerned with countermeasures against illegal logging which impedes sustainable forest management, rehabilitation of degraded forests, and creation of criteria and indicators for sustainable forest management, among others, in member countries which produce tropical timber between 2002 and 2005. Japan has made voluntary contribution of approximately US$3,400 for these projects.

- Support for the Food and Agriculture Organization (FAO)

  In order to support the activities of the FAO and contribute to the promotion of sustainable forest management in developing countries, Japan has voluntarily contributed to a trust fund to implement 14 projects since 1983 in addition to covering about 20% of the organization's regular budget. In fiscal 2005 Japan used voluntary contributions to commence support for the Project to Strengthen Monitoring, Assessment, and Reporting (MAR) on Sustainable Forest Management in Asia. This project sets out to accurately assess and analyze the current state of forest management in countries in the Asian region and use the results of the analyses to provide feedback for forest policies.

- CDM Afforestation Related Projects

  In order to develop infrastructure that contributes to the implementation of CDM afforestation projects by private companies, the Government of Japan is (1) providing analyses and distribution information regarding baseline removals, (2) creating technical manuals for project participants, and (3) training human resources that are involved in project applications, implementation, and management.

- Basic Study of Forests to Prevent the Warming of Permafrost Zones

  The Government of Japan implemented this basic study of forest sink activities implemented under the Joint Implementation Kyoto Mechanism in order to assess the technical issues arising from the implementation of projects in the Siberian permafrost zones.

6.4.2 Government Support Measures to Develop and Enhance the Capabilities and Technologies of Developing Countries

- Development Studies

The Government of Japan is providing cooperation that supports capacity building for the promotion of CDM projects in the developing countries. Specifically, Japan is implementing projects to enhance the management capacity of the DNA in the Philippines, and projects aimed at building the capacity of the relevant personnel through formulation of CDM afforestation projects in Chile.

Moreover, in the area of emission sources, Japan is formulating the master plan for small-scale hydroelectric power generation in Laos, and conducting surveys on the detailed design to modernize the thermoelectric power plants in Uzbekistan, and more.

- Project-type Technical Cooperation

To develop and improve capacity and technology in developing countries, Japan cooperates in projects related to global warming countermeasures by providing project-type technical cooperation that employs the dispatch of experts, acceptance of trainees, and provision of equipment in various combinations as necessary.

Specifically, cooperation is being afforded to environmental center projects in six countries including China, and energy conservation center projects in Thailand, Turkey, Iran and Poland. In Argentina, the CDM Capacity Development Project which aims to enhance the capacity of the relevant personnel mainly for the DNA is carrying out.

As for CDM afforestation, Japan is carrying out inspections to establish the development of quantitative methods for estimating the carbon fixation volume in artificial forests in Indonesia, and capacity building efforts in order to promote CDM afforestation in Uruguay.

- Dispatch of Experts and Acceptance of Trainees (as previously mentioned)

Specifically, training courses have been established with the objective of providing the information and improving the skills necessary to enable developing countries to independently create the technology needed to maintain an inventory of greenhouse gases and to formulate global warming countermeasures strategies, has accepted trainees, and has dispatched experts to Argentina, Indonesia and other countries.

- Asia-Pacific Seminar on Climate Change (as previously mentioned)

- Japan Kyoto Mechanisms Acceleration Program (JKAP) (as previously mentioned)

- Climate Technology Initiative (CTI) (as previously mentioned)

- Green Aid Plan (GAP) (as previously mentioned)

- APEC-VC

At an APEC Science and Technology Ministers Meeting Japan proposed the establishment of web sites concerning environmental and global warming technologies and information in each APEC country and region and the APEC Virtual Center for Environmental Technological Exchanges project and these proposals were endorsed by the ministers. The purpose of the virtual center is to enable the mutual transmission and exchange of environmental technology-related information possessed by governments, companies, and environmental organizations within the region. Since the first virtual center was established in Japan in April 1997, virtual centers have been established in 12 countries/regions, namely Australia, Taiwan, New Zealand, China, the Philippines, Vietnam, Thailand, Chile, Indonesia, Malaysia, and South Korea, and they are linked via the Internet. Furthermore, efforts are being made to establish virtual centers in countries and regions in which they have not been introduced yet and to improve usability by enhancing content, introducing a standard search engine, and so on.

- Asia-Pacific Network for Global Change Research (APN) (as previously mentioned)

- Criteria and Guidelines for Sustainable Forest Management

ITTO is working on improving the capacity of member countries, financial and technological support, and promotion of information sharing, in order to achieve its Year 2000 Objective, namely having “all tropical timber and tropical timber product exports come from sustainably managed sources by 2000.”

As a part of this process, the ITTO has created the Criteria and Guidelines for Sustainable Management of Tropical Forests and is introducing them in stages, and since 2004 it has been holding workshops to disseminate the criteria and guidelines in tropical timber producing countries. Japan is providing financial support for the efforts extended by the ITTO.

- International Expert Meetings on Forests for promoting IPF/IFF Proposals for Action in Asian Region

In order to study urgent issues that are an impediment to the practice of sustainable forest management, the Government of Japan invited officials in charge of forest policy and NGOs from developing countries, particularly in the Asian region, to Japan and held the International Expert Meeting on Forests five times from 2001 to 2005. In 2001 it was held as the International Expert Meeting in Support of the UN Forum on Forests (UNFF) and studies were conducted into policies to promote monitoring, assessment, and reporting for sustainable forest management in the participating countries. In 2002 the International Expert Meeting on Forests and Water was held and participants discussed the importance of forest management for conservation of water resources. In 2003 the International Expert Meeting on the Development and Implementation of National Codes of Practice for Forest Harvesting was held and the meeting studied issues related to legal and appropriate timber production in participating countries. In 2004 and 2005 Japan hosted the Meeting for the Promotion of the Asia Forest Partnership which aims to promote implementation of sustainable forest management in Asia.

- Promotion of the Asia Forest Partnership

  AFP, launched at the 2002 World Summit of Sustainable Development (WSSD) in Johannesburg, is a voluntary, multi-stake holder collaboration of governments, intergovernmental organizations and civil society organizations to promote sustainable forest management in Asia. The partnership promotes sustainable forest management through addressing urgent issues such as combat against illegal logging and its associated trade, management of forest fire, and rehabilitation and reforestation of degraded land.

  Japan has been promoting the implementation of projects related to the AFP by hosting the meetings to promote AFP activities and by providing support to workshop on strengthening the AFP.

- Support for Afforestation by Private Sector Parties

  The Government of Japan has been supporting the afforestation activities in developing countries of private sector groups such as NGOs by awarding grants for ex-ante studies and providing technical instruction through the dispatch of experts, and has also hosted international forums. Moreover, beginning in 2005 the Government of Japan has been promoting private sector afforestation overseas through the construction of a private sector afforestation network utilizing web sites and the development of small-scale afforestation model forests.

- Observation of Forestry Statuses Using Satellite Data

  In order to resolve the worsening degradation that has been observed in forests in the eastern part of Asia, the Japan Forest Technology Association has been using satellite data and developing technologies that enable efficient observation of the status of forest degradation.

- Support for Global Environmental Conservation Projects by Japan Post using “Postcards with a Donation”

  Japan has collected contributions through sales of postcards with a donation since 1992, some of which have been distributed to organizations working to conserve the global environment. In fiscal 2005 a total of 16.20 million yen was distributed to 8 groups implementing such projects.

6.4.3 Prevention of Acid Rain

Nitrogen oxides have been identified as one cause of acid rain; they are also considered a greenhouse gas in that they contribute to the formation of ozone in the troposphere. Thus, countermeasures to prevent acid rain also contribute to the arrest of global warming. Furthermore, by preventing damage to forests, countermeasures against acid rain contribute to the preservation of sinks for carbon dioxide, which is the most widespread greenhouse gas.

- Acid rain monitoring network in East Asia

  In order to establish a framework for countermeasures against acid rain through international cooperation across East Asia through the participation of 12 countries; namely, China, Indonesia, Japan, Laos, Malaysia, Mongolia, the Philippines, Korea, Russia, Thailand, Vietnam, and Cambodia; full-scale action has been implemented from January 2001, following a trial period from April 1998. The aim is to foster a common understanding among the participating countries of the current status of the acid rain issue in East Asia by preparing and evaluating reliable data that can be compared between the nations using a standardized method.

6.4.4 Prevention of Desertification

The loss of forests and other green land through desertification leads to the loss of important carbon dioxide sinks. In this sense, the prevention of desertification is important as a means of preventing global warming. Japan has been promoting a variety of desertification prevention-related projects through conservation of water resources, forest conservation and afforestation, agricultural development, and Official Development Assistance (ODA) including capacity building. In September 1998, Japan accepted the Convention to Combat Desertification that was adopted in June 1994 and became a party to the Convention, and has been working to support the formulation of national action programs so that developing country parties to the Convention affected by desertification can effectively implement the Convention. As a Party to the Convention, Japan has also been studying what the comprehensive desertification prevention related measures should be with due consideration for socioeconomic viewpoints, in order to contribute more actively in the implementation of the Convention. A network has been established to provide technological contributions and study support for the Thematic Programme Network (TPN) in the Asian region, particularly the TPN1 Desertification Monitoring and Assessment field and the TPN5 Strengthening Capacities for Drought Impact Management and Desertification Control field. Moreover, studies have been carried out concerning the monitoring and assessment of desertification using desertification guidelines and a pilot study is under way to consider the construction of a desertification early warning system.

6.5 Promoting International Cooperation in the Private Sector

- Cooperative Activities of Private Sector Groups

  In Japan, many of the existing environmental conservation technologies have been developed by private sector companies. Parallel to this, direct foreign investment by private sector companies to developing countries plays a very significant role in transfer of technologies. In addition, the Government of Japan and Japan's various NGOs (such as the Japan Wildlife Research Center; the International Lake Environment Committee Foundation; the Overseas Environmental Cooperation Center Japan; the Organization for Industrial, Spiritual and Cultural Advancement - International (OISCA); the

Federation of Economic Organizations; the Japan International Volunteer Center and the Nippon International Cooperation for Community Development (NICCO)) promote international environmental cooperation by implementing environmental conservation projects, hosting symposiums, lectures, and seminars, and by supporting environmental conservation activities.

NGOs have been affording cooperation for afforestation in various ways, such as through afforestation instruction in developing countries, dispatch of volunteer afforestation workers, and providing environmental education. For example, grassroots level groups, namely, the Green Earth Network; the Japan Association for Greening Deserts; the Defense of Green Earth Foundation; the Green Earth Center; the International Society for Mangrove Ecosystems; the Action for Mangrove Reforestation; the Organization for Industrial Spiritual, and Cultural Advancement – International (OISCA) and the International Charcoal Cooperative Association play important roles in providing cooperative assistance to forestry in various ways.

- Support for Private Sector Activities

Support is provided to activities in the private sector through the Ministry of Foreign Affairs' NGO Project Subsidies, Grant Assistance for Japanese NGO Projects, Grant Assistance for Grass-roots Human Security Projects, and Grass Roots Technical Cooperation, and the Japan Environment Corporation's assistance to private sector organizations from its Japan Fund for the Global Environment.

- Japan Kyoto Mechanisms Acceleration Program (JKAP) (as previously mentioned)

6.6 Other

6.6.1 Considerations in Undertaking International Cooperation Projects

In pursuing development assistance, it is important to take into account environmental conservation – including elements that might contribute to the mitigation of global warming – in order to promote sustainable development.

- In 1989, the Council of Ministers for Global Environmental Conservation agreed that greater consideration must be given to environmental issues when implementing ODA projects. The ODA Charter adopted by the Cabinet in 2003 presents addressing global issues, including environmental problems, as one of its priority issues and states that "environmental conservation and development should be pursued in tandem" as one of the principles of ODA implementation. And addressing global issues, including environmental problems, was presented as one of the priority issues in Japan's Medium-term Policy on ODA published in February 2005.

- In order to take the environment into consideration when implementing assistance, the Japan

International Cooperation Agency (JICA), one of the ODA implementing organizations, has been enforcing the new JICA Guidelines for Environmental and Social Considerations since April 2004 for ex-ante studies of technical cooperation projects and grant aid projects.

Regarding yen loan projects, the Japan Bank for International Cooperation (JBIC), the other ODA implementing organization, is enforcing the JBIC Guidelines for Confirmation of Environmental and Social Considerations revised in October 2003 and is checking that organizations implementing yen loan projects consider the environment.

These guidelines were formulated through a highly transparent and open process that reflected proposals from academic experts and people working for NGOs. Furthermore, these guidelines are groundbreaking in that they include a mechanism for local people to state an objection. In addition they incorporate necessity of regard for not only natural aspects but also social aspects of the environment and provisions for information disclosure.

Table 6.1 Contributions to Multilateral Institutions and Programs and the Global Environment Facility (GEF)

Institution or programme	Contribution				
	2000	2001	2002	2003	2004
Global Environment Facility (GEF)					
1. Promissory notes	121	121	0	243	121
Multilateral institutions:					
1. World Bank	121	116	80	52	44
2. International Finance Corporation	4	3	2	2	3
3. African Development Bank	1	1	0.6	0.5	1
4. Asian Development Bank	66	72	41	49	58
5. European Bank for Reconstruction and Development	9	8	3	4	4
6. Inter-American Development Bank	9	9	7	7	11
7. United Nations Development Programme-	105	102	105	105	95
8. United Nations Environment Programme	5	5	5	4	4
9. United Nations Framework Convention on Climate Change---Supplementary Fund	0	100,000	500,000	0	140,955
10. International Tropical Timber Organization (ITTO)	10	10	7	3	0

Notes:

1) The amounts listed above are for the Japanese accounting year (from April to March of the following year) and are generally in yen (rounded down to the nearest unit).

2) The amounts listed above represent the total initial budgetary provision for contributions to specific multilateral financial institutions, or other institutions, not the amounts used for areas related to climate change.

3) The amounts listed above represent the budgeted amounts for the fiscal year, in units of 100 million yen rounded down to the nearest 100 million yen. The amounts listed for “9. United Nations Framework Convention on Climate Change---Supplementary Fund” are in US dollars.

4) The amounts listed for “7. United Nations Development Programme” represent contribution only for regular resources. UNDP’s focus areas include energy and environmental issues.

Table 6.2.1 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2003 (Loan aid)

(millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Subtotal	Total
1. India		293.46	121.73				63.25	478.44					478.44
2. Indonesia	1,061.43							1,061.43					1,061.43
3. Egypt	116.45							116.45					116.45
4. China	326.60		236.41					563.01					563.01
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	1,504.49	293.46	358.14	0.00	0.00	0.00	63.25	2,219.34					2,219.34

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2003 (¥115.9=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.2 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2003

(General grant aid projects) (millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. China			9.22					9.22					9.22
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	0.00	0.00	9.22	0.00	0.00	0.00	0.00	9.22					9.22

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2003 (¥115.9=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.3 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2003

(JICA-based technical cooperation) (thousand U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. China	2,934	0	4,758	0	0	656	3,762	12,110					12,110
2. Indonesia	796	0	3,674	0	5	0	1,957	6,432					6,432
3. Brazil	17	0	1,406	0	0	0	2,094	3,517					3,517
4. Iran	1,054	0	0	0	0	0	2,301	3,355					3,355
5. Thailand	869	0	900	27	393	0	862	3,051					3,051
6. Burkina Faso	0	0	964	1,826	0	0	0	2,790					2,790
7. Myanmar	627	0	1,954	0	0	0	22	2,603					2,603
8. Philippines	905	0	257	0	284	0	1,080	2,526					2,526
9. Malaysia	5	0	369	0	1,263	0	870	2,507					2,507
10. Cambodia	8	0	811	0	1,661	0	11	2,491					2,491
11. Others (over 100 countries)	4,866	0	10,035	102	2,132	0	8,380	25,397					25,397
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	12,082	0	25,127	1,955	5,738	656	21,339	66,778					66,778

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2003 (¥115.9=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.4 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2002 (Loan aid)

(millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. Philippines	46.78							46.78					46.78
2. Sri Lanka	265.69							265.69					265.69
3. China	185.63		63.71				300.58	549.92					549.92
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	498.11	0.00	63.71	0.00	0.00	0.00	300.58	862.40					862.40

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2002 (¥125.2=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.5 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2002

(General grant aid projects) (millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. Egypt							4.38	4.38					4.38
2. Myanmar			3.83					3.83					3.83
3. China			3.91					3.91					3.91
4.													
5.													
6.													
7.													
8.													
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10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	0.00	0.00	7.74	0.00	0.00	0.00	4.38	12.12					12.12

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2002 (¥125.2=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.6 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2002

(JICA-based technical cooperation) (thousand U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. China	2,643	6	4,720	1,767	55	0	1,913	11,104					11,104
2. Indonesia	959	0	4,173	0	59	0	3,349	8,540					8,540
3. Thailand	3,534	0	990	0	1,514	0	2,367	8,404					8,404
4. Philippines	240	6	1,755	0	941	0	1,552	4,494					4,494
5. Malaysia	8	0	687	210	225	0	3,291	4,420					4,420
6. Myanmar	973	0	2,965	0	0	0	17	3,955					3,955
7. Laos	1,488	2	1,014	0	112	0	99	2,715					2,715
8. Viet Nam	767	2	1,121	0	372	0	339	2,600					2,600
9. Burkina Faso	0	0	685	0	0	0	1,876	2,560					2,560
10. Brazil	36	0	1,523	0	0	0	992	2,551					2,551
11. Others (over 100 countries)	6,131	368	12,045	0	6,507	0	13,325	38,376					38,376
12.													0
13.													0
14.													0
15.													0
16.													0
17.													0
18.													0
19.													0
20.													0
Total	16,781	383	31,676	1,977	9,784	0	29,119	89,720					89,720

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2002 (¥125.2=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.7 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2001 (Loan aid)

(millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. India		55.41						55.41					55.41
2. Chile						3.98		3.98					3.98
3. Viet Nam	82.30							82.30					82.30
4. Mongolia	50.53							50.53					50.53
5. China	277.33	246.93	98.77				171.65	794.67					794.67
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
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18.													
19.													
20.													
Total	410.16	302.34	98.77	0.00	0.00	3.98	171.65	986.89					986.89

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2001 (¥121.5=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.8 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2001

(General grant aid projects) (millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. Indonesia							3.85	3.85					3.85
2. Viet Nam			8.45					8.45					8.45
3. Mongolia	5.70							5.70					5.70
4. China							6.55	6.55					6.55
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	5.70	0.00	8.45	0.00	0.00	0.00	10.40	24.56					24.56

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2001 (¥121.5=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.9 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2001

(JICA-based technical cooperation) (thousand U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. China	545	0	4,569	1,906	52	0	4,007	11,079					11,079
2. Indonesia	902	0	3,513	2	232	0	4,030	8,678					8,678
3. Viet Nam	274	6	2,176	0	3,861	0	102	6,419					6,419
4. Malaysia	9	0	727	718	116	0	3,166	4,736					4,736
5. Brazil	20	0	2,185	0	994	0	1,471	4,670					4,670
6. Thailand	103	0	943	198	1,069	0	1,157	3,470					3,470
7. Philippines	41	6	78	0	1,616	0	1,648	3,389					3,389
8. Syria	284	0	0	0	1,398	0	1,429	3,112					3,112
9. Turkey	2,623	0	18	0	159	0	84	2,883					2,883
10. Laos	1,281	6	1,033	0	29	0	17	2,366					2,366
11. Others (over 100 countries)	8,378	87	13,452	0	5,915	0	12,300	40,132					40,132
12.													0
13.													0
14.													0
15.													0
16.													0
17.													0
18.													0
19.													0
20.													0
Total	14,461	105	28,693	2,823	15,442	0	29,410	90,934					90,934

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2001 (¥121.5=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.10 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2000 (Loan aid)

(millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. Tunisia			37.85					37.85					37.85
2. China		130.90					159.12	290.02					290.02
3. Malaysia	656.38							656.38					656.38
4. Thailand		425.03						425.03					425.03
5. Philippines		206.51						206.51					206.51
6.													
7.													
8.													
9.													
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11.													
12.													
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14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	656.38	762.44	37.85	0.00	0.00	0.00	159.12	1,615.79					1,615.79

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2000 (¥107.8=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.11 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2000

(General grant aid projects) (millions of U.S. dollars)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. Indonesia			1.42					1.42					1.42
2. Viet Nam			2.59					2.59					2.59
3. China			0.45					0.45					0.45
4. Maldives							7.44	7.44					7.44
5. Mongolia	10.56							10.56					10.56
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total	10.56	0.00	4.45	0.00	0.00	0.00	7.44	22.45					22.45

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2000 (¥107.8=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.2.12 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2000

(JICA-based technical cooperation) (thousand U.S. dollars)

(Note: All included in the "Others" category given that there was no category code in 2000)

	Reduction								Application				
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste Disposal	Industrial	Others	Subtotal	Capacity Building	Management of Coastal Regions	Other Vulnerability Assessment	Subtotal	Total
1. China							12,539	12,539					12,539
2. Indonesia							8,702	8,702					8,702
3. Viet Nam							6,830	6,830					6,830
4. Thailand							5,856	5,856					5,856
5. Guatemala							3,355	3,355					3,355
6. Azerbaijan							3,090	3,090					3,090
7. Turkey							2,910	2,910					2,910
8. Philippines							2,817	2,817					2,817
9. Mozambique							2,757	2,757					2,757
10. Chile							2,702	2,702					2,702
11. Others (over 100 countries)							62,289	62,289					62,289
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													
Total							113,847	113,847					113,847

Notes:

1) The amount of reduction has been estimated based on the DAC/CRS data derived from the Rio Statistics.

2) The figures in the table are converted with the DAC designated rate (end of December) for 2000 (¥107.8=US$1).

3) The amount allocated for application is difficult to extract since adequate data is not available in either the DAC/CRS data or the Rio Statistics.

Table 6.3.1 Description of selected projects or programs that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally-sound technologies

Project/program title:
Northern Luzon Wind Power Project (Loan aid)
Purpose:
* Introduce renewable energy with a small impact on the environment to meet the demand for electricity.

Recipient countries	Sector	Total funding	Years in operation
The Philippines	Energy	5.857 billion yen (amount committed in fiscal 2001)	Agreement signed in fiscal 2001

Description

In the Philippines demand for electricity is forecast to grow rapidly due to the development of the industrial infrastructure, promotion of the IT industry, increasingly widespread use of home electrical appliances, and growing regional electrification, all resulting from economic growth. On the other hand, in the Philippines approximately 60% of energy consumption depends on imported energy such as oil and coal so the country is aiming to reduce its dependence on imported energy through development of domestically-produced energy. Specifically, it intends to mainly develop its domestic natural gas resources but it also has high expectations of renewable energy, in particular wind power and geothermal power. In light of this situation, it is an urgent matter for the Philippines to reduce the use of fossil fuels, achieve a stable supply of electricity, and reduce its dependence on imported energy by developing wind power, a renewable energy resource with a small environmental impact.

The purpose of this project is to expand the electricity supply and develop domestically-produced energy resources with a small environmental impact by building 40 MW capacity wind farm facilities and laying down 42-kilometer transmission lines to link them up with the main transmission lines in northern Luzon Island (Ilocos Norte Province).

Technology transferred:

This project is the first wind power project in the Philippines. Through implementation of this project, technology related to wind power, a form of renewable energy, will be transferred and it is expected that in future this technology will be developed and disseminated in the Philippines.

Impact on greenhouse gas emissions/sinks (optimal):

Table 6.3.2 Description of selected projects or programs that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally-sound technologies

Project/program title:

The Project for Afforestation for Conservation of Middle Stream of Huang He (Grant aid)

Purpose:

The purpose of this project is to develop forests for conservation of the middle stream of the Huang He river centered on the Loess Plateau and protect the surrounding region.

Recipient countries	Sector	Total funding	Years in operation
China	Forest conservation	1.494 billion yen (amount committed in fiscal 2002-2005)	Agreement signed for fiscal years 2002-2005

Description

In China there is 260 million hectares of degraded land including 160 million hectares of desert. In particular around the middle stream of the Huang He river centered on the Loess Plateau there is 45 million hectares of degraded land and due to sediment discharges, sand storms, and wind corrosion damage is occurring including a decline in agricultural production and a reduction in the amount of agricultural land. Moreover, the degradation of the middle stream is having an impact on the lower stream and resulting in natural disasters including floods during the heavy rains in the summer and the drying up of the lower stream during the period in the winter when there is little rain.

It is expected that this afforestation of the middle stream of the Huang He river will contribute to rehabilitation of degraded land, dissemination of afforestation technology and afforested areas maintenance and management technology to local residents and the development of that technology, and reduce the dispersion of yellow sand to the surrounding region.

Technology transferred:

It is expected that through development of model forests that display many tree species and varieties and aim to stimulate interest in afforestation, the demonstration of simple afforestation methods that can be easily applied by farmers, and the implementation of work training in training forests, it will be possible to widely transfer afforestation technology to farmers who expect active afforestation in future.

Impact on greenhouse gas emissions/sinks (optimal):

Table 6.3.3 Description of selected projects or programs that promoted practicable steps to facilitate and/or finance the transfer of, or access to, environmentally-sound technologies

<table>
<tr><td colspan="4">Project/program title:

Group Training Course to Develop National Inventories and Strategies Against Climate Change (Technical cooperation: group training)</td></tr>
<tr><td colspan="4">Purpose:

This course provides the latest scientific and technological information on the United Nations Framework Convention on Climate Change and the Kyoto Protocol to developing countries, and supports implementation of obligations specified under the convention by simultaneously introducing Japan’s countermeasures.</td></tr>
<tr><td>Recipient countries</td><td>Sector</td><td>Total funding</td><td>Years in operation</td></tr>
<tr><td>DAC List Assistance Recipient Countries (Indonesia, the Philippines, Cambodia, India, Mexico, Argentina, Brazil, Nicaragua, Peru, Tuvalu, Senegal, Turkey, Cote d’Ivoire, Tunisia, Saint Lucia, and Sao Tome and Principe for fiscal 2004)</td><td>Warming countermeasures</td><td>205.41 million yen (amount committed in fiscal 1997-2004)

(27.159 million yen in fiscal 2004: accepted 16 people)</td><td>January 11th 2005 - March 3rd, 2005</td></tr>
<tr><td colspan="4">Description

The Seminar for Global Warming Countermeasures that was provided from 1992 to 1996 was updated and re-presented each year from 1997. For fiscal 2006, it is scheduled to be provided between January and March.

1. Course outline: lectures, discussions and study trips are provided covering the following points. Outline of the United Nations Framework Convention on Climate Change and Kyoto Protocol, important points of the IPCC Third Assessment Report, and Japan’s actions on global warming issues, etc. Outline of the IPCC inventory guidelines, calculation methods for emission amounts of various greenhouse gases. Options for strategies and various political measures, current status of Japan’s global warming countermeasures.

2. Trainee eligibility: administrators who are currently in charge of global warming related issues in the central government.</td></tr>
<tr><td colspan="4">Indicate factors which led to project’s success:</td></tr>
<tr><td colspan="4">Technology transferred:

Raising skills enabling the self-creation of inventories for greenhouse gases, provision of and upgrading skills for information required to establish strategies to arrest global warming.</td></tr>
<tr><td colspan="4">Impact on greenhouse gas emissions/sinks (optimal):</td></tr>
</table>

Chapter 7

Research and Systematic Observation

7.1 Comprehensive Government Policies and Fundraising for Research and Systematic Observation

The Council of Ministers for Global Environmental Conservation draws up a Comprehensive Program for the Promotion of Global Environmental Research, Monitoring and Technological Development each fiscal year since 1990. This Program is designed to build a solid foundation for global environmental conservation and to clarify the priority areas that Japan should address in order to contribute positively to international initiatives. The Program comprehensively promotes surveys, research, observation, monitoring, and technological development for the protection of the global environment and follows up on the implementation of efforts in these fields.

While ensuring consistency with the annual Comprehensive Program, a budgeting system for the Global Environment Research Fund has been established for its promotion. This is a system to comprehensively promote all types of scientific and international research on global environmental conservation. Experiment and Research Fund for Global Environmental has been established since April 2001 to promote studies on global warming from mid and long-term perspectives.

In December 2000, the cabinet drew up a new Basic Environment Plan in accordance with the Basic Environment Law with the long-term target of creating a society in which recycling, symbiosis, participation, and international measures can be realized, and it strives to comprehensively and deliberately promote measures for environmental conservation with a view towards the mid-21st century. It states the promotion of global warming-related measures as one of its strategic programs, and also specifies measures for the government to take in this field by including sections on “adequate surveys, research, monitoring, and observation, and promotion of proper technologies” and “ensuring international cooperation for surveys, research, monitoring, and observation, etc.”

In March 2001, the Government of Japan decided the Second Science and Technology Basic Plan (from 2001 to 2005) in accordance with the Science and Technology Basic Law, and the academic field of Environment Sciences was selected as one of the four priority fields for allocating research and development resources. Accordingly, a sectoral promotion strategy for Environment Sciences was decided in September 2001 by the Council for Science and Technology Policy (CSTP), chaired by the Prime Minister, established in 2001 as a control tower for drawing up the comprehensive and basic policy and strengthening coordination among related ministries and agencies in the area of science and technology. Under the sectoral strategy, it was decided that the government as a whole will make it one of its priorities to “carry out observation and prediction related to global warming; assess the effects of environmental changes such as temperature increase and sea level rise on nature, the economy, and society; and develop

technologies and means to avoid or minimize any detrimental effects" in its global warming-related research.

Along with the above strategy, Japan developed the world's highest performance supercomputer system, Earth Simulator, to be used for prediction and studies. It began operation in March 2002 and has been providing study results worldwide.

Besides, responding to the activities of the Intergovernmental Panel on Climate Change (IPCC) for preparing its Fourth Assessment Report (AR4) newly commenced in 2002, Japan launched in the same year the "Kyo-sei" Project in order to promote the global warming projection and process studies by utilizing the Earth Simulator just made available. Other global warming related physical science studies including a scenario based climate change study have also been conducted under the Special Coordination Fund for Promoting Science and Technology, Grants-in-Aid for Scientific Research (Kakenhi) and ordinary budget funds.

In November 2004, in order to strategically promote comprehensive research in the climate change field and based upon outcomes from research activities until then, a policy of "Strategic Promotion of Climate Change Research" was compiled by the "Global Warming Research Initiative", an initiative for environmental research under the CSTP.

Now the Third Science and Technology Basic Plan is under consideration. The academic field of Environment Sciences including response to the global environmental problem will continue to be as one of the four priority fields for allocating research and development resources under the third Basic Plan.

As for the area of systematic observation, Japan has been promoting the establishment of an observation network that combines observation on the ground with observation by satellites, aircraft, and ships. Recently, the following international and national activities are in progress.

Internationally, Japan has been actively contributing to the development of the 10-Year Implementation Plan and the establishment of the Global Earth Observation System of Systems (GEOSS) based of the Plan through hosting the second Earth Observation Summit in April 2004 and providing the various leadership roles such as a co-chair of the Ad hoc Group on Earth Observation (GEO) and a member of GEO Executive Committee.

Domestically, in response to deepening international discussions toward the establishment of GEOSS, the CSTP drew up the Earth Observation Promotion Strategy in December 2004. Based on this Strategy, the Earth Observation Promotion Committee was established under the Council for Science and Technology of the Ministry of Education, Culture, Sports Science and Technology in February 2005 in order to elaborate the Earth Observation Implementation Policy annually. Currently the concerned ministries and agencies are working together toward the realization of comprehensive, needs-driven Earth observation based on the Implementation Policy to be revised annually. In addition, under the Japan EOS (Earth Observation System) Promotion Plan, a competitive research funding program, started in April 2005, Japan effectively

implements research and development programs which are directly contributing to the establishment of advanced Earth observation systems and GEOSS through mobilizing high competent research institutes.

Furthermore, in the Kyoto Protocol Target Achievement Plan formulated by the government in April 2005 based on The Law Concerning the Promotion of Measures to Cope with Global Warming there is a section about the promotion of research on climate change and strengthening of the scientific observation and monitoring structure and the plan states that it is a basic policy of the government to strengthen the comprehensive scientific observation and monitoring structure.

7.2 Research

7.2.1 Basic Principles

- Under the Global Warming Research Initiative included in the sectoral promotion strategy of Environmental Sciences in the Second Science and Technology Basic Plan decided by the CSTP, individual research projects which had been implemented under various organizations were integrated into the following research programs. Consequently the related research and development have been promoted under collaboration among industry, academia, and government.

  a. Comprehensive monitoring program for global warming
  b. Research program for predicting global warming and climate change
  c. Research program for assessing impacts and risks of global warming
  d. Program for developing technologies to fix and sequester greenhouse gases
  e. Technological development program for controlling emission of greenhouse gases caused by human activities, such as energy generation
  f. Policy research program to control global warming

According to the Basic Principles on Formulating Science and Technology Basic Policy presented by the CSTP in June 2005 in preparation for the Third Science and Technology Basic Plan starting in fiscal 2006, ‘overcoming the global warming and energy problems’ is held as a secondary policy target under one of the six primary policy targets, ‘compatibility of environment and economy.’ Groundwork is currently being laid for the sectoral promotion strategy in the environmental field based on the results of the Second Science and Technology Basic Plan.

- Japan participates and cooperates in the World Climate Research Programme (WCRP), the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme of Global Environmental Change (IHDP), and other international global environmental research programs, conducts surveys and research based upon an appropriate international division of tasks, and otherwise promotes joint research and other initiatives together with overseas research organs.

- Based on the agreement reached among the participating nations at the Tenth Inter-Governmental Meeting of the Asia-Pacific Network for Global Change Research (APN) held in April 2005, Japan is promoting research on global environmental change in the Asia-Pacific region in cooperation with researchers from throughout the area, as well as developing a regional research network on global environmental change.

- In an effort to contribute to the development of government policy on climate change and global warming, Japan actively promotes research on global environmental problems from a human and social perspective, academic research integrating the natural and social sciences, and research on socioeconomic systems. Japan is also working to expand the international network of the Institute of Global Environmental Strategies (IGES) established in March 1998 as an international research institute for the study of political and practical strategies to realize sustainable development on a global scale, particularly with regard to the Asia-Pacific region.

- In accordance with the Climate Change Initiative announced at the G8 Gleneagles Summit, the Government of Japan is contributing to construction of the GEOSS, promoting the construction of an integrated scientific observation network employing satellite, oceanic and land observation systems particularly in the Asia-Pacific region, monitoring and evaluating the impact of climate change in the Asia-Pacific region, and providing information to national governments, and so on.

7.2.2 Priority Fields

While giving full consideration to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the Government of Japan is comprehensively promoting surveys and research to better understand present conditions and predict the future impact of global warming, fixation, sequestration and reduction of greenhouse gases, and to draw up appropriate countermeasures. Since the research issues on climate change projection and process studies identified by the Third Assessment Report (TAR) of the IPCC are important in response to the needs of the Convention, Japan has been addressing these issues mainly by Kyo-sei Project (see 7.1) and the Global Environment Research Fund. Advanced outcomes from the project are expected to contribute to the AR4 of the IPCC. Some of the model results have been provided developing countries for their regional adaptation studies. As bi-lateral cooperation, Japan-EU workshops and Japan-USA workshops on global change studies have been promoted both on a bi-annual basis hosting alternately to exchange new research information and to compare model results. The Government of Japan will also contribute to the establishment of guidelines for the compliance of the Kyoto Protocol and methods for assessing the removal of greenhouse gases by forests, and so on.

And the Government of Japan will give priority to the promotion of research into the areas of [1] climate change, [2] ecosystems, biodiversity, and land use, [3] changes in the atmospheric, terrestrial and marine domains, and [4] sustained use and sustainable development of resources, in accordance with the strategic plan adopted at the Tenth Inter-Governmental Meeting of the Asia-Pacific Network for Global Change Research (APN) in which these were defined as priority issues for the Asia-Pacific region.

7.2.3 Main Research Fields

7.2.3.1 Research on Climate Processes and the Climate System, Including Paleoclimate Research

Research has been carried out as follows: study of the spatial and temporal variations of ozone and black carbon and their impact on the climate in Asia, analysis of sea level rise in the Asia monsoon region based on the coral dentroclimatology, study on physical processes that have high uncertainly such as the indirect effect of aerosols, namely radiational effect of aerosols through clouds. Kyo-sei Project (see 7.1) also includes such process studies as focusing on ecosystem on land and diffusion processes in the ocean, and their outcomes have been reflected in improving climate modeling.

7.2.3.2 Climate Change Modeling and Prediction Studies

Climate change modeling and projection studies have been mainly conducted under the following 4 themes by the Kyo-sei Project using the Earth Simulator: (1) Global climate change projection experiments under scenarios by developing a high resolution atmosphere-ocean coupled model; (2) Climate change projection on regional and on extreme events by developing a 20km super-high resolution atmospheric general circulation model: (3) Next generation earth system modeling including feed back processes in the carbon cycle; (4) Experiments on long-term stabilization issues based on a climate model of the National Center for Atmospheric Research (NCAR, U.S.A.). Another scenario based climate change study has also been conducted separately.

Research has been carried out through the Global Environment Research Fund as follows: integrated carbon balance study on the ecosystem of the Asian continent with a view to 21st century carbon management, study on improving the precision of climate models with the objective of forecasting changes in the atmospheric water and energy cycles, global warming impact and evaluation study using high-resolution climate change scenarios, including extreme weather events.

7.2.3.3 Studies on the Impact of Climate Change

Research has been carried out as follows: integrated evaluation study on the impact of global warming aimed at studying the dangerous levels of global warming and the greenhouse gas stabilization level, forecast of the long-term variations of snow and tundra zones under conditions of global warming and their impact on agriculture, study on monitoring of the detection of global warming impacts using alpine vegetation.

7.2.3.4 Socioeconomic Analysis, Including Analysis of both the Impact of Climate Change and its Anticipated Reaction

Research has been carried out as follows: integrated research project on the establishment of multifaceted and comprehensive evaluation, forecasts, and formulation methods for medium- to long-term policy

options aimed at creating a society that does not cause global warming; study on the legal principles imposing international systems for prevention of medium-term global warming.

7.2.3.5 Research and Development on Reduction and Adaptive Technology

Research has been carried out as follows: development of technology to control greenhouse gas sinks and sources through utilization and conservation of the terrestrial ecosystem, study on the maintenance of sustainable national land in island states composed of atoll islands, study on the development, dissemination, and promotion of technologies to reduce energy consumption in the home, study of the evaluation of global warming alleviation and adaptive policies using the Asia-Pacific integrated evaluation model, study of economic assistance for the formation of residential cities contributing to the alleviation of climate change in developing countries.

7.3 Systematic Observations

7.3.1 Basic Principles

- Observation and monitoring of climate change should be implemented in accordance with the Science and Technology Basic Plan (decided by the Government of Japan in March 2001) and the Earth Observation Promotion Strategy (proposed by the CSTP in December 2004), and promoted comprehensively based on the annual Earth Observation Implementation Policy and the Comprehensive Monitoring Program for Global Warming included in the Global Warming Research Initiative. In this case, baring in mind the contribution to the establishment of GEOSS based on the 10-Year Implementation Plan, organizations that carry out such observations and monitoring shall mutually exchange the results setting coherent methods with the international observation and monitoring projects, and shall strive to utilize such data effectively.

- Again baring in mind the contribution to the establishment of the GEOSS, the Government of Japan participates and cooperates in the Global Environmental Monitoring System (GEMS), the Global Atmosphere Watch (GAW) Program, the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), the Joint WMO/IOC Commission for Oceanography and Marine Meteorology (JCOMM), and other international observation and monitoring programs, and conducts wide-ranging observations and monitoring based on an appropriate sharing of international tasks. The government is also working to promote the Asia-Pacific Network for Global Change Research (APN) and to facilitate implementation of observation and monitoring throughout the Asia- Pacific region.

- It is important to promote Earth observation by satellites effectively with coordination on a worldwide scale in accordance with Japan's Plan for Satellite Development for Global Observation and Means for Advancing Data Usage compiled in June 2005 by the Space Activities Commission. Accordingly, the Government of Japan is actively participating in the activities of the Committee on Earth Observation Satellites (CEOS) and other international forums and is promoting the development, launch, and

operation of satellites in conformity with these activities. Furthermore the Government of Japan promotes integrated global observations combining satellite and in-situ observations in cooperation with international organizations and research projects together through Integrated Global Observation Strategy Partnership (IGOS-P).

7.3.2 Priority Fields

The Government of Japan places special priority on promoting the observation and monitoring to identify the status, causes, and impacts of global warming and climate change.

Observation and monitoring related to climate changes and global warming cover a wide area or even the entire globe, so Japan has actively been promoting the development of effective methods such as utilization of various satellite sensors, as well as operating geostationary meteorological satellites.

7.3.3 Main Systematic Observations

7.3.3.1 Atmospheric Observing System for Climate Including Atmospheric Constituent Measurements

Homogeneous and high quality climate observations have been implemented by more than 150 meteorological stations in Japan for more than several decades. CLIMAT (reporting format of monthly values from a land station set by WMO) reports from some of the above stations have been exchanged internationally on a monthly basis. Japan has also been monitoring the reception rates and data quality of CLIMAT reports from all over the world jointly with Germany under the framework of the World Meteorological Organization (WMO). Japan has been providing climate change-related information, based on climate data collected and analyzed through the above activities, in quasi-real time within and outside Japan. Data from geostationary meteorological satellites, such as the cloud amount, are used to monitor long-term changes in global radiation, and climate change. The following has also been promoted: operation of Precipitation Radar (PR) onboard Tropical Rainfall Measuring Mission (TRMM) satellite which provides data of the rainfall distribution in the tropical area; development of the Greenhouse gases Observing SATellite (GOSAT, scheduled for launch in fiscal 2008) to make an international contribution to global carbon observation; developement of a Dual-frequency Precipitation Radar (DPR) for Global Precipitation Measuring (GPM) project; preliminary study for Global Climate Observation Mission (GCOM) which will make continuous observation with microwave and multi-band optical sensors; development of the comprehensive system to trace, analyze and forecast the changes in sun and Earth's upper atmosphere; international joint research for the development of comprehensive observation systems for the middle atmosphere; joint research into advanced global environmental instrumentation in Asia; and research and development of a stratospheric platform for directly observing the atmosphere at various altitudes ranging from the troposphere to stratosphere.

Table 7.1.1 Participation in the Global Atmospheric Observing System for Climate

	GSN	GUAN	GAW	Others
Number of stations	14	7	8	
Number of operating stations	14	7	8	
Number of stations operating to GCOS standards	14	1	8	
Number of stations expected to be operational in 2005	14	7	7	
Number of stations providing data to International Data Center	14	7	8	

As of December 31, 2004, including the Syowa Station at the Antarctic

Table 7.1.2 Atmospheric Observing Systems for Climate at the Land Surface (Land Surface Meteorological Observations)

Systems	Climate parameters	Total Sta-tions	Appropriate for characterizing national/regional climates?			Time Series Stations [digitized]			Adequate Quality Control Procedures?			Meta data available Total stations [digitized (%)]	Continuity Stations expected to be operational in 2005
			Fully	Partly	No	30-50 years	50-100 years	More than 100 years	Fully	Partly	No		
Stations useful for national climate monitor-ing purposes	Atmospheric pressure	157	○			18 [18]	79 [79]	60 [60]	○			157 [100]	157
	Cloud	110	○			13 [13]	42 [97]	55 [0]	○			110 [100]	110
	Weather	155	○			19 [155]	76 [0]	60 [0]	○			155 [100]	155
	Humidity	157	○			20 [20]	77 [77]	60 [60]	○			157 [100]	157
	Precipitation	155	○			19 [19]	76 [76]	60 [60]	○			155 [100]	155
	Radiation	67	○			67 [67]	0 [0]	0 [0]	○			67 [100]	67
	Sunshine duration	156	○			20 [20]	79 [79]	57 [57]	○			156 [100]	156
	Temperature	157	○			20 [20]	77 [77]	60 [60]	○			157 [100]	157
	Visibility	155	○			19 [155]	76 [0]	60 [0]	○			155 [100]	155
	Wind	156	○			19 [19]	77 [137]	60 [0]	○			156 [100]	156
Stations reporting inter-nationally		54											
CLIMAT reporting Stations		54											

As of December 31st 2004, including the Syowa Station at the Antarctic

Table 7.1.3 Available Homogenous Data Sets for Land Surface Meteorological Observations

Data set name	Climate Parameters	Stations and Region covered	Time period	Enquiries
Surface meteorological observation monthly and 10-day mean/total data file	Atmospheric pressure, clouds, weather, humidity, precipitation, sunshine duration, temperature, wind	156 stations in Japan	1961-2004	Japan Meteorological Agency
Surface meteorological observation daily mean/total data file	As above	As above	1961-2004	Japan Meteorological Agency
Surface meteorological observation monthly mean/total data file	As above	As above	1880s-2004	Japan Meteorological Agency

Table 7.1.4 Atmospheric Observing System (Upper Air Meteorological Observations)

Systems	Total sta-tions	Appropriate for characterizing national/regional climates?			Times Series Stations [digitized]				Adequate Quality Control Procedures?			Meta data available Total stations [digitized (%)]	Continuity Stations expected to be operational in 2005
		Fully	Partly	No	5-10 years	10-30 years	30-50 years	More than 50 years	Fully	Partly	No		
Radio Sonde Stations	19	○			0	[0]	9 [9]	10 [10]	○			19 [100]	19
Stations reporting internationally	19												
CLIMAT TEMP Reporting Stations	19												
Wind profiler stations	31				0	0	0	0	○			31 [100]	31

As of December 31st 2004, including the Syowa Station at the Antarctic

Table 7.1.5 Available Homogenous Data Sets for Upper Air Meteorological Observations

Data set names	Climate Parameters	Stations and Area covered	Time series	Enquiries
Upper air meteorological observation daily mean/total data file	Humidity, temperature, wind, altitude	18 stations in Japan Data at standard atmospheric pressure levels	1981-2004	Japan Meteorological Agency
Upper air meteorological observation monthly mean/total data file	As above	As above	1951-2004	Japan Meteorological Agency

As of December 31st 2004

Table 7.1.6 Atmospheric Constituent Observing Systems for Climate

Constituent	Total sta-tions	Appropriate for characterizing national climate?			Times Series Stations [digitized]				Adequate Quality Control Procedures?			Meta data available Total stations [digitized (%)]	Continuity Stations expected to be operational in 2005
		Fully	Partly	No	10-20 years	20-30 years	30-50 years	More than 50 years	Fully	Partly	No		
Carbon dioxide	5	○			4 [4]	0	0	0	○			5 [100]	5
Vertical carbon dioxide distribution	4	○			4 [4]				○			4 [100]	4
Surface ozone	7	○			2 [2]	0	0	0	○			6 [100]	7
Total ozone	8	○			2 [2]	0	5[5]	0	○			8 [100]	7
Vertical ozone distribution	7	○			2 [2]	0	4[4]	0	○			7 [100]	6
Other greenhouse gases	5	○			4 [4]	0	0	0	○			5 [100]	5
Aerosols	6	○			2 [2]	1[1]	0	0	○			5 [83]	6
Vertical aerosols distribution	2	○			0	0	0	0	○			2 [100]	2

As of December 31st 2004.Total of the Meteorological Agency's stations (including the Syowa Station at the Antarctic) and the National Institute for Environmental Studies'.

7.3.3.2 Ocean Observing System for Climate

Japan has been promoting the development of the Global Ocean Observing System (GOOS), and also contributing actively to its regional pilot project, North-East Asian Regional Global Ocean Observing System (NEAR–GOOS).

Furthermore, continuous observation has been implemented at nationwide observation points to monitor the change in the sea levels. Japan has been making efforts to enhance the observation and monitoring systems, and other measurements to determine time-and-space-related distributions of carbon dioxide in the ocean. Oceanographic observations have also been carried out to monitor the climate changes in the western North Pacific. With the aim of improving long-range weather forecasts, Japan has been improving the marine observation system by deploying Triton buoys in the tropical Western Pacific since 1998, and deploying ARGO floats since 2000 under the Advanced Ocean Observing System (ARGO Project). Moreover, the following has been implemented: preparation of bases for monitoring the marine environment in accordance with the Northwest Pacific Action Plan (NOWPAP); operation of the Advanced Microwave Scanning Radiometer-E (AMSR-E) for the marine observations; operation of Precipitation Radar (PR) onboard Tropical Rainfall Measuring Mission (TRMM) satellite which provides data of the rainfall distribution in the tropical area; developement of a Dual-frequency Precipitation Radar (DPR) for Global Precipitation Measuring (GPM) project; preliminary study for Global Climate Observation Mission (GCOM) which will make continuous observation with microwave and multi-band optical sensors, and also research into remote sensing technologies.

Table 7.2 Participation in the Global Ocean Observing System

	VOS	SOOP	Tide gauges	SFC drifters	Sub-SFC floats	Moored buoy	ASAP
Number of stations	675	34	15*2	15*1	229*1	17*1	5
Number of stations providing data to International Data Centers	204	31	15*2	15*1	224*1	16*1	5
Number of stations expected to be operational in 2005	675	34	15*2	23	345	17	5

*1: As of August 31, 2004, or as of December 31, 2004 for others

*2: Tide gauges participating in GLOSS, including the Showa Station at the Antarctic.

7.3.3.3 Terrestrial Observing System for Climate

Japan is continuously strengthening its observation and monitoring systems and other measurements to scrutinize the time and spatial distribution of greenhouse gases such as carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and tropospheric ozone, and has been carrying out the following: monitoring of greenhouse gas flux in northern forests; development of the Greenhouse gases Observing SATellite (GOSAT); launch of the Advanced Land Observing Satellite (ALOS); operation of Precipitation Radar (PR) onboard Tropical Rainfall Measuring Mission (TRMM) satellite which provides data of the rainfall distribution in the tropical area; operation of the Advanced Microwave Scanning Radiometer-E (AMSR-E); developement of a Dual-frequency Precipitation Radar (DPR) for Global Precipitation Measuring (GPM) project; preliminary study for Global Climate Observation Mission (GCOM) which will make continuous observation with microwave and multi-band optical sensors, research into remote sensing technology that carries out terrestrial environmental observations of vegetation amounts (biomass), land use, changes in land coverage, ground moisture, snow and ice.

7.3.3.4 Support for Developing Countries to Establish and Maintain Observation Systems, Concerned Data and Monitoring Systems

Japan has been jointly carrying out research on global environment measuring technologies in Asia, and has also been promoting the establishment of a strategic environment monitoring system using a satellite, Pilot Project for satellite date use and capacity building in the Asia-Pacific region.

Chapter 8

Education, Training, and Public Awareness

8.1 Approaches to Policies and Measures

Carbon dioxide emissions have been consistently increasing in recent years in the residential/commercial and transport sectors, which are closely related to the lifestyles of citizens. To mitigate global warming, all citizens must shift from the mass consumption and disposal lifestyle to resource and energy conservation. At the same time, consideration should be given for the usage of non-fossil fuel energy, including new and renewable energy and nuclear energy.

To that end, opportunities to learn about the global warming issue, as well as the energy issues closely involved with it, are provided for households, schools, and society at large. Japan promotes improved awareness through advertising in the mass media, distribution of pamphlets, and the holding of symposiums. Also, Japan is committed to increasing the support for environmental NGOs, which promise to play a leading role as advisors in citizen efforts to address the global warming problem.

The Government of Japan will actively provide and share, in as visible a manner as possible, knowledge about the increasingly serious global warming issue, the specific actions for which enormous efforts are needed in order to achieve the six percent reduction commitment, and information about what each individual must do, as well as carry out public relations and dissemination activities on these topics in order to improve the awareness of households and businesses and rouse them to take action.

8.2 Promotion of Environmental Education and Study

8.2.1 Outline

In July 2003 the Law for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education was established and it subsequently came into full force in October 2004 after a Cabinet Decision on the basic policy (September 24, 2004). In order to firmly entrench efforts to stop global warming in the lives of the citizens, the government will actively provide places and opportunities for people in households, schools, regions, and businesses to learn about the importance of looking after the global environment, the connection of the global warming issue to daily life, the energy issue which is closely related to the global warming issue, examples of specific actions people can take to stop global warming.

In particular, the Government of Japan will promote the implementation of hands-on environmental education and energy conservation activities in school facilities that play a central role in regions, through

such measures as renovations including the introduction of heat insulation materials and the use of locally harvested timber that would contribute to global warming countermeasures and the introduction of new energy devices, and will utilize the Internet, to promote support for global warming countermeasures, in households. In combination with these measures, the Government of Japan will continue to advance the development of teaching materials and programs that would encourage understanding and actions by citizens in collaboration with concerned entities such as NPOs.

Furthermore, the Government of Japan will promote various hands-on activities in forests and green park areas in order to deepen understanding of the role of forests in preventing global warming, necessity of forest development and cyclical use of timber resources and the value of urban greening, among others.

8.2.2 Specific Measures

- Promotion of Environmental Education Provided by Schools

  Established in fiscal 2002, the current Courses of Study aim to promote environmental education in schools more than previously by further enhancing content related to the environment in the social studies and science subjects and by enabling cross-subject and comprehensive study of the environment within the Period for Integrated Study through experiential and problem-solving learning. Furthermore, the following have been carried out as actual promotion measures: designating the model region practicing environmental education, holding environmental learning fairs and seminars for teachers in charge of environmental education, and certifying GLOBE (Global Learning and Observation to Benefit the Environment) model schools and environmentally friendly school facilities (eco-schools). Moreover, the government is aiming to further enhance environmental education in schools by implementing policies such as development of programs and teaching materials for the promotion of environmental education, and development of a comprehensive information provision structure for environmental education leader training basic courses and environmental education. Japan has been using recycled paper in textbooks to improve the further understanding of recycling for students. In light of the close relationship between global warming and energy consumption, Japan continues to upgrade the provision of education concerning resources and energy in schools, and to develop conditions for promoting education concerning energy and nuclear power.

- Environmental Education and Studies through Social Education and Other Opportunities

  Beginning in fiscal 2004 social education facilities have taken on a central role. They are implementing the Social Education Revitalization 21st Century Plan which aims to revitalize social education nationwide by comprehensively assessing environmental issues and other challenges faced by the regions before implementing model projects that involve the integrated planning, implementation and evaluation of projects and publicizing the results of the projects nationwide.

  In order to promote participation by a wide range of stakeholders in environmental education and environmental studies and expand the number of places and opportunities for hands-on education and study, the government is promoting environmental education and environmental studies policies in diverse places such as households, regional communities, parks, national forests, including the

promotion of energy conservation education, the Project for an Environment Minister at Home, the Junior Eco Club project, and the Junior Park Ranger project.

- Project for an Environment Minister at Home

  Beginning in 2005, with a view to promoting environmental conservation activities and environmental education in households, the Project for an Environment Minister at Home for households nationwide was commenced. Through this project information is provided and teaching materials are distributed using the Internet, and through events places for hands-on activities are provided.

- Promotion of Energy Conservation Education

  The energy conservation education is promoted by dispatching instructors and providing assistance on educational materials through the Energy Conservation Center.

- Junior Eco Club Project

  Since 1995 the government has been implementing the Junior Eco Club project which supports study of the environment voluntarily undertaken by elementary and junior high school students in the regions and in fiscal 2004 there were 4,183 clubs and 83,156 children participated in them.

- Junior Park Ranger Project

  Since 1999 the government has been running the Junior Park Ranger project that provides opportunities for elementary and junior high school students to get hands-on experience of various environmental conservation activities through communication with nature in national parks and other places. The project has been promoting children's interaction with nature and deepening their understanding of environmental conservation.

- Environmental Education at Urban Parks

  Since 1996 the government has been running a project to prepare 'environmentally friendly parks' as centers for environmental activities by citizens and the training of leaders. In order to improve awareness and encourage urban greening, the Green Consultation Center has been established. In addition the government is promoting activities for the conservation, creation, and management of green park areas with the participation and cooperation of local citizens.

- Development of a Support Structure for Forest Environmental Education Activities

  The government is providing support for the various forest experience activities of children, developing and utilizing school forests, establishing model school forests, and providing forest experience study utilizing the planning capacity of NPOs and is also supporting the development of a structure for the promotion of forest environmental education activities. For example it is constructing a network for environmental education about timber use.

  The government has also established Recreational Forests as places for the implementation of hands-on activities by schools in national forests and is implementing hands-on activities sponsored by the Regional Forest Offices and District forest offices and providing information and technical instruction.

8.3 Activities for Promoting the Prevention of Global Warming

8.3.1 Outline

In order to mitigate global warming, it is necessary for each member of the public to modify their own lifestyles, and public awareness and action is required to do so.

The Government of Japan will encourage voluntary actions by each individual citizen by strongly appealing to the awareness of citizens through the appropriate provision of information using diverse methods. In doing so, the government will work to foster a sound sense of crisis through the provision of the latest scientific knowledge, and to provide information and educate the public concerning what specific actions or purchases will contribute to the limitation of greenhouse gas emissions or the promotion of sink measures.

8.3.2 Specific Measures

- Development of National Campaigns (Team Minus 6%, COOL BIZ, WARM BIZ)
  In order to promote the understanding of all sectors of society, including businesses, and citizens and to make the realization of specific warming prevention actions certain, the government will disseminate knowledge and develop national campaigns while collaborating with the business circle, NPOs, the labor circle, and researchers.

  Specifically, since April 2005, the government has launched the national campaign 'Team Minus 6%' which aims to encourage all citizens to work as one to prevent global warming. With respect to countermeasures concerning reduction of greenhouse gas emissions, it has organically used the Internet, television, newspapers, and radio to conduct an intensive campaign urging people to take six specific warming prevention actions including setting heaters and air conditioners to appropriate temperatures.

  And as a part of these efforts, for example, Team Minus 6% is promoting the summer and winter business dress styles of COOL BIZ and WARM BIZ which encourage people in offices to wear clothes that enable them to set the air conditioner to 28 degrees Celsius in the summer and set the heating to 20 degrees Celsius in the winter and work comfortably and efficiently at those room temperatures.

- Presentation of the Actions and Standards Expected of Citizens
  Informing citizens of the specific actions and standards expected, in other words specifically what kinds of efforts they are expected to make and to what degree, is also effective for encouraging efforts to reduce greenhouse gases. The Government of Japan will formulate and present the specific actions expected of citizens and other details such as the amount of energy consumption including electric power, gas and petroleum expected of each household taking into account the characteristics of the regional climate, the number of people in the household and so on. as standards of actions of citizens and endeavor to educate the public about them.

- Measures through the Japan Center for Climate Change Actions (Stop Ondan Kan) and the Prefectural Centers for Climate Change Actions (or "prefectural centers for the promotion of activities to stop global warming")

  In accordance with the Law Concerning the Promotion of the Measures to Cope with Global Warming enacted in April 1999, the Japan Center for Climate Change Actions and Prefecture Centers for Climate Change Actions (or "prefectural centers for the promotion of activities to stop global warming") have been improving awareness and conducting promotional activities amongst local communities.

  The Japan Environment Association was designated as the Japan Center for Climate Change Actions in July 1999 and the Stop Ondan Kan was opened as a center for education of the public in July 2004. Thirty-nine Prefecture Centers for Climate Change Actions (or "prefectural centers for the promotion of activities to stop global warming") had been designated nationwide as of September 2005 and they are active as promoters of global warming countermeasures in the regions.

- Activities of the Global Warming Prevention Activities Advisors

  In accordance with the Law Concerning the Promotion of the Measures to Cope with Global Warming, activities to control the emission of greenhouse gases in relation to daily lifestyles by providing advice and seeking to improve public awareness have been carried out by the global warming prevention activities advisors designated by prefectural governors.

- Promotion of Green Purchasing

  The Law Concerning the Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities' (Law on promoting Green Purchasing) established in 2000 stipulates the Basic Policy on Promoting Green Purchasing in order to comprehensively and systematically promote procurement of environmentally friendly goods and services and the national and local governments are stipulating their goods and services procurement policies in line this Basic Policy and implementing priority procurement of environmentally friendly goods and services. And the law requires local governments, businesses and citizens to endeavor to select environmentally friendly goods and services. In order to contribute to that selection process the government is providing information through the Internet and is involved in public education activities such as green purchase seminars.

- Measures centered on Environment Month

  Both the national and local governments engage in various efforts to raise public awareness for environmental conservation. These activities are mainly conducted in June, which is Japan's Environment Month, and particularly on June 5th, which is Japan's annual Environment Day. Activities include: the Eco-Life Fair – an environmental exhibition; Eco Car World (low-emission vehicle exhibition) various lectures, symposiums, and events such as town meetings throughout Japan; the creation and distribution of pamphlets, posters, videos, etc.; the commendation of parties who provide environmental conservation services; and a PR campaign conducted in media such as television, radio, newspapers, and magazines. Since 2005 the government has implemented a variety of events in collaboration with the national campaign 'Team Minus 6%' to prevent global warming.

- Measures centered on Global Warming Prevention Month

  December has been designated Japan's Global Warming Prevention Month and the central and local governments promote various activities to further this aim. Specifically, the following have been promoted: various events, such as implementing symposiums that contributes to global warming prevention, etc.; the commendation of parties who provide environmental conservation services; and PR campaigns conducted in various media.

- Measures centered on Ozone Layer Conservation Promotion Month

  September has been designated Japan's Ozone Layer Conservation Promotion Month associated with the international ozone layer conservation day (September 16th), and various ozone layer conservation and global warming prevention related activities with the aim to reduce emissions of ozone layer depleting substances and three fluorinated gases have been promoted. Few examples of such events are the distribution of brochures and posters, presenting seminars, exhibitions of panels, and the commendation of companies and organizations that have contributed to ozone layer conservation or prevention of global warming.

- Awareness Campaign for Energy Conservation

  The council for promoting energy and resource conservation-related measures designated February as Energy Conservation Month, with the first day of each month being deemed an Energy Conservation Day, in addition to which August 1st is the Summer General Check-Up Day for Energy Conservation, and December 1st is the General Check-Up Day for Energy Conservation. The council implements intensive measures such as distribution of pamphlets and holding symposiums. Moreover, in order to promote cooperation on energy conservation measures by all sectors of society it decides the 'summer (winter) energy conservation measure' every year and strengthens its awareness campaigns with the cooperation of individual government offices.

- Awareness Campaign for 3R

  In order to disseminate and promote 3R (reduce, reuse, recycle), October each year has been designated 3R Promotion Month and in particular during this month activities to educate the public are implemented. These include the Awards for Achievement in Promoting Reduce, Reuse, Recycle Activities held to encourage 3R activities by stakeholders and the Awards for Resource-Recycling Technologies and Systems designed to promote recycling businesses.

- Measures for New Energy

  .Many types of equipment related to new energy have already been developed commercially, but are still expensive. For further cost reductions, initial demand is stimulated through commendation systems (the New Energy Prize) for superior products and application examples, as well as through seminars, symposiums (the New Energy Symposium, the Green Energy Festival, and others), and other awareness campaign activities.

- Awareness Campaign for Nuclear Power

With the assurance of safety as the major premise, nuclear power is promoted by actively disclosing information to the public to ensure greater transparency and reflect public opinions and by providing correct and easy-to-understand information through all types of media. In addition, guidebooks for students or teachers are supplied, and symposiums and seminars are held to fundamentally strengthen PR activities aimed at obtaining the consent of citizens for nuclear power policies.

- Awareness Campaign for Use of Wood Products

  The national and local governments are advancing the Wood Products Awareness Campaign which carries out a variety of awareness campaigns concerning wood products use, particularly in October which is Wood Products Awareness Promotion Month. Specifically, wood products awareness symposiums and a variety of seminars are held, pamphlets or posters are created and distributed, and public relations activities are carried out through a variety of media.

- Awareness Campaign for National Greenery and Urban Greenery

  Examples of awareness campaigns concerning national greenery and urban greening include development of citizen participation greening campaigns including national greening campaigns in Greenery Week, Urban Greening Month, etc. and the promotion of private sector forest establishment and greening activities through the utilization of charity collections for greenery and urban greening funds.

- Awareness Campaign for Transport Sector Environmental Issues

  Environmental measures for the transport sector are promoted throughout Japan by implementing specific measures and improving awareness of global environmental issues through the creation of pamphlets concerning global warming issues, energy conservation measures such as Eco-drive, and environmental issues for the transport sector such as air pollution problems, and their distribution to local government, industrial circles concerned, and the general public.

- Awareness Campaign for Fuel-Efficient Vehicles

  Fuel-efficient vehicles have been promoted by preparing and distributing the Automobile Fuel Efficiency List showing fuel efficiency and carbon dioxide emissions from vehicles, and providing the latest information through the Internet, etc.

- Provision of Information on the Current Status and Future Projections of Global Warming

  Japan has been encouraging the general public to become more aware of the latest information on climate change with publications describing the current status and future estimates of climate change, such as the Climate Change Monitoring Report, the Global Warming Projections, and the Report on Climate Change.

  In October 2005, the Report on Recent Climate Change was publicized after an interval of 6 years to provide latest scientific knowledge on climate change and global warming.

  Japanese editions of the Technical Summary (TS) and Summary for Policymakers (SPM) of the Third

Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC) have also been prepared and released in print and via the Internet.

8.4 Support for Environmental NGOs

8.4.1 Outline

The vital activity and healthy development of environmental NGOs and other private groups are indispensable for success in mitigating global warming. Such groups can also play important roles as leaders or advisors in efforts to get the general public involved. However, many groups do not have the financial resources needed to operate adequately and have depended on assistance from the national and local governments. Japan is committed to strengthening financial support for environmental NGOs and other private groups while preserving the original intent of their activities.

8.4.2 Specific Measures

- The Regional Joint Implementation Emissions Reduction Countermeasures Promotion Model Project of the Ministry of the Environment

  The Ministry of the Environment is running a regional joint implementation emissions reduction countermeasures promotion model project under which it recruits NGOs to run projects, provides support for the implementation of the projects, and creates manuals, in order to implement energy conservation and alternative energy-based carbon dioxide emissions reduction projects implemented by private groups such as NGOs, NPOs, etc. jointly with regional residents, etc., as model projects that are highly effective and have the potential to produce spin-off benefits for other regions too. The goal of the project is to have a wide-ranging impact on carbon dioxide emission reduction activities utilizing the capacity and ingenuity of the NGOs and NPOs of other regions through the nationwide transmission of the manual from the web site of the Japan Center for Climate Change Actions after implementation of the projects.

- The Japan Fund for the Global Environment

  The Japan Fund for the Global Environment was transferred from the jurisdiction of the Japan Environment Corporation to that of the Environmental Restoration and Conservation Agency of Japan in April 2004. Every year the fund provides subsidies and other support for greenery, recycling, and nature conservation-related activities undertaken by environmental NGOs both within and outside Japan. The fund made donations of 703.83 million yen to 203 projects in fiscal 2004. Japan Post has also been allocating donations from special postcard sales to environmental conservation-related projects carried out by private groups, as well as providing support.

- Funds for the Conservation of the Local Environment by Local Government

  Local governments also support the environmental conservation activities by NGOs and other groups through their respective funds for the conservation of the local environment.

- Measures to be taken by the Global Environment Information Centre

  The Global Environment Information Centre was established as a joint project between the United Nations University and the Environment Agency in October 1996. The Centre compiles the results of surveys and researches to build up mechanisms that will allow opinions of NGOs to be reflected in the Framework Convention on Climate Change. It also promotes NGOs' participation in the implementation of Agenda 21 through, inter alia, facilitation of international symposiums that focus on the roles of NGOs in arresting global warming; and runs an information service on the global warming problem with a wide range of materials from Japan and abroad. Moreover it is planned to establish regional environmental partnership offices nationwide beginning in fiscal 2004. They are to be centers for promoting the formation of partnerships in the regions. (They are scheduled to be established in Chubu, Kinki, and Chugoku in fiscal 2004 and in Hokkaido and Tohoku in fiscal 2005).

- Environmental Counselor Registration System

  The Environmental Counselor Registration System has been running since 1996. Under the system people with specialist knowledge and abundant experience are screened and registered as environmental counselors whose function is to provide advice on environmental conservation activities to private groups including consumers and entrepreneurs. The list of counselors is widely available to the public. As of the end of fiscal 2004, the number of people registered as environmental counselors had reached 3,665.

- Support for Private Afforestation Projects

  The Forestry Agency has been supporting private afforestation projects via the Japan International Forestry Promotion & Cooperation Center. The following are being implemented through this project.

  1) Support for afforestation projects implemented by NGOs
  2) Strengthening of cooperation with NGOs
  3) Training of afforestation engineers

- Provision of Opportunities for Forest Establishment Activities

  The government is providing leader training and safety and technical training to groups involved in forest establishment and is providing support for activities such as Activity Forests and other fields within national forests.

- Japan Post

  Japan Post is providing support for global environmental conservation using postcard contributions and other programs (as previously mentioned).

Appendix 1 : List of Measures and Policies Concerning Energy-originated Carbon Dioxide

*When estimating the projected amount of emissions reductions resulting from the effect of each measure, the projections are based on assumed factors other than the evaluation indicators of the measure and the projection at the time the plan is formulated

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
1. Forming CO2-saving regional and urban structures and socioeconomic systems a. CO2-saving urban design						
Promote Area energy network (Table 1－1a(1))	＜Improving efficiency by Area energy network (partly includes "Promote New Energy Measures," "Promote the Introduction of Cogeneration and Fuel Cells, etc.," "Spread High-efficiency Air Conditioning for Commercial Use," etc.)＞	Businesses: ・Promote businesses that meet consumers' needs ・Promote the improvement of efficiency by introducing high-efficiency equipment ・Promote technological development such as improving system efficiency ・Promote examination of the energy efficiency and environmental friendliness, etc. of systems to be introduced	・Framework-building by promoting the establishment of committees ・Promote pioneering model projects ・Formulate introduction manuals ・Promote environmental improvement ・Implement assistance by low-interest loan systems and subsidy systems, etc.	・Promote Area energy network through urban planning systems	・＜Improving efficiency by Area energy network (partly includes "Promote New Energy Measures," "Promote the Introduction of Cogeneration and Fuel Cells, etc.," "Spread High-efficiency Air Conditioning for Commercial Use," etc.)＞	
Promote global warming countermeasures for tenanted buildings, etc. at the regional level (Table 1-1a(2))	＜Numbers included in "Improve energy conservation capability of buildings," "Spread BUMS"＞	Building owners, tenants, etc: Promote cooperative efforts	・Implement model projects that support cooperation between building owners and tenants, etc.	・Publicize excellent examples through regional councils, establish consultation services ・System to assist small- and medium-sized enterprises	・Numbers included in "Improve energy conservation capability of buildings," "Spread BEMS"	

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
1. Forming CO2-saving regional and urban structures and socioeconomic systems b. Design CO2-saving transportation systems						
Promote use of public transportation (Table 1－1b(1))	Number of people transported by public transportation <improvement effect of approximately 2.5 billion people>	Transport businesses: Develop public transportation, improve services and convenience Businesses: Promote use of public transportation among employees, customers, etc. The public: Use public transportation	・Promote development of new railway lines ・Promote development of medium-capacity transit systems such as new transportation systems in urban areas and LRT ・Promote use of public transportation by improving services and convenience, such as promotion of informatization including the introduction of IC cards, improving transit and realizing seamless public transportation ・Implement Comprehensive Measures Projects to Facilitate Urban Transportation ・Promote development of transport nodes such as station squares ・Implement and support social experiments that contribute to promoting use of public transportation ・Promote use of public transportation according to the Law Concerning the Rational Use of Energy (Energy Conservation Law) ・Spread and raise awareness about measures ・Promote development of Public Transportation Priority Systems (PTPS) to give the priority signal for bus, etc.	・Develop public transportation ・Promote use of public transportation by improving services and convenience ・Spread and raise awareness about measures	Approximately 380	・Cumulate figures are calculated by region. This assumes that among the people transported by public transportation, in which an improvement effect is expected due to the development of new railway lines, a certain proportion would have switched from using their own cars. ・Assumes that of those who work in businesses with 100 or more employees and commute using their own cars, approximately 10% would have switched from using their own cars.
Promote environmentally friendly use of automobiles (Improve environmental friendliness of automobile transport businesses, etc. by promoting spread of eco-drive) (Table 1－1b(2))	Number of eco-drive-related equipment in use <200,000 units> Penetration rate of vehicles with advanced GPS-AVM systems <16%>	Manufacturers: Develop and sell eco-drive-related equipment Transport businesses: Introduce eco-drive-related equipment, put eco-drive into effect, develop taxi pools, effectively allocate vehicles using advanced GPS-AVM systems, create and implement medium- and long-term plans according to the Energy Conservation Law Consumers: Introduce eco-drive-related equipment, put eco-drive into effect	・Spread and promote eco-drive efforts by assisting EMS model projects ・Conduct demonstration experiments on anti-idling by developing taxi pools ・Support development of advanced GPS-AVM systems ・Spread and raise awareness about eco-drive including anti-idling ・Ensure that the Energy Conservation Law is applied to automobile transport businesses ・Promote efforts through the Green Distribution Partnership Meeting	・Spread and raise awareness about measures ・Promote measures to ensure compliance with anti-idling regulations	Approximately 130	・Effect of CO2 emissions reduction per vehicle due to the introduction of eco-drive-related equipment <approximately 15%> ・Amount of reduction of allocated distance using advanced GPS-AVM systems <approximately 1km>

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote environmentally friendly use of automobiles (Support introduction of anti-idling automobiles) (Table 1－1b(3))	Number of anti-idling automobiles in use <approximately 2.8 million units>	Manufacturers: Expand the types of automobiles that have the anti-idling function Distributors: Actively sell automobiles that have the anti-idling function	・Measures to support the purchase of automobiles with the anti-idling function ・Develop technology to improve automobile air conditioning systems ・Promote efforts through the Green Distribution Partnership Meeting ・Take initiative in introduction	・Spread and raise awareness about measures ・Take initiative in introduction	Approximately 60	・Effect of reduced fuel consumption resulting from automobiles with the anti-idling function <approximately 5-10%>
Adjust the demand of automobile traffic (Table 1－1b(4))	Develop bicycle tracks <Develop bicycle tracks totaling approximately 30,000km between FY1995 to FY2010>	Transport businesses: Promote traffic demand management (TDM) policies, implement Comprehensive Measures Projects to Facilitate Urban Transportation The public: Use bicycles, staggered commuting, etc.	・Promote traffic demand management (TDM) policies ・Implement Comprehensive Measures Projects to Facilitate Urban Transportation ・Develop and support an environment for bicycle use ・Implement and support social experiments that contribute to promoting bicycle use	・Promote traffic demand management (TDM) policies ・Implement Comprehensive Measures Projects to Facilitate Urban Transportation ・Develop an environment for bicycle use ・Implement and support social experiments that contribute to promoting bicycle use	Approximately 30	・Develop and extend bicycle tracks ・Number of km an automobile travels with a trip length of 5km or less ・Rate of conversion to bicycle use ・CO2 emission factors

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote Intelligent Transport Systems (ITS) (Table 1－1b(5))	Electronic Toll Collection System (ETC) utilization rate <Raise to approximately 70% by spring 2006> Vehicle Information and Communication System (VICS) penetration rate Centralized control of traffic signals <Put approximately 40,000 traffic signals under centralized control between FY1995 and FY2010>	The public, businesses: Introduce vehicles that can use ETC, VICS and mobile operation control systems (MOCS), etc.	・Implement measures to promote ETC use (put various discounts, etc. into effect, enable motorcycles to use ETC) ・Spread and promote VICS ・Promote collection and provision of traffic information ・Develop system to support safe and comfortable driving by providing information and warning, etc. to drivers ・Promote initiatives for introduction based on the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing) ・Promote area control of traffic signals ・Develop traffic control centers by upgrading central processing system and introducing a new traffic signal controlling system ・Promote real-time traffic signal control models ・Promote Environment Protection Management Systems (EPMS), etc. ・Develop Mobile Operation Control Systems (MOCS) for commercial vehicles, etc. ・Promote provision of accurate, appropriate traffic information by private companies ・Appropriately manage traffic information examination systems ・Promote creation of a traffic regulation and information database	・Promote collection and provision of traffic information ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing	Approximately 360	・ETC utilization rate ・Amount of traffic congestion by toll gate ・Number of vehicles passed by toll gate ・Improved speed due to the nonstop effect ・CO2 emission factors by speed ・VICS penetration rate ・Improved speed due to VICS penetration ・CO2 emission factors by speed ・Amount of reduced CO2 emissions per traffic signal under centralized control (2002 standards) ・Number of improved traffic signals
Reduce road construction (Table 1－1b(6))	Annual number of hours of road construction per 1km of road <reduce by approximately 20% by 2007 (compared with 2002)>	Occupant companies: Implement focused construction and joint construction	・Maintain common ducts, implement focused construction and joint construction ・Hold Road Construction Coordination Council meetings, etc. and implement adjustment of focused construction and joint construction	・Maintain common ducts, implement focused construction and joint construction ・Hold Road Construction Coordination Council meetings, etc. and implement adjustment of focused construction and joint construction ・Appropriately administer road permits	Approximately 50	・Annual number of hours of road construction per 1km of road ・Difference in speed with or without traffic congestion ・Length of traffic congestion due to construction ・CO2 emission factors by speed

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Develop traffic safety facilities (Table 1－1b(7))	Upgrade traffic signals <upgrade approximately 20,000 traffic signals between FY1995 to FY2010>		・Promote coordinated and actuated traffic signals ・Sophisticate traffic control ・Develop illegal parking prevention system ・Develop parking guidance system ・Promote measures against the bottleneck by developing traffic signals at railroad crossings and guide traffic using traffic information boards	・Establish traffic signals	Approximately 50	・Amount of reduced CO2 emissions per upgraded traffic signal (2002 standards) ・Number of improved traffic signals
Promote traffic alternatives using information and communications such as teleworking (Table 1－1b(8))	Teleworking population <applies to 25% of the number of employees, or approximately 16.3 million people>	Companies, economic and labor circles: Spread and raise awareness to promote teleworking, conduct survey research activities, etc.	・Provide information, conduct survey research and spread and promote teleworking and SOHO ・Conduct a trial run and implement teleworking for public servants		Approximately 340	・Teleworking population <applies to 25% of the number of employees, or approximately 16.3 million people>
Realize Environmentally Sustainable Transport (EST) (Table 1－1b(9))	Number of regions involved in EST efforts, CO2 reduction rate of regions participating in EST model projects	Transport businesses: Develop public means of transportation, improve services and convenience, reduce environmental burden on means of transport Businesses: Promote use of public means of transportation among employees, clients, etc. Local governments: Projects to promote use of public means of transportation, develop transport infrastructure, countermeasures against illegal parking, establish bus-only lanes, etc. Users: Voluntarily refrain from using automobiles, use public means of transportation and bicycles, promote walking	・Implement model projects (select regions in which to implement them, implement focused assistance) ・Provide information on target setting and evaluation methods, etc. for efforts ・PR activities	・Regional projects to promote use of public means of transportation, etc. ・Develop transport infrastructure that will contribute to reducing the environmental burden ・Environment building ・Spread and raise awareness about measures	・Numbers included in "Spread and promoting clean energy automobiles," "Adjust the demand of automobile traffic," "Promote use of public means of transportation," etc.	

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections ＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
1. Forming CO2-saving regional and urban structures and socioeconomic systems c. Build CO2-saving distribution systems						
Comprehensive Measures to Improve the Environmental Friendliness of Marine Transport (Table 1－1c(1))	Increase in marine transport volume (cargo volume (general merchandise) that can easily be exported by automobiles: ton-km) <5.4 billion ton-km>	Marine transport businesses: Create and implement medium-term plans according to the Energy Conservation Law Cargo owners: Cooperate with marine transport businesses and actively use domestic shipping	・Promote policies to develop, spread and promote new technology, such as the Super Eco-Ship ・Revitalize marine transport by reviewing regulations ・Ensure that the Energy Conservation Law is applied to cargo owners and marine transport businesses ・Assist introduction of new ships and equipment ・Promote efforts through the Green Distribution Partnership Meeting ・Promote modal shift through the Law Concerning the Promotion of the Integration and Efficiency of Distribution Operations	—	Approximately 140	・Basic unit of the ship-to-truck ratio <approximately 13%>
Modal shift to railway freight (Table 1－1c(2))	Amount of railway container transport (in ton-km) that increases as a result of switching from trucks to railway containers <3.2 billion ton-km>	Railway businesses: Effectively use transport capability by take advantage of IT Promote use of large container transport systems by developing them Improve transport efficiency by developing stations with Effective and Speedy Container Handling System (E&S) method Create and implement medium-term plans according to the Energy Conservation Law Forwarders: Promote use of enhanced transport equipment such as large containers Cargo owners: Actively use environmentally friendly railway freight transport	・Project to Strengthen Transport Capability of Railway Freight on the Sanyo Line ・Promote efforts through the Green Distribution Partnership Meeting ・Assist introduction of new high-performance trains that will contribute to strengthening transport capability ・Ensure that the Energy Conservation Law is applied to cargo owners and marine transport businesses ・Promote modal shift through the Law Concerning the Promotion of the Integration and Efficiency of Distribution Operations ・Promote raising awareness of environmentally friendly railway freight transport (spread and promote eco-rail mark, etc.)	・Spread and raise awareness about measures	Approximately 90	・Basic unit of the railway freight transport-to-truck ratio <approximately 8%>

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Improve efficiency of trucking (Table 1－1c(3))	Number of owned vehicles with a total vehicle weight of over 24 tons and 25 tons or below <120,800 units>, number of trailers owned <68,800 units>, rate of shift of trucks from private use to business use <improved by approximately 1%>, load efficiency <improved by approximately 1%>	Freight businesses: Enlarge vehicles, shift to trailers, promote efficiency of trucking, create and implement medium-term plans according to the Energy Conservation Law	・Promote enlargement of vehicles and shift to trailers ・Reinforce bridges so they can withstand larger vehicles ・Ensure that the Energy Conservation Law is applied to cargo owners and marine transport businesses ・Promote efforts through the Green Distribution Partnership Meeting ・Promote modal shift through the Law Concerning the Promotion of the Integration and Efficiency of Distribution Operations	・Spread and raise awareness about measures ・Reinforce bridges so they can withstand larger vehicles	Approximately 760	・Effect of reduced fuel consumption resulting from introduction of 25-ton vehicles <approximately 9,000L/unit> ・Effect of reduced fuel consumption resulting from introduction of trailers <approximately 24,000L/unit> ・Basic unit of ratio of business-use trucks to private-use trucks <approximately 17%>
Reduce land transport distance of international freight (Table 1－1c(4))	Reduce land transport of international freight (in ton-km) <reduction of approximately 9.2 billion ton-km>	Cargo owners, distributors: Use optimal ports that are closest to the sites of production and consumption	・Develop international maritime container terminals at central and core international ports ・Develop hubs at multipurpose international terminals ・Promote efforts through the Green Distribution Partnership Meeting	—	Approximately 270	・Shorten land transport distance of international freight

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
1. Forming CO2-saving regional and urban structures and socioeconomic systems d. Promote integrated introduction of new energy and energy interchange						
Build network of dispersed new energy sources (Table 1－1d(1))	<Numbers included in "Promote New Energy Measures">	Businesses: Promote use of new energy sources, etc. through business activities	・Develop and demonstrate technology, assist introduction, etc. ・Assist advanced businesses in regions	・Promote use of new energy sources through local governments' business activities	・Numbers included in "Promote New Energy Measures"	
Promote use of biomass (build biomass town) (Table 1－1d(2))	Number of biomass towns <500>	Agriculture, forestry and fisheries businesses, businesses, etc.: Actively use biomass resources Local residents: Actively cooperate to gather and use biomass resources	・Promote concept of biomass towns ・Assist formulation of plans, develop facilities, develop technology, provide information, etc. on regional efforts to use biomass	・Formulate and promote concept of biomass towns ・Build system for production, collection, transport, conversion and use of regional biomass	Approximately 100 (Partly includes "New Energy Measures")	・Use 90% of biomass from waste or 40% of unused biomass in approximately 500 municipalities nationwide ・Use approximately 100,000 tons of biomass plastic
Effective use of unused energy sources (Table 1－1d(3))	<Numbers included in "Promote New Energy Measures">	・Actively introduce through businesses, etc.	・Policies to introduce and promote new energy sources	・Introduce and promote through public facilities, etc.	・Numbers included in "Promote New Energy Measures"	
Energy conservation through cooperation among multiple businesses (Table 1－1d(4))	Amount of energy conserved through cooperation among multiple businesses in industrial complexes, etc. <Approximately 1 million kL (crude oil equivalent)>	Businesses: Introduce energy-conserving equipment	Measures to assist businesses in introducing energy-conserving equipment and feasibility studies	・Spread and raise awareness about measures	Approximately 320	・Scheduled to successively implement approximately 3 or 4 projects of priority per year in major industrial complexes

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Measures according to facility and by entity a. Efforts in the industrial sector (manufacturers, etc.)						
Steadily implement and follow up on voluntary action plans (Table 1－2a(1))	Follow up appropriately from the perspective of improving transparency, reliability and probability of achieving targets of voluntary action plans of Nippon Keidanren and individual industries	Nippon Keidanren, various industry groups: Efforts to reduce amount of emissions by improving unit energy consumption, etc. and achieving those targets by steadily implementing voluntary action plans	Follow up in relevant councils, etc.	—	Approximately 4,240	・Expect targets set by industry groups in voluntary action plans to be achieved (Compared to the absence of such measures, energy consumption per industrial activity (IIP) is improved by 5.9% on average)
Thoroughly manage energy according to the Energy Conservation Law (industry) (Table 1－2a(2))	Improve energy efficiency in factories, etc. ・Improve unit energy consumption in factories that will newly become type 2 designated factories ・Improve unit energy consumption in factories that are currently type 2 designated factories but will be upgraded to type 1 designated factories	Businesses: Thoroughly manage energy such as the integrated management of heat and electricity	Appropriately administer the Energy Conservation Law, etc.	—	Approximately 170	・Estimate changes in factories covered by the legal amendment (Approximately 1,800 factories will newly become type 2 designated factories, and approximately 1,200 factories which are currently type 2 designated factories will be upgraded to type 1 designated factories)

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Measures according to facility and by entity b. Efforts by transport businesses						
○Promote environmentally friendly use of automobiles (Improve environmental friendliness of automobile transport businesses, etc. by promoting spread of eco-drive) (same as last time) ○Promote environmentally friendly use of automobiles (Support introduction of anti-idling automobiles) (same as last time) ○Comprehensive measures to improve the environmental friendliness of marine transport (same as last time) ○Modal shift to railway freight (same as last time) ○Improving efficiency of trucking (same as last time) ○Reduce land transport distance of international freight (same as last time)						

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Measures according to facility and by entity c. CO2-saving in business facilities such as offices and stores						
Thoroughly manage energy according to the Energy Conservation Law (commercial and other sector) (Table 1-2c(1))	Improve, etc. energy efficiency of office buildings, etc. ・Improve unit energy consumption in factories that will newly become type 2 designated factories ・Improve unit energy consumption in factories that are currently type 2 designated factories but will be upgraded to type 1 designated factories	Businesses: Thoroughly manage energy such as the integrated management of heat and electricity	・Appropriately administer the Energy Conservation Law, comprehensively inspect business establishments, etc.	—	Approximately 300	・Estimate changes in business establishments covered by the legal amendment (Approximately 1,000 business establishments will newly become type 2 designated factories, and approximately 600 business establishments which are currently type 2 designated factories will be upgraded to type 1 designated factories) ・Past record of energy conservation diagnoses of business establishments by energy conservation centers, etc.

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Improve energy conservation capability of buildings (Table 1－2c(2))	・Percentage of new buildings that have achieved energy conservation standards (1999 standards) <80% (FY2006)>	Clients: Build buildings with high energy conservation capability when building new buildings or expanding or renovating buildings, use comprehensive capability evaluation Owners: Improve energy conservation capability through repair, maintenance, conservation, etc. and use comprehensive environmental capability evaluation Architects: Implement and use comprehensive environmental capability evaluation, provide information to clients, etc. Builders: Develop and use technology, use comprehensive environmental capability evaluation, provide information to clients, etc. Building material and equipment manufacturers: Promote technological development, provide information to clients, etc.	・Oblige clients, etc. to make efforts toward energy conservation measures based on the Energy Conservation Law, make notification of energy conservation measures mandatory when building or making large-scale repairs, etc. of buildings (non-residential) exceeding a certain size ・Promote the development of green government buildings, promote green assessments and renovations ・Carry out thorough and appropriate operation and management of existing government office facilities ・Develop and spread comprehensive environmental capability evaluation methods ・Support in the form of loans from the Development Bank of Japan, tax system, etc. ・Support advanced technological development ・Foster design and construction engineers ・Subsidize efforts to improve energy conservation in office buildings, etc. ・Make eco-friendly repairs at schools ・Promote voluntary efforts among relevant industries	・Use guidance and advising, designation, disclosure and recommendation system for clients, etc. based on the Energy Conservation Law ・Use comprehensive environmental capability evaluation ・Implement energy conservation measures for buildings owned by local governments	Approximately 2,550	・Expect effects outlined in the amended Energy Conservation Law, submitted to the 2005 ordinary Diet session, to be achieved, and assume further improvements to be made in the energy conservation capability of new and existing buildings <Percentage of buildings that have achieved energy conservation standards (1999 standards): 80% (FY2006)><Amount of energy conserved: approximately 5.6 million kL (crude oil equivalent)>

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Spread Building Energy Management Systems (BEMS) (Table 1－2c(3))	Amount of energy conserved through spread of BEMS and HEMS <Approximately 2.2 million kL (crude oil equivalent)>	Introduce to businesses, etc.	・Measures to support HEMS demonstration experiments and introduction of BEMS by businesses ・Support business models concerning energy conservation services for households, etc.	・Take initiative in introduction of BEMS and HEMS	Approximately 1,120	・Because BEMS and HEMS have many aspects in common such as the technological aspect and fields where they can be introduced, as for the measure evaluation indicator and projected volume of emissions reduction, the total amount of energy conservation for BEMS and HEMS and projected volume of emissions reduction is used.

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Measures according to facility and by entity d. CO2-saving in households						
Improve energy conservation capability of houses (Table 1－2d(1))	・Percentage of new houses that have achieved energy conservation standards (1999 standards) <50% (FY2008)>	Clients: Build houses with high energy conservation capability when building new houses or expanding or renovating houses, use comprehensive environmental capability evaluation Owners: Improve energy conservation capability through repair, maintenance, conservation, etc. and use comprehensive environmental capability evaluation Architects: Implement and use comprehensive environmental capability evaluation, provide information to clients, etc. Builders and housing suppliers: Develop and use technology, use comprehensive environmental capability evaluation, provide information to clients, etc. Building material and equipment manufacturers: Promote technological development, provide information to clients, etc.	・Oblige clients, etc. to make efforts toward energy conservation measures based on the Energy Conservation Law, make notification of energy conservation measures mandatory when building or making large-scale repairs, etc. of houses exceeding a certain size ・Spread and promote housing performance indication system ・Develop and spread comprehensive environmental capability evaluation methods ・Support energy conservation measures for public housing, etc. ・Encourage energy-conserving houses using frameworks for finance corporation loans and securitization loans ・Support advanced technological development ・Foster design and construction engineers ・Promote voluntary efforts among relevant industries	・Use designation, disclosure and recommendation system of the Energy Conservation Law ・Spread and promote housing performance indication system ・Use comprehensive environmental capability evaluation ・Implement energy conservation measures for public housing, etc. ・Provide information to clients, architects, etc.	Approximately 850	・Expect effects outlined in the amended Energy Conservation Law, submitted to the 2005 ordinary Diet session, to be achieved, and assume that further improvements will be made in the percentage of new houses that have achieved the 1999 energy conservation standards as well as in the energy conservation capability of existing houses <Percentage of buildings that have achieved energy conservation standards (1999 standards): 50% (FY2008)> <Amount of energy conserved: approximately 3 million kL (crude oil equivalent)>

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Model efforts for CO2-saving in houses undertaken with the cooperation of housing manufacturers, consumers, etc. (Table 1－2d(2))	<Numbers included in "Improve energy conservation capability of houses," "Improve efficiency of equipment that meets top-runner standards">	Housing manufacturers, building contractors, housing exhibits: Provide energy conservation information concerning housing Consumers: Actively improve energy conservation when building new houses	・Spread and promote energy-conserving houses, energy-conserving materials and facilities, etc.	・Provide energy conservation information using prefectural centers	・Numbers included in "Improve energy conservation capability of houses," "Improve efficiency of equipment that meets top-runner standards"	
Spread Home Energy Management Systems (HEMS) (Table 1－2d(3))	Amount of energy conserved through spread of BEMS and HEMS <Approximately 2.2 million kL (crude oil equivalent)>	Introduce to businesses, etc.	・Measures to support HEMS demonstration experiments and introduction of BEMS by businesses ・Support business models concerning energy conservation services for households, etc.	・Take initiative in introduction of BEMS and HEMS	Approximately 1,120	・Because BEMS and HEMS have many aspects in common such as the technology and fields where they can be introduced, as for the measure evaluation indicator and projected volume of emissions reduction, the total amount of energy conservation for BEMS and HEMS and projected volume of emissions reduction is used.

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Measures according to facility and by entity e. CO2-saving in the energy supply sector						
Reduce unit CO2 emissions in the electric field by promoting nuclear power, etc. (Table 1－2e(1))	Rate of improvement of unit CO2 emissions among electric power suppliers: (Federation of Electric Power Companies of Japan: Environmental Action Plan targets) Reduce emission of carbon dioxide per 1 kWh of electric power generation in FY2010 by approximately 20% from the FY1990 level <Reduce to approximately 0.34kg-CO2/kWh>	(Federation of Electric Power Companies of Japan) Efforts aimed at achieving the targets of the Environmental Action Plan through the following measures, etc. (1) Improve nuclear power plant's capacity factor by realizing scientific and rational operations management (2) Further improve the thermal efficiency of thermal power plants, adjust thermal power operation methods bearing in mind environmental characteristics, etc. (3) Attain credit (amount of CO2 emissions) according to the Kyoto Protocol using the Kyoto Mechanisms	Conduct the following measures, etc. to reduce unit CO2 emissions in the electric field. Follow up on the status of progress of achieving the targets of the Environmental Action Plan by the Japanese Electric Utility Industry (Federation of Electric Power Companies of Japan). With ensuring safety as the major premise, promote nuclear power with mutual public and private sector cooperation while attaining the people's understanding. Support measures to make thermal power plants highly efficient, such as subsidizing costs to convert antiquated coal-fired thermal power plants into those powered by natural gas. Assist steps to make use of the Kyoto Mechanisms. Continue to promote measures for electrical load leveling by spreading and promoting thermal systems, etc.	—	Approximately 1,700	・Raise the nuclear power planned capacity factor from 85% to 87-88% ・Reduce unit CO2 emissions by approximately 1% through operation and adjustment of thermal power plants ・Reduce unit CO2 emissions by approximately 1% using the Kyoto Mechanisms

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote measures for new energy sources (expand use of heat from biomass, photovoltaic power generation, etc.) (Table 1－2e(2))	Amount of new energy introduced <Approximately 19.1 million kL (crude oil equivalent)>	Promote use of new energy sources, etc. through business activities of businesses Manufacturers: Develop technology to improve efficiency of new energy facilities, etc. Consumers: Actively introduce new energy sources, including photovoltaic power generation in houses and system for intensive solar power use	・Provide assistance in the introduction stage ・Provide assistance in technological development and demonstration stage ・Spread and raise awareness about measures ・Facilitate implementation of the Special Measures Law Concerning the Use of New Energy by Electric Utilities (RPS Law), etc. ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing ・Build biomass towns ・Build network of dispersed new energy ・Effectively use unused energy sources (fields related to new energy sources) ・Subsidize development of model regions in which renewable energy sources are introduced in a focused manner ・Subsidize introduction of facilities that use bioethanol fuel ・Subsidize development of facilities that use highly efficient energy from waste and facilities that use biomass, etc. ・Subsidize local governments to take initiative in introducing new energy technology	・Promote formulation, implementation and evaluation of comprehensive plans to introduce new energy sources ・Promote introduction in public facilities, etc. ・Assist introduction of new energy sources ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	Approximately 4,690	・Photovoltaic power generation: 1.18 million kl, wind power generation: 1.34 million kl, waste power generation + biomass power generation: 5.86 million kl, solar power use: 900,000 kl, use of energy from waste: 1.86 million kl, use of biomass heat: 3.08 million kl (includes fuel derived from biomass in fuel for transport (500,000 kl)), unused energy: 50,000 kl, black liquor and waste wood, etc.: 4.83 million kl * Breakdown indicates tentative targets
Promote introduction of co-generation and fuel cells, etc. (Table 1－2e(3))	Cumulative amount of natural gas co-generation introduced (including power generated from fuel cells) <approximately 4.98 million kW> Cumulative amount of fuel cells introduced <approximately 2.2 million kW>	Manufacturers: Develop technology for natural gas co-generation and fuel cells Distributors: Sell natural gas co-generation and fuel cells, provide information to consumers Consumers: Actively introduce fuel cells and natural gas co-generation	・R&D concerning natural gas co-generation and fuel cells ・Subsidy system to introduce natural gas co-generation and fuel cells ・Subsidize introduction of fuel cells (local governments, regional councils) ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	・Take initiative to introduce natural gas co-generation and fuel cells ・Support introduction ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	(1) Natural gas co-generation: Approximately 1,140 (2) Fuel cells: Approximately 300	・Cumulative amount of natural gas co-generation introduced <approximately 4.98 million kW> ・Cumulative amount of fuel cells introduced <approximately 2.2 million kW> ・Annual operating hours ・Generating efficiency, thermal efficiency

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
3. Measures and policies, etc. by equipment a. Industrial sector						
Promote introduction of high-performance industrial furnaces (Table 1－3a(1))	Number of units introduced (small- and medium-sized enterprises) <approximately 2,000 units>	Businesses: Introduce energy conserving facilities	・Measures to support introduction of energy conserving facilities in businesses	・Support introduction ・Spread and raise awareness of measures	Approximately 200	・Amount of energy conserved by high-performance industrial furnaces (small- and medium-sized enterprises)
Spread high-performance boilers (Table 1－3a(2))	Number of units introduced (small- and medium-sized enterprises) <approximately 11,000 units>	Businesses: Actively introduce high-performance boilers	・Measures to support introduction of energy conserving facilities in businesses	・Support introduction ・Spread and raise awareness of measures	Approximately 130	・Amount of energy conserved by high-performance boilers
Promote introduction of next-generation coke ovens (Table 1－3a(3))	Number of units introduced <1 unit>	Businesses: Install next-generation coke ovens	・Measures to support introduction of energy conserving facilities in businesses	—	Approximately 40	・Amount of energy conserved by next-generation coke ovens <approximately 100,000 kl/unit>

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Spread fuel-efficient construction machinery in the construction field (Table 1－3a(4))	Penetration rate of fuel-efficient construction machinery <approximately 30%>	Manufacturers: Provide information to construction businesses and distributors that sell fuel-efficient construction machinery Construction businesses: Use fuel-efficient machinery	・Use fuel-efficient construction machinery for public works ・Measures to support the spread of fuel-efficient construction machinery	・Use fuel-efficient construction machinery for public works	Approximately 20	・Amount of total emissions from construction machinery <11.11 million t-CO2/year> ・Percentage of emissions from construction machinery covered by policies aimed at the amount of total emissions <60% (back hoe, tractor shovel, loader, bulldozer)> ・Percentage of reduction of CO2 emissions from construction machinery covered by policies <10%> ・Penetration effect (projected) <30%>

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
3. Measures and policies, etc. by equipment b. Transport sector						
Improve fuel efficiency of automobiles according to top-runner standards (Table 1－3b(1))	Status of achievement of top-runner standards of manufacturers and importers in the target fiscal year (depends on each business and on categories designated in the Energy Conservation Law)	Manufacturers, importers, etc.: Develop, produce, sell and import fuel-efficient automobiles Distributors: Actively sell fuel-efficient automobiles Consumers: Introduce fuel-efficient automobiles	・Establish top-runner standards ・Prefential tax treatment ・Acclerate development and spread of low-emission vehicles, triggered by the move to replace general official vehicles of the government with low-emission vehicles ・Provide information on fuel to consumers through an evaluation and disclosure system concerning automobile fuel efficiency and through vehicle body indications, etc. ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing ・Promote introduction of fuel-efficient vehicles through a low-interest loan system ・Newly introduce top-runner standards for heavyweight automobiles in the future ・In the future, formulate new top-runner standards for passenger cars running on gasoline after 2010 ・Promote efforts for automobile transport businesses to introduce fuel-efficient vehicles according to the amended Energy Conservation Law ・Promote development and practical use of low-emission vehicles bearing the next generation in mind	・Spread and promote measures ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	Approximately 2,100	・Average theoretical fuel consumption of new automobiles in 2010 ・Average theoretical amount of fuel conserved if measures are taken for automobiles that have already established fuel efficiency standards ・Average theoretical amount of fuel conserved if no measures are taken ・Total volume of transportation (ton kilo) Note: The amount achieved ahead of time by fuel efficiency standards established by domestic manufacturers is expected to be seen in the effect of improved fuel consumption of gasoline passenger cars

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Spread and promote clean energy automobiles (Table 1－3b(2))	Cumulative number of electric vehicles, hybrid cars, natural gas cars, methanol cars, cars using LP gas instead of diesel fuel and fuel cell cars introduced <Total: 2.33 million units>	Manufacturers, importers: Import, produce and develop technology for clean energy automobiles Distributors: Actively sell clean energy automobiles Consumers: Introduce clean energy automobiles	・Support introduction of clean energy automobiles ・Preferential tax treatment ・Accelerate development and spread of low-emission vehicles, triggered by the move to replace general official vehicles of the government with low-emission vehicles ・Develop high-output secondary batteries for hybrid cars ・Promote technological development, demonstration experiments, etc., leading the world in the early practical application of fuel cell cars ・Promote development and practical use of low-emission vehicles bearing the next generation in mind ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing ・Promote introduction of fuel-efficient vehicles through a low-interest loan system ・Promote efforts for automobile transport businesses to introduce fuel-efficient vehicles according to the amended Energy Conservation Law	・Support introduction ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing ・Spread and raise awareness about measures	Approximately 300	・Cumulative number of hybrid cars, cars using LP gas instead of diesel fuel, natural gas cars and electric cars introduced <Total: 2.33 million units> ・Energy conservation rate by type of clean energy automobile

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Limit the maximum speed for large trucks on highways (Table 1－3b(3))	Number of large trucks that have installed a speed limiting device <approximately 800,000 units>	Businesses: Install speed limiting devices on large trucks	・Oblige large trucks to install speed limiting devices in accordance with the Road Vehicles Act	—	Approximately 80	・Reduce fuel consumption by limiting the maximum speed on highways <approximately 13%>
○Promote environmentally friendly use of automobiles (Support introduction of anti-idling automobiles) (same as last time)						
Introduce sulfur-free fuel and cars that can run on sulfur-free fuel (Table 1－3b(4))	Rate of improvement of fuel consumption due to direct-injection lean-burn engines <Gasoline cars: approximately 10%> Rate of improvement of fuel consumption due to the decline in purge frequency to eliminate catalyst poisoning <Diesel cars: approximately 4%>	Oil refiners, oil wholesalers: Provide sulfur-free fuel Automobile manufacturers, etc.: Develop cars that can run on sulfur-free fuel Automobile dealers: Actively sell cars that can run on sulfur-free fuel Consumers: Introduce cars that can run on sulfur-free fuel, purchase sulfur-free fuel	・Provide support to ensure energy conservation in oil refinery facilities, etc. that produce sulfur-free fuel ・Support provision of sulfur-free fuel	・Take initiative to introduce cars that can run on sulfur-free fuel	Approximately 120	・Ratio shipments of cars with direct-injection lean-burn engines that can run on sulfur-free fuel to diesel cars <gasoline cars: 8%, diesel cars: 100%> ・Amount of energy consumed by gasoline cars and diesel cars
Improve energy consumption efficiency in railway (Table 1－3b(5))	Unit energy consumption <approximately 7% improvement>	Railway businesses: ・Voluntary action plans ・Create and implement medium- to long-term plans according to the Energy Conservation Law	・Support introduction of new vehicles ・Apply the Energy Conservation Law to railway businesses	—	Approximately 40	・Introduce energy-saving vehicles <approximately 75%>
Improve energy consumption efficiency in aviation (Table 1－3b(6))	Unit energy consumption <approximately 15% improvement>	Airline businesses: ・Voluntary action plans ・Create and implement medium- to long-term plans according to the Energy Conservation Law	・Support introduction of new aircraft ・Improve Air Traffic System and upgrade facilities for precision approach ・Promote eco-airports ・Apply the Energy Conservation Law to airline businesses	—	Approximately 190	・Domestic air traffic volume in FY2010 <101.9 billion person kilo>

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
3. Measures and policies, etc. by equipment c. Commercial and other sector, and residential sector						
Improve efficiency of equipment that meets top-runner standards (Table 1－3c(1))	Status of achievement of top-runner standards of manufacturers and importers in target fiscal years (depends on categories set for each business and in the Energy Conservation Law)	Manufacturers, importers: Import, produce and develop energy-efficient equipment Distributors: Actively sell energy-efficient equipment	・Establish top-runner standards ・Add equipment, review standards ・Promote spreading and raising awareness about "Course on Spreading Energy Conserving Household Appliances," etc. ・Provide information on "Stores Cooperating in the Spread of Energy Conserving Household Appliances" ・Create a scheme to provide information to retailers on the amended Energy Conservation Law ・Promote taking initiative in introduction based on Law on Promoting Green Purchasing	・Actively provide information on energy conservation through energy conservation labels, etc. ・Spread and raise awareness about measures ・Promote taking initiative in introduction based on Law on Promoting Green Purchasing	Approximately 2,900	・Energy consumption efficiency of equipment, etc. ・Number of households (residential sector), floor area (commercial and other sector) ・Equipment ownership rate ・Average number of years equipment has been used

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote replacement with energy conserving equipment (Table 1－3c(2))	Number of electric pots, dishwashers, electric bulb-type fluorescent lamps and other energy-conserving equipment introduced <approximately 78 million units>	Household appliance manufacturers, mass retailers, etc.: Provide information on energy conservation, explain effects of energy conservation (especially regarding electric pots, dishwashers and electric bulb-type fluorescent lamps) Consumers: Actively select energy-conserving equipment when replacing abovementioned equipment	・Promote spreading and raising awareness about "Course on Spreading Energy Conserving Household Appliances," etc. ・Provide information on "Stores Cooperating in the Spread of Energy Conserving Household Appliances"	・Spread and raise awareness about measures	Approximately 560	・Cumulative number of units introduced: Electric pots <approximately 10 million units>, dishwashers <approximately 17 million units>, electric bulb-type fluorescent lamps <approximately 51 million units>, water-saving showerheads <approximately 15 million units>, energy conserving control apparatus for air conditioner compressors <approximately 14,000 units> ・Energy conservation effect by replacing equipment: Electric pots <approximately 54%>, dishwashers <approximately 56%>, electric bulb-type fluorescent lamps <approximately 80%>, water-saving showerheads <approximately 20%>, energy-conserving control apparatus for air conditioner compressors <approximately 13%>

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Have energy supply businesses, etc. provide energy information to consumers (Table 1－3c(3))	Record of energy supply businesses having provided information, etc.	Energy supply businesses, etc.: Provide information that will contribute to rationalizing energy use for general consumers	・Systematize provision of information by energy supply businesses, etc. to general consumers in accordance with the amended Energy Conservation Law ・Actively provide energy information to consumer through the energy conservation labeling system and evaluation system for distributors of energy conservation products, etc. ・Support energy conservation businesses by energy supply businesses, etc.	・Spread and raise awareness about measures	Approximately 420	・Energy conservation effects, etc. by energy conservation navigation, etc. <approximately 5-20%>
Model efforts undertaken in collaboration with household appliance manufacturers, distributors and consumers, etc. to spread energy-conserving household appliances (Table 1－3c(4))	<Numbers included in "Improve efficiency of equipment that meets top-runner standards" and "Promote replacement with energy conserving equipment">	Household appliance manufacturers: Provide information on energy conservation Mass retailers, small- and medium-sized retailers: Explain effects of energy conservation in in-house training and sales floor Consumers: Actively select energy-conserving household appliances when replacing them	・Support the spread and promotion of energy-conserving products	・Provide energy conservation information by way of prefectural centers	・<Numbers included in "Improve efficiency of equipment that meets top-runner standards" and "Promote replacement with energy conserving equipment">	

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Spread efficient water heaters (Table 1－3c(5))	Number of units of CO2 refrigerant heat pump water heaters that have spread <approximately 5.2 million units> Number of latent heat recovery-type water heaters that have spread <approximately 2.8 million units>	Manufacturers, etc.: Develop technology for, produce and sell efficient water heaters Businesses, consumers: Actively introduce efficient water heaters	・Measures to support the introduction of efficient water heaters ・Subsidize the introduction of housing for which the amount of CO2 emissions is significantly lower than that of regular housing ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	・Spread and raise awareness about measures ・Promote taking initiative in introduction based on the Law Concerning the Promotion of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)	Approximately 340	・Cumulative number of units of CO2 refrigerant heat pump water heaters that have spread <approximately 5.2 million units> ・Cumulative number of latent heat recovery-type water heaters that have spread <approximately 2.8 million units> ・Performance of latent heat pump water heaters, heat recovery water heaters and conventional water heaters (coefficient of performance (COP)) Note: In addition to CO2 refrigerant heat pump water heaters and latent heat recovery-type water heaters, efficient water heaters include gas engine water heaters, but the prospect of the introduction of gas engine water heaters is calculated as part of cogeneration.
Spread efficient air conditioners for commercial use (Table 1－3c(6))	Number of units of efficient air conditioners introduced <approximately 12,000 units>	Manufacturers, etc.: Develop, produce and sell efficient air conditioners Owners of commercial facilities: Actively introduce efficient air conditioners for commercial use	・Measures to support the introduction of efficient air conditioners by businesses ・Subsidize efforts to make commercial buildings, etc. conserve energy (regional councils) ・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing	・Promote taking initiative in introduction based on the Law on Promoting Green Purchasing ・Spread and raise awareness about measures	Approximately 60	・Energy conservation efficiency of conventional combustion-type air conditioners ・Energy conservation efficiency of electric air conditioners ・Annual operating hours of air conditioners, etc.

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Spread energy-conserving refrigerators and freezers for commercial use (Table 1－3c(7))	Number of units of energy-conserving refrigerators and freezers for commercial use that have spread <approximately 16,300 units>	Manufacturers, etc.: Develop technology, produce and sell energy-conserving refrigerators and freezers Businesses using commercial-use refrigerators and freezers: Actively introduce energy-conserving refrigerators and freezers	・Spread energy-conserving refrigerators and freezers ・Subsidize efforts to make small- to medium-sized commercial facilities conserve energy	・Spread and raise awareness of measures	Approximately 60	・Number of units of energy-conserving refrigerators and freezers for commercial use that have spread <approximately 16,000 units>, number of units of refrigerated storage, etc. introduced <approximately 275 units> ・Amount of power consumption reduced per unit of energy-conserving refrigerator and freezer for commercial use <approximately 62,000 kWh> ・Amount of power consumption reduced per unit of refrigerated storage, etc. <approximately 188,000 kWh (if freezing capacity is 500W)>
Spread of efficient lighting (LED lights) (Table 1－3c(8))	Penetration rate of efficient lighting <approximately 10%>	Manufacturers, distributors, etc: Develop technology, produce and sell Businesses, consumers: Actively introduce efficient lighting	・Support development of technology aimed at making efficient lighting more efficient and less costly ・Support introduction by Global Warming Measures Regional Council, support initiatives taken by local governments	・Spread and raise awareness of measures ・Take initiative in introduction	Approximately 340	・Amount of energy conserved by using LED lights <4/5 of energy consumed by fluorescent lights, 1/5 of incandescent light bulbs>
Reduce standby power consumption (Table 1－3c(9))	Status of achievement of standby power consumption by equipment (less than 1W)	Manufacturers: Reduce standby power consumption of equipment Distributors: Actively sell equipment with low standby power consumption	・Spread and raise awareness of measures	・Spread and raise awareness of measures	Approximately 150	・Penetration rate per household

Appendix 2 : List of Measures and Policies Concerning Non-energy-originated Carbon Dioxide

*When estimating the projected amount of emissions reductions resulting from the effect of each measure, the projections are based on assumed factors other than the evaluation indicators of the measure and the projection at the time the plan is formulated

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement		Effect of measure	
						Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Expand use of blended cement (Table 2－(1))	Production volume of blended cement as a share of cement production volume <24.8%>	Manufacturers: Supply blended cement, provide information to consumers	・Promote initiatives for introduction based on the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)	・Promote initiatives for introduction based on the Law on Promoting Green Purchasing		Approximately 111	Projected cement production for FY2010 <68.004 million t> ・Regular cement <51.119 million t> ・Blended cement <16.885 million t> ・Amount of CO2 emissions per ton of limestone <415kg-CO2/t-limestone> ＊Projected figures based on past cement production volume

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote measures to reduce CO2 emissions deriving from waste incineration (Table 2－(2))	Amount of general waste (plastic) incinerated <approximately 4.5 million t> Amount of industrial waste (waste plastics) incinerated <approximately 2 million t> Amount of industrial waste (waste oil) incinerated <approximately 2.3 million t>	Businesses: Improve durability of and enhance repair system for products, etc. that are manufactured and sold, promote voluntary collection, handover and recycling of products, etc. that have become waste Consumers: Give consideration when buying or using products, etc. (use of recycled products, long-term use, etc. of products, etc.), give consideration to disposing of products, etc. (handover products, etc. that have become waste to businesses, cooperate in municipal efforts to separate and collect such products, etc.), etc.	・Efforts aimed at attaining the targets (March 2003 onward) established in the Basic Plan for Establishing the Recycling-based Society in accordance with the Basic Law for Establishing the Recycling-based Society ・Efforts aimed at attaining the targets (May 2001 onward) to reduce the amount of waste in accordance with the Waste Disposal Law ・Support municipal projects such as the development of waste recycling facilities, etc. ・Implement, evaluate and consider measures in accordance with individual recycling laws (Containers and Packaging Recycling Law, etc.) ・Formulate guidelines on separated garbage collection and establishing paid services in municipalities ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	・Promote, spread and raise awareness about residents' voluntary activities to limit waste generation and promote reuse and recycling, promote environmental education ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	Approximately 550	Amount of CO2 emissions per ton of waste incinerated (kg-CO2/t) ・General waste (plastic): 2,670 ・Industrial waste (waste plastics): 2,600 ・Industrial waste (waste oil): 2,900

Appendix 3 : List of Measures and Policies Concerning Methane and Nitrous Oxide

*When estimating the projected amount of emissions reductions resulting from the effect of each measure, the projections are based on assumed factors other than the evaluation indicators of the measure and the projection at the time the plan is formulated

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
1. Methane						
Reduce amount of final disposal of waste, etc. (Table 3－1(1))	Amount of final disposal of general waste (food waste, paper waste, textile waste, wood waste) <approximately 310,000 t/year> Amount of final disposal of industrial waste (livestock carcasses, animal and plant residual, paper waste, textile waste, wood waste) <approximately 120,000 t/year> Percentage by type of incinerator <continuous furnace: 84%, semi-continuous furnace: 11%, batch furnace: 5%> Amount of general waste incinerated <approximately 33.3 million t>	Businesses: Improve durability of and enhance repair system for products, etc. that are manufactured and sold, promote voluntary collection, handover and recycling of products, etc. that have become waste Consumers: Give consideration when buying or using products, etc. (use of recycled products, long-term use, etc. of products, etc.), give consideration when disposing of products, etc. (handover products, etc. that have become waste to businesses, cooperate in municipal efforts to separate and collect such products, etc.), etc.	・Efforts aimed at attaining the targets (March 2003 onward) established in the Basic Plan for Establishing the Recycling-based Society in accordance with the Basic Law for Establishing the Recycling-based Society ・Efforts aimed at attaining the targets (May 2001 onward) to reduce the amount of waste in accordance with the Waste Disposal Law ・Support municipal projects such as the development of waste recycling facilities, etc. ・Implement, evaluate and consider measures in accordance with individual recycling laws (Containers and Packaging Recycling Law, etc.) ・Formulate guidelines on separating and collecting and establishing paid services in municipalities ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	・Promote, spread and raise awareness about residents' voluntary activities to limit waste generation and promote reuse and recycling, promote environmental education ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	Approximately 50	Amount of CH4 emitted per ton of landfill waste (kg-CH4/t) ・Food waste: 143 ・Paper, textiles: 140 ・Wood waste: 136 Amount of CH4 emitted per ton of waste incinerated (g-CH4/t) ・Continuous furnace: 7.3 ・Semi-continuous furnace: 68 ・Batch furnace: 73

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
2. Nitrous Oxide						
Install equipment to decompose nitrous oxide in the adipic acid manufacturing process (Table 3－2(1))	Number of business offices that have introduced equipment (1) (the only office in Japan that produces adipic acid) Operating rate of equipment that decomposes nitrous oxide <94%>	Manufacturers: Introduce equipment to decompose nitrous oxide (completed)	—	—	Approximately 874	・Amount of adipic acid produced <120,000 t> ・Rate of N2O generated <250kg-N2O/t> ・Rate of N2O decomposition <99.9%>
Upgrade combustion in sewage sludge incineration facilities (Table 3－2(2))	Dissemination rate of upgraded combustion in fluidized bed furnace for the incineration of polymer-added sludge <100%>	Local governments: Implement the upgrading of combustion of sewage sludge	・Standardize the upgrading of combustion of sewage sludge	・Implement the upgrading of combustion of sewage sludge	Approximately 130	Amount of N2O emitted per ton of incinerated sewage sludge in fluidized bed furnace for the incineration of polymer-added sludge (g-N2O/t) ・Regular combustion: 1,508 ・High-temperature combustion: 645

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Upgrade combustion in general waste disposal facilities, etc. (Table 3－2(3))	Percentage by type of incinerator <continuous furnace: 84%, semi-continuous furnace: 11%, batch furnace: 5%> Amount of general waste incinerated <approximately 33.3 million t>	Businesses: Improve durability of and enhance repair system for products, etc. that are manufactured and sold, promote voluntary collection, handover and recycling of products, etc. that have become waste Consumers: Give consideration when buying or using products, etc. (use of recycled products, long-term use, etc. of products, etc.), give consideration when disposing of products, etc. (handover products, etc. that have become waste to businesses, cooperate in municipal efforts to separate and collect such products, etc.), etc.	・Support municipal projects such as the development of waste recycling facilities, etc. ・Promote the installation of incineration facilities with continuous furnaces in response to the widening scope of waste disposal ・Strengthen and enforce structural standards and operation and management standards for waste disposal facilities (March 2001 onward) ・Efforts aimed at attaining the targets (March 2003 onward) established in the Basic Plan for Establishing the Recycling-based Society in accordance with the Basic Law for Establishing the Recycling-based Society ・Efforts aimed at attaining the targets (May 2001 onward) to reduce the amount of waste in accordance with the Waste Disposal Law ・Implement, evaluate and consider measures in accordance with individual recycling laws (Containers and Packaging Recycling Law, etc.) ・Formulate guidelines on separated garbage collection and establishing paid services in municipalities ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	・Promote, spread and raise awareness about residents' voluntary activities to limit waste generation and promote reuse and recycling, promote environmental education ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.	Approximately 20	Amount of N2O emitted per ton of waste incinerated (g-N2O/t) ・Continuous furnace: 52 ・Semi-continuous furnace: 53 ・Batch furnace: 64

Appendix 4 : List of Measures and Policies Concerning Three Fluorinated Gases

*When estimating the projected amount of emissions reductions resulting from the effect of each measure, the projections are based on assumed factors other than the evaluation indicators of the measure and the projection at the time the plan is formulated

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Promote planned efforts made by industry (Table 4－(1))	Achieve targets and forecasts set by each industry group in voluntary action plans	Groups that have formulated voluntary action plans (22 industries in 8 sectors): Comply with voluntary action plans	・ Follow up at the Global Warming Prevention Measures Subcommittee, Chemicals and Bio-industry Committee, Industrial Structure Council ・Subsidize model projects that will contribute to limiting emissions of the three fluorinated gases, etc.	・Support efforts made by businesses	Approximately 4,360 of which ○Amount of emissions reduced resulting from the recovery of HFC23, of the amount of emissions reduced due to the planned efforts made by industry (included added amount): Approximately 1,510 ○Amount of emissions reduced as a result of measures to substitute aerosol, etc., SF6 measures concerning magnesium and measures to eliminate chlorofluorocarbon in foam and insulating material: Approximately 1,390	・Project a reduction of approximately 1 million t-CO2 as a result of targets and forecasts set by each industry group in voluntary action plans as well as from the added amount resulting from subsidies (add amount recovered from HFC23, etc.)
Promote development, etc. of substitute material and use of substitute products (Table 4－(2))	[Eliminate fluorocarbons in such products as aerosol] Shipment volume of HFC of aerosol products <HFC-134a: 1,300t, HFC-152a: 1,500t> Emissions of HFC that are used for MDI <405 net tons> [Eliminate fluorocarbons in foam and insulating material] Amount of HFC used in foam <Urethane foam: 7,800t, extruded polystyrene foam: 1,500t, highly expanded polyethylene foam: 680t, phenolic foam: 290t> [Develop and spread SF6-free magnesium alloy technology] Rate of introduction of SF6-free technology in rolling <70%> Rate of introduction of substitute gases in casting <40%>	Manufacturers of three fluorinated gases: Develop substitute material, etc. Manufacturers of products that use three fluorinated gases: Develop and sell substitute products, provide information to consumers Businesses and consumers that use products, etc. that use three substitute fluorinated gases: Select substitute products Manufacturers of magnesium alloys: Develop and spread SF6-free magnesium alloy technology Businesses that use magnesium (manufacturers of automobile parts, electronic devices, electric equipment, etc.): Use magnesium alloy manufactured using SF6-free technology	[Common policies regarding foam, insulating material and aerosol, etc.] ・Support technological development, etc. of substitute material, etc. ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing ・Spread and raise awareness about substitute products [Develop and spread SF6-free magnesium alloy technology] ・Support development of magnesium alloy technology that does not use SF6 as protective gas [Eliminate fluorocarbons in refrigeration and air conditioning equipment for commercial use] ・Develop and spread fluorocarbon-free, energy－conserving refrigeration and air conditioning equipment	・Promote procurement of substitute products ・Spread and raise awareness about substitute products ・Promote initiatives for introduction based on the Law on Promoting Green Purchasing		[Eliminate fluorocarbons in such products as aerosol] Prospected 2010 BAU emissions of aerosol products: 3.3 million t-CO2 Prospected 2010 BAU emissions using MDI: 540 net tons [Eliminate fluorocarbons in foam and insulating material] Prospected amount of HFC used in foam in 2010 BAU emissions: (Urethane foam: 14,500t, extruded polystyrene foam: 3,550t, highly expanded polyethylene foam: 1,450t, phenolic foam: 900t) [Develop and spread SF6-free magnesium alloy technology] Magnesium melting capacity is expected to increase at an annual rate of 32.0% (annual rate of increase has been calculated based on the increase in magnesium melting capacity between 1996 to 2003)

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected	Effect of measure	
					Projected emissions reduction (10,000t-CO2)	Premise of forecast at the time of cumulating the amount of emissions reductions*
Recover HFC packed as refrigerant in equipment in accordance with laws, etc. (Table 4－(3))	Recovery rate of refrigerants in car air conditioners <80%> Recovery rate of refrigerants in refrigeration and air conditioning equipment for commercial use <60% on average for the five-year period beginning FY2008> Recovery rate of refrigerants used as filling <30% on average for the five-year period beginning in FY2008>	People: Cooperate to recover and destroy chlorofluorocarbons without fail	・Appropriately implement and apply laws ・Spread and raise awareness of measures ・Consider measures to improve the recovery rate, including a fundamental review from the systemic aspect concerning the recovery of chlorofluorocarbons in refrigeration and air conditioning equipment for commercial use	・Appropriately implement and apply laws ・Spread and raise awareness of measures	Approximately 1,240	[Car air conditioners] Initial amount of refrigerant packed: 582 g/unit, number of units produced: hypothesize increase based on the economic growth rate every year [Refrigeration and air conditioning equipment for commercial use] Initial amount of refrigerant packed: 3kg-420kg/unit, number of units produced: hypothesize increase based on the economic growth rate every year

Appendix 5 : List of Measures and Policies for Greenhouse Gas Sinks

*When estimating the projected amount of emissions reductions resulting from the effect of each measure, the projections are based on assumed factors other than the evaluation indicators of the measure and the projection at the time the plan is formulated

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected amount absorbed by sinks (10,000t-CO2)	Premise of forecast at the time of cumulating the amount absorbed by sinks *
1. Measures for forest sinks						
Promote measures for greenhouse gas sinks by promoting forest and forestry measures (10-year policy on forest sinks to prevent global warming) (Table 5－1(1))	Area of forest maintained (average annual project volume until 2012) Renewal <60,000 ha> Weeding <350,000 ha> Thinning <450,000 ha> Cutting to induce the creation of multilayered forests <30,000 ha> Develop countryside forests, etc. <40,000 ha> Develop roads for conducting forest services, etc. <2,790 km> Wood supply and amount used <25 million m3>	・Develop policy based on the Basic Law on Forest and Forestry and Basic Plan on Forest and Forestry ・During the 10-year period from 2003 to 2012 when the first commitment period ends, strongly and systematically promote forest maintenance, etc. in accordance with the Basic Plan. Also develop a system for examining the report on the amount absorbed by sinks. (Develop 10-year policy on forest sinks to prevent global warming)			Approximately 4,767 (If the plan is achieved according to targets on the supply and use of forest products and targets concerning the full use of multiple functions of forests as indicated in the Basic Plan on Forest and Forestry. However, if forest maintenance, etc. stays around the current level, then it is forecasted that the results will fall well below targets.)	・If the plan is achieved according to targets on the supply and use of forest products and targets concerning the full use of multiple functions of forests as indicated in the Basic Plan on Forest and Forestry, it has been projected that it will be possible to secure approximately 47.67 million t-CO2 in terms of the amount absorbed. ・Targets concerning the full use of the multiple functions of forests (2010) <Forest area> Single-layered managed forests 10.2 million ha Multilayered managed forests 1.4 million ha Naturally regenerated forests 13.5 million ha Total 25.1 million ha (Total accumulated area) 4.41 billion m3 ・ Targets on the supply and use of forest products <Wood supply and amount used> 25 million m3

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected amount absorbed by sinks (10,000t-CO2)	Premise of forecast at the time of cumulating the amount absorbed by sinks *
Develop sound forests	Area of forest maintained (average annual project volume until 2012) Renewal <60,000 ha> Weeding <350,000 ha> Thinning <450,000 ha> Cutting to induce the creation of multilayered forests <30,000 ha> Develop countryside forests, etc. <40,000 ha> Develop roads for conducting forest services, etc. <2,790 km> Wood supply and amount used <25 million m3> (same as above)	National and local governments, etc.: Promote forest maintenance necessary for achieving the targets of the Basic Plan on Forest and Forestry Local governments, parties involved in forestry, NPOs, etc.: Steadily and efficiently carry out maintenance of inadequately managed forests	・Promote appropriate forest maintenance including necessary thinning, multilayered managed forests and lengthening the period until a tree is cut ・Eliminate areas where afforestation is incomplete by investigating the renewal status of such areas, etc. ・Promote appropriate maintenance of broadleaf forests and promote broadleaf and coniferous mixed forests ・Eliminate treeless areas in remote water source forests, etc. and restore devastated countryside forests, etc. ・Reduce costs by combining effective networks, etc. and develop networks that consider conservation of the natural environment ・Promote commissioning, etc. of operation and management to motivated personnel and promote development by public bodies ・Promote efforts to nurture and secure core forest and forestry personnel responsible for forest maintenance	・In accordance with the basic principles of the Basic Plan on Forest and Forestry, promote forest and forestry policy that meets an area's various natural, economic and social conditions, bearing in mind an appropriate division of labor with the government	Approximately 4,767 (If the plan is achieved according to targets on the supply and use of forest products and targets concerning the full use of multiple functions of forests as indicated in the Basic Plan on Forest and Forestry. However, if forest maintenance, etc. stays around the current level, then it is forecasted that the results will fall well below targets.) (same as above)	・If the plan is achieved according to targets on the supply and use of forest products and targets concerning the full use of multiple functions of forests as indicated in the Basic Plan on Forest and Forestry, it has been projected that it will be possible to secure approximately 47.67 million t-CO2 in terms of the amount absorbed. ・Targets concerning the full use of the multiple functions of forests (2010) <Forest area> Single-layered managed forests 10.2 million ha Multilayered managed forests 1.4 million ha Naturally regenerated forests 13.5 million ha Total 25.1 million ha (Total accumulated area) 4.41 billion m3 ・Targets on the supply and use of forest products <Wood supply and amount used> 25 million m3 (same as above)
Appropriately manage and protect forest reserves, etc.		National and local governments, etc.: Appropriately implement measures to develop conservation facilities and protect forest reserves, etc.	・Promote natural vegetation protection and recovery measures in coordination with appropriate conservation management and NPO, etc. by the fair administration of regulations set by the forest reserve system, systematic designation of forest reserves, forest protection system, etc. ・Promote development of mountainside facilities that fit the specific characteristics of the basin ・Prevent damage from forest disease pests, etc. and promote measures to prevent forest fires ・Expand natural parks and nature environment conservation areas and strengthen conservation management in these areas			
Promote forest-building, etc. with the participation of the people		National and local governments, businesses, NPOs, etc.: Promote spreading and raising awareness about measures, forest volunteer activities, forest environmental education, diverse forest use, etc.	・Promote spreading and raising awareness by launching the National Land Afforestation Campaign, etc. ・Promote afforestation activities by a more wide-ranging group of bodies, such as having companies, etc. promote participation in afforestation ・Improve technology possessed by forest volunteers, etc. and develop safety systems ・Promote forest environmental education ・Promote green worker programs that protect animals and plants, including those in forests found in national parks, etc.			

Concrete measures	Evaluation indicators of the measure ＜FY2010 projections＞	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure		
						Projected amount absorbed by sinks (10,000t-CO2)	Premise of forecast at the time of cumulating the amount absorbed by sinks *
Use wood and woody biomass		National and local governments, businesses, NPOs, etc.: Promote expanded use of wood and diversified use of wood resources in the housing and public sectors, etc. by spreading and raising awareness about the use of wood and structural reform of the lumber industry, etc.	・Promote use of regional materials for housing and public facilities, etc. by developing model facilities using regional materials ・Promote measures for consumers aimed at expanding the actual demand for regional materials by enhancing environmental education on the use of wood, etc. ・Through computerization, etc., develop a production, distribution and processing system, coordinated from upstream to downstream, which can meet consumer needs ・Promote use of low-quality material and woody biomass as energy and products ・Develop new technology for using forest products and new wood materials, etc. and put them to practical use ・Promote use of and spreading and raising awareness about new uses of charcoal, etc. used in water quality purification and humidity, etc.				

Concrete measures	Evaluation indicators of the measure <FY2010 projections>	Measure by each entity	Government policy	Examples of policy that local governments are expected to implement	Effect of measure	
					Projected amount absorbed by sinks (10,000t-CO2)	Premise of forecast at the time of cumulating the amount absorbed by sinks *
2. Promote urban greening, etc.						
Promote urban greening, etc. (Table 5-2(1))	Number of trees planted in public and common facilities, etc. <Assume that the increase in the number of trees planted is 75 million>	National and local governments: Promote greening in public and common facilities, etc., spread and raise awareness about greenery creation, promote greening through a wide range of bodies Citizens, companies and NPOs, etc.: Proactively participate in greenery activities, etc. in various facilities and land, etc.	・In accordance with the Green Policy Outline, promote the creation of urban parks, greening on roads, rivers, *sabo* (erosion and sediment control) facilities, harbors, etc., preserve existing privately-owned green spaces and promote the creation of new green spaces, etc. ・Closely examine and consider methods of calculating the amount absorbed by sinks, etc. through urban greening, etc. and develop a reporting and verification system of those methods ・Promote spreading and raising awareness about greenery generation and greening through a wide range of bodies such as citizens, companies and NPOs	・In accordance with green basic plans, promote the creation of urban parks, greening on roads, rivers, erosion control facilities, harbors, etc., preserve existing privately-owned green spaces and promote the creation of new green spaces, etc. ・Provide information that will contribute to calculating the amount absorbed by sinks through urban greening, etc. and reporting and verification, etc. ・Promote spreading and raising awareness about greenery generation and greening through a wide range of bodies such as citizens, companies and NPOs	Approximately 28	・Assume that the increase in the number of trees planted in public and common facilities, etc. is 75 million after FY1990 and until FY2010