Japan's Fifth National Communication

Under the United Nations Framework Convention on Climate Change

The Government of Japan

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CONTENTS

Chapter 1

National Circumstances Relevant to Greenhouse Gas Emissions and Removals

1.1 National Land Use

Japan, located on the east side of Eurasia, is a long and thin archipelago stretching approximately between latitudes 24 and 46 north, and consists of four major islands—(from north to south) Hokkaido, Honshu, Shikoku, and Kyushu—as well as more than 6,800 other islands.

As of FY2007 Japan's land area equaled 37.79 million hectares, or 0.3% of the total global land area, of which nearly 80% is accounted for by 24.98 million hectares (66.1%) of forests and 4.03 million hectares (10.7%) of agricultural land. Current land use statistics indicate that forests, agricultural land, and marshes are declining, while grasslands and developing areas are increasing.

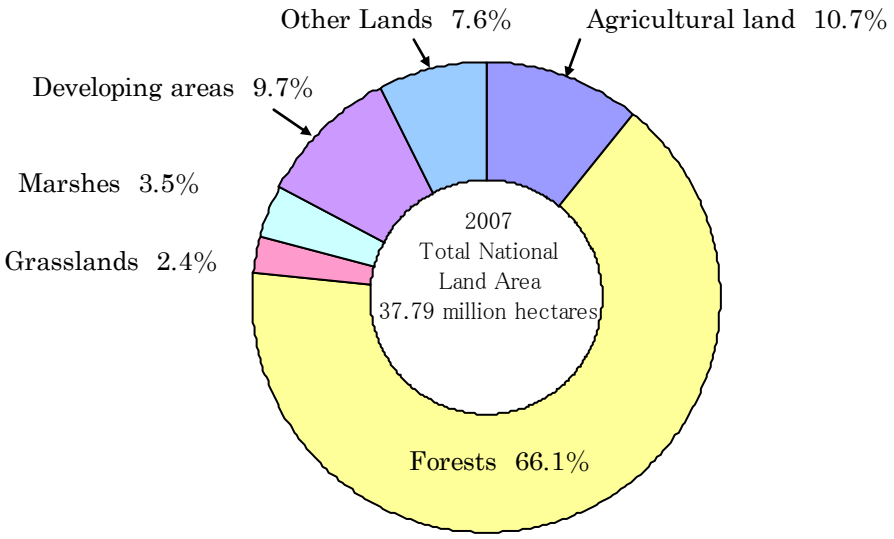


Figure 1.1 Current Land Use in Japan[1]

Source: National Greenhouse Gas Inventory Report of Japan (NIR) (April 2009)

[1] Developing areas are urban regions that do not correspond to forests, agricultural land, grasslands, or marshes. Figures are from the National Institute for Environmental Studies and consist of those directly assessed using existing statistics and those estimated for a portion of lands that could not be directly assessed.

1.2 Climate

Japan stretches over a great distance from north to south with subtropical zones in the south and subarctic zones in north. In addition, Japan has rich seasonal changes. Topographically, mountain ranges stretching from the south to north also serve to produce significant climatic change between different regions of Japan. In winter, seasonal cold winds from Siberia bring a large amount of snowfall to the coastal areas facing the Japan Sea, while seasonal warm winds from the south make summer hot and humid.

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 and approximately 25,300 other plants have been found.

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

Table 1.1 Major Climate Components of Japan

		Latitude	Longitude	Elevation (meters)	Annual Mean Temperature (℃)	Annual Mean of Daily Maximum Temperature (℃)	Annual Mean of Daily Minimum Temperature (℃)	Annual Precipitation (mm)
Northern Japan	Abashiri	44°01.0′	144°16.7′	37.6	6.2	10.0	2.6	801.9
	Nemuro	43°19.8′	145°35.1′	25.2	6.1	9.4	3.0	1,030.0
	Yamagata	38°15.3′	140°20.7′	152.5	11.5	16.4	7.2	1,125.0
	Ishinomaki	38°25.6′	141°17.9′	42.5	11.4	15.3	7.9	1,064.5
Eastern Japan	Fushiki	36°47.5′	137°03.3′	11.6	13.7	17.7	10.3	2,196.4
	Mito	36°22.8′	140°28.0′	29.3	13.4	18.5	8.9	1,326.0
	Choshi	35°44.3′	140°51.4′	20.1	15.3	18.3	12.3	1,580.1
	Iida	35°31.4′	137°49.3′	516.4	12.4	18.3	7.6	1,606.7
Western Japan	Sakai	35°32.6′	133°14.1′	2.0	14.9	19.0	11.1	1,894.9
	Hamada	34°53.8′	132°04.2′	19.0	15.2	19.1	11.5	1,705.7
	Hikone	35°16.5′	136°14.6′	87.3	14.4	18.5	10.8	1,617.9
	Miyazaki	31°56.3′	131°24.8′	9.2	17.2	21.8	13.0	2,457.0
	Tadotsu	34°16.5′	133°45.1′	3.7	16.0	20.0	12.2	1,090.7
Nansei Islands	Naze	28°22.7′	129°29.7′	2.8	21.5	24.7	18.6	2,913.5
	Ishigakijima	24°20.2′	124°09.8′	5.7	24.0	26.6	21.9	2,061.0

Source: Japan Meteorological Agency—'Climate Table of Japan' (CD-ROM (Eighth Edition))

In order to examine the long-term changes in temperature and precipitation in Japan, the average of the

[2] Average mean temperatures, annual means of daily maximum, and minimum temperatures are obtained by calculating monthly mean normals over a 30-year period and then calculating a 12-month average from that figure.

anomalies difference from the normal for annual mean surface temperature and annual precipitation ratios to the normal in the observation stations of the Japan Meteorological Agency in the period 1898-2008 were taken and the results[3] of the analysis of the data are presented here.

The annual mean surface temperature in Japan has repeatedly fluctuated, but is on a long-term increasing trend and is currently increasing at a rate of about 1.11ºC per century (Figure 1.2). In particular, preeminently high temperatures have been frequently recorded since the 1990s. The temperature anomaly in Japan for 2008 was +0.46°C, the eleventh highest figure since statistics began in 1898. The cause of recent frequent high temperature years in Japan, as well as the rest of the world, coincides with the impact of global warming, which accompanies increases in greenhouse gasses (such as CO_2) with the cycles in nature that repeat every decade or so. In addition, one cause for 2008 displaying a lower average temperature in comparison to recent years is thought to be the impact of the La Nina phenomenon that occurred between spring 2007 and spring 2008.

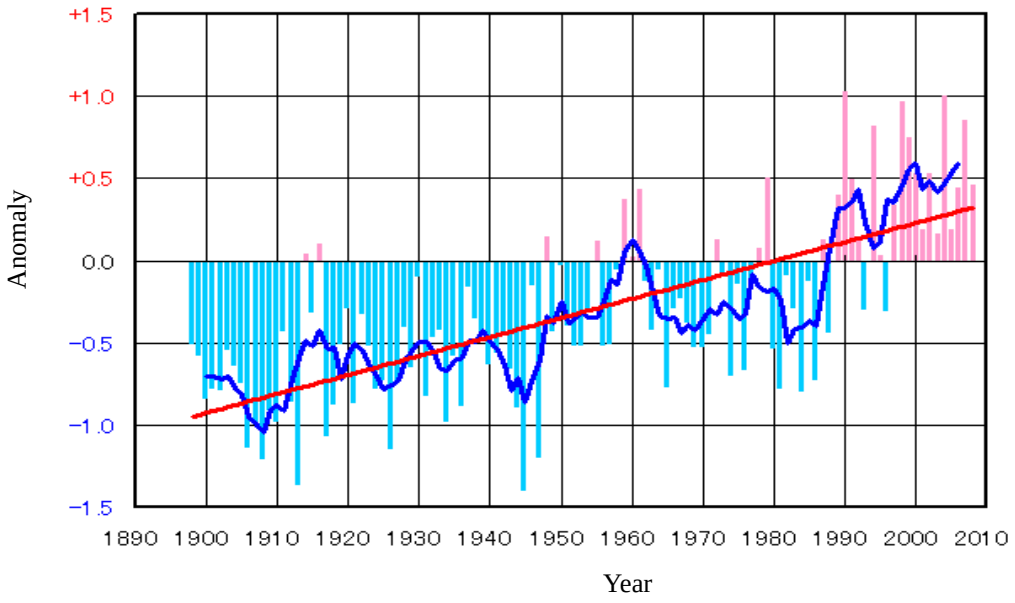


Figure 1.2 Variations in Annual Mean Surface Temperature in Japan (1898-2008)

The bar graph shows anomalies from the normal, the thick line (blue) indicates the five-year running mean, and the straight line (red) represents the long-term trend. The normal is derived from the average of 30 years between 1971 and 2000.

[3] For the analysis of surface temperature we used 17 stations 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 stations for which the observed data maintained its homogeneity in the long term. It should be noted that although for this analysis 17 stations were selected that are only impacted by urbanization to a minor degree when calculating surface temperature, the impact of urbanization is not completely eliminated from the analysis.

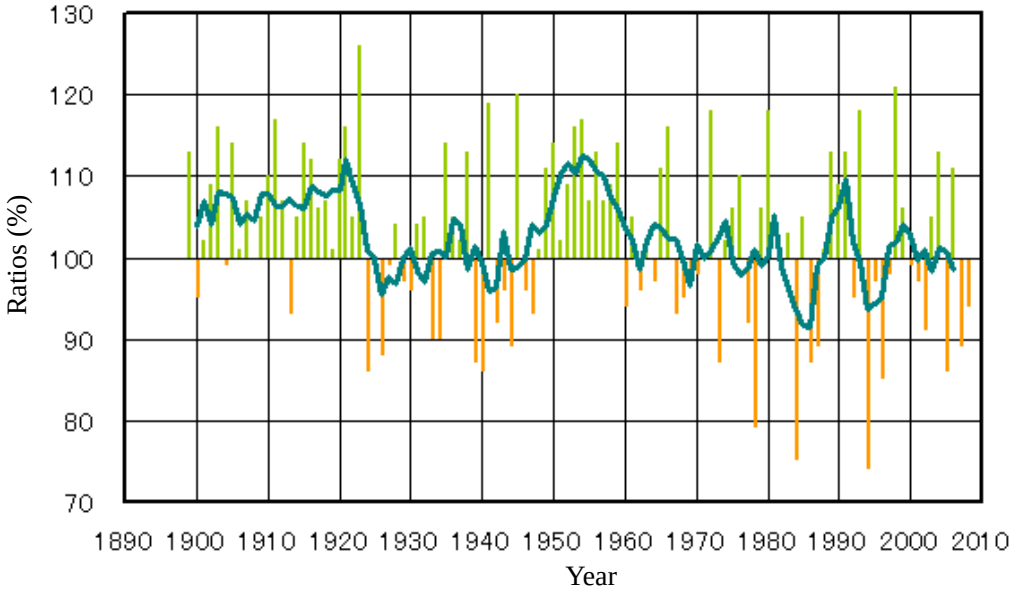


Figure 1.3 Variations of Annual Precipitation Ratios in Japan from 1898-2008

The bar graph shows averages of annual precipitation rations to the normal for 51 stations in Japan (expressed in percentages compared to annual means), and the thick line (green) represents the five-year running mean. The normal is derived from the average of 30 years between 1971 and 2000.

Source: Japan Meteorological Agency

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 little rain.

1.3 Population and Households

According to the population census, as of October 1, 2005, Japan's population was 127,285,653, representing a 0.3 percent increase over the October 2000 census. The population density was 343 inhabitants per square kilometer. In line with the falling birthrate and increased average longevity, the ratio of the elderly amongst the population is rapidly increasing at a higher rate than ever, and the population segment aged 65 or older as of 2005 reached 20 percent. This rate is among the highest of all the developed countries.

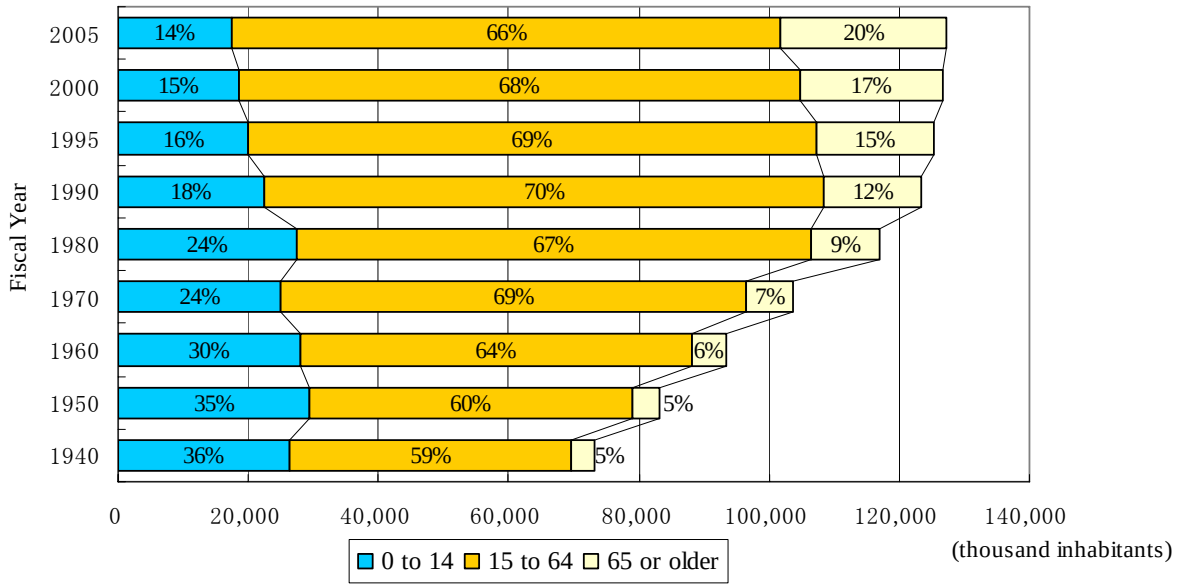


Figure 1.4 Population for Three Age Segments

Source: Ministry of Internal Affairs and Communications—'Population Census'

One of the major factors behind the aging of the population is the decline in the number of births. During the 1960s the number of births generally increased but peaked in 1973, and have continued to gradually decline ever since. In 2005, birth numbers reached their lowest in history, and the number of deaths exceeded the number of births, creating a natural decline of 18,516 people. 2007 displayed yet another negative figure, indicating that Japan is facing an era of a declining population.

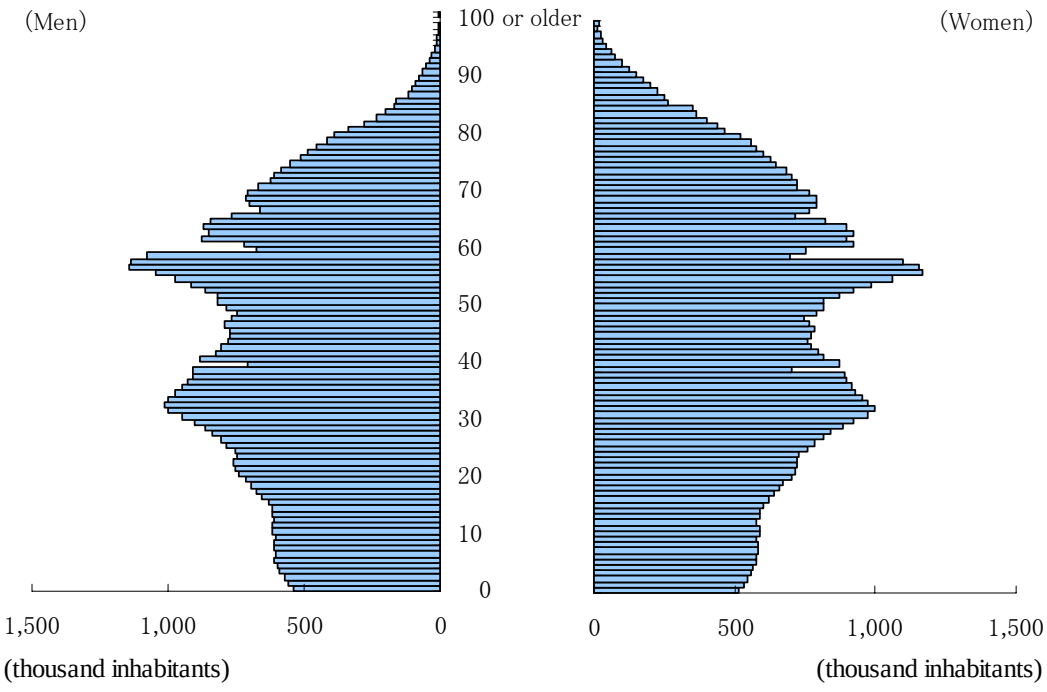


Figure 1.5 Japanese Population Pyramid in 2005

Source: Ministry of Internal Affairs and Communications—'Population Census'

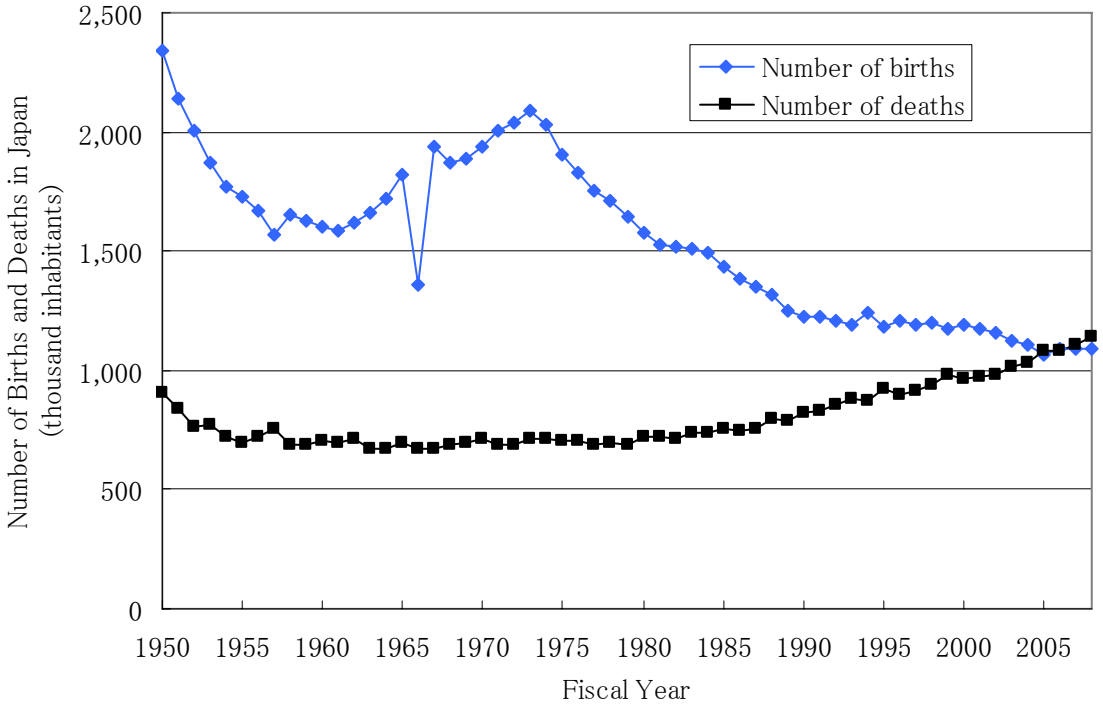


Figure 1.6 Changes in the Number of Births and Deaths in Japan

Source: Ministry of Health, Labour and Welfare – 'Annual Estimate of Vital Statistics 2008'

During the 1960s, 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 excess immigration into such areas of approximately 500,000 people per year. Further excess numbers of immigration have been seen again since 1996, and since 2004 that excess has been markedly increasing. In addition to the three metropolitan areas, as of October 2005 66.3% of Japan's total population was concentrated in densely inhabited districts[4], indicating that the concentration of Japan's population in urban regions is advancing.

[4] Regions within a city, town, or village and adjacent to basic unit districts with a high population density (a population density of at least 4,000 people per square kilometer in principle), and with a population of at least 5,000 people.

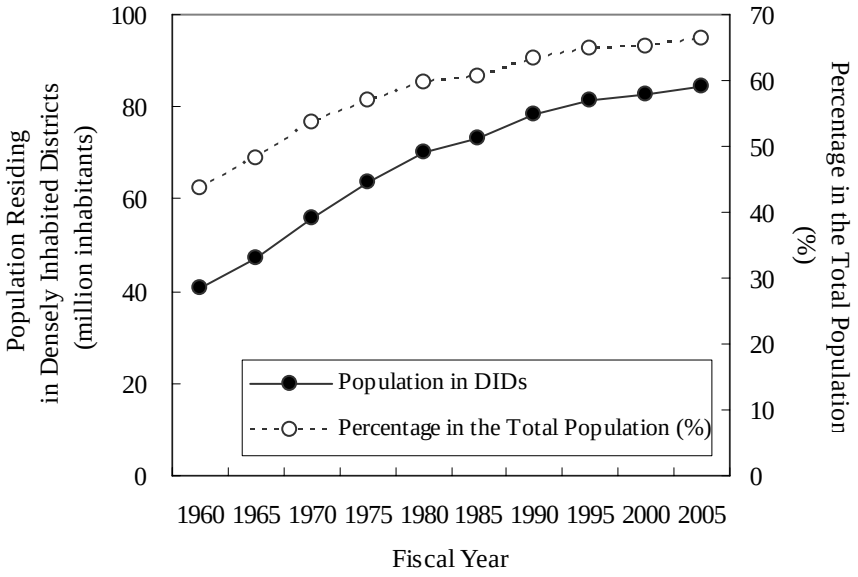


Figure 1.7 Population Residing in Densely Inhabited Districts

Source: Ministry of Internal Affairs and Communications—'Population Census'

In 2005, there were 490.63 million households in Japan, 4.9 percent more than recorded in the 2000 census. In 2005, the average household size was 2.55 persons. 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 a shift from extended families to nuclear families, an increased number of solitary-person households, and a reduction in the number of children reflected the falling birthrate.

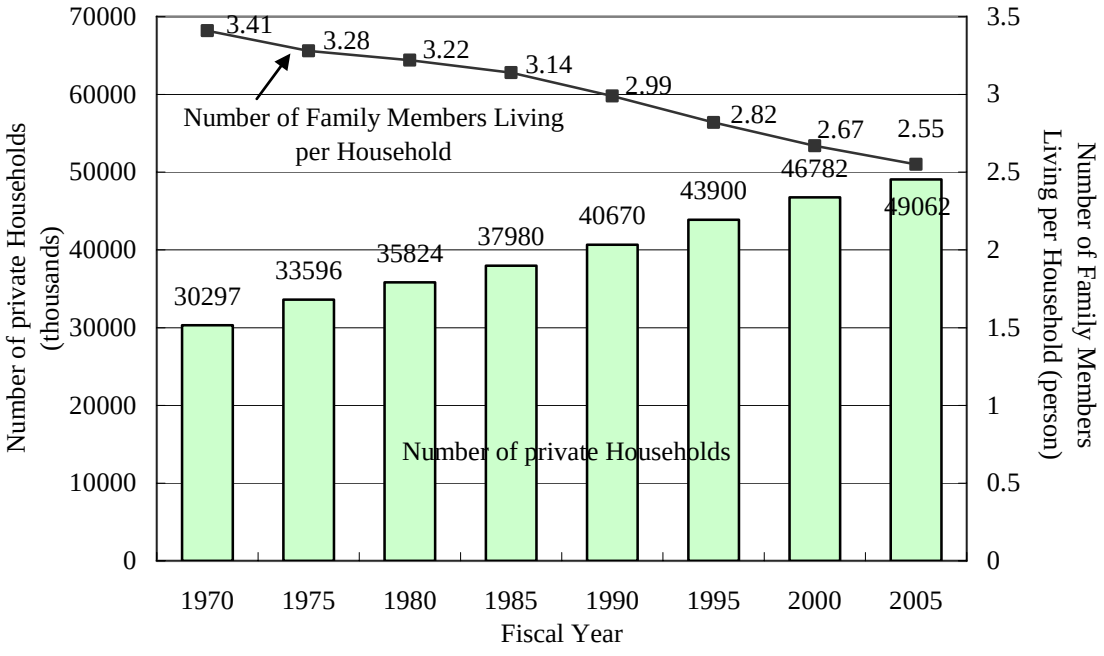


Figure 1.8 The Number and Average Size of Japanese Households

Source: Ministry of Internal Affairs and Communications—'Population Census'

1.4 Houses and Commercial Facilities

According to the 'Housing and Land Survey of Japan' in 2008, the total number of houses has reached 57.59 million for a total of 49.99 million households. As a result, the number of houses per household has reached 1.15, representing a continued improvement.

Meanwhile, in terms of the quality of such accommodations, the average area of floor space per home has risen to 92.71 square meters, demonstrating a steady improvement overall, but when the details are analyzed, a stark contrast can be seen between owned houses (120.89 square meters) and rented houses (45.93 square meters), illustrating the prominence of small rented houses.

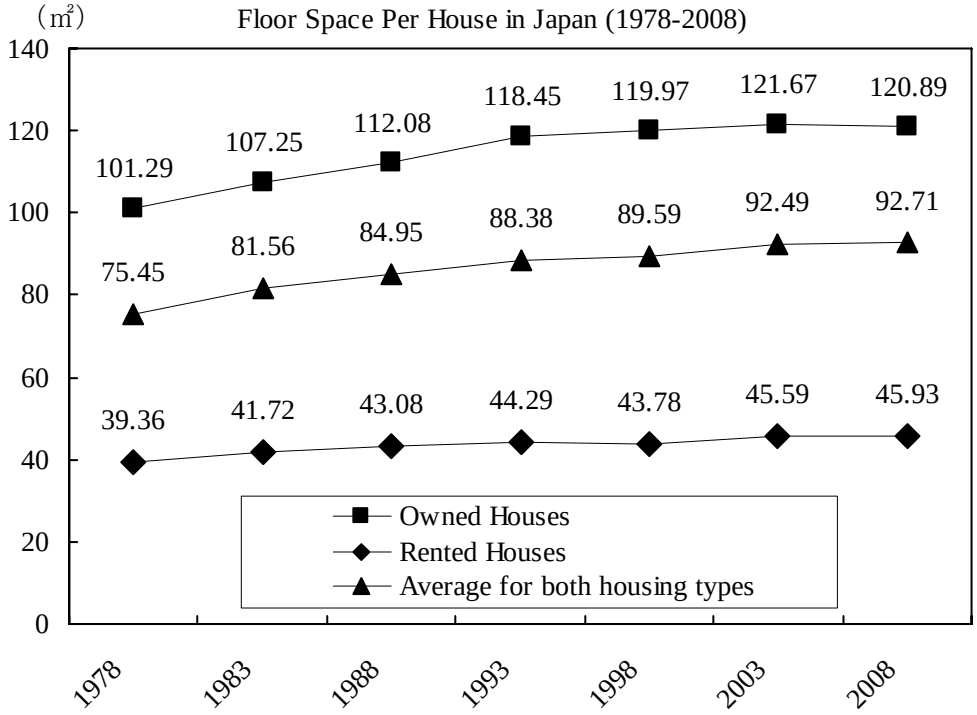


Figure 1.9 Floor Space Area per House in Japan

Source: Ministry of Internal Affairs and Communications – '2008 Housing and Land Survey of Japan' (preliminary totals)

In Japan, since the period of rapid economic growth, the ratio of tertiary industries has increased in terms of the industrial structure and particularly in regards to employment. The importance of "soft-type" works, including technology, information, planning, and design, has also increased for each industry, and the weight of indirect sectors has increased. In line with this shift towards service and other 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. However,

since 2000 the annual rate of increase has been in decline, with an annual average at 1.2 percent.

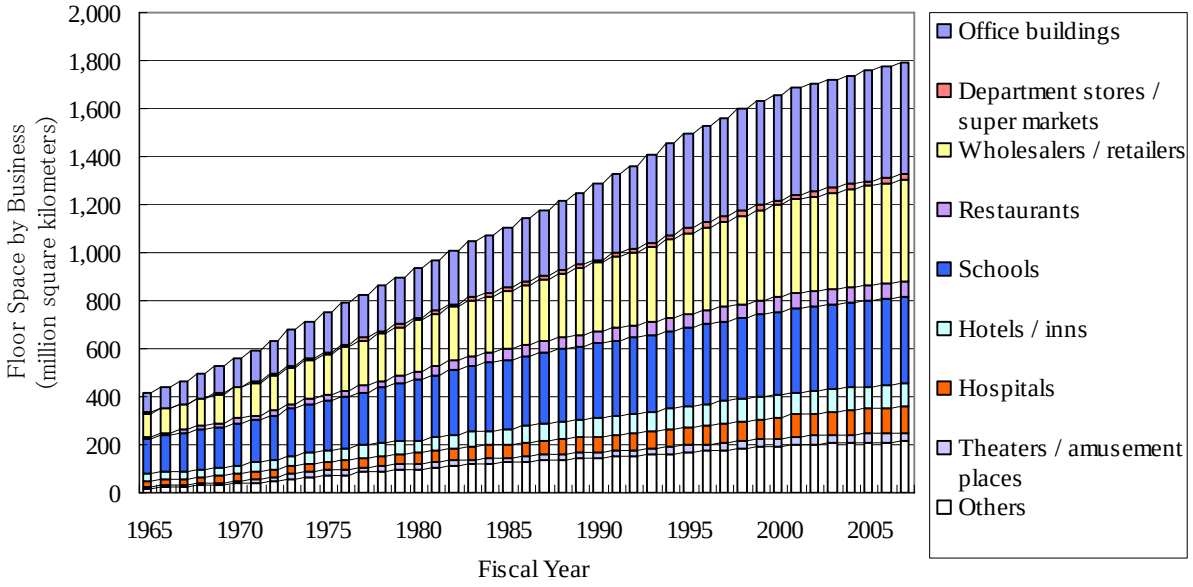


Figure 1.10 Change in the Amount of Floor Space in the Commercial Sector by Business Type

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

1.5 Japan's Industry and Economy

Compared to FY1980 Japan's real gross domestic product (GDP)[5] increased 1.8 times to 585 trillion yen in 2007. During the same period, per capita real GDP increased about 1.7 times from 2.70 million to 4.50 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 significant development of heavy industry, producing such essentials as steel and petrochemical materials. As a result, the Japanese economy increased consumption 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, along with depopulation, and other factors, the number of younger laborers working in agriculture decreased while the average age of the nation's farmers increased. Japanese forestry was primarily practiced by dispersed, extremely small businesses operating in steep mountainous areas. It was therefore difficult to improve labor productivity, so forestry faced various problems including a price differential versus imported lumber and an income disparity with other domestic 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 real economic growth rate recorded

[5] Real GDP according to fixed based year method (base calendar year 2000).

its first contraction since the Second World War. Economic growth remained sluggish for some time thereafter. At the same time, impact from the oil shock caused energy-intensive basic industries, such as the steel and petrochemical industries, to lose speed while high value-added processing and assembly industries, such as electrical appliances and machinery, developed further. As income levels rose, the economy's services and software components expanded. Tertiary industry came to account for over 50 percent of gross domestic product and total employment. In agriculture, the ratio of vegetables and dairy products increased as Japanese dietary habits changed and the nation ended up with a surplus of rice.

Following the Plaza Accord of 1985, the yen began to grow ever stronger, severely impacting the Japanese export industry in particular. The subsequent structural adjustment of the Japanese economy, however, expanded domestic demand, which in turn enlarged the economy, increased the sector shares of the financial, wholesale, and retail industries, and made the prices of land, securities, and other assets skyrocket.

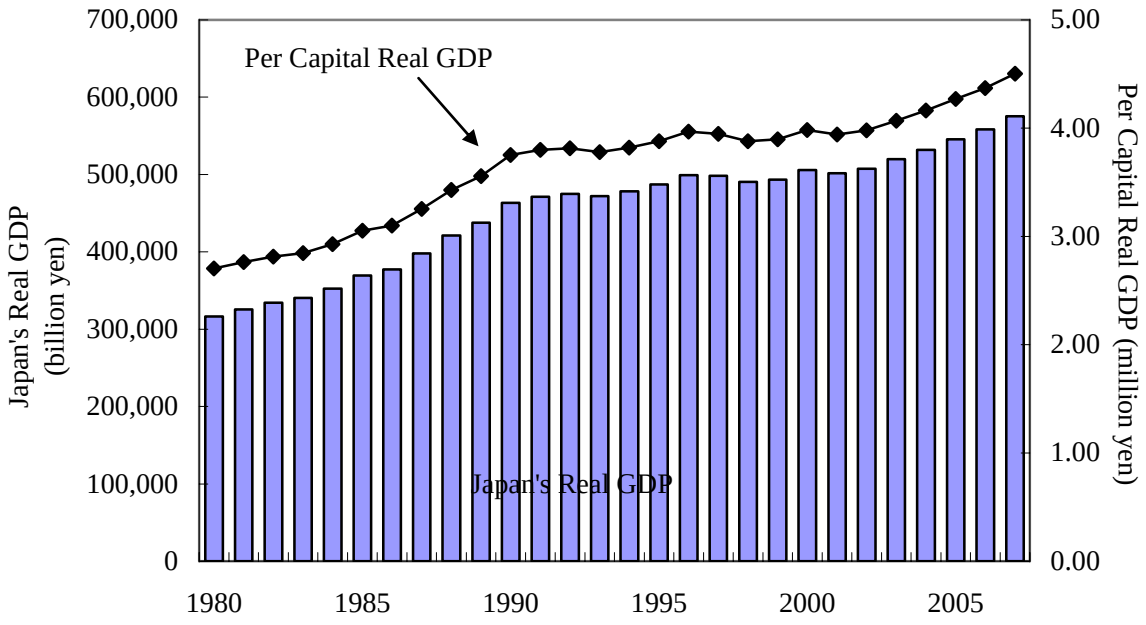


Figure 1.11 Change in Real Gross Domestic Product
(Fixed Based Year Method, Base Calendar Year 2000)

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2007'

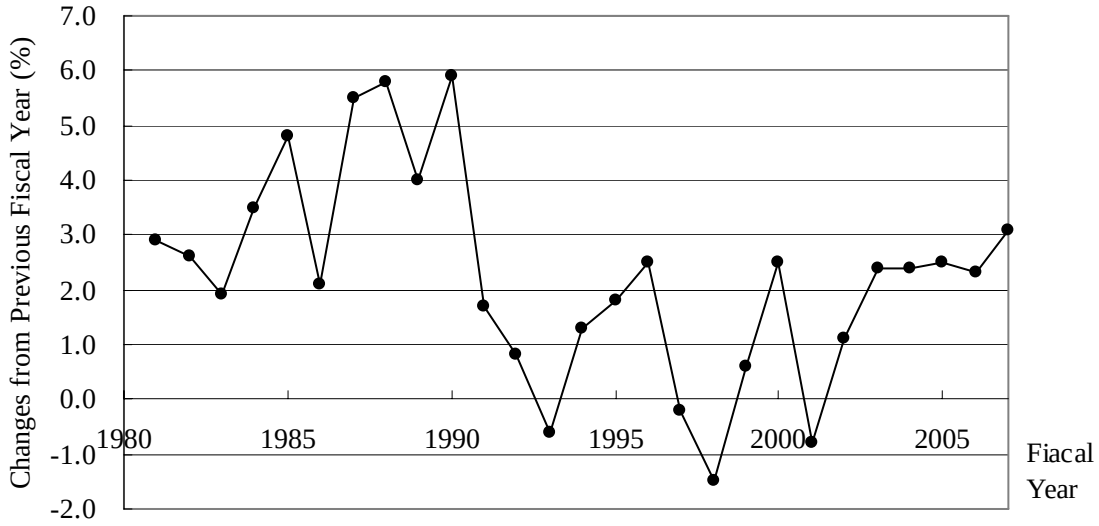


Figure 1.12 Change in Year-on-Year Real Gross Domestic Product Growth Rate (Fixed Based Year Method, Base Calendar Year 2000)

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2007'

Then, in the early 1990s, the prices of land, securities, and other assets nose-dived due to monetary tightening, among other factors. The collapse in asset prices led to a reduction in expenditure on consumables as well as to adjustments in consumer durables and capital stock. These in turn led to the stagnation of economic activities and to irrecoverable debts among 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 recorded negative growth. This difficult period for the economy lasted approximately ten years. However, the three excesses – excessive employment, excessive capital stock, and excessive debt – were largely eliminated and as the financial position of companies has strengthened, investment and consumption also began to rise. In addition, at the beginning of 2002 an increase in exports served to revive production, leading to the greatest period of economic recovery since the Second World War, longer than the expansion period of the 'Izanagi boom' (57 months between October 1965 and July 1970). During this period, the annual mean real growth rate surpassed the 2 percent level. However, in 2007, during the sixth year of economic recovery, changes in the financial and capital markets originating from the United States subprime housing loan crisis as well as skyrocketing crude oil and material prices, put pressure on corporate earnings and business confidence thereby making corporate and household spending behavior more cautious. The direct impact of the United States economic downturn became real, and began to impact even exports from Japan. The anticipated wave of economic recovery transmitted from corporations to households has not been realized as the corporate sector is losing its strength.

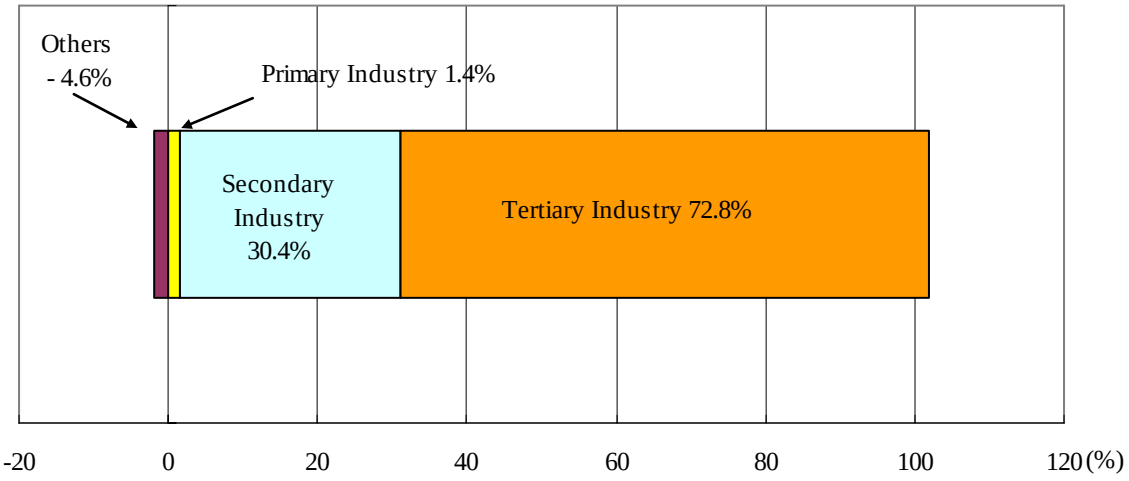


Figure 1.13 Gross Domestic Product by Economic Activity in 2007
(Real Base, Base Calendar Year 2000)

Source: Economic and Social Research Institute, Cabinet Office, Government of Japan – 'Annual Report on National Accounts of 2008'

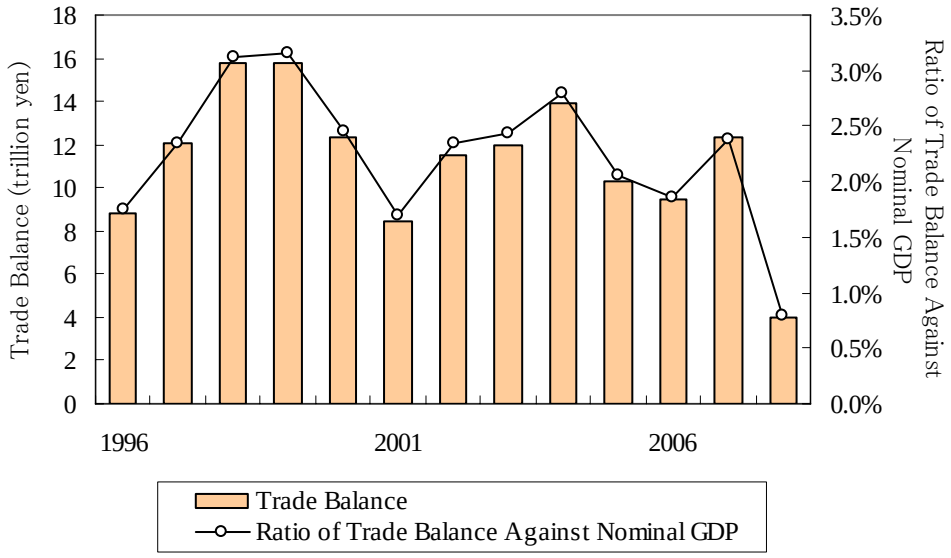


Figure 1.14 Changes in Trade Balance

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

In terms of the industrial sector, the yen continued to appreciate from the spring of 1990 through the spring of 1995, impacting 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 industries are recording large growth. In agriculture, competition with foreign producers has intensified as the volume of imports has been increasing 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 surplus of between 10 and 15 trillion yen has been recorded each year since the 1980s but the ratio of the surplus 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 transport system, and the reduction of travelling time accompanying network expansion. Private automobile ownership began to grow from around 1960 in line with the growth of income level. As a result, rail traffic's share decreased significantly throughout the 1960s as road traffic's share increased significantly. Air traffic represented a small fraction of all traffic, but its transport volume grew significantly due to its timesaving features and the introduction of jet aircraft in domestic airlines, which resulted in an increase in the size and speed of air transport services.

Following the oil shock, the growth in domestic passenger traffic slowed as a whole, but the rise in the standard of living and the increase of recreational time pushed up passenger travel by automobile. The introduction of jumbo jet services, relatively low airfares, and a growing preference for faster modes of transportation caused an increase in the volume of air traffic and its share. On the other hand, the share of railways decreased, sinking to barely above 40 percent in the end of the 1970s, down from 75 percent in 1960.

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

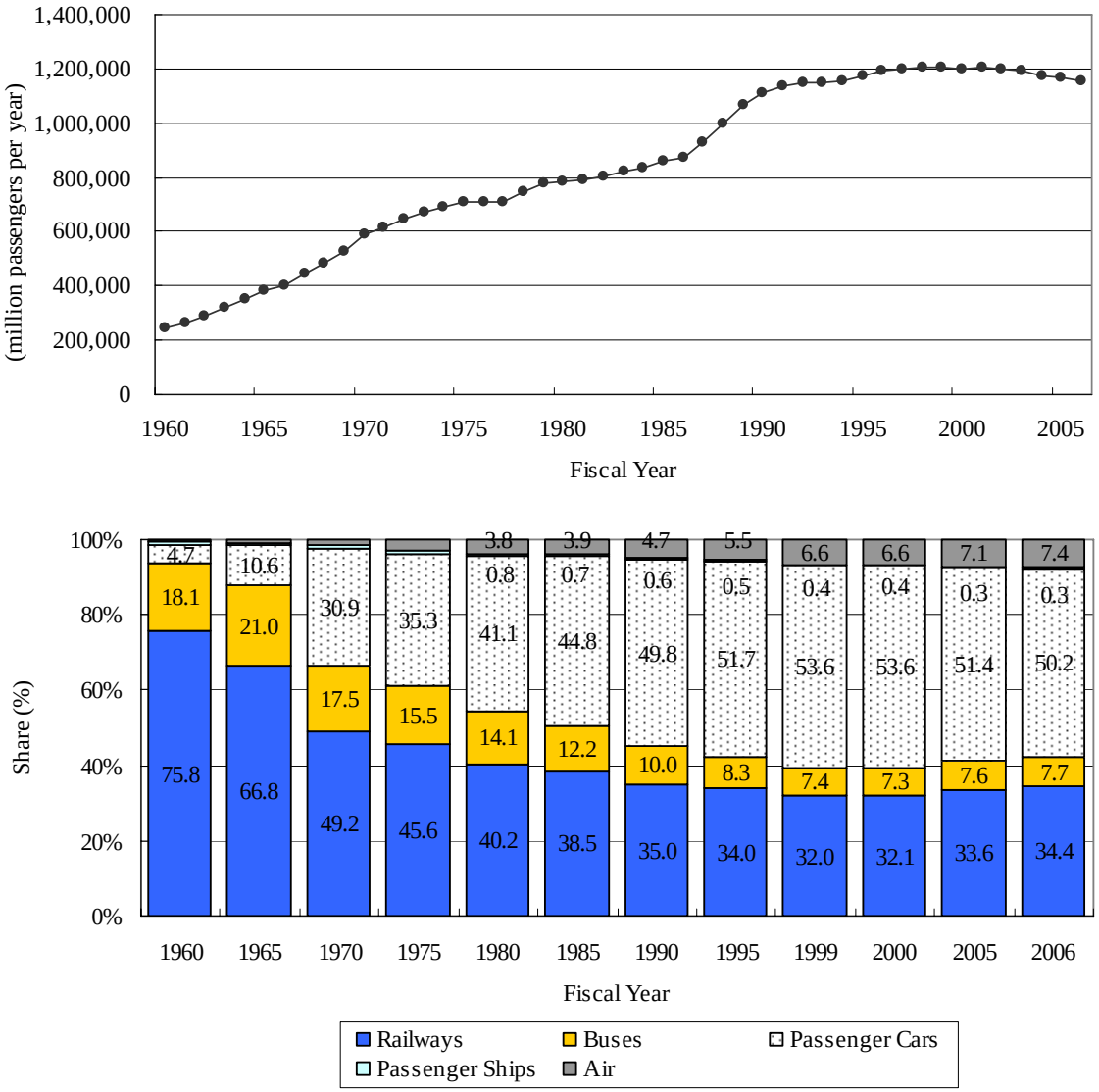


Figure 1.15 Volume of Domestic Passenger Traffic (above) and Modal Shares (below) in Passenger-Kilometers[6]

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

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 an increased demand for transportation of relatively light processing components and shortened transport distances as industries moved their offices to coastal complexes 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 grew, mainly carrying

[6] Passenger cars do not include light motor vehicles or household freight 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.

raw materials for the petrochemical, steel, cement, and other key heavy industries. In contrast, the growth of freight traffic by rail barely increased.

The first oil shock in 1973 sharply decreased domestic freight traffic in FY1974 and 1975. Freight traffic then gradually increased until FY1979 as the transport of civil engineering-related cargos grew due to robust expenditures for public works resulting from 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.

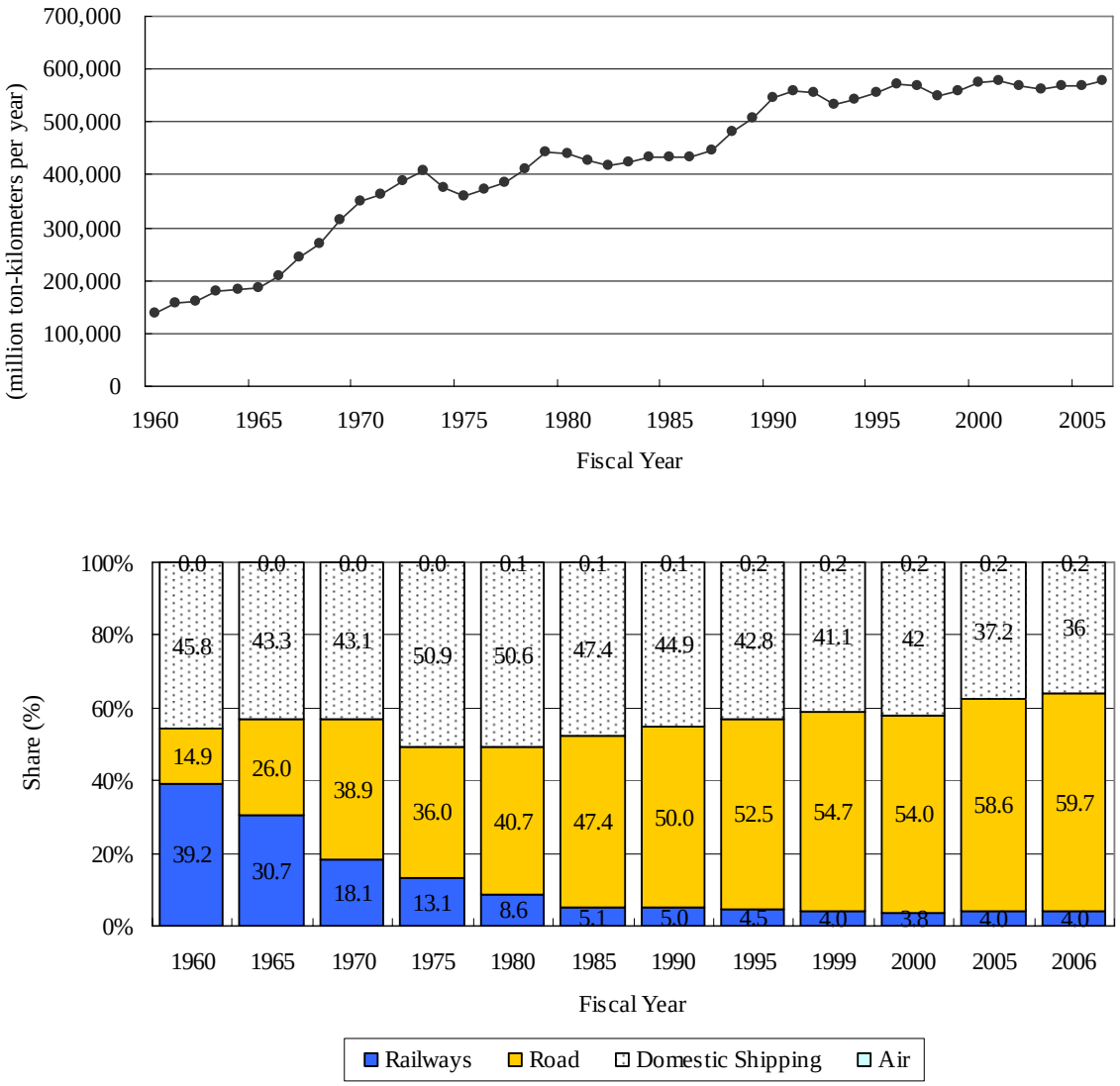


Figure 1.16 Domestic Freight Traffic (above) and Modal Shares (below) in Ton-Kilometers[7]

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

[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.

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. Transport demand generated through industrial activities has been reduced in line with the shift to a service-oriented economy. As a result, freight traffic remained generally flat during this period, decoupled from the economic growth. In the latter half of 1980s, freight traffic increased due to 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 of products, even as 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 overall, but it showed some growth with the economic expansion in the late 1980s. Domestic sea shipments exceeded their second oil shock freight traffic level in FY1990. Although 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 in recent years has slowed down this decline.

The total freight volume (tonne-kilometers) has remained generally flat since FY1991 due to the impact streamlined distribution and changes in the industrial sector following the collapse of the bubble economy at the beginning of the 1990s. However, in a tonne base, volumes have been slightly decreasing since their peak in FY1991.

1.6.3 Motor Vehicle Traffic

Road transport accounts for a large portion of both passenger traffic and freight traffic. In this section, both trends in the number of motor vehicles owned and vehicle mileage are explained. Changes in the number of motor vehicles owned show that total motor vehicle ownership has increased consistently since the 1960s, but has decreased in comparison to the previous year during 2006 and 2007.

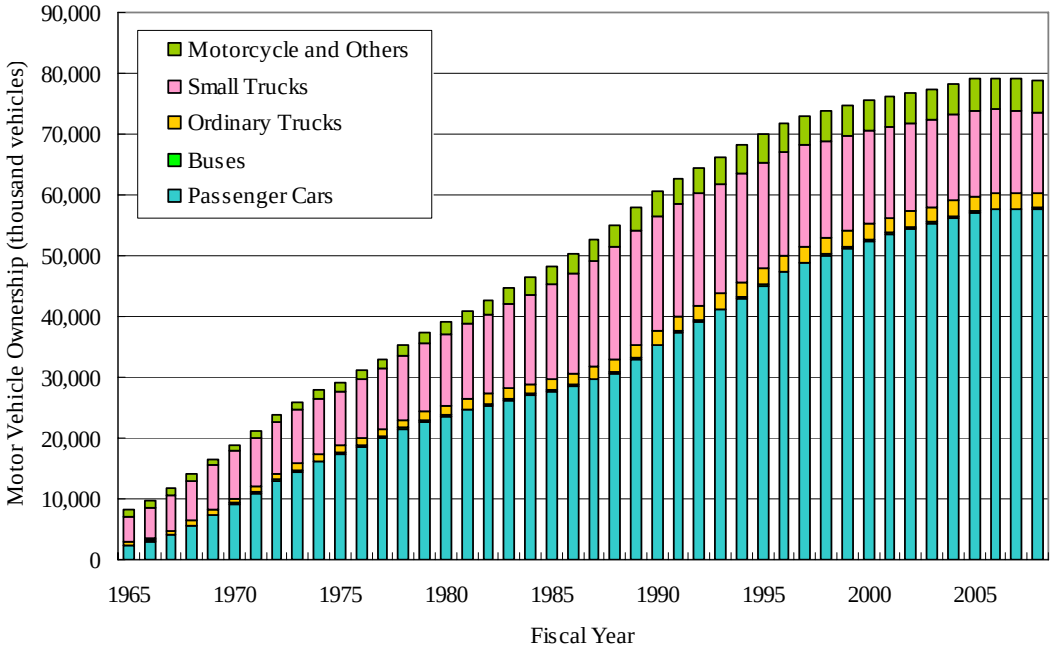


Figure 1.17 Motor Vehicle Ownership[8]

Source: Ministry of Land, Infrastructure and Transport

Motor vehicle mileage was on an upward trend until 2003, and began to decline in 2004. This is due to a decrease in the number of freight vehicles and business-use passenger cars in addition to the decline of household-use passenger cars, which had been increasing until 2003. The decrease in mileage for household-use passenger cars can be attributed to a change in people's perception of cars, such as a decrease in the number of people who enjoy leisure-time driving.

[8] "Passenger cars" includes light weight cars. "Small trucks" includes light weight trucks. Small special categories of vehicle, scooters (type I) and scooters (type II) are not included.

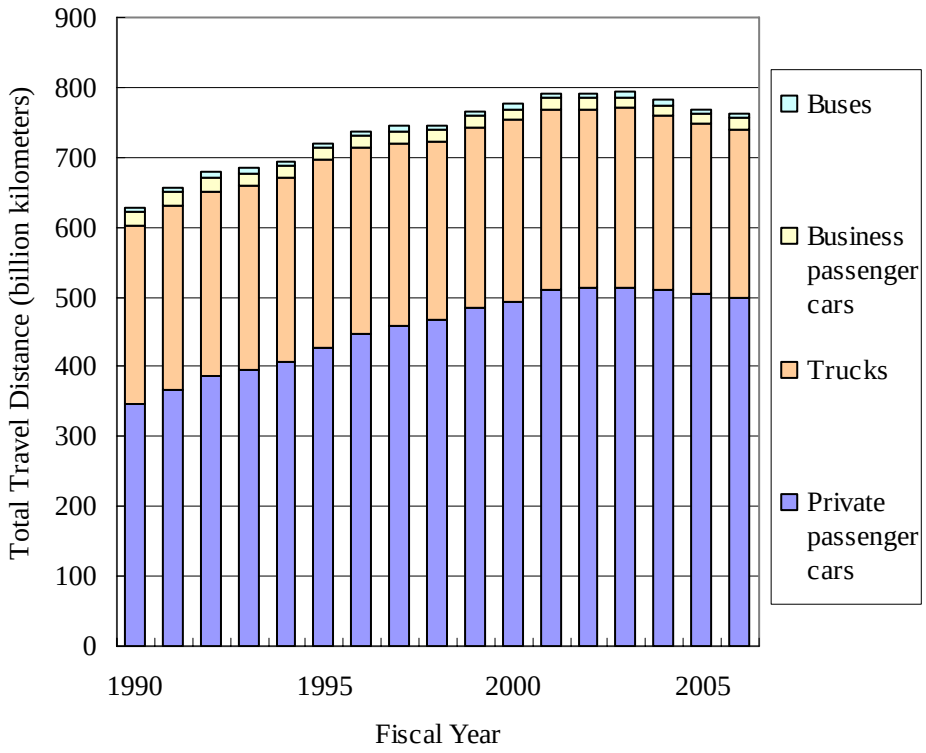


Figure 1.18 Change in Vehicle Total Travel Distance

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

With regard to passenger cars, which account for a large proportion of the total number of owned vehicles, preferences have shifted to luxury vehicles and RVs since 1980. The ratio of heavier vehicles has increased due in part to safety measures. In particular, there is a marked trend for increased size of ordinary passenger cars and compact passenger cars, excluding light-weight cars, and the ratio of passenger cars 1,000 kilograms or lighter in FY2007 was approximately 41.7% fewer than that in FY1980. Meanwhile, during the same period the number of passenger cars between 1,001 kilograms and 1,500 kilograms increased by nearly three-fold, while the number of passenger cars 1,501 or heavier increased 71.6 times.

However, the rise in ownership of ordinary and compact passenger cars recently reached its peak, and the share of light weight cars is increasing overall. The average weight of light weight cars has also been increasing following legislation to improve their safety implemented in 1994. Nevertheless, as they are still relatively lighter than ordinary and compact passenger cars, the increase in average weight of all passenger cars has reached its peak.

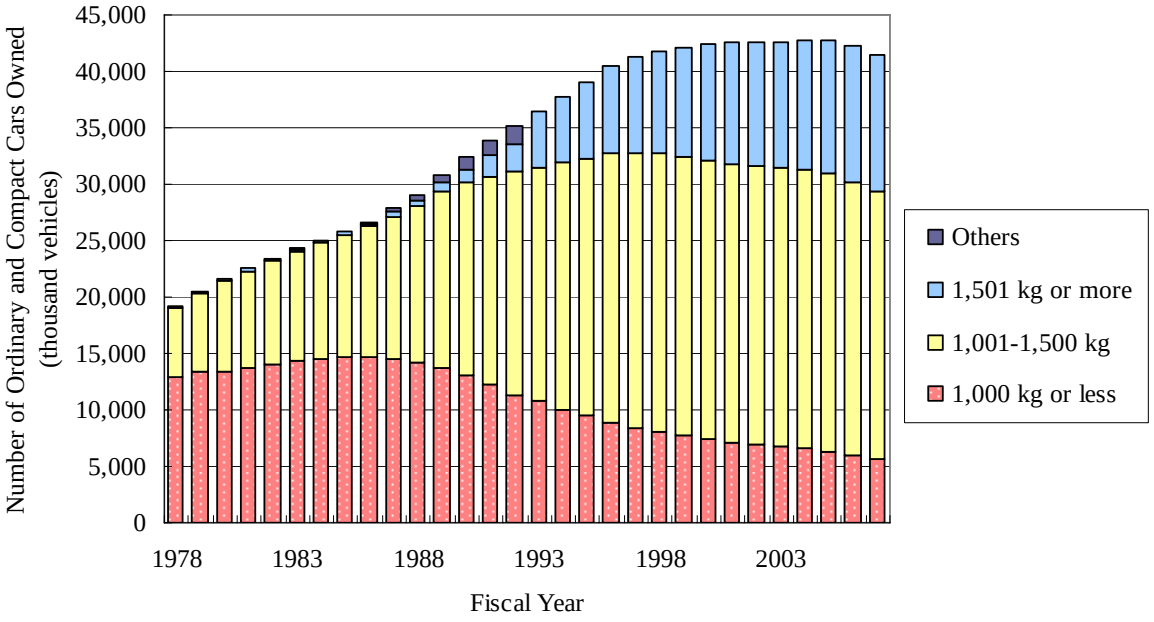


Figure 1.19 Increase in Size (Weight) of Ordinary and Compact Passenger Cars[9,10]

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

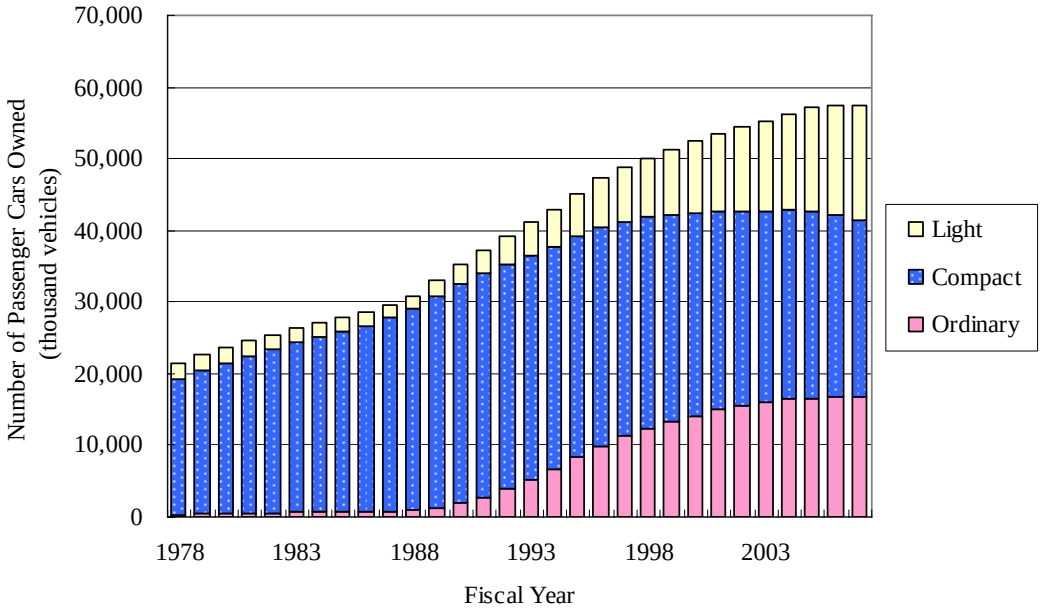


Figure 1.20 Ownership of Passenger Cars (ordinary, compact, and light weight)

Source: Automobile Inspection and Registration Association - 'Car ownership by category,' 'Car Ownership'

[9] Lightweight cars are not included. Minivans, etc. that weigh 1,501 kg or more were included under 'Others' until 1992, but they are categorized by weight from 1993 onwards.
[10] 'Other' includes vehicles for which a categorical assignment is unclear.

1.7 Energy

1.7.1 Consumption

Final energy consumption continued to increase significantly with the Japanese economy's rapid growth until the 1970s (Phase I). It then leveled off following the two oil shocks of the 1970s, followed by a period represented by a downward trend (Phase II). A strong economy and relatively lower crude oil prices in the late 1980s, however, pushed consumption to increase again (Phase III), where after it has nearly leveled off since 2000 (Phase IV). Energy consumption in FY2007 was 15,794 × 10^{15}J.

These trends can be summarized for different consumption sectors as follows. Until the first oil shock in 1973 (Phase I), the industrial, commercial and residential, and transport sectors energy consumption grew rapidly. From FY1973 until FY1986 (Phase II), the commercial and residential, and transport sectors energy consumption continued to grow, but industrial energy consumption began to decrease. From FY1986 until FY2000 (Phase III), the strong economy and drop in crude oil prices in the latter half of 1980s boosted energy consumption in all four sectors. From 2001 onward (Phase IV), energy consumption in the industrial and transport sectors has decreased overall, but energy consumption in the commercial and residential sector continued to increase. The share of final energy consumption for Japan in FY2007 was 45 percent for the industrial sector (including non-energy uses), 31 percent for the commercial and residential sectors, and 23 percent for the transport sector.

Energy consumption trends differ according to the type of energy in question. Electricity and gas consumption have grown uninterrupted; in FY2007, they were 2.5 times and 4.3 times their FY1973 levels, respectively. The commercial and residential demand for electricity, which includes the total consumption for electric lights and commercial power, accounted for 70% of the overall demand, and the growth in demand was led by commercial and residential consumption. In the residential sector, this increase was spawned by the rapid spread of electrical equipment due to a higher standard of living, while in the business sector the increase was supported by a larger number of office buildings and the swift diffusion of office automation equipment in response to economic informatization and the advancement of the services industry. The electrification ratio[11] was 12.7 percent in FY1970 and reached 23 percent by FY2007. Gas consumption was once centered on the residential sector, but the share for residential consumption has fallen below 50 percent since the 1990s, while the shares for industrial and commercial gas consumption are increasing. Reasons for this jump can be attributed to such factors as the implementation of a payment system that elicits large-scale and heavy-load industrial demand (with minimal fluctuation in usage amounts between seasons) for major gas companies that have introduced LNG, the advancement of technological innovation related to gas systems, and the demand for a response to global environmental problems. Coal consumption has gradually increased at a rather steady pace, while oil increased during Phase I and Phase II, but then gradually decreased during Phase III and Phase IV.

[11] The electrification ratio is the ratio of consumed electricity within 'Final Consumer Energy Consumption stipulated in General Energy Statistics.

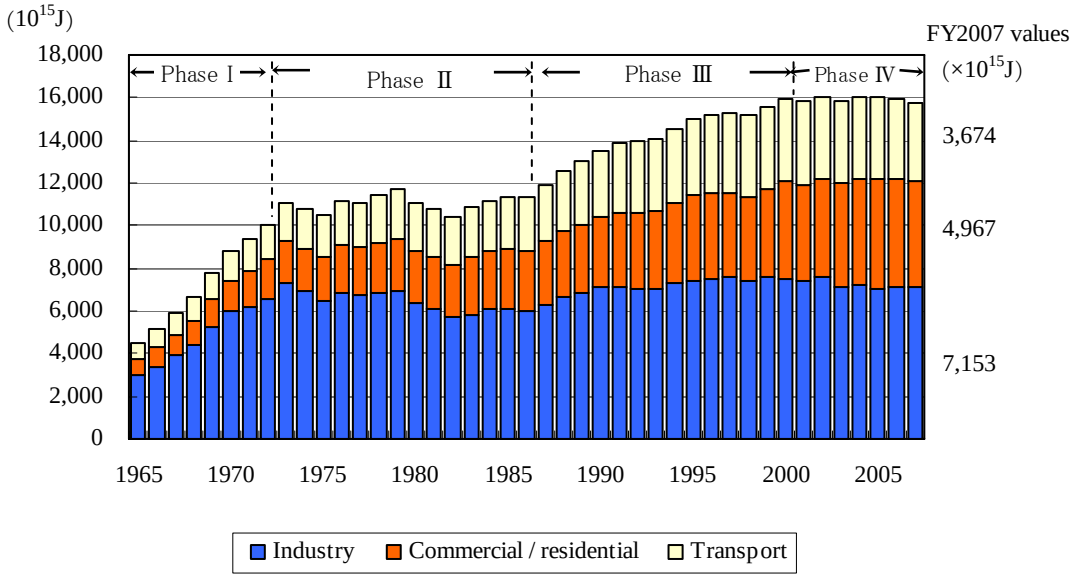


Figure 1.21 Final Consumer Energy Consumption[12]

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 0.4 percent for crude oil and 4.3 percent for natural gas (all data as of FY2007). Japan's dependence on foreign energy sources peaked in FY1973 at 89.4 percent of its energy supply. Although this dependence has been reduced by efforts to find substitutes for oil since then, in recent years foreign dependence has remained at about 80 percent, putting the nation in a 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 FY1973 but leveled off after the first oil shock. After FY1986 there was again a surge of growth, but supply has leveled off again in recent years. In FY2007, Japan's total primary energy supply was 23,861 × 10^{15}J.

Oil supplies grew continually during Phase I, and shrank in Phase II due to the promotion of oil substitution policies and energy conservation policies implemented in response to the oil shock. In Phase III, oil supplies overall increased due to Japan's strong economy and a drop in crude oil prices. However, they have been decreasing since FY1995 due to such reasons as the promotion of substitute energy sources, as one example. Coal supplies increased steadily, while natural gas and nuclear energy

[12] Figures for the industrial and transport sectors include non-energy use. Furthermore, the compilation methods of the "General Energy Statistics" for FY2001 and before and for FY2002 onwards are different, and attention shall also be given to the fact that there are points where data for FY1989 and before differs from those for FY1990 onwards.

supplies have increased significantly.

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. As a result, oil's share of total primary energy (the "oil dependency" rate) rose to its peak at 77 percent in FY1973. The oil dependency ratio then began to decrease with the promotion of substitute energy sources including nuclear energy, natural gas, the introduction of coal, and development of new energies. This result was a significant decrease in the share of oil supplies during Phase II, and its share was 47 percent in FY2007. At the same time, natural gas and nuclear energy rapidly increased their shares, reaching 16 percent (2 percent in FY1972) and 10 percent (1 percent in FY1972) in FY2007, respectively. The share of coal also increased to reach 21 percent (15 percent in FY1972) in FY2007.

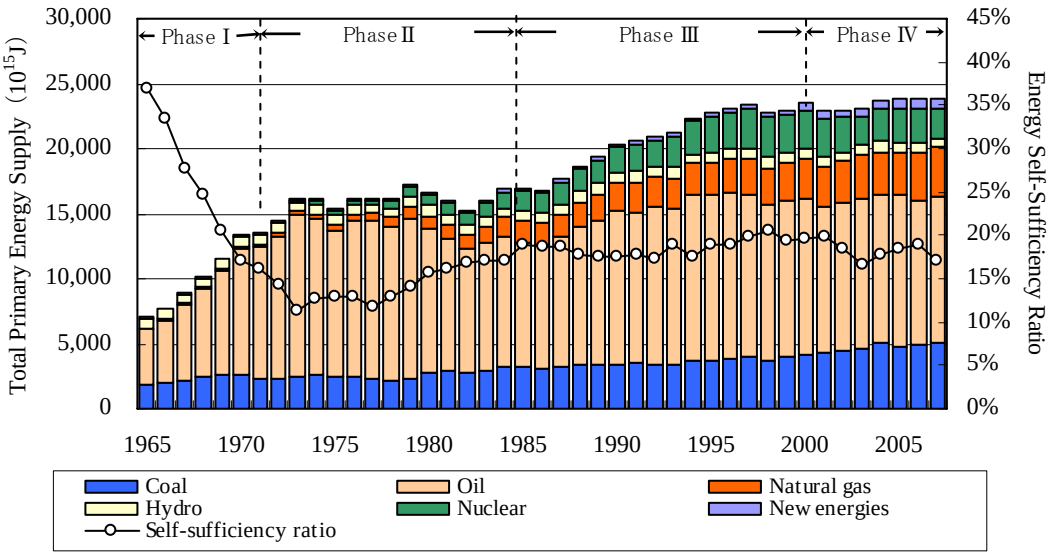


Figure 1.22 Total Primary Energy Supply and Self-Sufficiency Ratio[13]

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

The total electric power generation increased 2.5 times in FY2007 from FY1973. Sources for electrical power generation was 25.6 percent for nuclear power, 25.3 percent for coal-fired thermal power, 27.4 percent for LNG thermal power, 13.1 percent for oil and other thermal power, and 7.6 percent for hydroelectric power.

The amount of power generation from nuclear power in FY2007 was 263.8 billion kWh, about 27 times higher than amounts in 1973. Coal power generation in FY2007 amounted to 260.5 billion kWh, approximately 15 times more than levels in 1973. LNG power generation reached 282.1 billion kWh in FY2007, which was a level nearly 32 times that of those in 1973. Oil power generation amounts have

[13] New energies, etc. include geothermal heat.

dropped dramatically, amounting to 77.9 billion kWh in FY2006, which is approximately 30 percent of levels in 1973. The drop in oil usage is due to a shift to peak power optimization from base and middle power resources by such means as beginning new nuclear power operations and increasing their operations efficiency. The development of hydroelectric power commenced before the Second World War. Large-scale hydroelectric power plants have been almost completely developed and their power generation amounts generally continue to remain flat. The amount of hydroelectric power generation in FY2006 was 78.4 billion kWh, a level 1.2 times those in FY1973.

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 2007 is 187 × 10^9J, and has been declining in recent years.

Japan's total primary energy supply per unit of GDP (total primary energy supply per gross domestic product) increased during Phase I, but has improved significantly since Phase II. This is a result of the introduction of world-leading energy-saving facilities and technologies brought about by the oil shock. Levels remained generally static during Phase III. This is due to the significant contribution of the industrial sector's extensive investments in energy-saving reductions, which have already shown marked decrease in energy input per unit of output, as well as increased energy consumption in the commercial, residential and transport sectors, in accordance to the public's pursuit of a more comfortable and affluent standard of living. In Phase IV, amounts declined overall in response to changes in the industrial sector's structure and a shift to reductions in the transport sector.

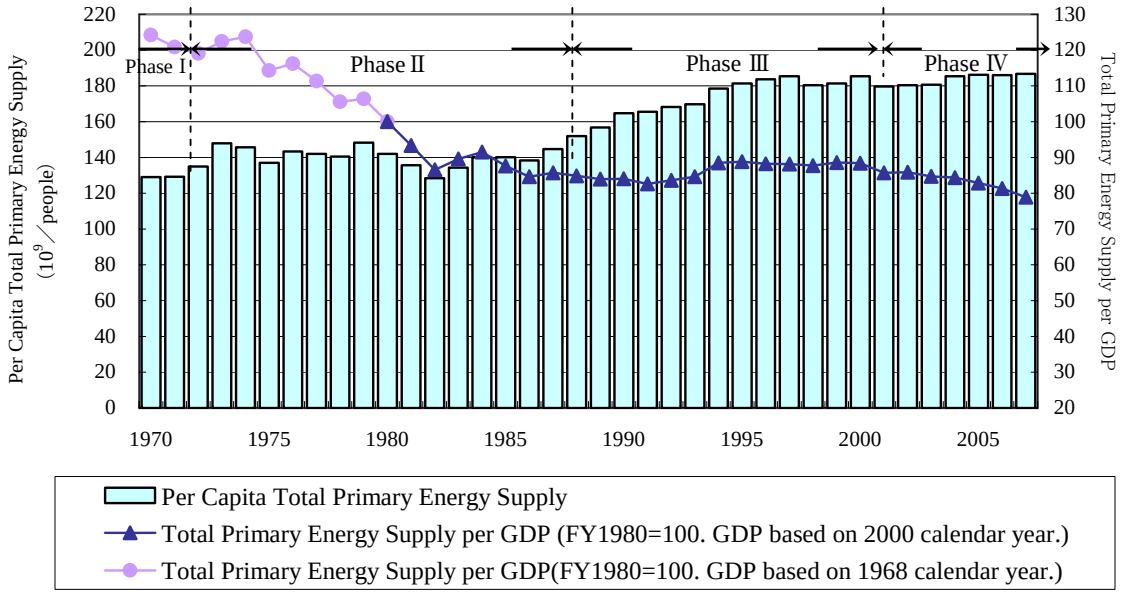


Figure 1.23 Per Capita Total Primary Energy Supply and Total Primary Energy Supply per GDP

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 Internal Affairs and Communications – 'Population Census' and 'The Annual Report on Current Population Estimates'

1.7.4 Prices

Imported energy was cheap and supplies stable during Phase I; prices skyrocketed as a result of the two oil shocks, peaking in FY1981 then beginning to fall, and have been steady since FY1986. The FY1990 yen-denominated real price of crude oil[14] (partially due to the substantial appreciation of the yen) is only slightly higher than it was prior to the oil shock.

Crude oil prices shot up temporarily at the outbreak of the 1990 Gulf War, but soon returned to the prior prevailing levels. In 1996, however, the price of crude oil topped US$20 a barrel, due to the strong growth of worldwide oil demand, the low inventory system for crude oil, oil products adopted by Western petroleum companies in an effort to reduce costs, and the unstable political situation in the Persian Gulf region.

As stated above, in the first half of the 1990s, the price per barrel changed to around US$20, but the crude oil price fell to US$10 per barrel when global oil stocks increased in line with a slowdown in the rate of demand, mainly in Asia. This was a result of the faltering Asian economy during the financial and currency crises from 1997 to 1998. Soon after, crude oil prices increased to the lower US$30s per barrel level as production was repeatedly reduced by the OPEC countries and Asian economy began to recover, among other factors. 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 US$17 (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 remained permanently above US$40 per barrel.

Crude oil prices continued to skyrocket and surpassed the price levels of the second oil shock, even recording a CIF import price of US$136 per barrel in August 2008. Nevertheless, CIF prices began to drop and the price after 2009 declined to US$40 per barrel. This was due not only to the fall in global crude oil prices from mid-July 2008, but also the appreciation of the yen (Figure 1.24).

There are various reasons for skyrocketing crude oil prices, including (1) a marked growth in demand for oil in the Asia-Pacific region, particularly in China and India, due to their high level of growth, (2) the reduction in oil production in non-OPEC oil-producing countries, specifically the significant decline in the United States' oil production in response to Hurricane Katrina in August 2005, and (3) the influx of funds to the oil market by speculators.

[14][14] Crude oil prices are adjusted using an indicator (deflator) to correct for price fluctuations after converting dollar-based crude oil prices to yen using exchange rate during the period concerned.

Crude oil prices dropped drastically following the financial crisis in September 2008, which can be owed to reasons such as (1) a significant reduction in OECD demand, as well as a quick deceleration in the growth of non-OECD demand, due to the impact from a rapidly worsening real economy, and (2) the increase in the withdrawal of funds from the crude oil futures market in order to evade risk following the financial crisis-induced credit crunch, as well as the accelerating concern over the future of the United States and global economies.

In Japan, the ratio of fossil fuels to all imports is falling (at a rate of 10% to 20%) due to policies in oil substitution and energy-saving, both implemented after the oil shock, as well as the effects of yen appreciation on crude oil transactions conducted in US dollars. In addition, due to the transformation of the industrial sector, the Japanese economic structure is changing into one that is resilient against the impact of rising crude oil prices. Thus the impact on the Japanese economy from these skyrocketing crude oil prices is relatively low compared with the first and second oil shocks.

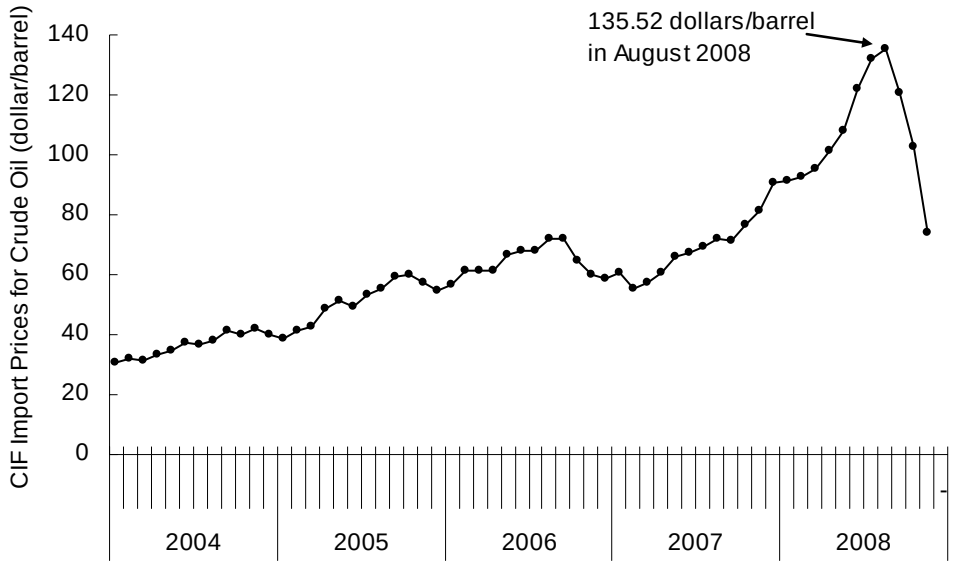


Figure 1.24 CIF Import Prices for Crude Oil (dollar/barrel)

Source: Ministry of Finance — 'Trade of Japan'

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.

On the demand side, the government is trying to promote efficient energy usage, beginning with energy conservation measures. In terms of supply, efforts are being made to promote the introduction of non-fossil energy, including 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. Until FY2006 the Special Accounts for Petroleum and Sophisticated Structure of Energy of Supply and Demand and the Special Accounts for Electric Power Development Acceleration Measures were responsible for this role. However, from FY2007, the two were integrated to form the Special Accounts for Measures for Energy. The Special Accounts for Measures for Energy is composed of the Accounts for Supply and Demand of Energy (formerly the Special Accounts for Petroleum and Sophisticated Structure of Energy of Supply and Demand) and the Accounts for Promotion of Power Development (formerly the Special Accounts for Electric Power Development Acceleration Measures).

Accounts for Supply and Demand of Energy focuses on measures for both a stable fuel supply and for advancing the supply and demand structure for energy. Measures for a stable fuel supply include increasing stockpiles of oil and promoting the development of oil, combustible natural gas, and coal resources, as well as measures for streamlining the production and distribution of those resources. Measures for advancing the supply and demand structure for energy include developing technology related to non-fossil energy (including energy conservation), and promoting the introduction of facilities using alternative energy as well as high-capacity energy-saving facilities. The accounts for supply and demand of energy in FY2009 amounted to 282.5 billion yen, an increase of 4.1 percent, as measures to upgrade the energy supply and demand structure.

Table 1.2 Accounts for the Supply and Demand of Energy and Accounts for the Promotion of Power Development

(Unit: hundred million yen)

Special Accounts for Measures for Energy	FY2009	FY2009	+/-	Year-on-Year Growth
Accounts for Supply and Demand of Energy	5,241	5,377	-137	-2,5%
Measures for stable fuel supply	2,415	2,663	-247	-9,3%
Measures for advancing the supply and demand structure for energy	2,825	2,715	+111	+4,1%
Accounts for Promotion of Power Development	3,679	3,715	-36	-1,0%
Measures for electrical power plant location	1,955	1,986	-31	-1,6%
Measures for electrical power generation diversification	1,724	1,729	-5	-0,3%

Japan has a system of energy-related taxes that include the Petroleum And Coal Tax, imposed on crude oil, imported oil products, coal, etc., and the Promotion of Power-Resources Development Tax, which is levied on the electricity sold by general electrical power suppliers. The FY2003 Tax Reform was adopted that revised the former 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. Tax rates on LPG, LNG, and coal were raised in three stages; FY2003, FY2005, and FY2007.

In addition, an investment-promoting taxation system was implemented from FY1981 that relates to Japanese energy infrastructure. The Energy Demand Structure Reform investment promotion tax system was established in FY1992 aimed to promote reforms to the supply and demand structure for energy. This overall system was established in order to promote the introduction of energy saving facilities, new energy facilities, etc. It allows for such measures as special depreciation and corporate tax or income tax credit in the event that an entity acquires facilities that implement energy supply and demand reforms as long as those reforms are applied to their operations within a one-year period (only certain small and medium sized enterprises below a level of 100 million yen in capital can elect to use the tax credit).

1.8 Waste

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

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. It continued to increase gradually between 1989 and 2000, however, has been decreasing since 2001. The total amount of municipal solid waste disposed of in 2006 was 52.04 million tonnes, which equates to about 1.1 kilograms per capita per day. This is comprised of 30.4 percent business waste and 69.6 percent household waste. In terms of the disposal methods, most is directly incinerated (77.7 percent), some is recycled (19.9 percent), and the rest buried as direct landfill (2.5 percent).

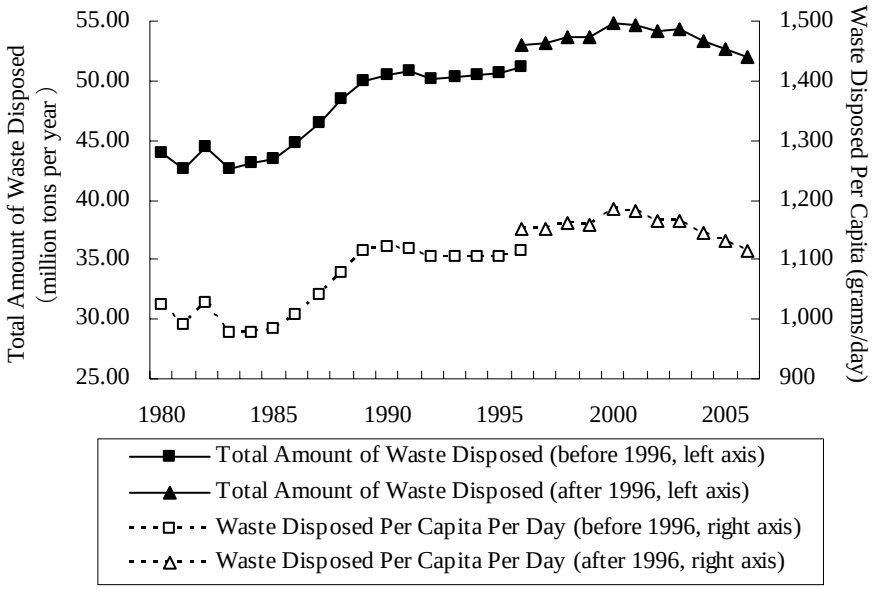


Figure 1.25 Changes in Amount of Municipal Solid Waste Disposed

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

*The 'Total Amount of Waste Disposed' has been corrected to included previous data from results gathered in FY2005 so as to be the same as 'Municipal Solid Waste Discharge Amounts' under 'the basic policy for comprehensive and planned promotion of measures for proper waste management focusing on waste reduction, etc.,' based on Article 5 Section 2 of the Waste Disposal and Public Cleansing Law.

'Total Amount of Waste Disposed' before FY1996 was comprised of the amount of waste collected, amount of waste directly hauled, and the amount of household waste disposed.

'Total Amount of Waste Disposed' after FY1996 was comprised of the amount of waste collected, amount of waste directly hauled, and the amount of waste collected by groups.

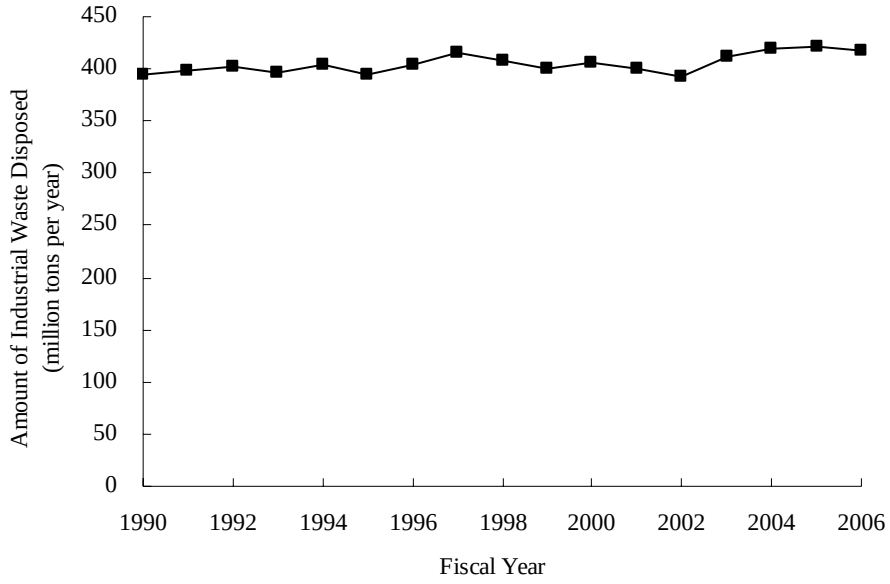


Figure 1.26 Changes in Amounts of Industrial Waste Disposed
Source: Ministry of the Environment – 'Status of Industrial Waste Discharge and Disposal'

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 2006 was about 400 million tonnes. After such industrial waste is disposed of, about 215 million tonnes (51%) is recycled and about 22 million tonnes (5%) 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 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), there is intense competition over land use. Therefore, the ratio of national land used for agriculture is about 13 percent and the cultivated field per household is small (approximately 1.6 hectares). Furthermore, the cultivated area has been decreasing each year, and in 2006, it had fallen about 28 percent from the peak period to 4.60 million hectares. In terms of paddy fields, new development was restricted in 1969, and since then the total area has declined by the rate of 1 percent per year due to the conversion of paddy fields to fields for other crops and/or non-agricultural land use. Since the latter half of the 1980s, farmland development has been reduced and much

farmland is being left uncultivated mainly in hilly and mountainous regions. As a result the total area under cultivation has also been reduced. This trend remains current.

Japan's food self-sufficiency ratio has also fallen significantly. During the period from 1965 to 2007, the food self-sufficiency ratio in terms of calorie base[15] 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.

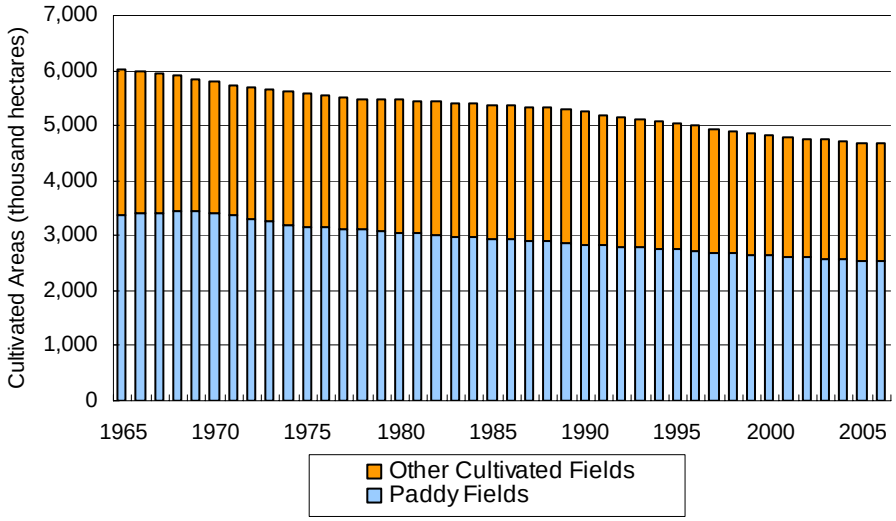


Figure 1.27 Changes in Cultivated Areas

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 and exercising functions for the public benefit. This includes national land conservation through forestry activities, including 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 (30 %)) and non-national forest (approximately 17.4 million hectares (70%). In Japan over 300 thousand hectares of trees were planted each year between the early 1950s and early 1970s, and at the effort's peak over 400 thousand hectares were being planted in a single year. This allowed for actively creating over ten million hectares of planted forests. And as a result of the growth of these planted forests, which is more than two times the

[15] 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.

level between 1945 and 1954, the volume of 25 million hectares of forests amounts to approximately 4.4 billion cubic meters.

Meanwhile, wood demand in Japan has recently declined to about 80 million cubic meters per year. However, domestic wood supply is increasing slightly, and its supply ratio in 2007 was approximately 23 percent.

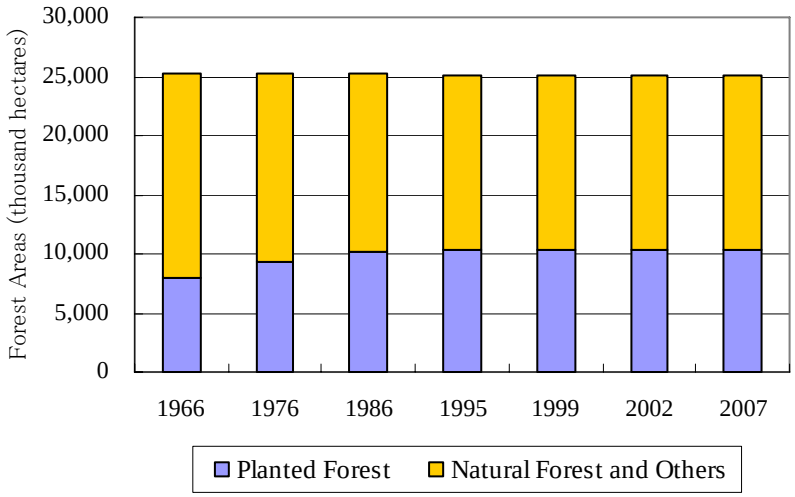


Figure 1.28 Changes in Forested Area

Source: Forestry Agency

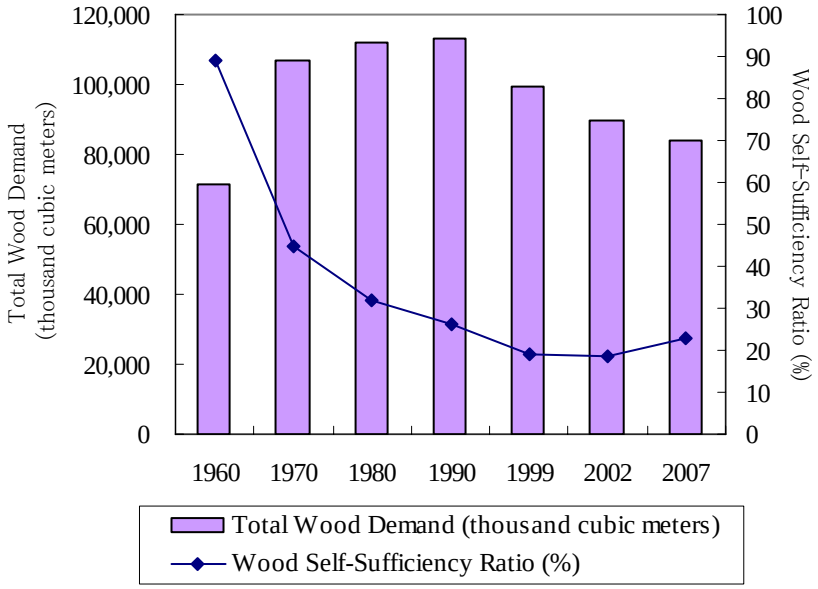


Figure 1.29 Change in Total Wood Demand and Wood Self-Sufficiency Ratio

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

1.11 Information and Telecommunications

There were 88.11 million Internet users in Japan at the end of 2007, whereas the diffusion rate among the Japanese population was 69 percent, a figure which continues to increase. User numbers from mobile phones and other mobile network devices were 72.87 million, while users from personal computers were 78.13 million (Figure 1.30).

The use of broadband lines[16] to connect to the Internet from household personal computers is increasing by the year. By the end of 2007, 40.6 percent of the entire population six years old or over used broadband lines, while 79.6 percent of people who use the Internet from household personal computers used broadband lines. The number of broadband connection contracts at the end of 2007 was 2.83 million, of which 13.13 million were DSL contracts. While the number of DSL contracts is on the decline, the number of FTTH contracts, 11.33 million, is on the rise. In addition, FTTH contracts accounted for over 40 percent of all broadband contracts. According to net contract numbers, DSL contract numbers continue to decrease while FTTH contract numbers have steadily increased since 2004. In this way, FTTH contracts are leading the increase in broadband contracts (Figure 1.31).

The purpose for Internet usage is also expanding to include various different sites such as Internet shopping, Internet auctions, financial trading, enjoying images and music, online games, and viewing and writing on SNS sites, in addition to the traditional activities of searching and viewing information (Figure 1.32).

E-commerce web sites targeting consumers using personal computers and mobile phones are also spreading. This can be attributed to factors such as the tremendously vast variety of products sold through Internet shopping and the ability to conveniently purchase products that would otherwise be unavailable without traveling to a far away location. The size of the consumer-targeted e-commerce market in Japan had expanded to 4.4 trillion yen in 2006, and personal computers and mobile phones are currently becoming the second most prominent purchasing method behind actual store visits (Figure 1.33).

[16] 'Broadband lines' includes cable television lines, fixed wireless access (FWA), third generation (3G) mobile phone lines, fiber optic lines (FTTH), and DSL lines.

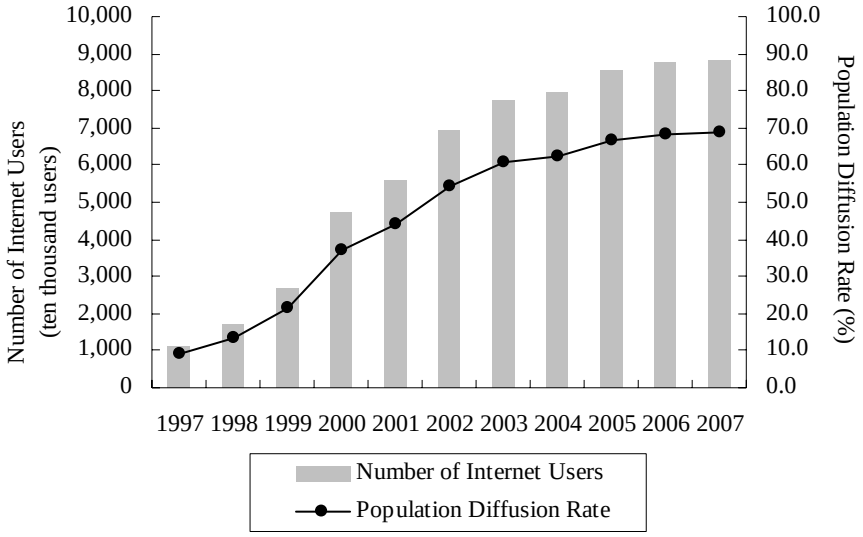


Figure 1.30 Number of Internet Users and the Internet Diffusion Rate

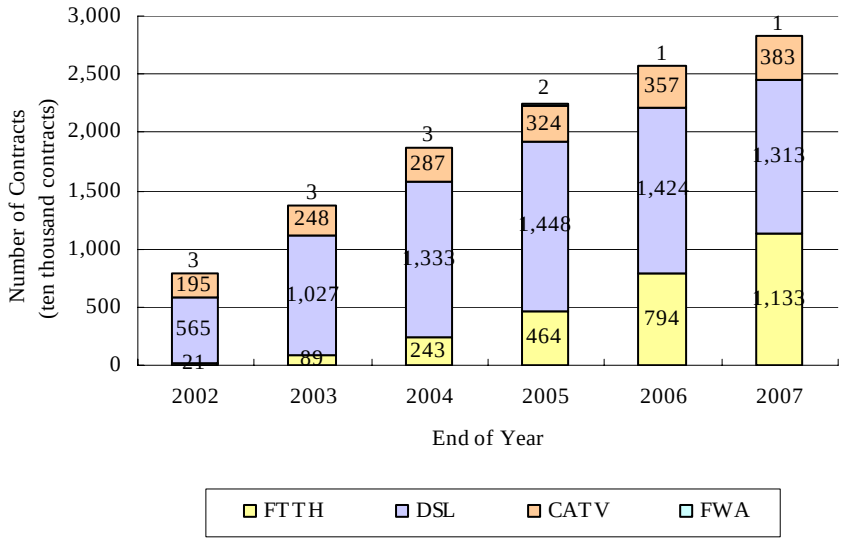
*The number of Internet users (estimate) is an estimated figure based on the results from a survey conducted over the past year on people aged six and over that use the Internet. Internet connection devices include personal computers, mobile phones and PHS, handheld information devices, gaming devices, and all other devices (subjects were not asked whether they possess said devices). The purpose of Internet use also includes all purposes, such as personal use, business use, and academic use.

*The population diffusion rate (estimate) is a figure acquired by dividing the estimated number of Internet users (88.11 million) from the estimate for the entire population as of October 2007 (127.69 million) (National Institute of Population and Social Security Research, 'Population Projections for Japan').

*Figures for between 1997 and the end of 2000 were taken from 'Information and Communications in Japan.' Figures for between 2001 and the end of 2007 are estimates from the 'Communications Usage Trend Survey.'

*The target age for surveys was 15-69 years old until 1999, however, this changed to 15-79 years old in 2000, and then to all persons age six and above from 2001 in consideration of the increase in usage by elderly people and primary and junior high school students. Therefore it is not possible to conduct a precise comparison between surveys.

Source: 2008 White Paper - Information and Communications in Japan



1.31 Changes in Numbers of Broadband Contracts

Source: Information and Communications in Japan 2008

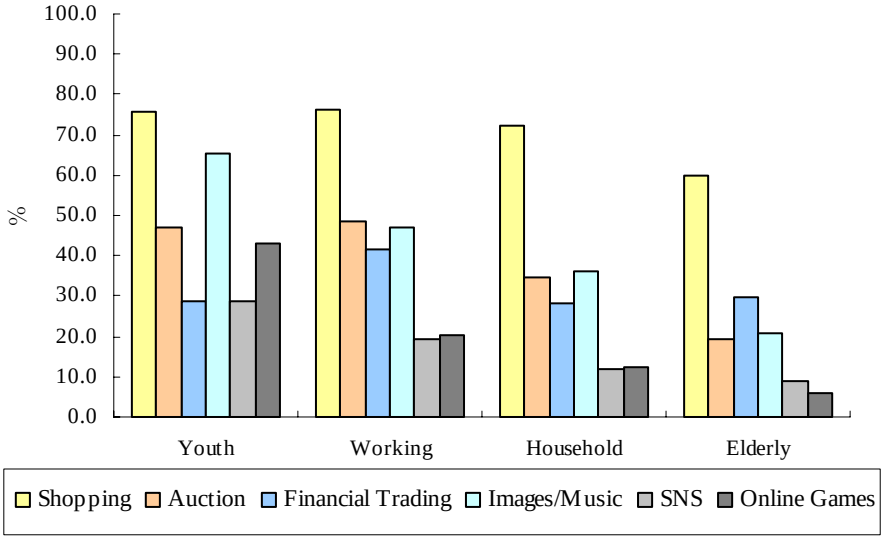


Figure 1.32 Functions and Services Used on Websites (personal computers and mobile phones) (multiple response)

Source: Information and Communications in Japan 2008

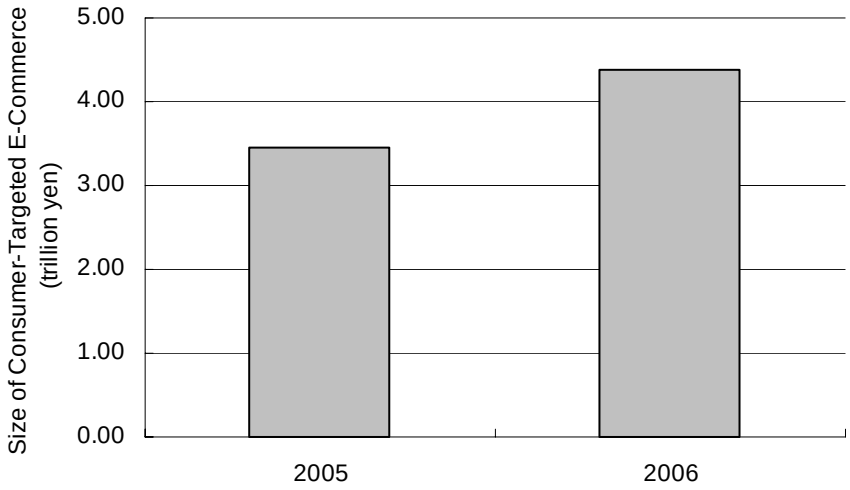


Figure 1.33 Scale of Consumer-Targeted E-commerce

Source: Information and Communications in Japan 2008

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 courts, 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 eleven 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; Environment; and Defense. 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 July 2008, there were 115 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 "Act on Promotion of Global Warming Countermeasures") 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, adopting a step-by-step approach of evaluating the progress of measures and emissions in 2004 and 2007, as well as adopting additional policies and measures as necessary. A complete evaluation and revision was conducted in 2004. Meanwhile, 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 Act on Promotion of Global Warming Countermeasures. In response to this need, in April 2005 the Cabinet approved the Kyoto Protocol Target Achievement Plan, which stipulated the countermeasures and policies necessary to reliably achieve Japan's 6% reduction commitment under the Kyoto Protocol.

The Act on Promotion of Global Warming Countermeasures stipulates that in 2007 considerations are to be paid to the targets and measures stipulated in the Kyoto Protocol Target Achievement Plan, and that changes must be promptly made if deemed necessary, based on the results of said considerations (Article 9). In response to these considerations, the entire plan was revised in March 2008. Specialized discussions are held regarding plan revisions by expert panels including the Central Environmental Council of the Ministry of the Environment, the Industrial Structural Council and the Advisory Council for Resources and Energy of the Ministry of Economy, Trade and Infrastructure, as well as the Council for Social Infrastructure and Council for Transport Policy of the Ministry of Land, Infrastructure, Transport and Tourism. Specifically, for approximately one year from the end of 2006 the progress of currently employed countermeasures and policies were evaluated, future emission amounts of greenhouse gasses were forecasted, and considerations were paid to the details of additional countermeasures and policies. In addition, the views of citizens have been reflected in these considerations by listening to the opinions of the industrial sector, local authorities, NGOs, and other bodies, while also conducting procedures for public comments. Persons were also allowed to sit in on meetings and meeting materials as well as agenda overviews were released publicly in effort to ensure the transparency of discussions. Later in March 2008, the Global Warming Prevention Headquarters,

which is composed of all Cabinet members, completed a proposal for the plan's revision and amendments to the Kyoto Protocol Target Achievement Plan were adopted by the Cabinet. In order to continuously assess and ensure the plan's effectiveness following its draft, each year rigorous inspections are made on such factors as the progress of each countermeasure employed by the government using an evaluation index and other measures, and when necessary the plan is amended in a flexible manner by adding additional, or strengthening existing, countermeasures and policies. In addition, in FY2009 projections are to be provided on Japanese greenhouse gas emissions during the first commitment period (five years) while a comprehensive evaluation is to be conducted on the progress of countermeasures and policies stipulated in the plan along with emission amounts. This is to allow for promptly implementing effective additional countermeasures and policies to ensure that targets are achieved following from FY2010 onward, which is the middle of the first commitment period.

Against this backdrop, revisions were made to the Act on Promotion of Global Warming Countermeasures and the Law Concerning the Rational Use of Energy. Regarding the Act on Promotion of Global Warming Countermeasures, from April 2006 the "system on calculation, reporting, and official announcement of green house effect gases effluent" was introduced, requiring entities that emit over a certain level of greenhouse gasses to measure their emissions and report those measurements to the government. The Law also allowed the government to count and publish the data reported. In addition, a revision made in June 2008 expanded the scope of the calculation, reporting, and official announcement system mainly in the business sector, and set new obligations for businesses to make efforts to control emissions. Regarding the Law Concerning the Rational Use of Energy, a revision in April 2006 stipulated unifying the regulations category for factories and business sites, strengthening countermeasures in the transport sector (requiring that freight transporters, passenger transporters, and shippers above a stipulated size create energy conservation plans and report energy usage amounts), enhancing energy conservation countermeasures in the housing and architecture sector, and developing policies that promote efforts for energy conservation by consumers. For the industrial and business sectors, a May 2008 revision was also made to promote improvements to overall corporate energy management by introducing corporate-based energy management as well as to introduce sector-based benchmarks for energy conservation standards to factories and offices while further strengthening the energy conservation measures for housing performance in the housing and architecture sector. Again in August 2009, the new Law on Advancing Energy Supply Structure was executed, requiring energy suppliers (electric power companies, gas companies, and oil companies) above a certain size to use non-fossil energy resources, such as solar power, nuclear power, hydroelectric power, geothermal power, or biomass, and to use fossil energy resources more effectively.

Japan has also proposed the long-term target of at least halving global greenhouse gas emissions from the current level by 2050 as an internationally shared objective. In order to achieve this objective, it is vital for all of the nations in the world to address this problem. The Action Plan for Achieving a Low-Carbon Society (approved by the Cabinet in July 2008) announces Japan's long-term target of

reducing emissions by 60 to 80 percent from the current level by 2050, which indicates that global emission levels should be made to peak in the next 10 to 20 years. The Action Plan also proposes that Japan announce a quantified national emission reduction target at a proper time during 2009.

In April 2009, Japan proposed a Draft Protocol on a new framework beyond 2012, which includes the target for at least halving global emissions by 2050 in the preamble and contains such content as indicating the obligations of advanced nations using total emission amounts and reduction rates taken from multiple reference years. In June 2009, then Prime Minister Taro Aso announced that, in order to achieve the long-term objective, developed nations must aim to have their emission levels peak by 2015 and developing nations by 2025, and that Japan had established a mid-term objective of cutting emissions by 15 percent by 2020 compared with the 2005 levels.

Also, at the United Nations Summit on Climate Change on September 22, 2009 Prime Minister Yukio Hatoyama announced that Japan would aim to reduce its emissions by 25% by 2020, if compared to the 1990 level, premised on the formulation of a fair and effective international framework by all major economies and agreement on their ambitious targets.

In addition, Prime Minister Hatoyama also voiced that a vast amount of financial resources would be required to resolve the climate change problem, in particular to support adaptive measures in vulnerable developing nations and island states. The Prime Minister thereupon announced that Japan is prepared to provide more financial and technical assistance than in the past, in accordance with the progress of the international negotiations. In addition, with regard to the assistance to developing nations the Prime Minister expressed that 1) developed countries must contribute through substantial, new and additional public and private financing, 2) rules must be developed that will facilitate international recognition of developing countries' emissions reductions, in particular those achieved through financial assistance, in a measureable, reportable, and verifiable manner 3) considerations need to be paid to an innovative mechanisms for financial assistance in a predictable manner, while a system is also needed for providing information and matching on bilateral and multilateral funds, and 4) a framework must be constructed to ensure the protection of intellectual property rights in order to promote the transfer of low-carbon technology. These were proposed under the title of the Hatoyama Initiative, and Japan intends to exert every effort for the success of Copenhagen, in the course of formulating this initiative.

As of June 31st, 2009, local public organizations included 47 prefectures and 1,758 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.

It is becoming increasingly more important for these local public organizations to make active efforts.

The Act on Promotion of Global Warming Countermeasures revised in June 2008, requires that local public organizations in prefectures, designated cities, core cities, and specially designated cities

expand their action plans to include measures in response to area-wide natural conditions commensurate to traditional regional promotion plans. Moreover, the Act on Promotion of Global Warming Countermeasures requested that efforts be made to collaborate between related policies, including new local public organization action plans (such as area-based measures), city plans, and development plans for agricultural promotion areas.

As of December 2008, local public organization action plans (clerical affairs) had been drafted by all 47 prefectures and 1,061 municipalities (cities, towns, and villages). In addition, 183 more municipalities are planning to establish them within FY2008. Moreover, as of December 2008 regional promotion plans—the area-based local public organization action plans—had been drafted for all 47 prefectures as well as for 113 municipalities, while 88 more municipalities plan to draft them within FY2008.

Furthermore, 6,796 volunteers to promote activities to mitigate global warming have been commissioned by 45 prefectures (there were 3,677 as of April 2005). Prefectural centers for the promotion of activities to stop global warming have been designated in 45 prefectures, and 461 global warming countermeasure regional councils have been established in 47 prefectures (there were 128 as of April 2005).

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

Among local public organizations, Tokyo is implementing particularly advanced undertakings. In June 2007, the Tokyo Climate Change Strategy was drafted, which defines the basic policy for climate change countermeasures over the ensuing ten years in Tokyo. Based on this strategy, the Tokyo Metropolitan Ordinance on Environmental Preservation was revised in June 2008, requiring large business establishments to cut total greenhouse gas emissions. It also introduced an emissions trade system and implemented a global warming countermeasures reporting system for small- to medium-sized enterprises, amongst other revisions. In addition, in January 2009 environment-related tax breaks (tax system promoting energy conservation for small- to medium-sized enterprises, tax system promoting the introduction of next-generation automobiles, etc.), which are unique to Tokyo, were implemented.

Regarding the creation of a low-carbon society, the Action Plan for Achieving a Low-Carbon Society sets high targets for significantly cutting greenhouse gas emissions. The plan selected ten cities nationwide to challenge themselves with pioneering efforts in creating an Eco-Model city. Thirteen cities had been selected as of January 2009. Support and result follow-ups will be conducted on these efforts in the future in order to promote distinguished cases nationwide. In addition, partnerships will be

formed with overseas cities that are aggressively addressing environmental measures so that Japan can transmit its leading efforts to the rest of the world. The Promotion Council for the Low Carbon Cities, which is formed of local public organizations and other entities eager to create a low-carbon society, was established in December 2008 as a venue for nationally promoting the aforementioned distinguished cases and forming partnerships with overseas cities in addition to other activities. The Council is currently promoting activities aimed at constructing a low-carbon society (membership of 168 organizations as of October 5, 2009).

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 1 to March 31 the following year), 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, national bonds. This account covers the most fundamental national expenses, such as social welfare, education, and defense. In FY2009, ordinary expenditure totaled 51.731 trillion yen, 9.4 percent more than the initial budget for the previous year. The general account totaled 88.548 trillion yen, an increase of 6.6 percent.

Special accounts are specially established under the Finance Law independent of the general account in cases where the national government runs certain enterprises, invests certain funds, or allots certain revenues to particular expenditures. At the end of 2010 there will be a total of 17 such accounts, including 12 special accounts for government enterprises, 2 special accounts for fund management, and 3 special accounts for the consolidation of funds (there were 21 funds in FY2008, which have been sequentially integrated). Government-related organizations are wholly state-owned financial institutions established via special legislation. Currently, the Okinawa Development Finance Corporation, Japan Finance Corporation, and Japan International Cooperation Agency are two banks and one organization set up this way in the loan assistance sector.

Table 1.3 FY2009 General Expenditure Budget

(Hundred million yen)

	FY2008 budget			FY2009 estimates		
		2007-2008 change	Growth rate (%)		2008-2009 change	Growth rate (%)
Social Security	217,829	6,415	3.0	248,344	30,515	14.0
Education and Science	53,119	265	0.5	53,104	-15	0.0
Science and Technology Promotion	13,628	151	1.1	13,777	149	1.1
Government Employee Pensions and Others	8,522	-713	-7.7	7,872	-650	-7.6
National Defense	47,796	-217	-0.5	47,741	-55	-0.1
Public Works	67,352	-2,121	-3.1	70,701	3,349	5.0
Economic Assistance	6,660	-253	-3.7	6,295	-365	-5.5
(Reference) ODA	7,002	-291	-4.0	6,722	-280	-4.0
Small- and Medium-sized Businesses	1,761	121	7.3	1,890	129	7.3
Energy Measures	8,655	12	0.1	8,562	-93	-1.1
Major Foodstuff Measures	8,582	27	0.3	8,659	77	0.9
Miscellaneous	49,069	272	-0.6	50,642	1,573	3.2
Economic Emergency Response Preparation	-	-	-	10,000	10,000	-
Contingencies	3,500	0	0.0	3,500	0	0.0
General Expenditure Total	472,845	3,061	0.7	517,310	44,465	9.4

Source: Ministry of Finance

Beginning in FY2003, funds related to global warming countermeasures in the draft budgets of concerned ministries and agencies have been classified under the Outline for Promotion of Efforts to Prevent Global Warming. In response to the Cabinet approval in April 28, 2005 for the Kyoto Protocol Target Achievement Plan, the budget from FY2006 was classified according to the countermeasures category of the budget related to the Kyoto Protocol Target Achievement Plan. The budget related to the Kyoto Protocol Target Achievement Plan in FY2009 was 538.5 billion yen for "items directly affecting the six percent emission cut commitment of the Kyoto Protocol," 344.6 billion yen for "items affecting greenhouse gas cuts in the mid- to long-term," 271.6 billion yen for "other items that result in contributing to greenhouse gas cuts," and 65.1 billion yen for "basic measures, etc." The following table is a breakdown of the budget.

Table 1.4 Budget Related to the Kyoto Protocol Target Achievement Plan (by ministry and office)

(Unit: million yen)

	A		B		C		D	
	Items directly affecting the six percent emission cut commitment of the Kyoto Protocol		Items affecting greenhouse gas cuts in the mid- to long-term		Other items that result in contributing to greenhouse gas cuts		Basic measures, etc.	
	FY2009	FY2008	FY2009	FY2008	FY2009	FY2008	FY2009	FY2008
Cabinet Office, etc.	1,057	1,525	140	141	729	426	2	15
Internal Affairs and Communications					300	299		
Justice	492	465						
Foreign Affairs	375	310					574	579
Finance	355	427						
Education, Culture, Sports, Science and Technology	200		158,926	159,066			19,360	24,661
Health, Labour and Welfare	789	1,496						
Agriculture, Forestry and Fisheries	201,023	194,057	27,464	34,242	123,394	130,927	2,815	2,321
Economy, Trade and Industry	282,123	273,908	128,211	100,769	40,211	31,334	25,644	10,038
Land, Infrastructure and Transport	12,262	9,936	25,085	10,729	60,507	132,968	10,722	2,169
Environment	39,786	37,239	4,821	4,603	46,495	47,087	5,936	4,919
All ministries and offices	538,462	519,365	344,647	309,550	271,636	343,043	65,054	44,701

Note 1: 'Cabinet Office, etc.' represents the Cabinet Office, National Police Agency, etc.

Note 2: Amounts that include items not pertinent to the budget related to the Kyoto Protocol Target Achievement Plan are not calculated in these figures.

Note 3: The total may not be consistent due to the processing of fractions (rounding).

Table 1.5 Budget Related to the Kyoto Protocol Target Achievement Plan (classification by type of measure)

(Unit: million yen)

	FY2008	FY2009	2008-2009 change	Growth Rate
A. Items directly affecting the six percent emission cut commitment of the Kyoto Protocol	5,194	5,385	191	3.7%
B. Items affecting greenhouse gas cuts in the mid- to long-term	3,096	3,446	350	11.3%
C. Other items that result in contributing to greenhouse gas cuts	3,430	2,716	-714	-20.8%
D. Basic measures, etc.	447	651	204	45.6%

Chapter 2

Trends in GHGs 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 emission in FY2007[2] (the sum of emissions of CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 converted to CO_2 equivalents by multiplying its global warming potential (GWP)[3] respectively; excluding for CO_2 removals) was 1,374 million tonnes (in CO_2 equivalents), an increase by 9% compared to emissions in the base year under the Kyoto Protocol (FY1990 for emissions of CO_2, CH_4, N_2O; FY1995 for emissions of HFCs, PFCs, and SF_6).

Compared to emissions (CO_2, CH_4, N_2O, excluding CO_2 removals) in FY1990, it increased by 13.8%, it should be noted that actual emissions of HFCs, PFCs, and SF_6 in the period from 1990 to 1994, have not been estimated (NE)[4].

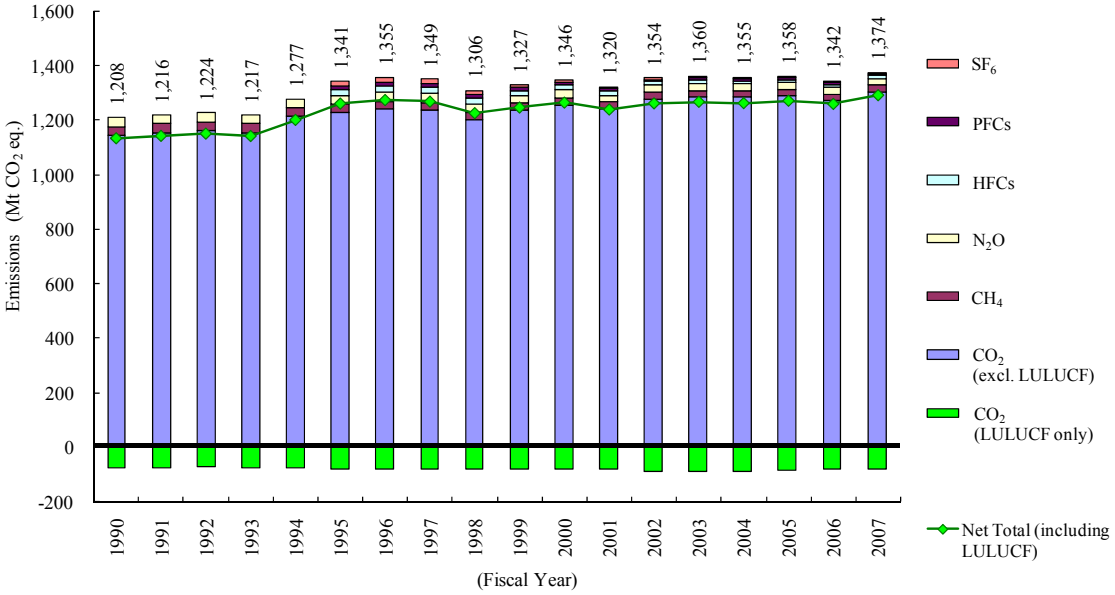


Figure 2.1 Trends in emission and removals of greenhouse gases in Japan

Emissions of CO_2 in FY2007 were 1,304 million tonnes (without LULUCF), comprising 94.9% of the total. It represents an increase by 14% from FY1990, and an increase by 2.6% in comparison

[1] This chapter was written in accordance with the National Greenhouse Gas Inventory Report of Japan (April 2009).

[2] "FY (Fiscal Year)" is used because CO_2 is the primary GHGs emissions and estimated on the fiscal year basis; from April of the year to March of the next year. ("CY" stands for "Calendar Year")

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

[4] Potential emissions are reported in CRF for 1990-1994.

with the previous year. Removals of CO_2 in FY2007 were 81.4 million tonnes[5], equivalent to 5.9% of total annual greenhouse gas emissions. It represents an increase by 9.4% from FY1990, and a decrease by 0.5% in comparison with the previous year. Emissions in FY2007 of CH_4 (including LULUCF) were 22.6 million tonnes (in CO_2 eq.), comprising 1.6% of total emissions. The value represents a reduction by 30.7% from FY1990 and 1.9% in comparison with the previous year. Emissions in FY2007 of N_2O (including LULUCF) were 23.8 million tonnes (in CO_2 eq.), comprising 1.7% of total emissions. The value represents a reduction by 25.8% from FY1990, and a decrease by 3.8% in comparison with the previous year.

Emissions in CY2007 of HFCs were 13.2 million tonnes (in CO_2 eq.), comprising 1.0% of total emissions. The value represents a reduction by 34.8% on CY1995, and an increase by 13.7% in comparison with the previous year. Emissions in CY2007 of PFCs were 6.5 million tonnes (in CO_2 eq.), comprising 0.5% of total emissions. The value represents a reduction by 54.9% from CY1995, and a decrease by 12.2% in comparison with the previous year. Emissions in CY2007 of SF_6 were 4.4 million tonnes (in CO_2 eq.), comprising 0.3% of total emissions. The value represents a reduction by 74.1% from CY1995, and a decrease by 14.8% in comparison with the previous year.

[5] In the inventory submitted under the FCCC, removals by forest planted before 1990 are contained. Therefore, this value do not correspond to 13 Mt indicated in the annex of Decision 16/CMP.1 (Land use, land-use change and forestry) adopted in COP/MOP1.

Table 2.1 Trends in emissions and removals of greenhouse gas in Japan

[Mt CO_2 eq.]	GWP	Base year of KP	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CO_2 (excl. LULUCF)	1	1,144.1	1,143.2	1,152.6	1,160.8	1,153.6	1,213.5	1,226.6	1,238.9	1,234.9	1,198.9	1,233.9	1,254.6
CO_2 (incl. LULUCF)	1	NA	1,068.8	1,078.4	1,087.0	1,078.6	1,137.8	1,147.0	1,159.0	1,154.7	1,118.8	1,153.6	1,174.0
CO_2 (LULUCF only)	1	NA	-74.4	-74.3	-73.9	-74.9	-75.7	-79.5	-79.9	-80.1	-80.0	-80.3	-80.7
CH_4 (excl. LULUCF)	21	33.4	32.6	32.4	32.1	31.8	31.1	30.2	29.5	28.5	27.6	27.0	26.4
CH_4 (incl. LULUCF)	21	NA	32.6	32.4	32.1	31.9	31.2	30.2	29.6	28.5	27.7	27.0	26.4
N_2O (excl. LULUCF)	310	32.6	32.0	31.5	31.5	31.3	32.5	32.8	33.9	34.6	33.1	26.7	29.3
N_2O (incl. LULUCF)	310	NA	32.1	31.5	31.6	31.3	32.5	32.9	33.9	34.6	33.1	26.8	29.3
HFCs	HFC-134a : 1,300 etc.	20.2	NE	NE	NE	NE	NE	20.3	19.9	19.9	19.4	19.9	18.8
PFCs	PFC-14 : 6,500 etc.	14.0	NE	NE	NE	NE	NE	14.4	14.9	16.3	13.5	10.6	9.7
SF_6	23,900	16.9	NE	NE	NE	NE	NE	17.0	17.5	15.0	13.6	9.3	7.3
Gross Total (excluding LULUCF)		1,261.3	1,207.8	1,216.5	1,224.5	1,216.7	1,277.1	1,341.2	1,354.7	1,349.1	1,306.2	1,327.5	1,346.0
Net Total (including LULUCF)		NA	1,133.5	1,142.3	1,150.7	1,141.8	1,201.4	1,261.7	1,274.9	1,269.0	1,226.2	1,247.2	1,265.4

[Mt CO_2 eq.]	GWP	Base year of KP	2001	2002	2003	2004	2005	2006	2007	Emission increase from the base year of KP	Emission increase from 1990 (2007)	Emission increase from 1995 (2007)	Emission increase from previous year (2007)
CO_2 (excl. LULUCF)	1	1,144.1	1,238.8	1,276.7	1,283.9	1,282.5	1,287.3	1,270.2	1,303.8	14.0%	14.0%	-	2.6%
CO_2 (incl. LULUCF)	1	NA	1,158.0	1,185.6	1,192.5	1,190.9	1,201.7	1,188.4	1,222.4	-	14.4%	-	2.9%
CO_2 (LULUCF only)	1	NA	-80.8	-91.1	-91.4	-91.6	-85.6	-81.7	-81.4	-	9.4%	-	-0.5%
CH_4 (excl. LULUCF)	21	33.4	25.6	24.7	24.2	23.8	23.4	23.0	22.6	-32.3%	-30.7%	-	-1.9%
CH_4 (incl. LULUCF)	21	NA	25.6	24.7	24.2	23.8	23.4	23.0	22.6	-	-30.7%	-	-1.9%
N_2O (excl. LULUCF)	310	32.6	25.8	25.5	25.2	25.3	24.8	24.7	23.8	-27.1%	-25.6%	-	-3.8%
N_2O (incl. LULUCF)	310	NA	25.8	25.5	25.2	25.3	24.9	24.7	23.8	-	-25.8%	-	-3.8%
HFCs	HFC-134a : 1,300 etc.	20.2	16.2	13.7	13.8	10.6	10.6	11.6	13.2	-34.6%	-	-34.8%	13.7%
PFCs	PFC-14 : 6,500 etc.	14.0	8.1	7.5	7.3	7.5	7.1	7.4	6.5	-53.8%	-	-54.9%	-12.2%
SF_6	23,900	16.9	6.0	5.7	5.4	5.3	4.6	5.1	4.4	-74.1%	-	-74.1%	-14.8%
Gross Total (excluding LULUCF)		1,261.3	1,320.5	1,353.7	1,359.7	1,355.0	1,357.8	1,342.1	1,374.3	9.0%	13.8%	2.5%	2.4%
Net Total (including LULUCF)		-	1,239.7	1,262.7	1,268.4	1,263.4	1,272.3	1,260.4	1,292.9	-	14.1%		2.6%

* NA: Not Applicable, NE: Not Estimated

* CH4 and N2O emissions in Table 2.1 include emissions from Land-Use Change and Forestry based on the estimation method decided by the UNFCCC. On the contrary, since emissions from Land-Use Change and Forestry are regarded as RMU (removal unit) according to Article 3.3 of the Kyoto Protocol, they are not included in GHG emissions based on Kyoto Protocol (refer annex 8 table 1).

2.1.2 CO_2 Emissions Per Capita

Total CO_2 emissions in FY2007 were 1,304 million tonnes, with an emission of 10.20 tonnes per capita. Compared to FY1990, it represents an increase of 14.0% in total CO_2 emissions, and an increase of 10.3% in CO_2 emissions per capita. CO_2 emissions compared to the previous year decreased by 2.6% in total emissions and by 2.6% per capita.

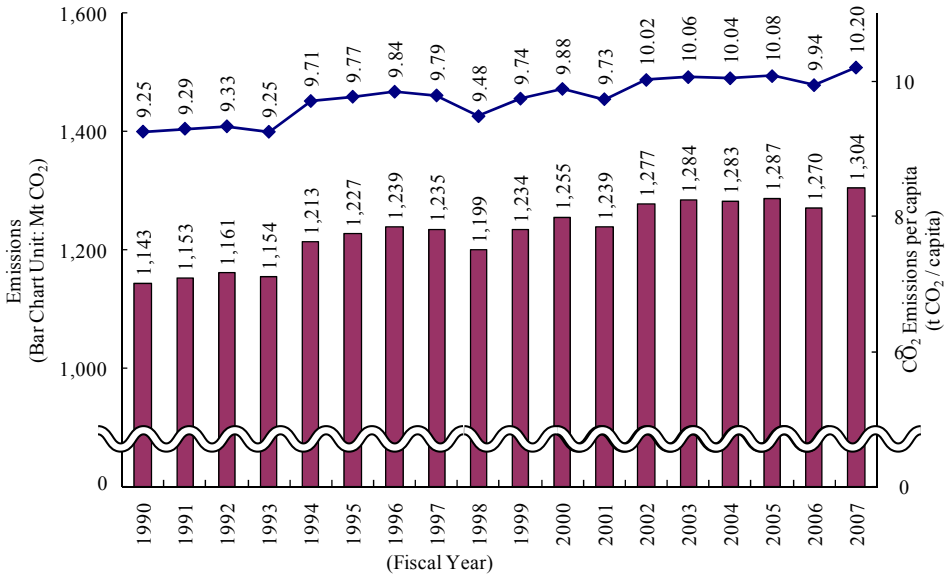


Figure 2.2 Trends in total CO_2 emissions and CO_2 emissions per capita

Source of population: Ministry of Public Management, Home Affairs, Posts and Telecommunications Japan, *Population Census*

MPMHAPTJ, *Annual Report on Current Population Estimates*

2.1.3 CO_2 Emissions Per Unit of GDP

CO_2 emissions per unit of GDP in FY2007 were 2.32 tonnes/million yen, resulting in a decrease by 8.7% since FY1990, and an increase by 0.7% from the previous year.

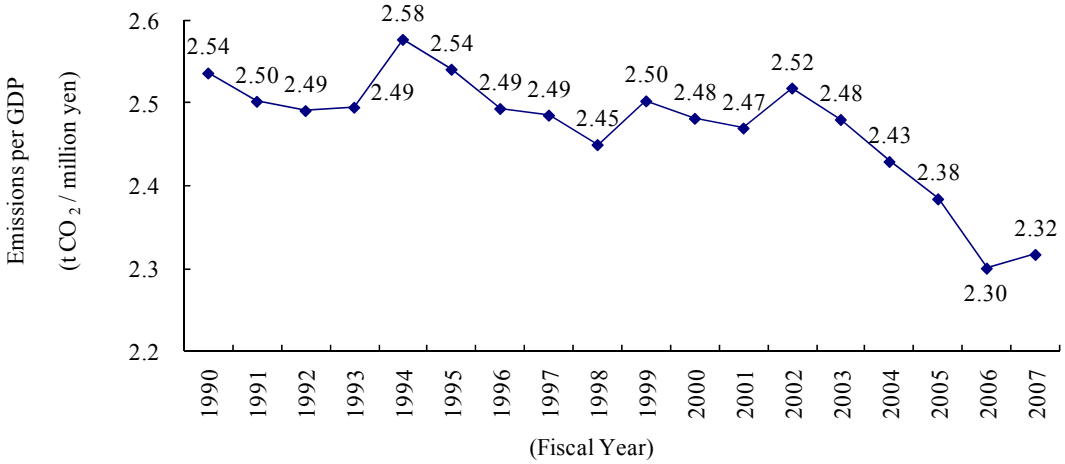


Figure 2.3 Trends in CO_2 emissions per unit of GDP

Source of GDP: (Before FY1993) Energy Conservation Center, *EDMC Handbook of Energy & Economic Statistics in Japan*
(After FY1994) Cabinet Office, Government of Japan, *Annual Report on National Accounts*
(Real Gross Domestic Product, expenditure approach, chain-linked, chained CY2000)

2.2 Description and Interpretation of Emission and Removal Trends by Gas

2.2.1 CO_2

CO_2 emissions in FY2007 were 1,304 million tonnes (excluding LULUCF), comprising 94.9% of the total. It represents an increase by 14% from FY1990, and a decrease by 2.6% in comparison with the previous year.

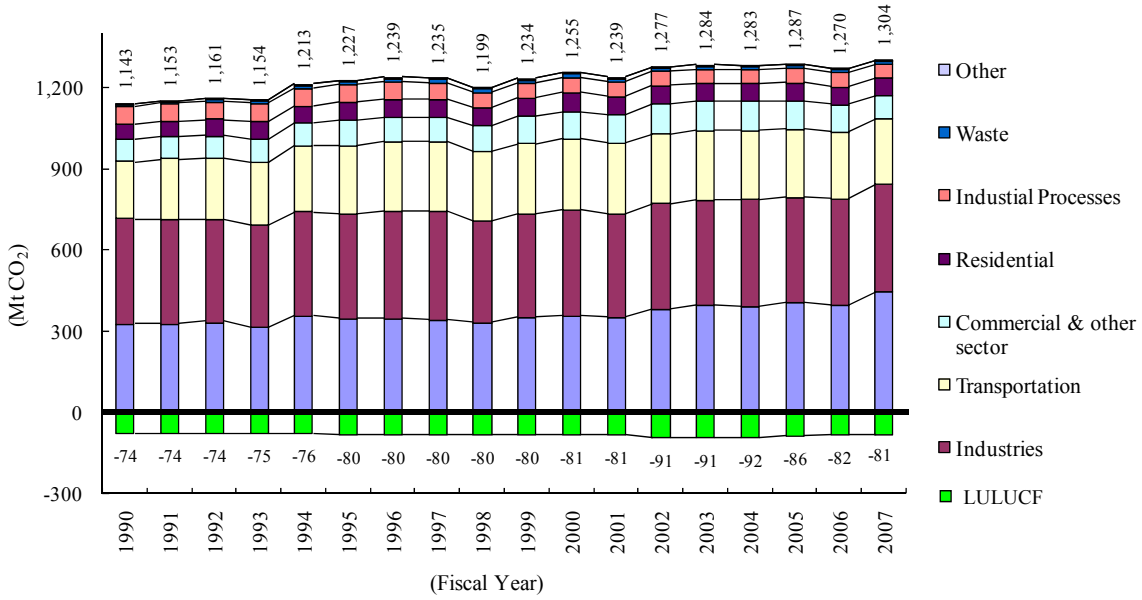


Figure 2.4 Trends in CO_2 emissions

The breakdown of CO_2 emissions in FY2007 shows that CO_2 emitted in association with fuel combustion accounted for 94.7% of the total, CO_2 from industrial processes accounted for 4.1%, and carbon dioxide from the waste sector accounted for 1.1%. The energy sector accounts for 34.4% of emissions of CO_2 from fuel combustion, making it the single largest source of emissions followed by the industrial sector at 30.3% and the transport sector at 18.5%.

Fluctuations in emissions by sector show that CO_2 emissions from fuel combustion in the energy sector, which accounts for about 30% of CO_2 emissions, increased by 38.4% compared to FY1990, and 13.4% compared to the previous year. CO_2 emissions from fuel combustion in the industrial sector increased by 0.4% compared to FY1990, and decreased by 0.2% compared to the previous year. CO_2 emissions from fuel combustion in the transport sector increased by 14.5% compared to FY1990, and decreased by 1.9% compared to the previous year. CO_2 emissions from fuel combustion in the commercial and other sectors increased by 5.1% compared to FY1990, and decreased by 12.8% compared to the previous year. CO_2 emissions from fuel combustion in the residential sector increased by 10.8% compared to FY1990, and decreased by 1.4% compared to the previous year.

Removals of CO_2 in FY2007 were 81.4 million tonnes[4], equivalent to 5.9% of total annual CO_2 emissions. It represents an increase by 9.4% from FY1990, and a decrease by 0.5% in comparison with the previous year.

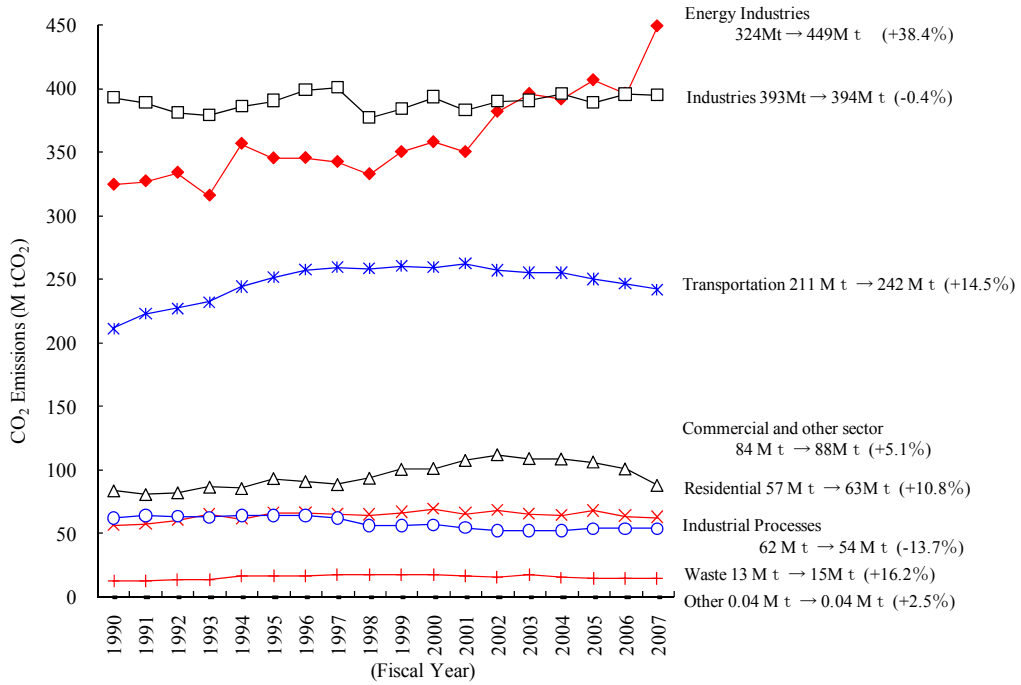


Figure 2.5 Trends in CO_2 emissions in each sector

(Figures in brackets indicate relative increase or decrease to the FY1990 values)

Table 2.2 Trends in CO_2 emissions and removals in each sector

[Gg CO_2]

Category	1990	1995	2000	2005	2006	2007
1A. Fuel Combustion	1,068,019	1,145,682	1,180,026	1,218,738	1,201,534	1,235,227
Energy Industry	324,014	344,805	357,482	406,196	395,571	448,564
Public Electricity & Heat Production	296,835	315,256	330,772	379,078	371,477	424,862
Petroleum Refining	15,893	16,956	17,285	16,436	16,090	16,015
Manufacture of Solid Fuel and Other Energy	11,286	12,592	9,426	10,682	8,003	7,687
Industries	392,690	390,118	393,123	388,909	395,164	394,402
Manufacturing Industries & Construction	371,310	370,592	377,014	375,516	381,831	381,040
Agriculture, Forestry and Fisheries	21,380	19,526	16,109	13,393	13,333	13,362
Transport	211,054	251,161	259,204	249,534	246,335	241,587
Civil Aviation	7,162	10,278	10,677	10,799	11,178	10,876
Road Transportation	189,228	225,376	232,955	225,197	221,895	217,653
Railways	932	819	707	644	645	647
Navigation	13,731	14,687	14,865	12,895	12,616	12,411
Commercial and Residential	140,262	159,598	170,216	174,099	164,465	150,674
Commercial & other sector	83,593	93,277	101,258	106,324	100,814	87,896
Residential	56,668	66,320	68,958	67,775	63,650	62,777
Other	NO	NO	NO	NO	NO	NO
1B. Fugitive Emissions from Fuel	37	51	36	38	36	38
2. Industrial Processes	62,269	64,223	56,839	53,858	53,862	53,730
Mineral Products	57,399	59,340	52,412	50,431	50,464	50,219
Chemical Industry	4,514	4,525	4,178	3,185	3,221	3,299
Metal Production	356	357	248	242	178	212
5. LULUCF	-74,364	-79,546	-80,666	-85,608	-81,735	-81,363
6. Waste	12,877	16,619	17,735	14,702	14,745	14,786
Total (including LULUCF)	1,068,837	1,147,028	1,173,970	1,201,728	1,188,442	1,222,419
Total (excluding LULUCF)	1,143,201	1,226,575	1,254,636	1,287,335	1,270,177	1,303,781

2.2.2 CH_4

CH_4 emissions in FY2007 were 22.6 million tonnes (in CO_2 eq.), comprising 1.6% of total emissions. The value represents a reduction by 30.7% from FY1990 and 1.9% in comparison with the previous year. The reduction from FY1990 is mainly a result of the reduction of the waste sector's emissions (e.g. SWDS), which decreased by 46% compared to FY1990.

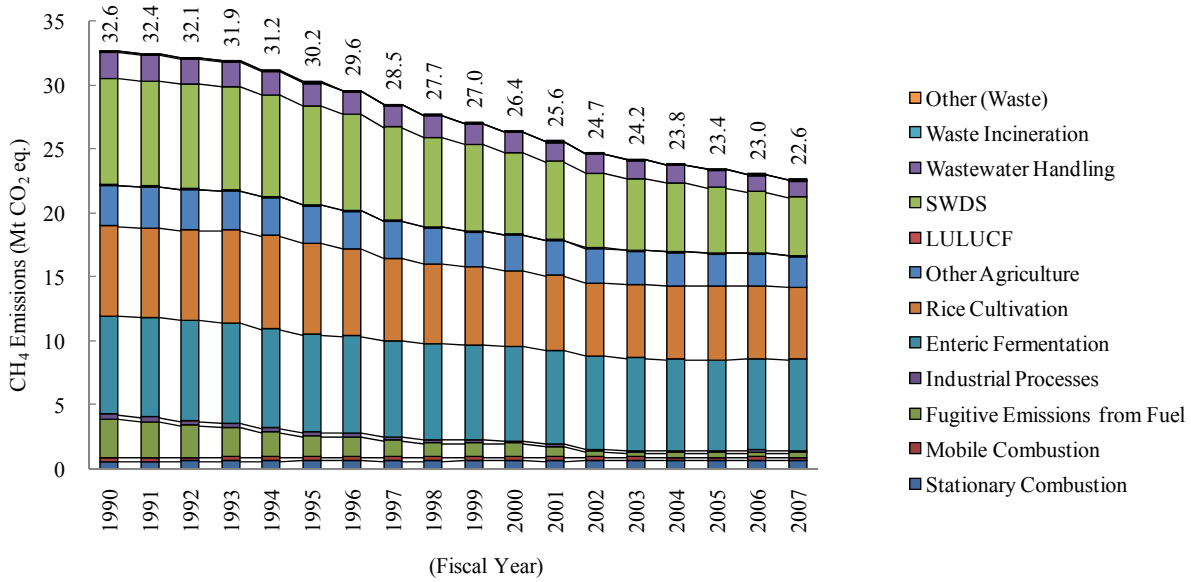


Figure 2.6 Trends in CH_4 emissions

The breakdown of CH_4 emissions in FY2007 shows that CH_4 emitted from enteric fermentation in livestock accounted for 31% of the total, making it the single largest source of emissions. It is followed by CH_4 emissions from rice cultivation at 25%, and CH_4 emissions from SWDS (Solid Waste Disposal Site) at 20%.

Table 2.3 Trends in CH_4 emissions

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
1A. Fuel Combustion	881	955	956	892	917	869
1A1. Energy Industries	30	34	44	43	45	50
1A2. Industries	347	358	345	358	369	369
1A3. Transport	297	308	298	238	223	209
1A4. Residential / Institutional	207	255	269	253	281	241
1B. Fugitive Emissions from Fuels	3,037	1,610	1,043	396	409	416
1B1. Solid Fuels	2,806	1,345	769	74	68	51
1B2. Oil & Natural Gas	231	265	274	322	340	365
2. Industrial Processes	358	322	181	134	133	134
4. Agriculture	17,912	17,756	16,127	15,477	15,399	15,272
4A. Enteric Fermentation	7,674	7,605	7,374	7,087	7,105	7,121
4B. Manure Management	3,105	2,903	2,688	2,513	2,448	2,394
4C. Rice Cultivation	7,003	7,127	5,956	5,775	5,743	5,654
4F. Field Burning of Agricultural	130	121	109	102	103	103
5. LULUCF	8	9	8	9	2	2
6. Waste	10,434	9,576	8,058	6,524	6,180	5,913
6A. SWDS	8,286	7,689	6,394	5,094	4,784	4,517
6B. Wastewater Handling	2,121	1,861	1,637	1,406	1,369	1,369
6C. Waste Incineration	13	15	13	10	10	10
6D. Other (Waste)	14	11	13	14	17	17
Total (including LULUCF)	32,631	30,229	26,372	23,430	23,039	22,606
Total (excluding LULUCF)	32,622	30,220	26,365	23,421	23,037	22,604

2.2.3 N_2O

N_2O emissions in FY2007 were 23.8 million tonnes (in CO_2 eq.), comprising 1.7% of total emissions. The value represents a reduction by 25.8% from FY1990, and a decrease by 3.8% in comparison with the previous year. The reduction from FY1990 is mainly a result of a reduction of industrial sector's emissions (e.g. adipic acid production), which decreased by 90% compared to FY1990. In March 1999, N_2O abatement equipment came on stream in the adipic acid production plant, causing a sharp decline in emissions from the process during the period from FY1998 to FY1999. In FY2000, N_2O emissions increased because of a decrease in operational rate of the abatement equipment. In 2001, N_2O emissions decreased with resuming the normal operation of the equipment.

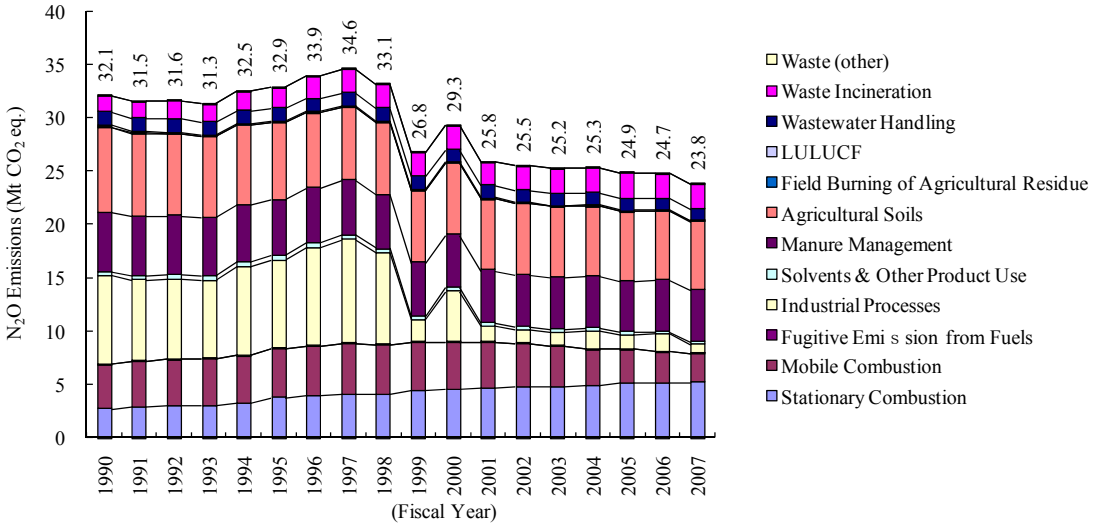


Figure 2.7 Trends in N_2O emissions

The breakdown of N_2O emissions in FY2007 shows that emissions from agricultural soils comprise 27% of the total, making it the single largest source of emissions. It is followed by emissions from fuel combustion in stationary sources at 22%, and emissions from manure management at 20%.

Table 2.4 Trends in N_2O emissions

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
1A. Fuel Combustion	6,923	8,381	9,015	8,331	8,089	7,942
1A1. Energy Industries	920	1,455	1,765	1,982	1,980	2,064
1A2. Industries	1,527	1,940	2,327	2,771	2,790	2,778
1A3. Transport	4,204	4,650	4,561	3,221	2,974	2,783
1A4. Residential / Institutional	272	336	362	357	345	316
1B. Fugitive Emissions from Fuels	0.1	0.2	0.1	0.1	0.1	0.1
2. Industrial Processes	8,267	8,213	4,690	1,300	1,625	860
3. Solvent & Other Product Use	287	438	341	266	245	245
4. Agriculture	13,696	12,552	11,759	11,355	11,311	11,274
4B. Manure Management	5,661	5,246	4,984	4,849	4,854	4,861
4D. Agricultural Soils	7,931	7,218	6,694	6,433	6,382	6,337
4F. Field Burning of Agricultural	104	89	81	73	75	76
5. LULUCF	69	42	21	11	9	8
6. Waste	2,820	3,260	3,470	3,594	3,470	3,470
6B. Wastewater Handling	1,290	1,247	1,214	1,169	1,159	1,159
6C. Waste Incineration	1,518	2,003	2,245	2,413	2,296	2,296
6D. Waste (other)	13	10	12	13	15	15
Total (including LULUCF)	32,063	32,885	29,297	24,857	24,748	23,800
Total (excluding LULUCF)	31,994	32,843	29,276	24,846	24,739	23,792

2.2.4 HFCs

Emissions of HFCs in 2007[6] were 13.2 million tonnes (in CO_2 eq.), comprising 1.0% of total emissions. The value represents a reduction by 34.8% from CY1995, and an increase by 13.7% in comparison with the previous year. The reduction from CY1995 is mainly the result of a reduction in HFC-23, a by-product of HFCF-22, which decreased by 99% as compared to CY1995.

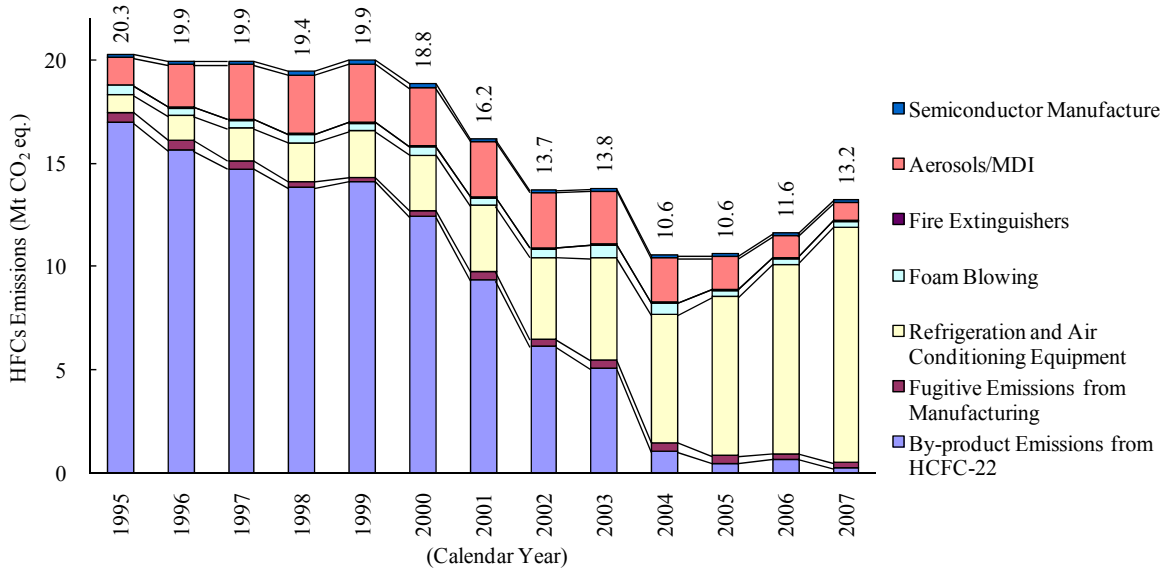


Figure 2.8 Trends in HFCs emissions

The breakdown of HFCs emissions in 2007 shows that emissions of refrigerants from refrigeration and air conditioning equipment accounted for 86% of the total, followed by emissions from aerosols / MDI at 6%.

Table 2.5 Trends in HFCs emissions

[Gg CO_2eq.]

Category	1995	2000	2005	2006	2007
2E. Productions of F-gas	17,445	12,660	816	938	498
2E1. By-product Emissions from Production of HCFC-22	16,965	12,402	463	657	218
2E2. Fugitive Emissions	480	258	353	281	280
2F. Consumption of F-gas	2,815	6,141	9,785	10,685	12,713
2F1. Refrigeration and Air Conditioning Equipment	840	2,688	7,703	9,160	11,375
2F2. Foam Blowing	452	440	364	310	317
2F2. Fire Extinguishers	NO	4	6	6	6
2F4. Aerosols/MDI	1,365	2,834	1,572	1,057	850
2F7. Semiconductor Manufacture	158	174	139	152	164
2F9. Other	NA	NA	NA	NA	NA
Total	20,261	18,800	10,601	11,623	13,210

2.2.5 PFCs

PFCs emissions in 2007 were 6.5 million tonnes (in CO_2 eq.), comprising 0.5% of total emissions. The value represents a reduction of 54.9% from CY1995, and a decrease by 12.2% in comparison with the previous year. The reduction from CY1995 is mainly a result of an emission reduction of

[6] Emissions of calendar year basis are adopted for HFCs, PFCs and SF_6.

solvents, which decreased by 81% compared to CY1995.

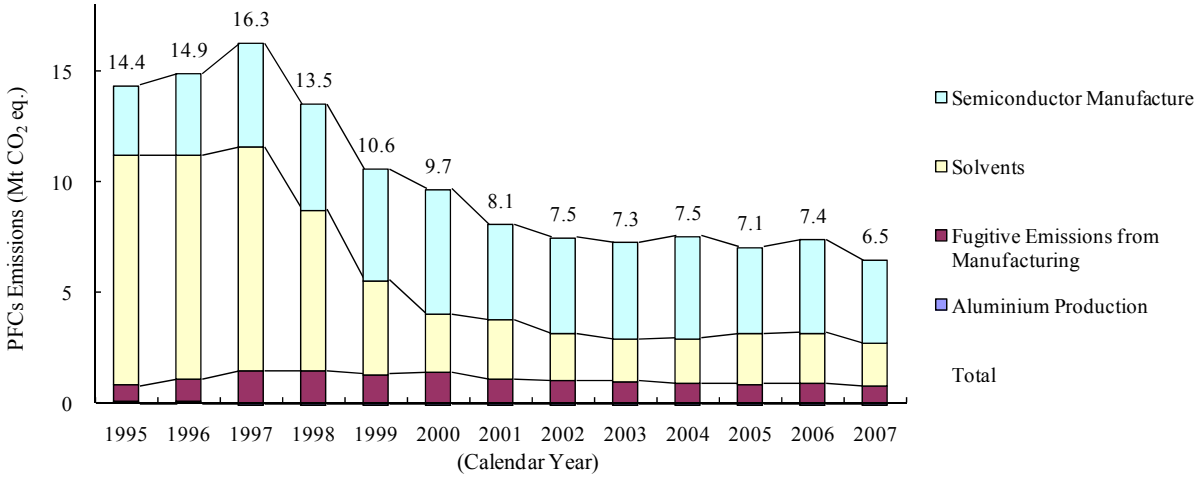


Figure 2.9 Trends in PFCs emissions

The breakdown of PFCs emissions in 2007 shows that emissions from semiconductor manufacture accounted for 58% of the total, followed by emissions from solvents in washing metals etc. at 30%, and fugitive emissions from manufacturing at 12%.

Table 2.6 Trends in PFCs emissions

[Gg CO_2eq.]

Category	1995	2000	2005	2006	2007
2C3. Aluminium Production	70	18	15	15	15
2E2. Fugitive Emissions	763	1,359	837	879	783
2F. Consumption of F-gas	13,531	8,288	6,206	6,491	5,686
2F5. Solvents	10,382	2,649	2,305	2,286	1,944
2F7. Semiconductor	3,149	5,639	3,901	4,205	3,741
Total	14,363	9,665	7,058	7,385	6,483

2.2.6 SF_6

Emissions of SF_6 in 2007 were 4.4 million tonnes (in CO_2 eq.), comprising 0.3% of total emissions. This value represents a reduction by 74.1% from CY1995, and 14.8% in comparison with the previous year. The reduction from CY1995 is mainly a result of an emission reduction of electrical equipment, which decreased by 92% as compared to CY1995.

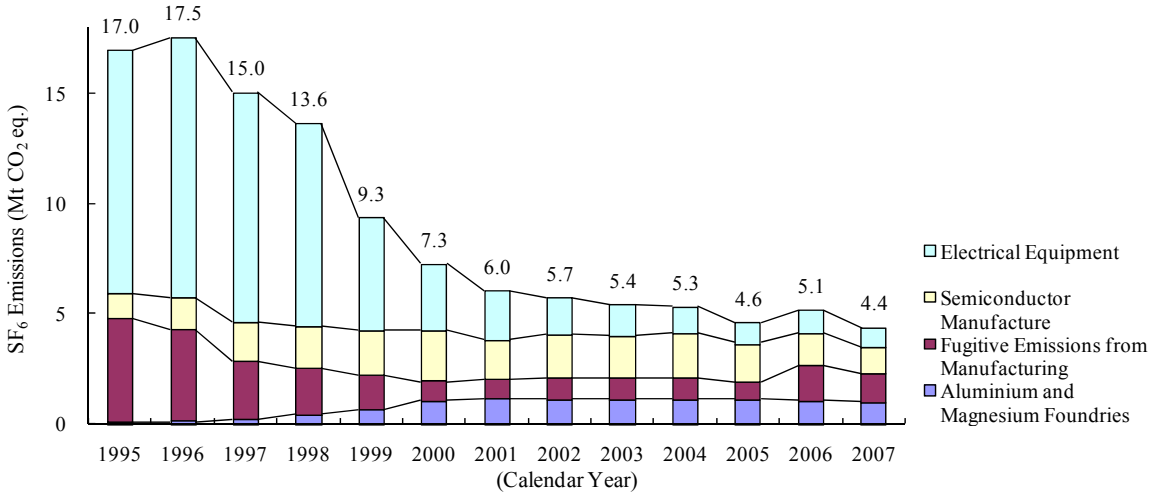


Figure 2.10 Trends in SF_6 emissions

The breakdown of SF_6 emissions in 2007 shows that fugitive emissions accounted for 29%, followed by emissions from semiconductor manufacturing at 27%, and emissions from magnesium foundries at 23%.

Table 2.7 Trends in SF_6 emissions

[Gg CO_2eq.]

Category	1995	2000	2005	2006	2007
2C4. SF_6 Used in Aluminium and Magnesium Found	120	1,028	1,114	1,046	996
2E2. Fugitive Emissions	4,708	932	789	1,648	1,270
2F. Consumption of F-gas	12,134	5,295	2,678	2,453	2,118
2F7. Semiconductor Manufacture	1,129	2,245	1,736	1,440	1,196
2F8. Electrical Equipment	11,005	3,050	943	1,014	922
Total	16,962	7,255	4,582	5,147	4,385

2.3 Description and Interpretation of Emission and Removal Trends by Categories

The breakdown of emissions and removals of greenhouse gases in FY2007 by sector[7] shows that the energy sector accounted for 90.6% of total annual greenhouse gas emissions, followed by the industrial sector at 5.7%, solvents and other product use at 0.02%, agriculture at 1.9% and waste at 1.8%.

Removals by land use, land-use change and forestry in FY2007 were equivalent to 5.9% of total annual greenhouse gas emissions.

[7] It implies "Category" indicated in the *Revised 1996 IPCC Guidelines* and *CRF*.

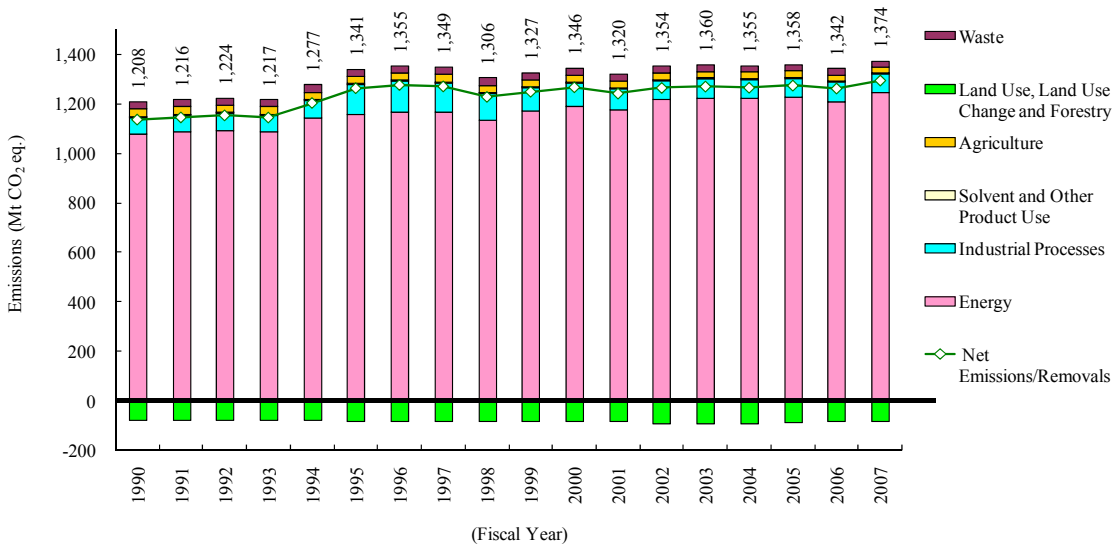


Figure 2.11 Trends in emissions and removals of greenhouse gases in each category

Table 2.8 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
Energy	1,078.9	1,086.8	1,094.2	1,087.7	1,143.8	1,156.7	1,169.0	1,166.0	1,135.8	1,171.2
Industrial Processes	70.9	71.7	71.3	70.3	72.6	124.3	125.9	123.5	111.6	98.3
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
Agriculture	31.6	31.5	31.4	31.3	30.9	30.3	29.6	29.0	28.6	28.1
Land Use, Land Use Change and Forestry	-74.3	-74.2	-73.8	-74.9	-75.6	-79.5	-79.8	-80.1	-80.0	-80.3
Waste	26.1	26.1	27.2	26.9	29.3	29.5	29.8	30.2	29.9	29.5
Net Emissions/Removals	1,133.5	1,142.3	1,150.7	1,141.8	1,201.4	1,261.7	1,274.9	1,269.0	1,226.2	1,247.2
Emissions	1,207.8	1,216.5	1,224.5	1,216.7	1,277.1	1,341.2	1,354.7	1,349.1	1,306.2	1,327.5

[Mt CO_2 eq.]	2000	2001	2002	2003	2004	2005	2006	2007
Energy	1,191.1	1,178.4	1,218.4	1,224.2	1,224.2	1,228.4	1,211.0	1,244.5
Industrial Processes	97.4	86.6	80.9	80.0	77.8	77.5	79.8	78.8
Solvent and Other Product Use	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Agriculture	27.9	27.6	27.4	27.2	27.0	26.8	26.7	26.5
Land Use, Land Use Change and Forestry	-80.6	-80.8	-91.0	-91.3	-91.6	-85.6	-81.7	-81.4
Waste	29.3	27.6	26.8	28.0	25.8	24.8	24.4	24.2
Net Emissions/Removals	1,265.4	1,239.7	1,262.7	1,268.4	1,263.4	1,272.3	1,260.4	1,292.9
Emissions	1,346.0	1,320.5	1,353.7	1,359.7	1,355.0	1,357.8	1,342.1	1,374.3

2.3.1 Energy

Emissions from the energy sector in FY2007 were 1,244 million tonnes (in CO_2 eq.), an increase of 15.3% compared to FY1990, and an increase of 2.8% in comparison with the previous year.

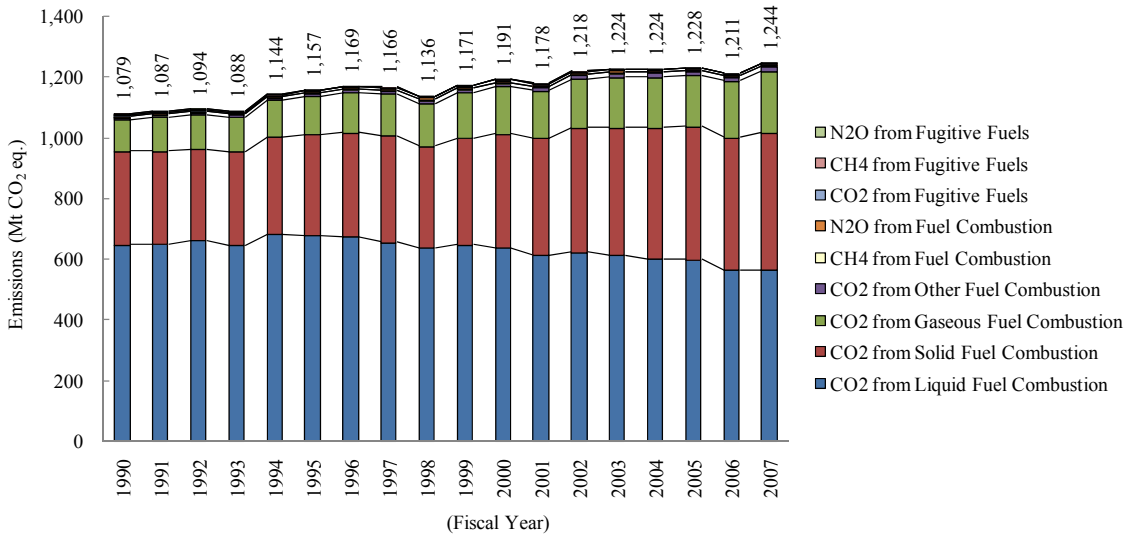


Figure 2.12 Trends in GHGs emissions from the energy sector

The breakdown of emissions of greenhouse gases from the energy sector in FY2007 shows that CO_2 emissions from liquid fuel account for 45%, making it the single largest source of emissions, followed by the CO_2 emissions from solid fuel at 36% and the CO_2 emissions from gaseous fuel at 16%.

Table 2.9 Trends in GHGs emissions from the energy sector

[Gg CO_2eq.]

Source Category	1990	1995	2000	2005	2006	2007
1A. Fuel Combustion	1,075,824	1,155,018	1,189,997	1,227,960	1,210,540	1,244,039
Liquid Euel CO_2	646,223	677,349	635,121	598,218	562,478	564,064
Solid Fuel CO_2	308,620	331,721	376,537	438,247	437,025	451,893
Gaseous Fuel CO_2	104,301	126,198	155,261	166,837	186,389	203,287
Other Fuels (Waste)	8,875	10,415	13,108	15,436	15,643	15,983
CH_4	881	955	956	892	917	869
N_2O	6,923	8,381	9,015	8,331	8,089	7,942
1B. Fugitive Emissions from Fuel	3,074	1,661	1,079	433	445	454
CO_2	37	51	36	38	36	38
CH_4	3,037	1,610	1,043	396	409	416
N_2O	0.1	0.2	0.1	0.1	0.1	0.1
Total	1,078,898	1,156,679	1,191,076	1,228,394	1,210,984	1,244,493

2.3.2 Industrial Sector

Emissions from the industrial sector in FY2007 were 78.8 million tonnes (in CO_2 eq.), an increase of 11.2% compared to FY1990, and a decrease by 1.2% in comparison with the previous year.

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

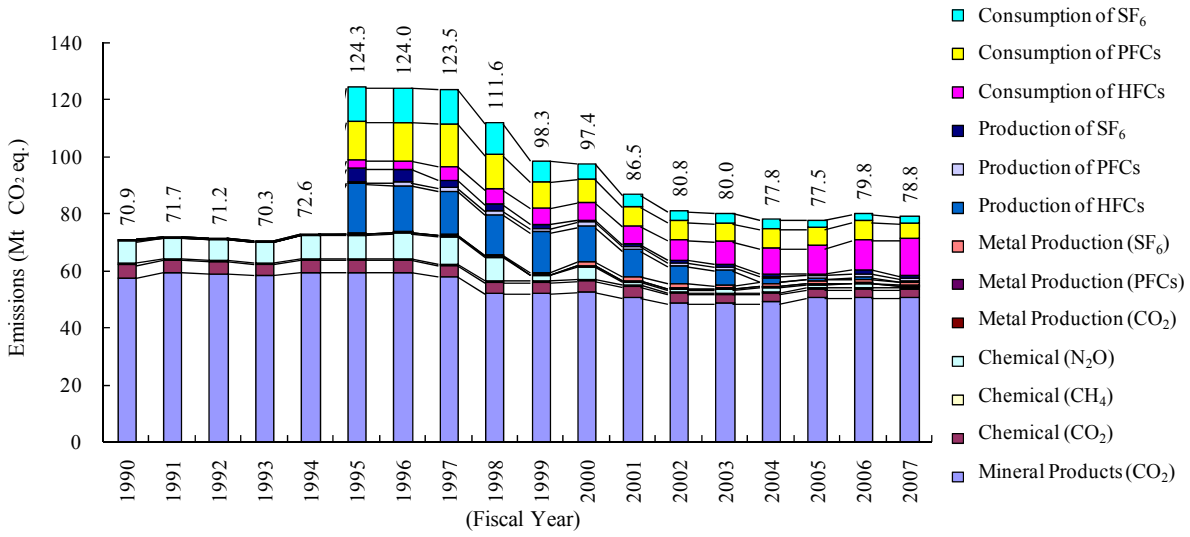


Figure 2.13 Trends in GHGs emissions from the industrial sector

The breakdown of emissions of greenhouse gases from the industrial sector in FY2007 shows that emissions from mineral products, such as CO_2 emissions from the limestone in cement production, account for 64%, making it the single largest source of emissions followed by the emissions from the consumption of HFCs at 16% and the consumption of PFCs at 7%.

Table 2.10 Trends in GHGs emissions in the industrial sector

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
2A. Mineral Products (CO_2)	57,399	59,340	52,412	50,431	50,464	50,219
2B. Chemical Industry	13,119	13,043	9,032	4,602	4,962	4,276
CO_2	4,514	4,525	4,178	3,185	3,221	3,299
CH_4	338	304	164	117	116	117
N_2O	8,267	8,213	4,690	1,300	1,625	860
2C. Metal Production	356	564	1,311	1,388	1,255	1,240
CO_2	356	357	248	242	178	212
PFCs	NE	70	18	15	15	15
SF_6	NE	120	1,028	1,114	1,046	996
2E. Production of F-gas	NE	22,916	14,951	2,443	3,466	2,551
HFCs	NE	17,445	12,660	816	938	498
PFCs	NE	763	1,359	837	879	783
SF_6	NE	4,708	932	789	1,648	1,270
2F. Consumption of F-gas	NE	28,480	19,724	18,669	19,629	20,517
HFCs	NE	2,815	6,141	9,785	10,685	12,713
PFCs	NE	13,531	8,288	6,206	6,491	5,686
SF_6	NE	12,134	5,295	2,678	2,453	2,118
Total	70,874	124,344	97,430	77,533	79,775	78,802

2.3.3 Solvent and Other Product Use

Emissions from solvents and other product use in FY2007 were 245 thousand tonnes (in CO_2 eq.), a decrease by 14.7% from FY1990, and remained the same 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.

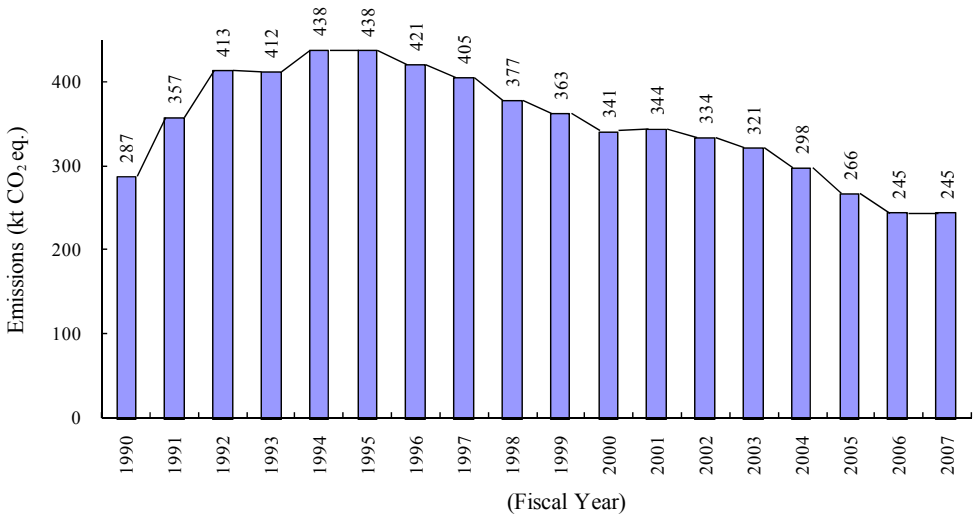


Figure 2.14 Trends in GHGs emissions from the solvent and other product use sector

2.3.4 Agricultural sector

Emissions from the agricultural sector in FY2007 were 26.5 million tonnes (in CO_2 eq.), a decrease by 16.0% compared to FY1990, and by 0.6% in comparison with the previous year.

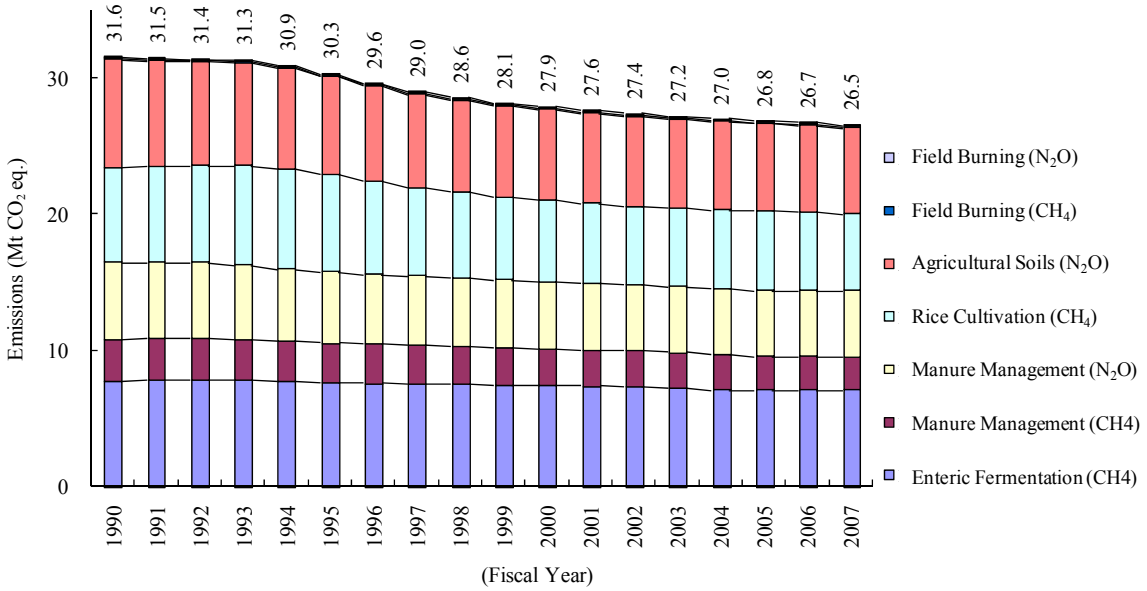


Figure 2.15 Trends in GHGs emissions from the agricultural sector

The breakdown of emissions of greenhouse gases from agriculture in FY2007 shows that CH_4 emissions from enteric fermentation was 27%, making it the single largest source, followed by N_2O emissions from agricultural soils due to the nitrogen-based fertilizers at 24%, and CH_4 emissions from rice cultivation at 21%.

Table 2.11 Trends in GHGs emissions from the agricultural sector

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
4A. Enteric Fermentation(CH_4)	7,674	7,605	7,374	7,087	7,105	7,121
4B. Manure Management	8,766	8,149	7,671	7,361	7,303	7,255
CH_4	3,105	2,903	2,688	2,513	2,448	2,394
N_2O	5,661	5,246	4,984	4,849	4,854	4,861
4C. Rice Cultivation(CH_4)	7,003	7,127	5,956	5,775	5,743	5,654
4D. Agricultural Soils (N_2O)	7,931	7,218	6,694	6,433	6,382	6,337
4F. Field Burning of Agricultural Residues	234	210	190	175	178	179
CH_4	130	121	109	102	103	103
N_2O	104	89	81	73	75	76
Total	31,608	30,308	27,886	26,832	26,710	26,546

2.3.5 Land Use, Land-Use-Change and Forestry

Net removals (including CH_4 and N_2O emissions) in the land use, land-use change and forestry (LULUCF) in FY2007 was 81.4 million tonnes (in CO_2 eq.), an increase of 9.5% from FY1990, and a decrease by 0.5% in comparison with the previous year.

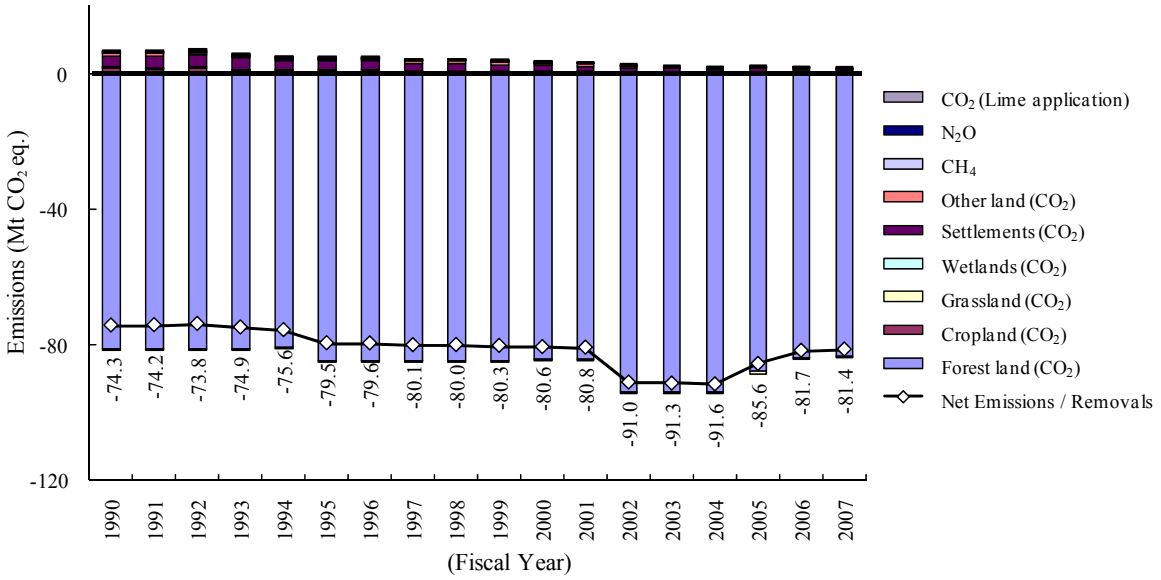


Figure 2.16 Trends in emissions and removals of GHGs from the LULUCF sector

The breakdown of emissions and removals of greenhouse gases from the LULUCF in FY2007 shows that CO_2 removals from forest land was 82.9 million tonnes, accounting for 102% of total net removals of LULUCF sector.

Note: This means emissions and removals of greenhouse gases from LULUCF sector include grassland and other land-use sectors in addition to forest land. Removals of CO_2 from forest land represent

removals from all forest land in Japan, regardless of whether sustainable forest management is undertaken. Therefore, it should be noted that this value differs from the removals based on the Kyoto Protocol, Article 3, paragraph 3 and 4.

Table 2.12 Trends in emissions and removals of GHGs from the LULUCF sector

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
5A. Forest land	-80,769	-84,355	-84,042	-87,494	-83,390	-82,865
CO_2	-80,778	-84,365	-84,050	-87,504	-83,392	-82,867
CH_4	8	9	8	9	2	2
N_2O	0.8	0.9	0.8	0.9	0.2	0.2
5B. Cropland	2,126	1,015	535	269	266	273
CO_2	2,058	974	514	259	257	265
CH_4	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
N_2O	68	41	20	10	9	8
5C. Grassland	-516	-401	-460	-593	-621	-615
CO_2	-516	-401	-460	-593	-621	-615
CH_4	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
N_2O	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
5D. Wetlands	292	355	407	142	187	167
CO_2	292	355	407	142	187	167
CH_4	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
N_2O	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
5E. Settlements	3,073	2,583	1,663	1,261	924	849
CO_2	3,073	2,583	1,663	1,261	924	849
CH_4	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
N_2O	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
5F. Other land	957	1,004	927	597	680	608
CO_2	957	1,004	927	597	680	608
CH_4	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
N_2O	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
5G. Other	550	303	333	231	230	230
CO_2	550	303	333	231	230	230
Total	-74,287	-79,496	-80,637	-85,588	-81,723	-81,353

2.3.6 Waste

Emissions from the waste sector in FY2007 were 24.2 million tonnes (in CO_2 eq.), a decrease by 7.5% compared to FY1990, and a decrease by 0.9% in comparison with the previous year[8].

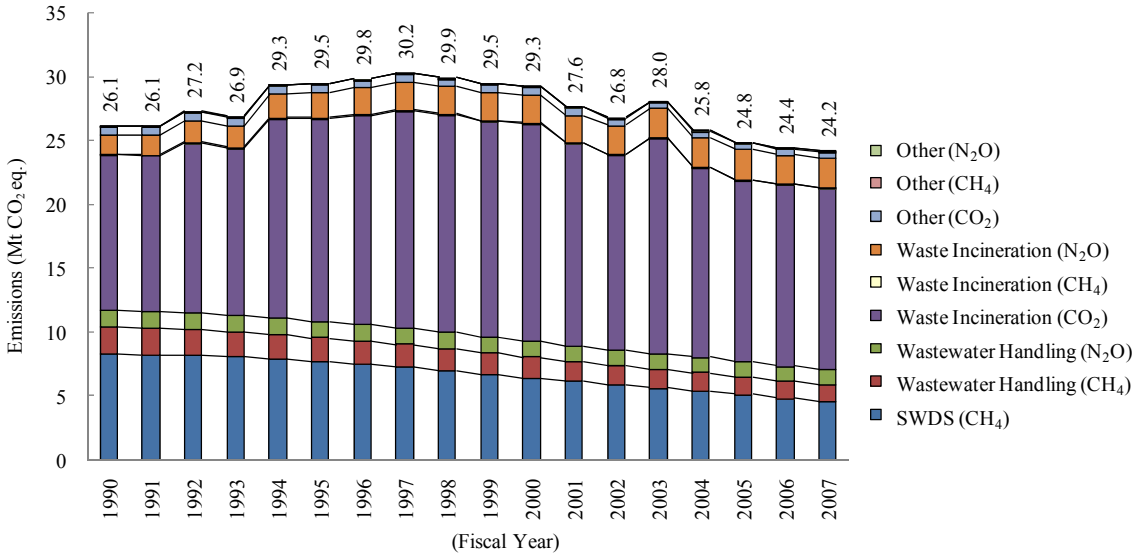


Figure 2.17 Trends in GHGs emissions from the waste sector

The breakdown of GHGs emissions from the waste sector in FY2007 shows that CO_2 emissions from waste derived from petrochemicals such as waste plastics and waste oil incineration, accounting for 59%, making it the single largest source of emissions. It is followed by CH_4 emissions from solid waste disposal sites at 19%, and N_2O emissions from combustion of waste (including waste products derived from substances other than fossil fuels) at 10%.

Table 2.13 Trends in GHGs emissions from the waste sector

[Gg CO_2eq.]

Category	1990	1995	2000	2005	2006	2007
6A. SWDS (CH_4)	8,286	7,689	6,394	5,094	4,784	4,517
6B. Wastewater Handling	3,410	3,108	2,851	2,575	2,528	2,528
CH_4	2,121	1,861	1,637	1,406	1,369	1,369
N_2O	1,290	1,247	1,214	1,169	1,159	1,159
6C. Waste Incineration	13,705	17,968	19,337	16,617	16,528	16,533
CO_2	12,174	15,951	17,079	14,195	14,222	14,227
CH_4	13	15	13	10	10	10
N_2O	1,518	2,003	2,245	2,413	2,296	2,296
6D. Other	730	689	681	534	554	591
CO_2	703	668	656	507	522	560
CH_4	14	11	13	14	17	17
N_2O	13	10	12	13	15	15
Total	26,131	29,455	29,263	24,819	24,394	24,169

[8] Starting with the 2009 inventory report, the reporting categories which fall under the "Emissions from Waste Used as Energy and the Incineration of Waste Accompanied by Energy Recovery" are moved from Incineration of Waste (Category 6.C.) to Fuel Combustion (Category 1.A.).

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

Under UNFCCC, it is required to report emissions of indirect greenhouse gases (NO_X, CO and NMVOC) and SO_2, in addition to the 6 types of greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs and SF_6) which are not controlled by the Kyoto Protocol. Emission trends of these gases are indicated below.

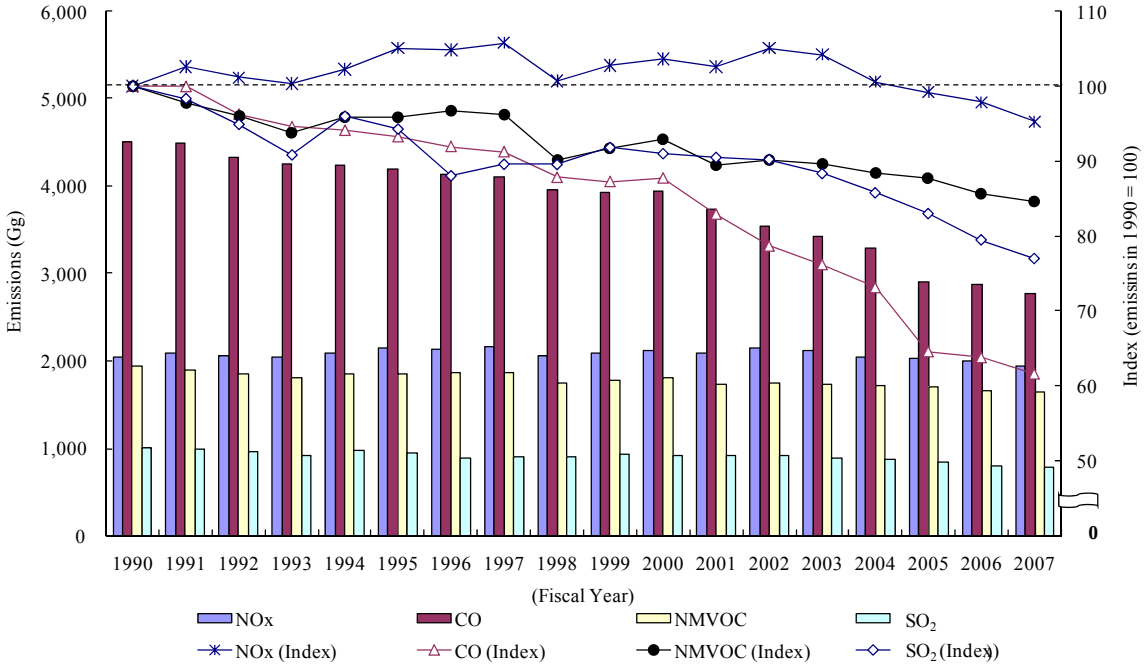


Figure 2.18 Trends in Emissions of Indirect Greenhouse Gases and SO_2

Nitrogen oxide (NO_X) emissions in FY2007 were 1,943 Gg, a decrease by 4.7% compared to FY1990, and by 2.6% compared to the previous year.

Carbon monoxide (CO) emissions in FY2007 were 2,761 Gg, a decrease by 38.1% compared to FY1990, and a decrease by 3.4% compared to the previous year.

Non-methane volatile organic compounds (NMVOC) emissions in FY2007 were 1,638 Gg, a decrease by 15.4% compared to FY1990, and a decrease by 1.1% compared to the previous year.

Sulfur dioxide (SO_2) emissions in FY2007 were 780 Gg, a decrease by 22.9% compared to FY1990, and a decrease by 3% compared to the previous year.

2.5 Overview of Emission Estimation Methods

The description below indicates the methods for estimating emissions in the preceding sections. This section will present an overview for methods for estimating greenhouse gas emission amounts in Japan's major emitting sectors; however, for a more detailed description of estimation methods, please refer to Chapters 3 through 9 (See NIR Attachment 3 for calculation methods for gasses including precursors (NOx, CO, NMVOC, SO_2)) of the National Greenhouse Gas Inventory of Japan (NIR) (April 2009).

2.5.1 Energy (CRF sector 1)

2.5.1.1 Fuel Combustion (1.A.)

This category covers GHG emissions from the combustion of fossil fuels such as coal, oil, and natural gas, and incineration of waste for energy purposes and with energy recovery.
This section includes GHG emissions from five sources: Energy Industries (1.A.1)—emissions from power generation and heat supply; Manufacturing Industries and Construction (1.A.2)—emissions from the manufacturing industry and construction; Transport (1.A.3)—emissions from aviation, railways, road transport, and shipping; Other Sectors (1.A.4)—emissions from commercial/institutional, residential, and agriculture/forestry/fishing sources; and Other (1.A.5)—emissions from other sectors. Estimation method of emissions from waste incineration with energy recovery is described in section 2.5.6.4 .

2.5.1.1.a Stationary sources (Energy Industries (1.A.1.)、Manufacturing Industries and Construction (1.A.2)、Other Sources (1.A.4))

(1) CO_2

Tier 1 Sectoral approach has been used in accordance with the decision tree from *Good Practice and Uncertainty Management in National Greenhouse Gas Inventories (2000)* (hereafter, *Good Practice Guidance (2000))* (Page 2.10, Fig. 2.1) to calculate emissions. Country-specific emission factors are used for all types of fuel.

(2) CH_4, N_2O

Because it is possible to use fuel-specific, sector-specific and furnace-specific activity data, and also to set country-specific emission factors for Japan, Tier 2 country-specific emission factors were used to calculate emissions in accordance with the *1996 Revised IPCC Guidelines* and *Good Practice Guidance* (2000). However, in residential and other sectors in which activity data for different furnace types cannot be used, Tier 1 IPCC default emission factors were used.

2.5.1.1.b Mobile source (Mobile Combustion (1.A.3.))

(1) CO_2

See Section 2.5.1.1.a. Because CO_2 emissions from natural gas-powered vehicles and steam locomotives include the Commercial /Institutional section in Other Sectors (1.A.4), CO_2 emissions from these sources are reported as “IE.”

(2) CH_4, N_2O

Emissions from Civil Aviation (1.A.3.a.) have been calculated using the Tier 2a method for jet fuel and the Tier 1 for aviation gasoline, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.58, Fig. 2.7).
Emissions from Light Passenger Vehicles, Light Cargo Trucks, Passenger Vehicles, Buses, Small Cargo Trucks, Regular Cargo Trucks, and Special-purpose Vehicles of Road Transportation (1.A.3.b.) have been calculated as distance travelled per type of vehicle by

emission factors using the Tier 3 method, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.45, Fig. 2.5). The country-specific emission factors were used for some categories of vehicle, and the default emission factors were used for the other categories of vehicle. The activity data was estimated by using running mileage and fuel efficiency, which were provided from the Ministry of Land, Infrastructure, Transport and Tourism's *Statistical Yearbook of Motor Vehicle Transport*. (Refer to *1A3-car-2005.xls* for details on the calculation process).

Emissions from natural gas-powered vehicles for Road Transportation (1.A.3.b.) were calculated by multiplying the distance traveled per type of natural gas-powered vehicle by the emission factor for the type of vehicle.

Emissions from motorcycles for Road Transportation (1.A.3.b.) were estimated based on the method developed in Japan by the Ministry of Environment for the estimation of emissions from vehicles not subject to the PRTR (Pollutant Release and Transfer Register) Program. The emissions were calculated for two emission sources of "hot start" and "increment for cold start." For details of the calculation method, see the *Greenhouse Gases Estimation Methods Committee Report – Transportation* (February 2006).

Railways (1.A.3.c.) is not a key source category, and emissions were calculated by multiplying the default emission factor given in the *Revised 1996 IPCC Guidelines* by fuel consumption on a calorific basis.

Emissions from Navigation (1.A.3.d.) were calculated using the default values for methane and nitrous oxide given in the *Revised 1996 IPCC Guidelines*, in accordance with decision tree from *Good Practice Guidance (2000)* (Page 2.52, Fig. 2.6).

2.5.1.2 Fugitive Emissions from Fuels (1.B.)

The fugitive emissions sector consists of intentional and unintentional emissions of CO_2, CH_4, and N_2O from unburned fossil fuels during their mining, production, processing, refining, transportation, storage, and distribution.

There are two main source categories in this sector: Solid Fuels (1.B.1), comprised of emissions from coal mining and handling, and Oil and Natural Gas (1.B.2), comprised of emissions from the oil and natural gas industries. The main source of emissions from solid fuels is methane contained in coal beds, whereas fugitive emissions, venting, flaring, volatilization, and accidents are the main emission sources in the oil and natural gas industries.

2.5.1.2.a Solid Fuels (1.B.1.)

Within Coal Mining and Handling (1.B.1.a.), emissions from mining activities for underground mines were drawn from actual measurements obtained from individual coal mines, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.72, Fig. 2.10). Emissions from post-mining activities were calculated using the Tier 1 method, which uses default emission factors in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.73, Fig. 2.11). (Refer to *1B1-2008.xls* for the calculation process.)

Within Coal Extraction (1.B.1.a.), CH_4 emissions from mining activities for surface mines were calculated using the Tier 1 method and the default emission factor in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.71, Fig. 2.9). CH_4 emissions from post-mining activities were calculated using the Tier 1 method and the default emission factor in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.73, Fig. 2.11).

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

(1) Oil (1.B.2.a.)

CO_2, CH_4 and N_2O emissions associated with oil exploration and pre-production testing were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)*. Emissions were calculated by multiplying the number of exploratory wells, and the number of wells tested for oil and gas during pre-production testing, by their respective emission factors.

Emissions relating to fugitive emissions from petroleum production and servicing of oilfield production wells were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.81, Fig. 2.13). Emissions were calculated by multiplying the amount of crude oil production by the emission factor.

Emissions relating to fugitive emissions associated with transport were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.81, Fig. 2.13). Emissions were calculated by multiplying the amount of crude oil or condensate production by the emission factors.

Emissions relating to fugitive emissions from refining were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.82, Fig. 2.14).

Emissions relating to fugitive emissions from storage should be calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.82, Fig.2.14), but as the country-specific emission factor is available for this emissions source, it was applied to the inventories instead.

Petroleum products are distributed in Japan, and where CO_2 and CH_4 are dissolved, it is conceivable that either or both will be emitted as a result of the relevant activity. The level of CO_2 or CH_4 emitted by this activity is probably negligible, in light of the composition of the petroleum products, but because there are no examples of measurement of the CO_2 or CH_4 content of petroleum products, it is not currently possible to calculate emissions. Emissions were reported as “NE” in the absence of the default emission factors.

(2) Natural Gas (1.B.2.b.)

There are test drillings of oil and gas fields in Japan, and it is conceivable that this activity could give rise to emissions of CO_2, CH_4, or N_2O. It is difficult, however, to distinguish between oilfields and gas fields prior to test drilling, Emissions were reported as “IE” because the calculation was combined with the subcategory of *1.B.2.a.i. Fugitive Emissions Associated with Oil Exploration*.

Fugitive emissions of the production of natural gas and processing of natural gas, such as adjusting its constituent elements, and servicing natural gas production wells was calculated using the Tier 1 method, and in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.80, Fig. 2.12).

Fugitive emissions during natural gas production and conditioning processes were estimated by multiplying the amount of natural gas production by their respective emission factors. Fugitive emissions during gas field inspections were calculated by multiplying the number of production wells by the emission factor.

In regards to natural gas transmission leakage, total natural gas pipeline length is multiplied by a Japan-specific emission factor to calculate CH_4 emissions occurring in conjunction with releases by pipeline construction and relocation, and releases of gas used to operate pressure regulators.

With regards to leakages at LNG receiving terminals, town gas production facilities, and satellite terminals (natural gas supplies), some of the main emission sources are gas samples taken for analysis as well as residual gas emitted at times such as regular maintenance of manufacturing facilities. The Tier 1 method is employed in accordance with the decision tree from *Good Practice Guidance* (2000) (page 2.82, Fig. 2.14). However, because it is possible to use a Japan-specific emission factor, the amounts of liquefied natural gas and natural gas used as town gas feedstock were multiplied by a Japan-specific emission factor to obtain emissions.
CH_4 emissions from high-pressure pipelines and from medium- and low-pressure pipelines and holders are calculated by multiplying the total length of city gas pipeline by the emission factor. CH_4 emissions from service pipes are calculated by multiplying the number of users by the emission coefficient.
Conceivable sources of CH_4 emissions from industrial plants and power stations in the residential and commercial sectors (1.B.2.b. v.) include gas pipe works in buildings, but because these emissions are included in those of "Natural Gas Distribution" (distribution through the town gas network) (1.B.2.b.iv), CH_4 emissions from this source are reported as "IE." Additionally, because CO_2 is basically not included among town gas constituents, CO_2 emissions from this source are reported as "NA."

(3) Venting and Flaring (1.B.2.c.)

Emissions from venting in the petroleum industry were calculated using the Tier 1 Method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 2.81, Fig. 2.13) by multiplying the amount of crude oil production by the default emission factors.
CO_2 and CH_4 emissions from venting in the natural gas industry were considered only for the amount during transportation as *Good Practice Guidance* (2000) provides emissions factors only for transportation. Intentional CO_2 emissions from natural gas pipelines are reported as "NA" because CO_2 emissions during the transmission of natural gas are considered as "NA" (1.B.2.b.iii.) Intentional CH_4 emissions from natural gas pipelines are reported as "IE" because they are included in emissions during natural gas transmission (1.B.2.b.iii).
Statistical data are reported for two categories of petroleum and natural gas in Japan. As a result, fugitive emissions from venting in the combined petroleum and natural gas industries were reported as "IE" since they were accounted for in the emissions from venting in the petroleum industry (1.B.2.c.i) and the natural gas industry (1.B.2.c.ii.), respectively.
CO_2, CH_4, and N_2O emissions from flaring in the petroleum industry were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)*, by multiplying the amount of crude oil production in Japan by the default emissions factors.
CO_2, CH_4, and N_2O emissions associated with flaring in the natural gas industry were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)*. Emissions were calculated by multiplying the amount of production of natural gas by the emission factors. The total emissions associated with flaring both during gas production and processing were reported as the emissions from flaring in the natural gas industry.
Statistical data are reported for two categories of petroleum and natural gas in Japan. As a result, fugitive emissions from flaring in the combined petroleum and natural gas industries were reported as "IE" since they were accounted for respectively in the emissions from flaring in the Petroleum Industry (1.B.2.c.i) and the Natural Gas Industry (1.B.2.c.ii.).

2.5.2 Industrial Processes (CRF sector 2)

2.5.2.1 Mineral Products (2.A.)

This category covers CO_2 emissions from the calcination of mineral raw material such as $CaCO_3$, $MgCO_3$, Na_2CO_3, etc.

This section includes GHG emissions from six sources: Cement Production (2.A.1), Lime Production (2.A.2.), Limestone and Dolomite Use (2.A.3.), Soda Ash Production and Use (2.A.4.), Asphalt Roofing (2.A.5.), Road Paving with Asphalt (2.A.6.).

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

Following the *Good Practice Guidance (2000)* decision tree, the CO_2 emissions from this source was estimated by multiplying the amount of clinker produced by the emission factor.

Because Japan's cement industry takes in large amounts of waste and byproducts from other industries and recycles them as substitute raw materials for cement production, clinker contains CaO from sources other than carbonates. This CaO does not go through the limestone calcination stage and so does not emit CO_2 during the clinker production process. For that reason, emission factors were determined by estimating the CaO content of clinker from carbonates, derived by subtracting CaO originating from waste and other sources from total CaO content of clinker. Because clinker productions from 1990 to 1999 are unavailable, they are estimated by the ratio between clinker productions and limestone consumptions for 2000 through 2003.

2.5.2.1.b Lime Production (2.A.2.)

CO_2 emissions are calculated according to the Tier 1 method in *Good Practice Guidance (2000)* in which amounts of high calcium quicklime and dolomitic quicklime produced are multiplied by country-specific emission factors.

2.5.2.1.c 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.

2.5.2.1.d Soda Ash Production and Use (2.A.4.)

CO_2 emissions from soda ash use are calculated according to the *Revised 1996 IPCC Guidelines* by multiplying the amount of soda ash consumed by the default emission factor.

2.5.2.1.e Asphalt Roofing (2.A.5.)

Asphalt roofing is manufactured in Japan, but information on the manufacturing process and activity data is inadequate, and it is not possible to definitively conclude that CO_2 is not emitted from the manufacture of asphalt roofing. Emissions have also never been actually measured, and as no default emission value is available, it is not currently possible to calculate emissions. Therefore, it has been reported as "NE".

2.5.2.1.f Road Paving with Asphalt (2.A.6.)

Roads in Japan are paved with asphalt, but almost no CO_2 is thought to be emitted in the process. It is not possible, however, to be completely definitive about any emissions in this process. Emissions have also never been actually measured, and as no default emission value is available, it is not currently possible to calculate emissions. Therefore, it has been reported as "NE".

2.5.2.2 Chemical Industry (2.B.)

This category covers CO_2, CH_4, and N_2O emissions from the processes of chemical productions.
This section includes GHG emissions from five sources: Ammonia Production (2.B.2), Nitric Acid Production (2.B.2.), Adipic Acid Production (2.B.3.), Carbide Production (2.B.4.), and Other (2.B.5.).

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

CO_2 emissions are calculated by multiplying the amount of fuels consumed as ammonia feedstock by emission factors.
Emission of CH_4 from ammonia production has been confirmed by actual measurements. As there are currently not any sufficient enough examples to enable the establishment of an emission factor, it is not currently possible to calculate emission levels. The *Revised 1996 IPCC Guidelines* also do not give a default emission factor. Therefore, CH_4 was reported as "NE".
Emission of N_2O from ammonia production is not theoretically conceivable, and given that even in actual measurements the emission factor for N_2O is below the limits of measurement, N_2O was reported as "NA".

2.5.2.2.b Nitric Acid Production (2.B.2.)

N_2O emissions were estimated by multiplying nitric acid production volume by an emission factor, based on the method given in *Good Practice Guidance (2000)* (page 3.31, Equation 3.9).

2.5.2.2.c Adipic Acid Production (2.B.3.)

Emissions were estimated using N_2O generation rates, N_2O decomposition volume, and adipic acid production volume of the relevant operating sites, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 3.32, Fig. 3.4).

2.5.2.2.d Carbide Production (2.B.4.)

(1) Silicon Carbide (2.B.4.-)

CO_2 emissions are calculated by multiplying the amount of petroleum coke used as silicon carbide feedstock by an emission factor.
CH_4 emissions were calculated by multiplying an emission factor based on actual figures obtained in Japan by the energy consumption of electric arc furnaces. This is the same method used for calculating CH_4 emissions in the Fuel Combustion Sector (1.A. Solid Fuels).

(2) Calcium Carbide (2.B.4.-)

CO_2 emissions are calculated by multiplying calcium carbide production by the default emission factor, based on the *Revised 1996 IPCC Guidelines*.
Byproduct gases (mainly CO) generated in carbide reactions include a small amount of CH_4, all of which is recovered and burned as fuel, with none being emitted outside the system. Therefore emissions from this source are reported as "NA".

2.5.2.2.e Other (2.B.5.)

(1) Carbon Black (2.B.5.-)

CH_4 emissions from carbon black production are calculated by multiplying carbon black production volume by Japan's emission factor, in accordance with the *Revised 1996 IPCC Guidelines*.

(2) Ethylene (2.B.5.-)

CH_4 and CO_2 emissions from ethylene production were calculated by multiplying ethylene production by a Japan-specific emission factor, in accordance with the *Revised 1996 IPCC Guidelines*.

There is almost no nitrogen in naphtha, the raw material in ethylene production, and the ethylene production process takes place under conditions that are almost completely devoid of oxygen. Emissions are reported as "NA" in accordance with the judgment of experts that in principle there are no N_2O emissions.

(3) 1,2-Dichloroethane (2.B.5.-)

CH_4 emissions from 1,2-dichloroethane production are calculated by multiplying production volume by a Japan-specific emission factor, in accordance with the *Revised 1996 IPCC Guidelines*.

(4) Styrene (2.B.5.-)

CH_4 emissions from styrene production were calculated by multiplying styrene production volume by a Japan-specific emission factor, based on the method given in the *Revised 1996 IPCC Guidelines*.

(5) Methanol (2.B.5.-)

CH_4 emissions from methanol production are calculated using the method given in the *Revised 1996 IPCC Guidelines*.

According to industry organizations, the production (synthesis) of methanol stopped in Japan in 1995 due to the price difference with overseas methanol. Since then, all methanol has been imported, and methanol production plants disappeared from Japan in and around 1995. According to the Yearbook of Chemical Industries Statistics, beginning in 1997 there was also no production of refined methanol. Because the methanol refining process merely dewaters the synthesized methanol, in principle no CH_4 is generated.

Accordingly, emissions from 1990 to 1995 were reported using production volumes from industry organization statistics. For 1996 and thereafter, the report is "NO" because it is assumed that methanol has not been produced (synthesized) since 1995.

(6) Coke (2.B.5.-)

CH_4 emissions from coke production were calculated by multiplying coke production volume by a Japan-specific emission factor, based on the method given in the *Revised 1996 IPCC Guidelines*.

This category is reported as "IE" because the emissions of CO_2 from coke production are included in the coal products and production section of the Fuel Combustion Sector (1.A. Solid Fuels).

We have no measurements of the concentration of N_2O in the gas leaking from coking furnace lids, and N_2O emissions from this source are reported as "NA," since experts say that N_2O is likely not produced because the reducing atmosphere in a coke oven is normally at least 1,000°C.

2.5.2.3 Metal Production (2.C.)

This category covers CO_2, CH_4, N_2O, PFCs and SF_6 emissions from the manufacturing processes of metal production. This section includes GHG emissions from three sources: Iron and Steel Production (2.C.2), Ferroalloys Production (2.C.2.) Aluminum Production (2.C.3.) and SF_6 Used in Aluminum and Magnesium Foundries (2.C.4.).

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

(1) Steel (2.C.1.-)

Coke oxidizes when it is used as a reduction agent in steel production, and CO_2 is generated. The volume of coke used has been included under consumption of fuel in the Fuel Combustion Sector (1.A. Solid Fuels), and the CO_2 generated through the oxidization of coke used as a reducing agent has already been calculated under the Fuel Combustion Sector (1.A. Solid Fuels), as well. Therefore, it has been reported as "IE".

(2) Pig Iron (2.C.1.-)

CO_2 generated from pig iron production is emitted when coke is used as a reduction agent. The amount of coke used has been included under consumption of fuel in the Fuel Combustion Sector (1.A. Solid Fuels), and the CO_2 generated through the oxidization of coke used as a reducing agent has already been calculated under the Fuel Combustion Sector (1.A. Solid Fuels), as well. Therefore, it has been reported as "IE".
It is not theoretically possible that CH_4 will be generated in association with pig iron production, and it has been confirmed that CH_4 is not emitted from actual measurements. Therefore, emissions have been reported as "NA".

(3) Sinter (2.C.1.-)

CO_2 generated when making sinter is all generated by the combustion of coke fines; these emissions come under the Fuel Combustion Sector (1.A. Solid Fuels). As they are already calculated in this sector, they are reported as "IE".
CH_4 generated when making sinter is all generated by the combustion of coke fines; these emissions come under the Fuel Combustion Sector (1.A. Solid Fuels). As they are already calculated in this sector, they are reported as "IE".

(4) Coke (2.C.1.-)

Coke is mainly produced in iron and steel production in Japan. This category is reported as "IE" because the emissions of CO_2 from coke production are included in the coal products and production section of the Fuel Combustion Sector (1.A. Solid Fuels).
Emissions of methane were calculated at 4.2.5.6. Coke (2.B.5.-), and have been reported as "IE".

(5) Use of Electric Arc Furnaces in Steel Production (2.C.1.-)

CO_2 emissions from arc furnaces for steel production are estimated by the amount of carbon calculated by weight of production and the import of carbon electrodes minus their export weight. This difference of the carbon is assumed to be diffused into the atmosphere as CO_2. The carbon included in electric furnace gas given in the General Energy Statistics are subtracted from the CO_2 emission in this source, since this emission are included in the Fuel Combustion Sector (1.A. Solid Fuels).
Emissions were calculated by multiplying an emission factor based on actual figures obtained in Japan by the energy consumption of electric arc furnaces. This is the same method used for calculating CH_4 emissions in the Fuel Combustion Sector (1.A.).

2.5.2.4.b Ferroalloys Production (2.C.2.)

CH_4 emissions from ferroalloy production were calculated by multiplying an emission factor based on actual figures obtained in Japan by the energy consumption of electric arc furnaces. This is the

same method used for calculating CH_4 emissions in the Fuel Combustion Sector (1.A. Solid Fuels).
Ferroalloys are produced in Japan, and the carbon dioxide generated in association with ferroalloy production is emitted as a result of the oxidization of coke used as a reducing agent. Consumption of coke is included in consumption of fuel under the Fuel Combustion Sector (1.A. Solid Fuels), and CO_2 generated as a consequence of the oxidization of coke used as a reduction agent has already been calculated under the Fuel Combustion Sector (1.A. Solid Fuels), as well. Residual carbon in ferroalloys is oxidized when ferroalloys are used in the production of steel, and are released to the atmosphere as CO_2. Therefore, it has been reported as "IE".

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

Estimating PFC emissions involved multiplying the production volume of primary aluminum refining by Japan-specific emission factors calculated using the equation prescribed in the *Revised 1996 IPCC Guidelines*.
Aluminum refining is conducted in Japan. CO_2 generated in association with aluminum smelting is emitted in conjunction with the oxidization of the anode paste used as a reducing agent. Consumption of coke, the main ingredient in the anode paste has been included in fuel consumption under the Fuel Combustion Sector (1.A. Solid Fuels), and the CO_2 that is generated by the oxidization of coke used as a reducing agent has already been calculated under the Fuel Combustion Sector (1.A. Solid Fuels), as well. Therefore, it has been reported as "IE".
There is a small amount of hydrogen in the pitch that acts as a raw material for the anode paste used in aluminum smelting. Theoretically, therefore, it is possible that CH_4 could be generated. As there is no actual data on emissions, however, it is not possible to calculate emissions. There is also no emission factor offered in the *Revised 1996 IPCC Guidelines*, and no data on the hydrogen content of pitch. As it is not possible to estimate an emission factor, emissions have been reported as "NE".

2.5.2.4.d SF_6 Used in Aluminum and Magnesium Foundries (2.C.4.)

(1) Aluminum

Emissions from this source were reported as "NO" as it was been confirmed that Japan had no record of the use of SF_6 in aluminum forging processes.

(2) Magnesium

The data reported for emissions of SF_6 used in magnesium foundries was given in documentation prepared by the Chemical and Bio Sub-Group, Industrial Structure Council, Ministry of Economy, Trade and Industry,

2.5.2.5 Other Production (2.D.)

2.5.2.5.a Pulp and Paper (2.D.1.)

According to the CRF, it is required to report on emissions of nitrogen oxides (NO_X), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), and sulfur dioxide (SO_2).

2.5.2.5.b Food and Drink (2.D.2.)

Foods and drinks are manufactured in Japan, and because CO_2 is used in the manufacturing process (frozen CO_2, raw material for carbonated drinks, etc.), it is conceivable that CO_2 is emitted into the atmosphere in the course of manufacturing. The CO_2 used in the process of manufacturing foods and drinks, however, is a by-product gas of petrochemical products, and as these emissions have already

been incorporated into the Fuel Combustion Sector (1.A. Solid Fuels), they have been reported as "IE".

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

This category covers HFCs, PFCs and SF_6 emissions from the manufacturing processes of the production of Halocarbons and SF_6. This section includes GHG emissions from two sources: By-product Emissions: Production of HCFC-22 (2.E.1) and Fugitive Emissions (2.E.2.).

2.5.2.6.a By-product Emissions: Production of HCFC-22 (2.E.1.-)

Estimating emissions involved subtracting the recovery and destruction amount of by-product HFC-23 (measured data) from the amount of by-product HFC-23 generated at HCFC-22 production plants in Japan. The amount of by-product HFC-23 was estimated by multiplying the production of HCFC-22 by the generation rate of HFC-23 (obtained from the results of composition analysis of the interior of a reactor).

2.5.2.6.b Fugitive Emissions (2.E.2.)

Emissions were estimated based on the mass balance of measurement data at each HFCs, PFCs, and SF_6 manufacturing plant in Japan. Fugitive emissions in production from this source category were reported by subtracting the amount of production from the amount of HFCs, PFCs, SF_6 generated at each gas manufacturing facility. Emissions of HFCs for each year were given by the Japan Fluorocarbon Manufactures Association and of PFCs and SF_6 by the Japan Chemical Industry Association.

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

This category covers HFCs, PFCs and SF_6 emissions from the manufacturing, utilization and disposal processes of the products that use Halocarbons and SF_6. This section includes GHG emissions from nine sources: Refrigeration and Air Conditioning Equipment (2.F.1), Foam Blowing (2.F.2.), Fire Extinguishers (2.F.3.), Metered Dose Inhalers (2.F.4.-) Solvents (2.F.5.), Other applications using ODS substitutes (2.F.6.), Semiconductors (2.F.7.), Electrical Equipment (2.F.8.) and Other (2.F.9.).

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

(1) Domestic Refrigeration (2.F.1.-)

The collected volume of HFCs under regulation was subtracted from (1) the fugitive refrigerant ratio from production, (2) the fugitive refrigerant ratio from use (including failure of devices), and (3) refrigerant contained at the time of disposal, separately, based on production and shipment volumes and refrigerant contained. Then, all there were combined.
Emission from this source in the "production" category was reported as "NO" as Japan had no record of their use in the production. The emission was also reported as "NO" in the "use" and "disposal" categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

(2) Commercial Refrigeration (2.F.1.-)

i) Commercial Refrigeration

In accordance with the IPCC Guidelines, emissions of each species of F-gases from (1) manufacturing, (2) installation, (3) operation and (4) disposal are estimated for devices.
Emission from this source in the “production” category was reported as “NO” as Japan had no record of their use in the production. The emission was also reported as “NO” in the “use” and “disposal” categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

ii) Automatic Vending machine

Emissions of HFCs from (1) manufacturing, (2) accident and (3) disposal are estimated. Emissions of HFCs relating to automatic vending machines are estimated using values described in *Documents of Group for prevention of global warming*, Chemical and Bio Sub-Group, Industrial Structure Council, Ministry of Economy, Trade and Industry.
PFCs Emission from this source in the “production” category was reported as “NO” as Japan had no record of their use in the production. The emission was also reported as “NO” in the “use” and “disposal” categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

(3) Transport Refrigeration (2.F.1.-)

Emission was reported as “IE” since HFCs in this category had been included in the total reported in 2.5.2.7.a Commercial Refrigeration and Air-conditioning Equipment section (2) .
PFCs emission from this source in the “production” category was reported as “NO” as Japan had no record of their use in the production. The emission was also reported as “NO” in the “use” and “disposal” categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

(4) Industrial Refrigeration (2.F.1.-)

HFCs emissions have been reported as “IE”, as they are included in 2.5.2.7.a Commercial Refrigeration and Air-conditioning Equipment section (2) .
PFCs emission from this source in the “production” category was reported as “NO” as Japan had no record of their use in the production. The emission was also reported as “NO” in the “use” and “disposal” categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

(5) Stationary Air-Conditioning (Household) (2.F.1.-)

In accordance with the IPCC Guidelines, HFCs emissions from (1) manufacturing, (2) operation, (3) disposal are estimated for devices.
PFCs emission from this source in the “production” category was reported as “NO” as Japan had no record of their use in the production. The emission was also reported as “NO” in the “use” and “disposal” categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

(6) Mobile Air-Conditioning (Car Air Conditioners) (2.F.1.-)

In accordance with the IPCC Guidelines, HFCs emissions from (1) manufacturing, (2) operation, (3)

maintenance, (4) accident and (5) disposal are estimated.
PFCs emission from this source in the "production" category was reported as "NO" as Japan had no record of their use in the production. The emission was also reported as "NO" in the "use" and "disposal" categories, because it was unlikely that PFCs were used in imported products or refrigerant was refilled.

2.5.2.7.b Foam Blowing (2.F.2.)

(1) Hard Foam (2.F.2.-)

i) Urethane Foam (HFC-134a)

In accordance with the IPCC Guidelines (closed-cell foams), emissions were calculated assuming that 10% of the emission from foam blowing agents used each year occurred within the first year after production, with the remainder emitted over 20 years at the rate of 4.5% per year. The amount of foam blowing agents used each year was provided by the Japan Urethane Foam Association/Japan Urethane Raw Materials Association.

ii) High Expanded Polyethylene Foam (HFC-134a, HFC-152a) (2.F.2.-)

In accordance with the IPCC Guidelines (open-cell foams), emissions were calculated assuming that all emissions from foam blowing agents occurred at the time of production. The amount of emissions from foam blowing agents used each year was provided by the High Expanded Polyethylene Foam Industry Association.

iii) Extruded Polystyrene Foam (HFC-134a) (2.F.2.-)

Emissions were calculated assuming that 25% of emissions from foam blowing agents occurs within the first year after production, with the remainder emitted over 30 years at the rate of 2.5% per year. The amount of the emissions from foam blowing agents used each year was provided by the Extruded Polystyrene Foam Industry Association.

(2) Soft Foam (2.F.2.-)

All foam using HFCs for forming is hard foam. Emissions have therefore been reported as "NO".

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

HFC-23 and HFC-227ea are used for the production of fire extinguishers. However, as of 2004, only HFC-227ea is filled in fire extinguishing equipment, and each company purchases HFC-23 fire extinguishers with HFC-23 already pre-filled.
HFCs emission from this category was reported as "NO" by expert judgment since HFC-227ea was very small amount, 0.0007(t) (= 700g) when emission from production in FY2004 was estimated.
For 1996 and following years, emissions are estimated by the HFC extinguishing agent stock.

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

(1) Aerosols (2.F.4.-)

In accordance with the IPCC Guidelines, emissions were calculated on the assumption that 50% of emissions from the amount of aerosol filled in products (potential emissions) occurred in the year of production, with the remaining 50% emitted in the following year.

(2) Metered Dose Inhalers (2.F.4.-)

In accordance with the IPCC Guidelines, emissions were calculated on the assumption that from the

amount used each year, 50% of emissions occurred in the year of production, with the remaining 50% emitted in the following year.

2.5.2.7.e Solvents (2.F.5.)

Assuming that the total amount of liquid PFC shipment was used in cleaners and for cleaning purposes each year, the entire amount was reported in the "use" category as the amount of emission. Emission during production was reported as "IE" as it was believed to be included in Fugitive Emissions (2.E.2). Emission at the time of disposal was reported as "IE" on the assumption, from a conservative point of view, that the entire amount, including that which was disposed, was emitted during use, because of the difficulty in determining the status of the disposal of PFCs. No disposal was identified in 1995.

2.5.2.7.f Other applications using ODS substitutes (2.F.6.)

Emission from this category was reported as "NE" since there is no actual data on emissions.

2.5.2.7.g Semiconductors (2.F.7.)

(1) Semiconductors(2.F.7.-)

Methods of emissions from semiconductors are in line with IPCC guidelines. These emissions are estimated with purchase of F-gas, process supply rate, use rate of F-gas, removal rate, by-product generation ratio and removal ratio for by-products. Calculation on removal equipment is based on installation or removal ratio of each technology.

(2) Liquid Crystals (2.F.7.-)

The same methods applied to semiconductors are also applied to emissions from the manufacturing of liquid crystals. The World LCD Industry Cooperation Committee (WLICC) has established a voluntary action plan to reduce PFCs emissions. In these activities, IPCC methods should be applied.

2.5.2.7.h Electrical Equipment (2.F.8.)

Emissions from producing electrical equipment were calculated by multiplying the amount of SF_6 purchased by assembly fugitive rate. Emissions from the use of electrical equipment were calculated based on the fugitive rate during the use of electrical equipment. Emissions from the inspection and disposal of electrical equipment were obtained by actual measurements of SF_6.

2.5.2.7.i Other (2.F.9.)

In this category, the emission sources of SF_6 that are considered utilized for research purposes are recognized. Judging from the actual utilization practices, however, the emissions from these sources were considered to be better included in Electrical Equipment (2.F.8.). Therefore, it is reported as "IE".

2.5.3 Solvent and Other Product Use (CRF sector 3)

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. They have been reported as "NA."

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

Degreasing and dry-cleaning are practiced in Japan. Degreasing is defined as, "washing processes that do not involve chemical reactions", and it is assumed that it does not generate CO_2. Although the CO_2 emissions may occur in association with washing methods involving dry ice or carbonic gas, such methods are not thought to be used 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. However washing methods using liquefied carbonic gas are being used experimentally in research facilities and it is not possible to completely negate the possibility of CO_2 emissions. As a result, these activities have been reported as "NE" due to the fact that there are no sufficient data available on the actual condition of emissions from degreasing and dry-cleaning and the absence of a default emission factor prevents any calculations from being performed.

It is also assumed that N_2O is not generated in the degreasing and dry-cleaning processes. In Japan, there are no methods which have the potential to emit N_2O used for degreasing or dry-cleaning, and they have therefore been reported as "NA".

2.5.3.3 Other (3.D.)

N_2O is emitted during anesthetic (laughing gas) use. In relation to emissions of N_2O from the use of anesthetics, the actual amount of N_2O shipped as an anesthetic by pharmaceutical manufacturers or import traders has been reported.

2.5.3.3.a Fire Extinguishers (3.D.-)

N_2O is not installed in fire extinguishers in Japan. Therefore the N_2O emissions from this category are reported as "NO".

2.5.3.3.b Aerosol Cans (3.D.-)

Aerosol products manufactured in Japan do not use N_2O. In principle, no N_2O is emitted, so it has been reported as "NA".

2.5.4 Agriculture (CRF sector 4)

2.5.4.1 Enteric Fermentation (4.A.)

Ruminants such as cattle, buffalo, sheep, and goats have multi-chamber stomachs. The rumen carries out anaerobic fermentation to break down cellulose and other substances, thereby releasing CH_4. Horses and swine are not ruminants and have monogastric stomachs, but fermentation in their digestive tracts produces small amounts of CH_4, which is released into the atmosphere. These methane emissions are calculated and reported in the Enteric Fermentation (4.A.) section.

2.5.4.1.a Cattle (4.A.1.)

In accordance with the decision tree from *Good Practice Guidance (2000)* (Page 4.24 Fig. 4.2), calculations for dairy and non-dairy cattle should be performed using the Tier 2 method. The Tier 2 method requires the total energy intake of livestock to be multiplied by the methane conversion factor to derive the emission factor, although it has been the practice in Japan during livestock-related research to use volume of dry matter intake. It is considered that, by applying the results of previous researches, the estimation method using volume of dry matter intake provides

more accurate data. For that reason, a technique similar to the Tier 2 method but specific to Japan was used for the calculation of methane emissions associated with enteric fermentation by cattle. The emissions were calculated by multiplying the cattle population (dairy and non-dairy) by the emission factors established based on their dry matter intake.

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

CH_4 emissions associated with enteric fermentation by buffalo, sheep, goats, horses, and swine, were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)*.

2.5.4.1.c Poultry (4.A.9.)

It is conceivable that CH_4 is emitted from enteric fermentation in poultry, but Japanese literature offers no data on emission factors, and neither the *Revised 1996 IPCC Guidelines* nor *Good Practice Guidance (2000)* offer default emission factors. Therefore, this category has been reported as "NE".
In addition, poultry other than layers and broilers are not covered by official statistics, suggesting that they may be presumed to be negligible.

2.5.4.2 Manure Management (4.B.)

Livestock manure generates CH_4 when its organic content is converted to CH_4 gas through CH_4 fermentation, or when CH_4 from enteric fermentation dissolved in manure is released by aeration or agitation. In manure management, N_2O is produced mainly by microorganism via nitrification and denitrification processes.

2.5.4.2.a Cattle, Swine and Poultry (4.B.1., 4.B.8., 4.B.9.)

(1) Calculation of Emissions (Cattle, Swine and Poultry in sheds and barns)

CH_4 emissions associated with the treatment of manure excreted by cattle (dairy and non-dairy), swine, and poultry (layers and broilers) in sheds and barns were calculated by multiplying the volume of organic matter contained in the manure from each type of livestock by the emission factor for each type of treatment method.

(2) Calculation of Emissions (Cattle under grazing)

For CH_4 and N_2O emitted from pasture, range, and paddock manure, the amount of emissions was calculated for cattle by multiplying the Japan-specific emission factors by the total grazing population in accordance with the decision tree from *Good Practice Guidance (2000)* (page 4.55, Fig. 4.7).

(3) Reporting in Common Reporting Format (CRF)

In the CRF, with regard to CH_4 emissions from this category, it is required to report emissions by each livestock. However, for N_2O emissions from this category, it is required to report emissions by AWMS (11. Anaerobic Lagoons、12. Liquid Systems、13. Solid Storage and Dry Lot、14. Other).
For cattle, swine, and poultry, Japan's country-specific manure management categories as well as the implementation rates of these management categories have been established for each type of animal.
The current CRF divides the reporting categories into Anaerobic Lagoons, Liquid Systems, Solid Storage and Dry Lots, and Other. In Japan, however, composting is widely practiced, particularly with respect to domestic livestock feces. Consequently the composting-related subcategories of

"Piling" and "Composting" have been established under the Other category. Additional subcategories of "Thermal drying" and "Incineration", which are practiced for the purposes of volume reduction and easier handling of dung, have been also included in the Other category, as well. Urine undergoes purification treatment as sewage with high concentrations of pollutants. Accordingly, a subcategory of "Purification" has also been added to the Other category.

Composting is widely practiced in Japan as: (1) it is essential for Japanese livestock farmers to facilitate transportation and handling, since the lack of space required for on-site reduction of manure makes it necessary to direct the manure for uses outside their farms; and (2) compost is in considerably higher demand as a fertilizer for various crops than is slurry or liquid manure in Japan where fertilizers tend to be lost by heavy rain and the expectations of the protection of water quality, prevention of odor, and sanitary management are high.

Anaerobic Lagoons have been reported as "NO". Because there are quite a small number of livestock farmers who have enough area of field to spread manure, and it is assumed that there are no livestock farmers who use anaerobic lagoons. There are cases when manure is spread to fields in Japan, but even in these cases, stirring is conducted before the spreading. Therefore, there are no anaerobic manure management systems.

(4) Nitrogen in Livestock Manure Applied to Agricultural Soil

The percentage of application of manure-derived organic fertilizers was calculated by subtracting the nitrogen contents in the livestock manure disposed of in the "direct final disposal", the nitrogen volatized as nitrous oxide, the nitrogen volatilized as ammonia and nitrogen oxides, and the nitrogen eliminated by "incineration" and "purification", from the total nitrogen contained in livestock manure excreted in sheds and barns.

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

CH_4 emissions associated with the management of manure excreted by buffalo, sheep, goats, and horses were calculated using the Tier 1 method in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 4.33, Fig. 4.3).

N_2O emissions associated with a management of the manure of sheep, goats and horses have been calculated, using the Tier 1 method in accordance with decision tree from *Good Practice Guidance* (2000) (Page 4.41, Fig. 4.4).

2.5.4.3 Rice Cultivation (4.C.)

CH_4 is generated under anaerobic conditions by the action of microbes. Therefore, paddy fields provide favorable conditions for methane generation. Intermittently and continuously flooded paddy fields are targeted in this category. In Japan, rice cultivation is practiced mainly on intermittently flooded paddy fields.

2.5.4.3.a Intermittently Flooded (Single Aeration) (4.C.1.-)

CH_4 emissions from intermittently flooded paddy fields (single aeration) were calculated by taking the overall usage of organic fertilizers into account, since the actual measurements of emission factors per soil type for each type of organic fertilizer application existed. The amount of CH_4 generated per type of soil for each method of organic matter management was calculated by multiplying the area of intermittently flooded paddy fields by the amount of CH_4 generated per type of soil per unit area for each management method, percentage of the area of each type of soil, and

percentage of each management method.

2.5.4.3.b Continuously Flooded (4.C.1.-)

CH_4 emissions from continuously flooded paddies have been calculated using country-specific emission factors for different soil types and for different organic amendments, in accordance with decision tree from *Good Practice Guidance (2000)* (Page 4.79, Fig. 4.9).

2.5.4.3.c Rainfed & Deep Water (4.C.2., 4.C.3.)

As indicated in the IRRI (International Rice Research Institute) *World Rice Statistics 1993–94*, rain-fed paddy fields and wet bed methods do not exist in Japan. Therefore, this category has been reported as "NO".

2.5.4.3.d Other (4.C.4.)

As indicated in the IRRI (International Rice Research Institute) *World Rice Statistics 1993-94*, a possible source of emissions in this category is upland crop paddies, but since upland crop paddies are not flooded, like the soil of fields, they are acidic and do not become anaerobic. The bacteria that generate CH_4 are definitely anaerobic, and unless the soil is maintained in an anaerobic state, there will be no generation of methane. As generation of methane is not feasible, this category was reported as "NA".

2.5.4.4 Agricultural Soils (4.D.)

This section provides the estimation methods for N_2O direct emissions from soils (by applied synthetic fertilizers, organic fertilizers, nitrogen fixation by N-fixing crops, crop residue and plowing of organic soil), and for N_2O indirect emissions (by atmospheric deposition and nitrogen leaching and run-off).

2.5.4.4.a Direct Emissions (4.D.1.)

(1) Synthetic Fertilizers (4.D.1.-)

N_2O emissions associated with the application of synthetic fertilizer to farmland soil (field lands) were calculated, using country-specific emission factors, and in accordance with the decision tree from *Good Practice Guidance (2000)* (Page. 4.55 Fig. 4.7).

(2) Organic Fertilizer (Application of Animal Waste) (4.D.1.-)

Emissions of N_2O associated with the application of organic fertilizer (livestock and other compost and barnyard manure) to agricultural soils have been calculated using the country-specific emission factors, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 4.55, Fig. 4.7).

(3) N-fixing Crops (4.D.1.-)

Emissions are calculated by taking the amount of nitrogen fixed by nitrogen-fixing crops, which is estimated using Japan's observation data, and multiplying by country-specific emission factor.

(4) Crop Residue (4.D.1.-)

N_2O emissions associated with the application of crop residues to agricultural soils were calculated by multiplying the default emissions factors given in the *Revised 1996 IPCC Guidelines* by the nitrogen input through the use of crop residues for soil amendment.

(5) Plowing of Organic Soil (4.D.1.-)

Emissions of N_2O from the plowing of organic soil were calculated by multiplying the area of the plowed organic soil of paddy fields and upland fields by the emission factor in accordance with the *Revised 1996 IPCC Guidelines* and *Good Practice Guidance (2000)*.

2.5.4.4.b Pasture, Range and Paddock Manure (4.D.2.)

The method for calculating CH_4 and N_2O emissions from pasture, range, and paddock cattle manure is described in 6.3.1 "Livestock Waste Management: Cattle, Swine and Poultry (4.B.1., 4.B.8., 4.B.9.)". N_2O emissions are counted in 4.D.2.

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

(1) Atmospheric Deposition (4.D.3.-)

N_2O emissions associated with atmospheric deposition have been calculated using default emission factors, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 4.69, Fig. 4.8).

(2) Nitrogen Leaching and Run-off (4.D.3.-)

N_2O emissions associated with leaching and run-off of nitrogen were calculated according to the decision tree from *Good Practice Guidance (2000)* (Page 4.69, Fig. 4.8), by multiplying Japan's country-specific emission factors by the amount of nitrogen that leached or ran off.

2.5.4.5 Prescribed Burning of Savannas (4.E.)

This source is given in the *Revised 1996 IPCC Guidelines* as "being for the purpose of managing pastureland in sub-tropical zones." There is no equivalent activity in Japan, and this source has been reported as "NO".

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

Incomplete burning of crop residues in fields releases CH_4 and N_2O into the atmosphere. CH_4 and N_2O emissions from this source are calculated and reported in this category.

2.5.4.6.a Rice, Wheat, Barley, Rye, and Oats (4.F.1.)

CH_4 and N_2O emissions from the field burning of crop residues of rice, wheat, barley, rye, and oats were calculated, using the default technique indicated in the *Revised 1996 IPCC Guidelines* and *Good Practice Guidance (2000)*, multiplying the amounts of carbon and nitrogen released by field burning by the methane emission rate and nitrous oxide emission rate, respectively.
Wheat, barley, rye, and oats are cultivated either as grain or green crops. The portions of the green crops which were cultivated for use of the entire above ground mass for cattle feed were excluded from the calculation of emissions.

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

CH_4 and N_2O emissions from the field burning of crop residues of corn, peas, soy, adzuki beans, kidney beans, peanuts, potatoes and other root crops (sugarbeets), and sugar cane were calculated in accordance with the relevant decision tree in *Good Practice Guidance (2000)* (page 4.52, Fig. 4.6),

multiplying the total carbon released, as calculated by the default technique, by the default CH_4 emission rate and N_2O emission rate, respectively.

2.5.4.6.c Dry beans (4.F.2.-)

Dry beans are a type of kidney beans, and the term refers to the mature, husked vegetable. Kidney beans in Japan are eaten before ripening, however, which means there is little of this type of product. Kidney beans are included in Beans (4.F.2.), under "Other crops" and, therefore, dry beans have been reported as "IE".

2.5.4.6.d Other (4.F.5.)

It is possible that agricultural waste other than cereals, pulse, root vegetables and sugar canes are burnt in the fields. However, data on actual activity is not available and it is not possible to establish the emission factor. Therefore, these sources have been reported as "NE".

2.5.5 Land Use, Land-Use Change and Forestry (CRF sector 5)

2.5.5.1 Forest land (5.A.)

Forests absorb CO_2 from the atmosphere by photosynthesis; they fix carbon as organic substances and store these substances for a given period. In contrast, events such as logging and natural disturbances can possibly make forests a source of CO_2.

In FY2007, Japan's forest land area was about 25.0 million ha—about 66.1% of the total national land area. The net CO_2 removal by this category in FY2007 was 82,867 Gg-CO_2 (excluding 2.1 Gg-CO_2 of CH_4 and N_2O emissions resulting from biomass burning); this represents an increase of 2.6% over the FY1990 value, and a decrease by 0.6% over the FY2006 value.

This section divides forest land into two subcategories, Forest land remaining Forest land (5.A.1.) and Land converted to Forest land (5.A.2.), and describes them separately in the following subsections.

2.5.5.1.a Forest land remaining Forest land (5.A.1.)

(1) Carbon Stock Changes in Living Biomass

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in living biomass in forest land remaining forest land are estimated by the Tier 2 stock change method. In this method, a biomass stock change is the difference between the absolute amount of biomass at two points in time.

(2) Carbon Stock Changes in Dead Organic Matter and Soils

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in dead wood, litter and soil in forest land remaining forest land are estimated by the Tier 3 model method.

Carbon emissions/removals in each pool per unit area are estimated by using the CENTURY-jfos model and are multiplied by the land area of each forest management type. The sum of all forest management types is the annual change in total carbon stocks in dead wood, litter and soil.

2.5.5.1.b Land converted to Forest land (5.A.2)

(1) Carbon Stock Changes in Living Biomass

Carbon stock change in living biomass in land converted to forest land has been calculated, using the

Tier 2 stock change method in accordance with page 3.18 of the GPG-LULUCF. In this method, biomass stock change is estimated by the difference between the biomass at time t2 and time t1, with additional subtracted biomass stock change due to land conversion.

(2) Carbon Stock Changes in Dead Organic Matter and Soils

Carbon stock changes in dead wood, litter and soils were calculated under the assumption that these carbon stocks have changed linearly from those in land-use categories other than forest land to those in forest land during the past 20 years.

2.5.5.2 Cropland (5.B)

Cropland is the land that produces annual and perennial crops; it includes temporarily fallow land. Cropland in Japan's inventory consists of rice fields, upland fields and orchards.

In FY2007, Japan's cropland area was about 4.03 million ha, which is equivalent to about 10.7% of the national land. The emissions from this category in FY2007 were 265 Gg-CO_2 (excluding 7.9 Gg-CO_2 eq. of N_2O emissions resulting from disturbance associated with land-use conversion to cropland and 230 Gg-CO_2 of CO_2 emissions resulting from lime application to cropland), which was a 87.1% decrease from the FY1990 value and a 3.4% increase over the FY2006 value.

This section divides cropland into two subcategories, Cropland remaining Cropland (5.B.1.) and Land converted to Cropland (5.B.2.), and describes them separately in the following subsections.

2.5.5.2.a Cropland Remaining Cropland (5.B.1)

This subcategory deals with carbon stock changes in the cropland, which has remained as cropland during the past 20 years.

With respect to living biomass, the carbon stock change in perennial tree crops (fruit trees) is subject to estimation according to GPG-LULUCF. However, in Japan, tree growth is limited by trimming. In order to have high productivity, tree height is kept low, and the tree shape is managed and improved the by pruning the lateral branches. Therefore, carbon accumulation because of tree growth can not be expected, and the annual carbon fixing volume of perennial tree crops in all orchards is stated as "NA."

Although the estimation method for dead organic matter is not given in GPG-LULUCF, an estimate input cell is found in CRF. Therefore, carbon stock change in dead organic matter is reported as "NE".

With respect to soil, its carbon stock change is reported as "NA" according to Tier 1 given in GPG-LULUCF, because soil carbon stocks are assumed not to have changed during the past 20 years regardless of any changes in management practices.

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

(1) Carbon Stock Changes in Living Biomass

The Tier 2 method is applied to the case of forest land converted to cropland. The Tier 1 method is used for the case of land uses other than forest land converted to cropland. Provisional and default values of the amount of biomass accumulation are used for the Tier 1 method.

(2) Carbon Stock Changes in Dead Organic Matter and in Soils

Carbon stock changes in dead wood, litter and soils were calculated under the assumption that these carbon stocks have changed linearly from those in land-use categories other than forest land to those

in forest land during the past 20 years. Since all soils are regarded as being mineral, organic soil is reported as “IE”.

2.5.5.3 Grassland (5.C)

Grassland is generally covered with perennial pasture and is used mainly for harvesting fodder or grazing.

In FY2007, Japan’s grassland area was about 0.91 million ha, which is equivalent to about 2.4% of the national land. The net CO_2 removals from this category in FY2007 were 615 Gg-CO_2 (excluding 230 Gg-CO_2 of CO_2 emissions resulting from agricultural lime application), which was a 19.1% increase over the FY1990 value and a 1.0% decrease from the FY2006 value.

This section divides grassland into two subcategories, Grassland remaining Grassland (5.C.1.) and Land converted to Grassland (5.C.2.), and describes them separately in the following subsections.

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

This subcategory deals with carbon stock changes in the grassland, which has remained as grassland during the past 20 years.

With respect to living biomass, its carbon stock change is assumed to be constant and reported as “NA” according to Tier 1.

Although the estimation method for dead organic matter is not given in GPG-LULUCF, an estimate input cell is found in CRF. Therefore, carbon stock change in dead organic matter is reported as “NE”.

With respect to soil, its carbon stock change is reported as “NA” according to Tier 1 given in the GPG-LULUCF, because soil carbon stocks are assumed not to have changed during the past 20 years regardless of any changes in management practices.

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

(1) Carbon Stock Changes in Living Biomass

The Tier 2 method is applied to the cases of forest land and cropland (rice fields) converted to grassland (pasture lands). The Tier 1 method is used for land uses other than forest land and cropland (rice fields) converted to grassland (pasture lands). The biomass growth is assumed to be complete during the first five years after the land-use conversion. Therefore, the annual biomass stock change in the living biomass in grassland is the sum of biomass stock changes over the last five years.

(2) Carbon Stock Changes in Dead Organic Matter and Soils

Carbon stock changes in dead wood, litter and soils were calculated under the assumption that these carbon stocks have changed linearly from those in land-use categories other than grassland to those in grassland land during the past 20 years. Since all soils are regarded as being mineral, organic soil is reported as “IE”.

2.5.5.4 Wetlands (5.D)

Wetlands are the land that are covered with or soaked in water throughout the year. They do not fall under the categories of forest land, cropland, grassland, or settlements. GPG-LULUCF divides wetlands into two large groups: peat land and flooded land.

In FY2007, Japan’s wetland area was about 1.33 million ha, which is equivalent to about 3.5% of the

national land. The CO_2 emissions from this category in FY2007 were 167 Gg-CO_2, which was a 42.9% decrease from the FY1990 value and a 10.6% decrease from the FY2006 value.
This section divides wetlands into two subcategories, Wetlands remaining Wetlands (5.D.1.) and Land converted to Wetlands (5.D.2.), and describes them separately in the following subsections.

2.5.5.4.a Wetlands remaining Wetlands (5.D.1)

This subcategory deals with carbon stock changes in the Wetlands, which have remained as Wetlands during the past 20 years. Carbon stock changes in organic soils that are managed for peat extraction are reported as "NO", since the peat extraction is not carried out in Japan. (Default value for Japan is not provided in GPG-LULUCF p.3.282 Table 3A3.3). Flooded land remaining flooded land is not calculated at the present time as this will be treated in an appendix, and reported as "NE".

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

(1) Carbon Stock Changes in Living biomass

The Tier 2 method is applied.

(2) Carbon Stock Changes in Dead Organic Matter and Soils

Carbon stock changes in dead wood, litter and soils were calculated under the assumption that these carbon stocks have changed linearly from those in land-use categories other than wetlands to those in wetlands land during the past 20 years. Since all soils are regarded as being mineral, organic soil is reported as "IE".

2.5.5.5 Settlements (5.E)

Settlements are all developed land, including transportation infrastructure and human habitats, and preclude lands that have been placed in other land-use categories. In Settlements, trees existing in urban green areas such as urban parks and special greenery conservation zones absorb carbon.
In FY2007, Japan's settlement area was about 3.68 million ha, equivalent to about 9.7% of the national land. The net CO_2 emissions by this category in FY2006 were 849 Gg-CO_2, which was 72.4% decrease from the FY1990 value, and 8.2% decrease from the previous year.
This section divides settlements into two subcategories, Settlements remaining Settlements (5.E.1.) and Land converted to Settlements (5.E.2.), and describes them separately in the following subsections.
Carbon pools estimated in settlements are living biomass and dead organic matter. Soil carbon stock changes in settlements are not estimated because their method of estimation is not described in GPG-LULUCF. Nonetheless, soil carbon stock changes will be estimated, if necessary, when data is obtained from research.
With respect to activity data, Tier 1a and Tier 1b of GPG-LULUCF assume that removals derived from biomass growth are equal to emissions derived from biomass loss where the average tree age in a green area is older than 20 years. Therefore, carbon stock changes in urban green areas more than 20 years old are regarded as zero and not estimated. Moreover, urban green areas included in the activity data are divided into two categories; urban green facilities established as urban parks and special greenery conservation zones on which conservation measures are applied and permanent protection is ensured.

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

(1) Carbon Stock Changes in Living Biomass

Due to the different characteristics of urban green areas, the Tier 1a method is used for special greenery conservation zones that are communal green areas, and Tier 1b is used for urban green facilities that are urban parks, green areas by greenery promoting system for private green space, and green areas in roads, ports, around sewage treatment facilities, along rivers and erosion control sites, and around government buildings and public rental housing.

(2) Carbon Stock Changes in Dead Organic Matters

This category estimates carbon stock changes in litter in urban parks and green areas in ports. Carbon stock changes in dead wood result in "IE" because they are included in carbon stock changes in living biomass. Carbon stock changes in litter in the subcategories other than urban parks and green areas in ports are not estimated due to the difficulty of obtaining their activity data.

2.5.5.5.b Land converted to Settlements (5.E.2)

(1) Carbon Stock Changes in Living Biomass

Carbon stock changes in living biomass under the land converted to settlements are estimated by calculating the carbon stock changes before and after conversion and adding annual carbon stock changes in land converted to urban green areas. The carbon stock changes in living biomass before and after conversion are estimated by applying the equation of section 3.6.2 in GPG-LULUCF (multiplying the land area converted from each land use to settlements by the difference between the values of biomass stock before and after conversion, and by the carbon fraction). Biomass stocks in land converted to urban green areas are increased due to the growth of trees planted after conversion. Hence, carbon stock changes in living biomass in land converted to urban green areas are estimated by making carbon stock changes before and after conversion plus annual carbon stock changes after conversion that are estimated by applying the Tier 1b method from section 3A.4.1.1.1 in GPG-LULUCF.

(2) Carbon Stock Changes in Dead Organic Matter

Carbon stock changes in dead organic matter under the land converted to settlements are estimated by summing up the carbon stock changes in settlements converted from forest land and the carbon stock changes in litter on the land (other than forest land) converted to urban parks and green areas on port.

2.5.5.6 Other Land (5.F)

Other land consists of land areas that are not included in the other five land-use categories. It includes bare land, rock, ice, and unmanaged land areas. Other land in Japan includes areas abandoned after cultivation, areas used for national defense, and the northern territories of Japan. In FY2007, Japan's other land area was about 2.86 million ha, which is equivalent to about 7.6% of the national land. The areas are determined by subtracting the summed areas of the other five land-use categories from the national land area shown in *the Land Use Status Survey* compiled by the Ministry of Land, Infrastructure, Transport, and Tourism. The CO_2 emissions from this category in FY2007 were 608 Gg-CO_2, which was a 36.5% decrease from the FY1990 value and a 10.6% decrease/increase over the FY2006 value.

This section divides other land into two subcategories, Other land remaining Other land (5.F.1.) and Land converted to Other land (5.F.2.), and describes them separately in the following subsections.

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

This subcategory deals with carbon stock changes in other land, which has remained as other land during the past 20 years. However, changes in carbon stocks and non-CO_2 emissions and removals in this subcategory are not considered in accordance with GPG-LULUCF.

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

(1) Carbon stock change in Living Biomass

The Tier 2 method is applied.

(2) Carbon Stock Change in Dead Organic Matter

The Tier 2 method is applied.
Carbon stock changes in dead wood and litter were calculated under the assumption that these carbon stocks have changed linearly from those in land-use categories other than other land to those in other land during the past 20 years.

2.5.5.7 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 fertilization application in forest land may not conducted in Japan. Therefore, these sources have been reported as “IE”.

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

Regarding the N_2O emissions from soil drainage activities in forest land and wetlands, experts advised that the N_2O emissions are extremely low, because the soil drainage activities are very rarely carried out in Japan. Based on this advice, this category is reported as “NO”.

2.5.5.9 N_2O emissions from disturbance associated with land-use conversion to Cropland (5.(III))

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

2.5.5.10 CO_2 emissions from agricultural lime application (5.(IV))

Tier 1 method is used in accordance with GPG-LULUCF (page 3.80).

2.5.5.11 Biomass burning (5.(V))

For CH_4 and N_2O emissions due to biomass burning, the Tier 1 method is used.

2.5.6 Waste (CRF Sector 6)

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

This category includes CH_4 and CO_2 emissions from solid waste disposal on land. The CO_2 emissions from this source category are biogenic in origin and therefore the emissions are not

included in national total emissions. Since wastes are classified into municipal and industrial solid waste, category-specific methods were used for emission estimates. Emissions from waste types in Table 2.14 were estimated for solid waste disposal on land.

Table 2.14 Categories whose emissions are estimated for solid waste disposal on land (6.A.)

Category	Waste types estimated			Treatment type
6.A.1.	Municipal solid waste	Kitchen garbage		Anaerobic landfill / Semi-aerobic landfill
		Waste paper		Anaerobic landfill / Semi-aerobic landfill
		Waste wood		Anaerobic landfill / Semi-aerobic landfill
		Waste textiles (natural fiber) [a]		Anaerobic landfill / Semi-aerobic landfill
		Sludge	Human waste treatment, Septic tank sludge	Anaerobic landfill / Semi-aerobic landfill
	Industrial waste	Kitchen garbage		Anaerobic landfill [b]
		Waste paper		
		Waste wood		
		Waste textiles (natural fiber) [a]		
		Sludge	Sewage sludge	
			Waterworks sludge	
			Organic sludge from manufacturing industries	
			Livestock waste [c]	
6.A.3.	Inappropriate disposal [d]			Anaerobic landfill

a) Only natural fiber waste textiles are included in the estimation under the assumption that synthetic fiber waste is not biologically decomposed in landfills.

b) For landfill disposal of industrial waste, the entire volume is deemed to have been disposed of in an anaerobic landfill because the percentage disposed of in semiaerobic landfill cannot be determined.

c) Although livestock waste is not classified as “sludge” under Japanese law, emissions from it were estimated within the category of sludge because of the similarities in their properties.

d) Illegally dumped waste containing biodegradable carbon is considered to include waste wood, waste paper, and sludge. However, only the emissions from waste wood were calculated, because only its state of dumping is known at present.

2.5.6.1.a Emissions from Controlled Landfill Sites (6.A.1.)

An emissions calculation method is used that complies with the 2006 IPCC Guidelines decision tree (Tier 3) and combines the revised FOD methods with parameters unique to Japan. Japan’s emission coefficient is defined as the CH_4 amount produced by biodegraded waste, while the activity amount is defined as the biodegraded waste amount during the fiscal year of calculation.

2.5.6.1.b Emissions from Unmanaged Waste Disposal Sites (6.A.2)

There are no unmanaged waste disposal sites in Japan, because landfill sites in Japan are appropriately controlled pursuant to the Waste Disposal and Public Cleansing Law. Therefore, the emission from this source category is reported as NA.

2.5.6.1.c Emissions from Other Controlled Landfill Sites (6.A.3.)

(1) Emissions from Inappropriate Disposal (6.A.3.a)

"Waste wood" and "waste paper" are types of waste which contain biodegradable carbon content and which are inappropriately disposed without incineration, but because the amount of waste paper that remains is very small, only waste wood is estimated.
Just as with Emissions from Controlled Disposal Sites (6.A.1.), a FOD method with unique Japanese parameters is used for estimation. Emissions from the part of the wood that is inappropriately disposed of without incineration are estimated by multiplying an emission factor by the amount of wood (dry basis) that degrades in the estimation year.

2.5.6.2 Wastewater Handling (6.B.)

The CH_4 and N_2O emissions from wastewater handling were estimated. The categories for estimation are shown in Table 2.15. Since wastewater and sludge treatment processes are combined in the emission factors used in Japan, emissions from these processes were also combined for estimation.

Table 2.15 Categories for which wastewater amount is estimated under wastewater handling (6.B.)

Category	Type Estimated	Forms of Treatment		CH_4	N_2O
6.B.1.	Industrial wastewater	(Sewage treatment plants)		○	○
6.B.2.	Domestic/commercial wastewater	Sewage treatment plants (8.3.2.1)		○	○
		Domestic wastewater treatment facilities (mainly septic tanks) (8.3.2.2)	Community plant	○	○
			Gappei-shori johkasou	○	○
			Tandoku-shori johkasou	○	○
			Vault toilet	○	○
		Human waste treatment facilities (8.3.2.3)	High-load denitrification treatment	○	○
			Membrane separation	○	○
			Anaerobic treatment	○	○
			Aerobic treatment	○	
			Standard denitrification treatment	○	
			Other	○	
	Degradation of domestic wastewater in nature (8.3.2.4)	Discharge of untreated domestic wastewater	*Tandoku-shori johkasou*	○	○
			Vault toilet	○	○
			On-site treatment	○	○
		Sludge disposal at sea	Human waste sludge	○	○
			Sewage sludge	○	○

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

The *Good Practice Guidance (2000)* decision tree is followed in estimating methane emissions on a BOD basis and N_2O emissions on a nitrogen basis for industries that have much organic matter in their wastewater. As the default values set in the *Revised 1996 IPCC Guidelines* seem unsuited to Japan's situation, methane emissions were estimated by multiplying the annual amount of organic matter in industrial wastewater (BOD basis) by the emission factor per unit BOD since BOD value is used in effluent regulation in Japan. Because CH_4 is emitted in wastewater biological treatment processes, BOD-based activity data (amount of organic matter in wastewater degraded through biological treatment) is thought to be preferable to COD-based data. For this reason, CH_4 emissions are calculated in Japan using BOD. N_2O emissions were estimated by multiplying the amount of nitrogen in industrial wastewater by the emission factor of N_2O generated when treating industrial wastewater.

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

(1) Sewage Treatment Plants (6.B.2.a)

Emissions of CH_4 and N_2O from this source have been calculated using Japan's country-specific method, in accordance with the decision tree from *Good Practice Guidance (2000)* (Page 5.14, Fig. 5.2). Emissions were derived by multiplying the volume of sewage treated at sewage treatment plants by the emission factor.

(2) Domestic Sewage Treatment Plants (mainly septic tanks) (6.B.2.b)

CH_4 and N_2O emitted from this source were calculated using Japan's country-specific method, in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.14, Fig. 5.2). Emissions were derived by multiplying the annual population of treatment for each type of domestic sewage treatment plant by the emission factor.

(3) Human-Waste Treatment Plants (6.B.2.c.)

CH_4 emitted from this source has been calculated using Japan's country-specific methodology, in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.14, Fig. 5.2). Emissions were calculated by multiplying the volume of domestic wastewater treated at human waste treatment plants by the emission factor.

N_2O emitted from this source has been calculated using Japan's country-specific methodology, in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.14, Fig. 5.2). Emissions were calculated by multiplying the volume of nitrogen treated at human waste treatment plants by the emission factor.

(4) Emission from the Natural Decomposition of Domestic Wastewater (6.B.2.d)

The calculation method was established in accordance with the method described in the 2006 IPCC Guidelines. In the natural decomposition of wastewater, the volume of both organic matter extracted as sludge and recovered methane was zero. Accordingly, CH_4 emissions were calculated by multiplying the volume of organic matter contained in the untreated domestic wastewater that was discharged into public waters by the emission factor. The N_2O emission was calculated by multiplying the volume of nitrogen contained in the wastewater by the emission factor.

(5) Recovery of CH_4 emitted from treating domestic and commercial wastewater (6.B.2.-)

The amount of CH_4 recovered from sludge digesters at sewage treatment plants is calculated by multiplying the amount of digester gas recovered from digesters by an emission factor that takes into account the concentration of methane in digester gas.

2.5.6.3 Waste Incineration (6.C.)

Japan uses incinerators to reduce the volume of waste. Emissions of CO_2, methane, and N_2O from the incineration of the wastes are estimated in this category.

The following reporting categories which fall under the "Emissions from Waste Used as Energy and the Incineration of Waste Accompanied by Energy Recovery" are moved from Incineration of Waste (Category 6.C.) to Fuel Combustion (Category 1.A.) in accordance with the *Revised 1996 IPCC Guidelines* and *Good Practice Guidance* (2000).

- Emissions from the Incineration of Waste in Which Energy is Recovered
- Emissions from Waste Used Directly as Fuel
- Emissions from Fuel Made from Waste

Accordingly, the emissions reported under the Incineration of Waste (Category 6.C.) are the emissions from the incineration without recovery of energy (simple incineration). Reporting categories for the calculation of emissions from the incineration of waste are summarized in Table 2.16.

As the *Revised 1996 IPCC Guidelines* stipulate, the concept for the emission factors and estimation methods used in the Waste Incineration (Category 6.C.) should be same as that applied to the calculation of emissions from the incineration of waste used as energy and that from which energy is recovered. As it is desirable to estimate emissions in a consistent manner regardless of whether energy is used or not in order to prevent duplication or omission of the emissions, the description of the methods of estimating emissions is included in the Incineration of Waste (Category 6.C.) as was the case in the past.

Table 2.16 Categories for the calculation of emissions from waste incineration (6.C.)

Incineration	Waste category	Estimation classification	Category of estimation	CO_2	CH_4	N_2O
Waste incineration (without energy recovery)	Municipal solid waste	Plastic	6.C.1	○	○ Estimated in bulk	○ Estimated in bulk
		Synthetic textile	6.C.1	○		
		Other (biogenic)[a)]	6.C.1			
	Industrial solid waste	Waste oil	6.C.2	○	○	○
		Waste plastic	6.C.2	○	○	○
		Other (biogenic)[a)]	6.C.2		○	○
	Specially controlled industrial waste	Waste oil	6.C.3	○	○	○
		Infectious waste (plastic)	6.C.3	○	○	○
		Infectious waste (except plastic) [a)]	6.C.3		○	○
Waste incineration with energy recovery	Municipal solid waste	Plastic	1.A.1	○	○ Estimated in bulk	○ Estimated in bulk
		Synthetic textile	1.A.1	○		
		Other (biogenic) [a)]	1.A.1			
	Industrial solid waste	Waste oil	1.A.1	○	○	○
		Waste plastic	1.A.1	○	○	○
		Other (biogenic) [a)]	1.A.1		○	○
Direct use of waste as fuel	Municipal solid waste	Plastic	1.A.1/2	○	○	○
	Industrial solid waste	Waste oil	1.A.2	○	○	○
		Waste plastic	1.A.2	○	○	○
		Waste wood	1.A.2		○	○
	Waste tire	Fossil origin	1.A.1/2	○	○	○
		Biogenic origin	1.A.1/2			
Use of waste processed as fuel	Refuse derived fuel (RDF/RPF)	Fossil origin	1.A.2	○	○	○
		Biogenic origin	1.A.2			

a) The CO_2 emissions from the incineration of biomass-derived waste is not included in the total emissions in accordance with the *Revised 1996 IPCC Guidelines*; instead it is estimated as a reference value and reported under " Biogenic" in Table 6.A,C of the CRF.

Table 2.17 GHG emissions from incineration of waste (Category 6.C.) (FY2007)

Incineration type	Waste category	Estimation classification	Unit	CO_2	CH_4	N_2O
Waste incineration (without energy recovery)	Municipal solid waste	Plastics	Gg CO_2	3154.5	5.1	242.0
		Synthetic textile	Gg CO_2	455.4		
		Other (biogenic)[a)]	Gg CO_2			
	Industrial solid waste	Waste oil	Gg CO_2	4577.4	0.2	5.8
		Waste plastic	Gg CO_2	4284.6	1.1	93.5
		Other (biogenic)[a)]	Gg CO_2		3.2	3553.9
	Specially-controlled waste	Waste oil	Gg CO_2	1503.8	0.1	1.9
		Infectious waste plastics	Gg CO_2	432.6	0.1	9.4
		Infectious waste (except plastics)	Gg CO_2		0.1	1.5
Total			Gg CO_2	14408.3	9.8	3907.9

a) The CO_2 emissions from the incineration of biomass-derived waste is not included in the total emissions in accordance with the *Revised 1996 IPCC Guidelines*; instead it is estimated as a reference value and reported under " Biogenic" in Table 6.A,C of the CRF.

2.5.6.3.a Municipal Solid Waste Incineration (6.C.1.)

Emissions of CO_2 from this source has been calculated by using Japan's country-specific emission factors, the volume of waste incinerated (dry basis) and percentage of municipal waste incinerated at the municipal incineration facilities which recover energy, in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.26, Fig. 5.5). Emissions from plastics and synthetic textile scraps in municipal waste were estimated for the estimation of CO_2 emissions from the incineration of fossil-fuel-derived waste[9].

$$E = EF \times A \times (1 - R)$$

E : Emission of CO_2 from the incineration of various types of waste (kg CO_2)
EF : Emission factor for the incineration of various types of waste (dry base) (kg CO_2/t)
A : Volume of each type of waste incinerated (dry basis) (t)
R : Percentage of municipal solid waste incinerated at facilities with energy recovery
E : Emission of CO_2 from the incineration of various types of waste (kg CO_2)

CH_4 emissions from the incineration of municipal waste were calculated by taking the amount of incinerated municipal waste by incinerator type (emission basis) and multiplying by the emission factor established for each type, and then multiplying the result by the percentage of municipal waste incinerated in energy-recovering municipal incinerators.

Emissions of N_2O from the incineration of municipal solid waste were determined in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.27, Fig. 5.6). Specifically, the emissions were calculated by multiplying the volume of the municipal solid waste incinerated (wet basis) by Japan's country-specific emission factor that was determined from the N_2O concentration of flue gas from the incinerators of municipal solid waste and by the percentage of municipal solid waste incinerated at incineration facilities with energy recovery.

2.5.6.3.b Industrial Waste Incineration (6.C.2)

Emissions of CO_2 from this source have been calculated using the volume of waste oil and waste

[9] Emissions from the incineration of kitchen garbage, waste paper, waste natural fiber textiles and waste wood were accounted for as the reference figures of biogenic waste. Estimation methods for their emissions are the same as those for emissions from the incineration of plastics and synthetic textile scraps.

plastics incinerated, and Japan's country-specific emission factor, in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.26, Fig. 5.5). Since industrial textile waste does not include synthetic fabric scraps under the regulation of the Waste Disposal and Public Cleansing Law, industrial textile waste is regarded as natural fiber waste. Thus the CO_2 emissions from incineration of industrial textile waste are not included in national total because of the emissions are from a biogenic source.

Emissions of CH_4 from this source have been calculated by multiplying the volume of industrial waste incinerated by Japan's country-specific emission factor and by the percentage of industrial solid waste incinerated at facilities with energy recovery.

N_2O emissions from this source were calculated by multiplying the incinerated volume of the industrial waste by Japan's country-specific emission factor and by the percentage of industrial solid waste incinerated at facilities with energy recovery. For sewage sludge, a separate emission factor was calculated for each type of flocculant and incinerator used, and where high-molecular-weight flocculants and fluidized-bed incinerators were used, separate emission factors were calculated for different combustion temperatures.

2.5.6.3.c Incineration of Specially Controlled Industrial Waste (6.C.3)

Emissions of CO_2 from the incineration of waste oil and infectious plastic waste contained in specially controlled industrial waste were calculated in accordance with the decision tree from *Good Practice Guidance* (2000) (Page 5.26, Fig 5.5) using Japan's country-specific emission factors and the incinerated volume.

Emissions of CH_4 from the incineration of waste categorized as waste oil and infectious plastic waste of specially controlled industrial waste were calculated by multiplying the volume of incinerated waste by type (wet basis) by Japan's country-specific emission factor.

Emissions of N_2O from the incineration of the waste oil and infectious plastic waste in specially controlled industrial waste were calculated by multiplying the incinerated volume of each type of waste (wet basis) by Japan's country-specific emission factor.

Because the actual state of energy recovery from the incineration of specially controlled industrial waste is not sufficiently understood, the emissions from specially controlled industrial waste are reported entirely in Waste Incineration (Category 6.C.).

2.5.6.4 Emissions from Waste Incineration with Energy Recovery (1.A.)

2.5.6.4.a Incineration of Municipal Solid Waste with Energy Recovery (1.A.1.a)

A methodology similar to that used in Incineration of Municipal Waste (6.C.1) is used.

2.5.6.4.b Incineration of Industrial Solid Waste with Energy Recovery (1.A.1.a)

A methodology similar to that used in Incineration of Industrial Waste (6.C.2) is used.

2.5.6.5 Emissions from Direct Use of Waste as Fuel (1.A.)

The reporting category for emissions for each type of waste, according to its use as fuel or raw material, is Energy Industry (Category 1.A.1.) or Manufacturing and Construction (1.A.2). The fuel type is classified as "Other fuels".

The GHG emissions during the direct use of waste as a raw material, such as plastics used as reducing agents in blast furnaces or as a chemical material in coking furnaces, or the use of

intermediate products manufactured using waste as a raw material, are calculated in this category. Waste used as raw material and waste used as fuel are combined and expressed as "Raw Material/Fuel Use" in this section.

Table 2.18 Estimation category for emissions from the direct use of waste as fuel

Emission source	Application breakdown	Major application	Reporting category of energy sector
Use of municipal solid waste (plastics) as alternative fuel or raw material	Petrochemical	Fuel	1A2f Other
	Blast furnace reducing agent	Reducing agent in blast furnace	1A2a Iron & Steel
	Coke oven chemical feedstock	Alternative fuel or raw material in coke oven	1A1c Manufacture of solid fuels
	Gasification	Fuel	1A2f Other
Use of waste oil as alternative fuel or raw material	Cement burning	Cement burning	1A2f Cement & Ceramics
	Other	Fuel	1A2f Other
Use of industrial solid waste (waste plastics) as alternative fuel or raw material	Blast furnace reducing agent	Blast furnace reducing agent	1A2a Iron & Steel
	Cement burning	Cement burning	1A2f Cement & Ceramics
Use of industrial solid waste (waste wood) as alternative fuel or material	-	Fuel	1A2f Other
Use of waste tire as alternative fuel or raw material	Cement burning	Cement burning	1A2f Cement & Ceramics
	Boiler	Fuel	1A2f Other
	Iron manufacture	Alternative fuel or raw materials in iron manufacturing	1A2a Iron & Steel
	Gasification	Fuel in iron manufacturing	1A2a Iron & Steel
	Metal refining	Fuel in metal refining	1A2b Non-ferrous metals
	Tire manufacture	Fuel in tire manufacturing	1A2c Chemicals
	Paper manufacture	Fuel in paper manufacturing	1A2d Pulp, paper and print
	Power generation	Power generation	1A1a Public electricity and heat production*

*1A1a was utilized when the industry category for use could not be specified.

CO_2 emissions were calculated by multiplying the incinerated volume of each type of waste used as either raw material or fuel by Japan's country-specific emission factor. The wastes included in the calculation were the portions used as raw material or fuel of: plastics in municipal solid waste; waste plastics and waste oil in industrial waste and waste tires.

CH_4 and N_2O emissions were calculated by multiplying the amount of each type of waste used as raw material or fuel by the country-specific emission factor.

2.5.6.5.a Emissions from Municipal Waste (Waste Plastics) used as Alternative Fuel (1.A.1 and 1.A.2)

CO_2 emissions were calculated by multiplying the incinerated volume of each type of waste used as raw material or fuel by Japan's country-specific emission factor.
For the estimation method and the emission factors for CH_4 and N_2O, refer to the section 2.5.6.5 .

2.5.6.5.b Emissions from Industrial Waste (Waste Plastics, Waste Oil, Waste Wood) Used as Raw Material or Alternative Fuels (1.A.2.))

For the estimation of CO_2 emission, emission factors used for incineration of industrial waste are used for waste plastics and waste oil.
For the estimation of CH_4 and N_2O emissions, refer to the section 2.5.6.5 .

2.5.6.5.c Emissions from Waste Tires Used as Raw Materials and Alternative Fuels (1.A.1 and 1.A.2)

CO_2 emissions were calculated by multiplying the incinerated amount of waste tires used as raw materials or fuels by Japan's country-specific emission factor.
For estimation of CH_4 and N_2O emissions, refer to the section 2.5.6.5 .

2.5.6.6 Emissions from Incineration of Waste Processed as Fuel (1.A.)

2.5.6.6.a Incineration of Refuse-Based Solid Fuels (RDF and RPF) (1.A.2)

CO_2 emissions were calculated by multiplying the incinerated amount of RDF and RPF by Japan's country-specific emission factor.
For the estimation method and the emission factors used in estimating CH_4 and N_2O emissions, refer to 2.5.6.5 . The standard calorific value for RPF is calculated using the Report on the Results of Discussions and Revised Values for Standard Calorific Values to be Used in FY2005 and Subsequent Years (Resources and Energy Agency).

2.5.6.7 Other (6.D.)

In this category, CO_2 emitted as a result of the decomposition of petroleum-derived surfactants and CH_4 and N_2O emissions from the composting of organic waste are calculated.

2.5.6.7.a Emissions from Composting of Organic Waste (6.D.1)

Emissions were calculated by taking the amount of organic waste composted, which was extracted from the statistical information available in Japan, and multiplying it by the default emission factor provided in the IPCC 2006 Guidelines. The calculation method is the same for both CH_4 and N_2O emissions.

2.5.6.7.b Emissions from the Decomposition of Petroleum-Derived Surfactants (6.D.2)

As neither the *Revised 1996 IPCC Guidelines* nor *Good Practice Guidance* (2000) specified a method for determining CO_2 emissions, a method specifically established in Japan was applied to the

calculation. Because carbon contained in surfactants emitted into wastewater treatment facilities and into the environment is eventually oxidized to CO_2 and emitted into the atmosphere as a result of surfactants decomposition, CO_2 emissions were estimated based on the amount of carbon contained in surfactants emitted into wastewater treatment facilities and into the environment.

The main subject of estimation was the carbon content of petroleum-derived surfactants, and it was assumed that all of the carbon contained in surfactants is ultimately decomposed into CO_2. In addition, all domestically used surfactants were assumed to be discharged into wastewater treatment facilities and into the environment. The carbon content in petroleum-derived surfactants was determined by using the amount of surfactant raw materials consumed and the amount of surfactants imported and exported.

Based on the facts stated above, the CO_2 emissions were calculated by multiplying the volume of the petroleum-derived surfactant for each type of raw material by the carbon content of each of the materials. The calculation covered synthetic alcohols, alkylbenzenes, alkylphenols, and ethylene oxide. Some of the carbon contained in surfactants discharged into wastewater treatment facilities are adsorbed and assimilated by sludge. However, this portion of carbon is not decomposed biologically. It is released into the atmosphere as CO_2 through incineration and landfilling of sludge. Therefore, the emission is included in CO_2 emission estimates.

2.5.7 Other (CRF sector 7)

The national inventory does not include the emissions and removals of gases targeted under the Kyoto Protocol (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) from the sources which are not included in the IPCC Guideline. The national inventory includes CO emissions from smoking as the emissions of indirect greenhouse gases (NOx, CO, NMVOC) and SO_2 from the sources which are not included in the IPCC Guideline.

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 A Description of Japan's Institutional Arrangement for the Inventory Preparation

The Ministry of the Environment (MOE), with the cooperation of relevant ministries, agencies and organizations, prepares Japan's national inventory, which is annually submitted to the UNFCCC Secretariat in accordance with the UNFCCC and the Kyoto Protocol. The MOE takes overall

responsibilities for the national inventory and therefore also makes an effort on improving its quality. For instance, the MOE organizes the Committee for the Greenhouse Gas Emission Estimation Methods (the Committee) in order to integrate the latest scientific knowledge into the inventory and to modify it based on more recent international provisions. The estimation of GHG emissions and removals, the key category analysis and the uncertainty assessment are then carried out by taking the decisions of the Committee into consideration. Substantial activities, such as the estimation of emissions and removals and the preparation of Common Reporting Format (CRF) and NIR, are done by the Greenhouse Gas Inventory Office of Japan (GIO), which belongs to the Center for Global Environmental Research of the National Institute for Environmental Studies. The relevant ministries, agencies and organizations provide the GIO the appropriate data (e.g., activity data, emission factors, GHG emissions and removals) by compiling various statistics. The relevant ministries check and verify these inventories (i.e., CRF, NIR, KP-CRF and KP-NIR) including the spreadsheets that are actually utilized for the estimation, as a part of the Quality Control (QC) activities. The checked and verified inventory data are Japan's official values. They are then made public by the MOE and the national inventory is submitted to the UNFCCC Secretariat by the Ministry of Foreign Affairs.

Figure 2.20 shows the overall institutional arrangement for inventory preparation within Japan. More detailed information on the role and responsibility of each relevant ministry, agency and organization in the inventory preparation process is described below.

2.6.2.1 Ministry of the Environment, Climate Change Policy Division, Global Environment Bureau (See section 2.6.1)

- The single national agency responsible for preparing Japan's inventory, which was designated pursuant to the Kyoto Protocol Article 5.1.
- It is responsible for editing and submitting the inventory.

2.6.2.2 Greenhouse Gas Inventory Office of Japan (GIO), Center for Global Environmental Research, National Institute for Environmental Studies

- Performs the actual work of inventory compilation. Responsible for inventory calculations, editing, and the archiving and management of all data.

2.6.2.3 Relevant Ministries/Agencies

The relevant ministries and agencies have the following roles and responsibilities regarding inventory compilation.

- Preparation of activity data, emission factor data, and other data needed for inventory compilation, and submission of the data by the submission deadline.
- Quality control (QC) of the data provided to the Ministry of the Environment and the GIO.
- Confirmation and verification of the inventory (CRF, NIR, spreadsheets, and other information) prepared by the Ministry of the Environment and the GIO.
- When necessary, responding to questions from expert review teams about the statistics controlled by relevant ministries and agencies, or about certain data they have prepared, and preparing comments on draft reviews.
- When necessary, responding to visits by expert review teams.

2.6.2.4 Relevant Organizations

Relevant organizations have the following roles and responsibilities regarding inventory compilation.

- Preparation of activity data, emission factor data, and other data needed for inventory compilation, and submission of the data by the submission deadline.
- Quality control (QC) of the data provided to the Ministry of the Environment and the GIO.
- When necessary, responding to questions from expert review teams about the statistics controlled by relevant organizations, or about certain data they have prepared, and preparing comments on draft reviews.

2.6.2.5 Committee for the Greenhouse Gas Emissions Estimation Methods

The Committee for the Greenhouse Gas Emissions Estimation Methods (the Committee) is a committee created and run by the Ministry of the Environment. Its role is to consider the methods for calculating inventory emissions and removals, and consider the selection of parameters such as activity data and emission factors. Under the Committee are inventory working groups (WGs) that examine crosscutting issues, and breakout groups that consider sector-specific problems (Breakout group on Energy and Industrial Processes, Breakout group on Transport, Breakout group on F-gas [HFCs, PFCs, and SF_6], Breakout group on Agriculture, Breakout group on Waste, and Breakout group on LULUCF). Inventory WGs and breakout groups are comprised of experts in various fields, and consider suggestions for inventory improvements. Improvement suggestions are considered once more by the Committee before approval.

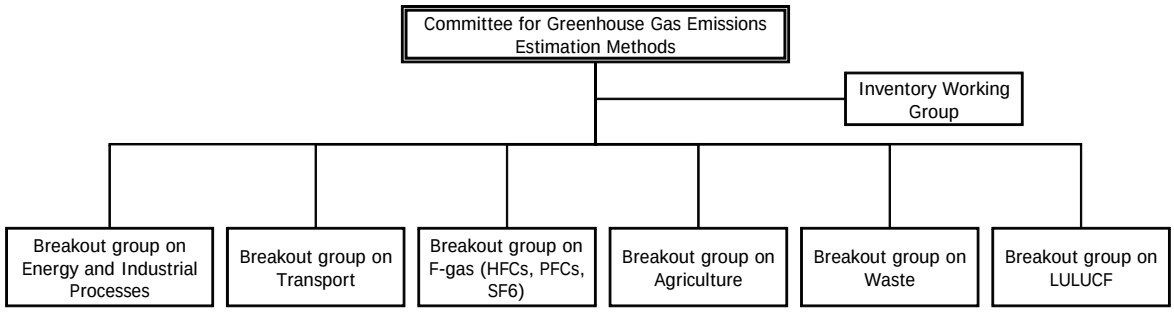


Figure 2.19 Structure of the Committee for the Greenhouse Gas Emissions Estimation Methods

2.6.2.6 GHG Inventory Quality Assurance Working Group (Expert Peer Review) (QA-WG)

The GHG Inventory Quality Assurance Working Group (the QA-WG) is an organization for QA activities, and is comprised of experts who are not directly involved in inventory compilation. Its role is to assure inventory quality and to identify places that need improvement by conducting detailed reviews of each emission source and sink in the inventory.

2.6.2.7 Private Consulting Companies

Private consultant companies that are contracted by the Ministry of the Environment to perform tasks related to inventory compilation play the following roles in inventory compilation based on their contracts.

- Quality control (QC) of inventory (CRF, NIR, spreadsheets, and other information) compiled by the Ministry of the Environment and the GIO.
- When necessary, providing support for responding to questions from expert review teams and for preparing comments on draft reviews.
- When necessary, providing support for responding to visits by expert review teams.

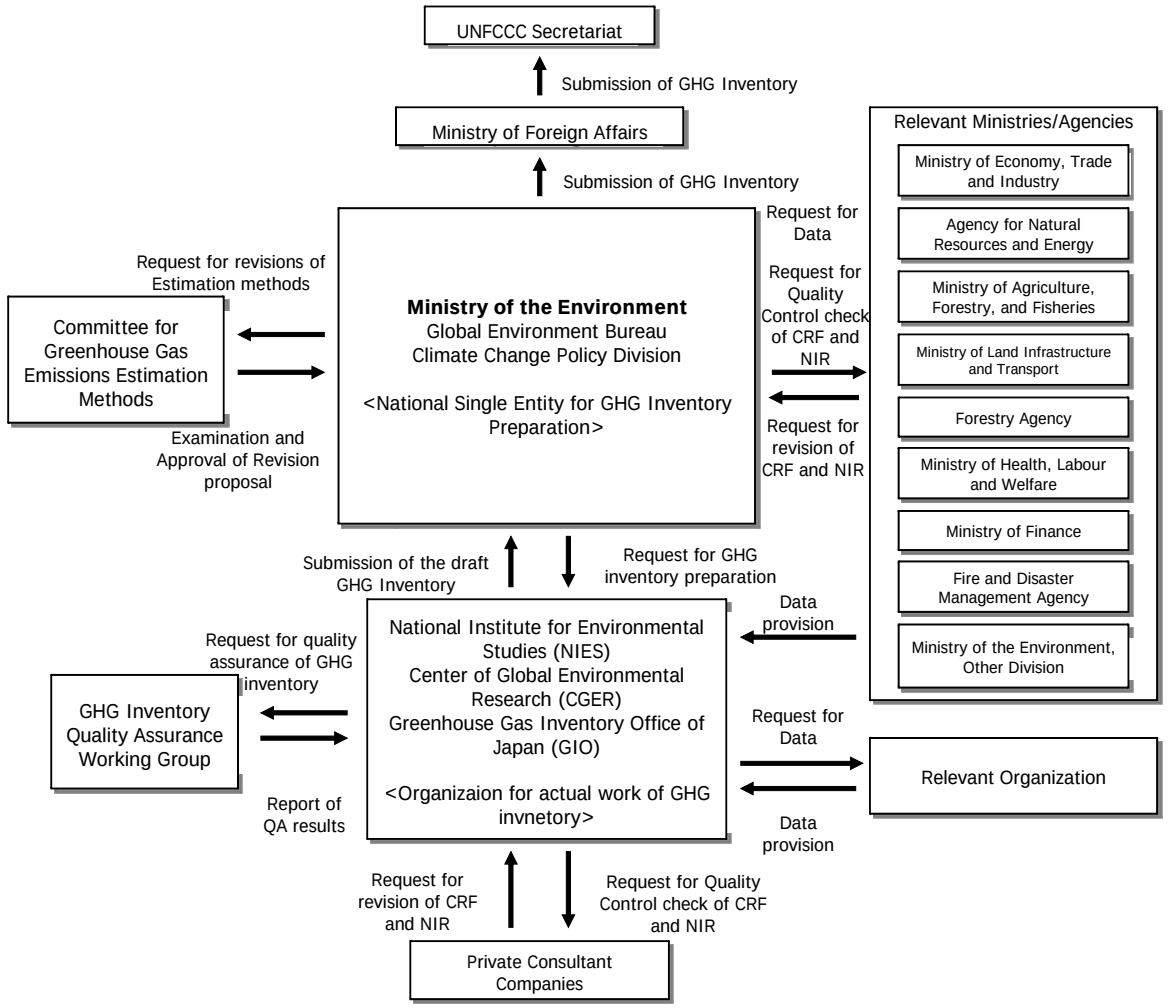


Figure 2.20 Japan's institutional arrangement for the national inventory preparation

2.6.3 Brief Description of the Inventory Preparation Process

2.6.3.1 Annual Cycle of Inventory Preparation

Table 2.19 shows the annual cycle of the inventory preparation. In Japan, in advance of the estimation of the national inventory submitted to the UNFCCC (submission deadline: April 15), preliminary figures are estimated and published as a document as an official announcement. In preliminary figures, only GHG emissions excluding removals are estimated.

Table 2.19 Annual cycle of the inventory preparation

*Inventory preparation in fiscal yaer "n"

	Process	Relevant Entities	Calender Year n+1							CY n+2				
			Fiscal Year n+1										FY n+2	
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	Discussion on the inventory improvement	MOE, GIO	→	→	→	→								
2	Holding the meeting of the Committee	MOE, (GIO, Private consultant)	→	→	→	→	→	→	→	→				
3	Collection of data for the national inventory	MOE, GIO, Relevant Ministries/Agencies, Relevant organization, Private consultant							→	→	→	→		
4	Preparation of a draft of CRF	GIO, Private consultant								→	→	→		
5	Preparation of a draft of NIR	GIO, Private consultant								→	→	→		
6	Implementation of the exterior QC and the coordination with the relevant ministries and agencies	MOE, GIO, Relevant Ministries/Agencies, Private consultant									→	→	→	
7	Correction of the drafts of CRF and NIR	MOE, GIO, Private consultant										→	→	
8	Submission and official announcement of the national inventory	MOE, Ministry of Foreign Affairs, GIO											Note ★	
9	Holding the meeting of the QA-WG	MOE, GIO	→	→	→	→								→

Note: Inventory submission and official announcement must be implemented within 6 weeks after April 15.
MOE: Ministry of the Environment,
GIO: Greenhouse Gas Inventory Office of Japan
The Committee: The Committee for the Greenhouse Gas Emission Estimation Methods
The QA-WG: The Inventory Quality Assurance Working Group

2.6.3.2 Process of Inventory Preparation

2.6.3.2.a Discussion on Inventory Improvement (Step 1)

The MOE and the GIO identify the items which need to be addressed by the Committee, based on the results of the previous inventory review by the UNFCCC, the recommendations of the Inventory Quality Assurance Working Group (the QA-WG), the items needing improvement as identified at former Committee's meetings, as well as any other items requiring revision, as determined during previous inventory preparations. The schedule for the expert evaluation (Step 2) is developed by taking the above mentioned information into account.

2.6.3.2.b Holding the Meeting of the Committee for the Greenhouse Gas Emission Estimation Methods [evaluation and examination of estimation methods by experts] (Step 2)

The MOE holds the meeting of the Committee, in which estimation methodologies for the annual inventory and issues requiring technical reviews are discussed by experts from different scientific backgrounds (refer to Section 2.6.2.5).

2.6.3.2.c Collection of Data for the National Inventory (the final figures) (Step 3)

The required data, especially that which was not available prior to Step 3, is collected for the estimation of the final figures. A complete check of the data used for the preliminary figures, which may be updated afterwards, is also carried out.

2.6.3.2.d Preparation of a Draft of CRF [including the implementation of the key category analysis and the uncertainty assessment] (Step 4)

The data input and estimation of emissions and removals are carried out simultaneously by utilizing

files containing spreadsheets (JNGI: Japan National GHG Inventory files), which have inter-connecting links based on the calculation formulas for said emissions and removals. Subsequently, the key category analysis and uncertainty assessment are also carried out.

2.6.3.2.e Preparation of a Draft of NIR (Step 5)

The drafts of NIR and KP-NIR are prepared by following the general guidelines made by the MOE and the GIO. These entities identify the points which need to be revised or which require additional descriptions by taking any discussion from Step 1 into account. The GIO and selected private consulting companies prepare new NIR and KP-NIR by updating data, and by adding and revising descriptions in the previous NIR and KP-NIR.

2.6.3.2.f Implementation of the Exterior QC and the Coordination with the Relevant Ministries and Agencies (Step 6)

As a QC activity, the selected private consulting companies check the JNGI files and the initial draft of CRF (the "0" draft) prepared by the GIO (exterior QC). These companies not only check the input data and the calculation formulas in the files, but also verify the estimations by re-calculating the total amounts of GHG emissions determined, utilizing the same files. Because of this cross-check, any possible data input and emission estimation mistakes are avoided. The consulting companies also check the content and descriptions of the initial draft of NIR (the "0" draft) prepared by the GIO.

Subsequently, the GIO sends out the primary drafts of the inventories as well as any official announcements as electronic computer files to the MOE and the relevant ministries and agencies, and possible revisions are carried out by them. These primary drafts include not only the drafts, to which the exterior QC was applied, but also the drafts of KP-CRF and KP-NIR that are prepared by the selected private consulting companies. The data, which is estimated based on confidential data, is only sent out for confirmation to the ministry and/or the agency which provided them.

2.6.3.2.g Correction of the Drafts of CRF and NIR (Step 7)

When revisions are requested at Step 6, the possible corrections are discussed among the MOE, the GIO and the relevant ministries and/or agencies. The corrected drafts then become the secondary drafts. These secondary drafts are sent out again to the relevant ministries and/or the agencies for conclusive confirmation. If there is no additional request for revision, they are considered to be the final versions.

2.6.3.2.h Submission and Official Announcement of the National Inventory (Step 8)

The completed inventory is submitted by the MOE via the Ministry of Foreign Affairs to the UNFCCC Secretariat. Information on the estimated GHG emissions and removals is officially made public and is published on the MOE's homepage (http://www.env.go.jp/), complete with any additional relevant information. The inventory is also published on the GIO's homepage (http://www-gio.nies.go.jp/index-j.html).

2.6.3.2.i Holding the Meeting of the Greenhouse Gas Inventory Quality Assurance Working Group (Step 9)

The QA-WG, which is composed of experts who are not directly involved in or related to the inventory preparation process, is organized in order to guarantee the inventory's quality and to find out possible improvements. This QA-WG verifies the validation of the following information:

estimation methodologies, activity data, emission factors, and the contents of CRF and NIR.
GIO integrates the items suggested for improvement by the QA-WG into the inventory improvement program, and utilizes them in discussions on the inventory estimation methods and in subsequent inventory preparation.

2.6.4 Brief General Description of Methodologies

The methodology used in estimation of GHG emissions or removals is accordance with the *Revised 1996 IPCC Guidelines, Good Practice Guidance (2000)* and the *LULUCF-GPG*. The country-specific methodologies are also used for some categories (e.g., "4.C. Methane Emissions from Rice Cultivation") in order to reflect the actual situation of emissions in Japan.
Results of the actual measurements or estimates based on research conducted in Japan are used to determine the country-specific emissions factors. The default values given in the *Revised 1996 IPCC Guidelines*, the *Good Practice Guidance (2000)* and the *LULUCF-GPG* are used for: emissions which are assumed to be quite low (e.g., "1.B.2.a.ii Fugitive Emissions from Fuel (Oil and Natural Gas"), and where the possibility of emission from a given source is uncertain (e.g., "4.D.3. Indirect Emissions from Soil in Agricultural Land").

2.6.4.1 Collection Process of Activity Data

When the activity data needed for calculations are available from sources such as publications and the internet, the necessary data is gathered from these media. Data that is not released in publications, the internet, or in other media, and unpublished data used when compiling the inventory is obtained by the Ministry of the Environment or the GIO which request the data from the relevant ministries, agencies or organizations which control this data. The main relevant ministries, agencies and organizations that provide data are as shown in Table 2.20.

Table 2.20 List of the main relevant ministries and agencies and the relevant organizations (data providers)

Ministries/Agencies/Organizations		Major data or statistics
Relevant Ministries/ Agencies	Ministry of the Environment	Research of Air Pollutant Emissions from Stationary Sources / volume of waste in landfill / volume of incinerated waste / number of people per *johkasou* facility / volume of human waste treated at human waste treatment facilities
	Ministry of Economy, Trade and Industry	General Energy Statistics / Yearbook of Production, Supply and Demand of Petroleum, Coal and Coke / Yearbook of Iron and Steel, Non-ferrous Metals, and Fabricated Metals Statistics / Yearbook of Chemical Industry Statistics / Yearbook of Ceramics and Building Materials Statistics / Census of Manufactures / General outlook on electric power supply and demand
	Ministry of Land, Infrastructure, Transport and Tourism	Annual of Land Transport Statistics / Survey on Transport Energy / Statistical Yearbook of Motor Vehicle Transport / Survey on Current State of Land Use, Survey on Current State of Urban Park Development / Sewage Statistics
	Ministry of Agriculture, Forestry and Fisheries	Crop Statistics / Livestock Statistics / Vegetable Production and Shipment Statistics / World Census of Agriculture and Forestry / Statistics of Arable and Planted Land Area / Handbook of Forest and Forestry Statistics / Table of Food Supply and Demand
	Ministry of Health, Welfare and Labor	Statistics of Production by Pharmaceutical Industry
Relevant Organizations	Federation of Electric Power Companies	Amount of Fuel Used by Pressurized Fluidized Bed Boilers
	Japan Coal Energy Center	Coal Production
	Japan Cement Association	Amount of clinker production / Amount of waste input to in raw material processing / Amount of RPF incineration
	Japan Iron and Steel Federation	Emissions from Coke Oven Covers, Desulfurization Towers, and Desulfurization Recycling Towers
	Japan Paper Association	Amount of final disposal of industrial waste / Amount of RPF incineration
	local public entity	Carbon Content of Waste by Composition

2.6.4.2 Selection Process of Emission Factors and Estimation Methods

Calculation methods for Japan's emission and removal amounts are determined by the Committee, which explores calculation methods suited to Japan's situation for all the activity categories necessary to calculate the proper results, based on the *1996 Revised IPCC Guidelines, Good Practice Guidance* (2000), LULUCF-GPG, and the 2006 IPCC Guidelines.

2.6.5 Recalculation of Previously Submitted GHG Inventory Data

In accordance with the *Good Practice and Uncertainty Management in National Greenhouse Gas Inventories (2000)* (hereafter, *Good Practice Guidance (2000)*) and the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*, recalculations of previously reported emissions and removals are recommended in the cases of (1) application of new estimation methods, (2) addition of new categories for emissions and removals and (3) data refinement. Major changes in the inventory submitted last year are indicated below. See National Inventory Report Chapter 10 for the details.

2.6.5.1 General Issues

In general, activity data for the latest year available at the time of inventory compilation is often revised in the year following the submission year, because of the publication of data on a fiscal year basis. In the national inventory submitted this year, activity data in many sources for 2006 has been changed and as a result, the emissions from those sources for the inventory year have been recalculated.

2.6.5.2 Recalculations in Each Sector

The information of recalculation for sectors (energy; industrial processes; solvent and other product use; agriculture; land use, land-use change and forestry; and waste) is described separately at sections named as "Source/Sink-specific Recalculations" in Chapters 3 to 8.

2.6.5.3 Implications for Emission Levels

Compared to the values reported in the previous year's inventory, total emissions excluding LULUCF sector in the base year (1990) under the UNFCCC decreased by 0.20%, and the total emissions in year 2006 increased by 0.15% compared to the data reported in last year (
Table **2.21**).

Table 2.21 Comparison of emissions and removals in the inventories submitted in 2008 and 2009

[Mt CO_2eq.]

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
CO_2	JNGI2008	1,052.2	1,062.7	1,071.9	1,064.3	1,124.5	1,134.6	1,147.8	1,143.6	1,107.7	1,143.2	1,164.1	1,148.3	1,176.0	1,183.7	1,182.2	1,194.7	1,182.1
with LULUCF[3)]	JNGI2009	1,068.8	1,078.4	1,087.0	1,078.6	1,137.8	1,147.0	1,159.0	1,154.7	1,118.8	1,153.6	1,174.0	1,158.0	1,185.6	1,192.5	1,190.9	1,201.7	1,188.4
	difference	*1.59%*	*1.48%*	*1.41%*	*1.35%*	*1.18%*	*1.09%*	*0.98%*	*0.98%*	*1.00%*	*0.91%*	*0.85%*	*0.85%*	*0.81%*	*0.75%*	*0.74%*	*0.59%*	*0.54%*
CO_2	JNGI2008	1,144.2	1,153.6	1,161.8	1,154.6	1,214.5	1,228.1	1,241.1	1,236.8	1,200.5	1,235.8	1,256.7	1,240.7	1,278.6	1,286.2	1,284.4	1,290.6	1,273.6
without LULUCF	JNGI2009	1,143.2	1,152.6	1,160.8	1,153.6	1,213.5	1,226.6	1,238.9	1,234.9	1,198.9	1,233.9	1,254.6	1,238.8	1,276.7	1,283.9	1,282.5	1,287.3	1,270.2
	difference	*-0.09%*	*-0.09%*	*-0.09%*	*-0.09%*	*-0.08%*	*-0.12%*	*-0.18%*	*-0.15%*	*-0.13%*	*-0.16%*	*-0.17%*	*-0.15%*	*-0.15%*	*-0.18%*	*-0.15%*	*-0.25%*	*-0.27%*
CH_4	JNGI2008	33.5	33.2	33.0	32.7	32.0	31.0	30.3	29.2	28.4	27.7	27.0	26.2	25.3	24.8	24.4	24.0	23.7
with LULUCF	JNGI2009	32.6	32.4	32.1	31.9	31.2	30.2	29.6	28.5	27.7	27.0	26.4	25.6	24.7	24.2	23.8	23.4	23.0
	difference	*-2.55%*	*-2.59%*	*-2.68%*	*-2.62%*	*-2.60%*	*-2.60%*	*-2.56%*	*-2.55%*	*-2.54%*	*-2.49%*	*-2.42%*	*-2.40%*	*-2.35%*	*-2.32%*	*-2.33%*	*-2.23%*	*-2.64%*
CH_4	JNGI2008	33.4	33.1	32.9	32.6	31.9	31.0	30.3	29.2	28.4	27.7	27.0	26.2	25.3	24.8	24.4	24.0	23.7
without LULUCF	JNGI2009	32.6	32.4	32.1	31.8	31.1	30.2	29.5	28.5	27.6	27.0	26.4	25.6	24.7	24.2	23.8	23.4	23.0
	difference	*-2.29%*	*-2.32%*	*-2.38%*	*-2.40%*	*-2.41%*	*-2.40%*	*-2.66%*	*-2.67%*	*-2.58%*	*-2.51%*	*-2.45%*	*-2.44%*	*-2.43%*	*-2.33%*	*-2.38%*	*-2.27%*	*-2.65%*
N_2O	JNGI2008	32.7	32.2	32.3	32.0	33.2	33.5	34.6	35.2	33.8	27.4	29.9	26.5	26.1	25.9	26.0	25.6	25.6
with LULUCF	JNGI2009	32.1	31.5	31.6	31.3	32.5	32.9	33.9	34.6	33.1	26.8	29.3	25.8	25.5	25.2	25.3	24.9	24.7
	difference	*-2.06%*	*-2.13%*	*-2.25%*	*-2.18%*	*-2.03%*	*-1.85%*	*-1.84%*	*-1.79%*	*-1.85%*	*-2.29%*	*-2.10%*	*-2.42%*	*-2.55%*	*-2.65%*	*-2.60%*	*-2.85%*	*-3.23%*
N_2O	JNGI2008	32.6	32.1	32.2	32.0	33.1	33.4	34.6	35.2	33.8	27.4	29.9	26.5	26.1	25.9	26.0	25.6	25.6
without LULUCF	JNGI2009	32.0	31.5	31.5	31.3	32.5	32.8	33.9	34.6	33.1	26.7	29.3	25.8	25.5	25.2	25.3	24.8	24.7
	difference	*-1.96%*	*-2.03%*	*-2.16%*	*-2.10%*	*-1.97%*	*-1.79%*	*-1.95%*	*-1.87%*	*-1.93%*	*-2.38%*	*-2.17%*	*-2.49%*	*-2.62%*	*-2.71%*	*-2.65%*	*-2.89%*	*-3.27%*
HFCs	JNGI2008	NE	NE	NE	NE	NE	20.2	19.8	19.8	19.3	19.8	18.6	15.8	13.1	12.5	8.3	7.3	6.6
	JNGI2009	NE	NE	NE	NE	NE	20.3	19.9	19.9	19.4	19.9	18.8	16.2	13.7	13.8	10.6	10.6	11.6
	difference	*NA*	*NA*	*NA*	*NA*	*NA*	*0.24%*	*0.31%*	*0.49%*	*0.63%*	*0.75%*	*1.15%*	*2.09%*	*4.14%*	*9.92%*	*26.36%*	*46.02%*	*75.63%*
PFCs	JNGI2008	NE	NE	NE	NE	NE	14.3	14.9	16.1	13.2	10.5	9.3	7.8	7.1	6.8	7.0	6.5	6.3
	JNGI2009	NE	NE	NE	NE	NE	14.4	14.9	16.3	13.5	10.6	9.7	8.1	7.5	7.3	7.5	7.1	7.4
	difference	*NA*	*NA*	*NA*	*NA*	*NA*	*0.43%*	*-0.07%*	*1.02%*	*2.19%*	*1.21%*	*4.25%*	*3.46%*	*6.26%*	*6.44%*	*7.12%*	*8.77%*	*16.79%*
SF_6	JNGI2008	NE	NE	NE	NE	NE	16.9	17.5	14.8	13.4	9.1	6.9	5.7	5.4	4.8	4.6	4.2	4.3
	JNGI2009	NE	NE	NE	NE	NE	17.0	17.5	15.0	13.6	9.3	7.3	6.0	5.7	5.4	5.3	4.6	5.1
	difference	*NA*	*NA*	*NA*	*NA*	*NA*	*0.19%*	*0.23%*	*1.46%*	*1.59%*	*2.19%*	*5.77%*	*5.63%*	*6.33%*	*12.17%*	*15.99%*	*8.37%*	*18.36%*
Total	JNGI2008	1,118.4	1,128.2	1,137.2	1,129.0	1,189.6	1,250.6	1,265.0	1,258.8	1,215.8	1,237.7	1,255.7	1,230.3	1,253.0	1,258.5	1,252.5	1,262.2	1,248.6
with LULUCF	JNGI2009	1,133.5	1,142.3	1,150.7	1,141.8	1,201.4	1,261.7	1,274.9	1,269.0	1,226.2	1,247.2	1,265.4	1,239.7	1,262.7	1,268.4	1,263.4	1,272.3	1,260.4
	difference	*1.36%*	*1.25%*	*1.19%*	*1.13%*	*0.99%*	*0.89%*	*0.78%*	*0.82%*	*0.85%*	*0.77%*	*0.77%*	*0.76%*	*0.77%*	*0.79%*	*0.87%*	*0.80%*	*0.95%*
Total	JNGI2008	1,210.2	1,218.9	1,227.0	1,219.1	1,279.5	1,343.9	1,358.3	1,352.0	1,308.6	1,330.3	1,348.4	1,322.8	1,355.6	1,361.0	1,354.8	1,358.1	1,340.1
without LULUCF	JNGI2009	1,207.8	1,216.5	1,224.5	1,216.7	1,277.1	1,341.2	1,354.7	1,349.1	1,306.2	1,327.5	1,346.0	1,320.5	1,353.7	1,359.7	1,355.0	1,357.8	1,342.1
	difference	*-0.20%*	*-0.20%*	*-0.20%*	*-0.20%*	*-0.19%*	*-0.20%*	*-0.27%*	*-0.21%*	*-0.18%*	*-0.21%*	*-0.18%*	*-0.17%*	*-0.14%*	*-0.10%*	*0.02%*	*-0.02%*	*0.15%*

2.6.5.4 Implication for Emission Trends, including Time Series Consistency

Total emissions excluding the LULUCF sector in the 2009 submission increased by approximately 4.2 million tonnes (in CO_2 equivalents) and increased by 0.4 points, compared to the data reported in the previous submission.

Table 2.22 Comparison of increase and decrease from the base year, between the inventories submitted in 2008 and 2009 excluding the LULUCF sector

		Trend [Mt CO_2eq.]			Trend (%)		
		JNGI2008	JNGI2009	Difference	JNGI2008	JNGI2009	Difference
CO_2	1)	129.4	127.0	-2.4	11.3%	11.1%	-0.2%
CH_4	1)	-9.7	-9.6	0.1	-29.1%	-29.4%	-0.3%
N_2O	1)	-7.1	-7.3	-0.2	-21.6%	-22.7%	-1.0%
HFCs	2)	-13.6	-8.6	5.0	-67.3%	-42.6%	24.6%
PFCs	2)	-8.0	-7.0	1.0	-55.8%	-48.6%	7.2%
SF_6	2)	-12.6	-11.8	0.8	-74.3%	-69.7%	4.7%
Total	3)	78.5	82.7	4.2	6.2%	6.6%	0.4%

1) Comparison of emissions between FY1990 and FY2006

2) Comparison of emissions between CY1995 and CY2006

3) Comparison of emissions between the base year of the Kyoto Protocol (CO_2, CH_4, N_2O: FY1990, HFCs, PFCs, SF_6: CY1995) and 2006

2.6.6 Key Category Analysis

2.6.6.1 Brief Description of Key Categories

Key category analysis is carried out in accordance with *Good Practice Guidance (2000)* and the *LULUCF-GPG* (Tier 1, Tier 2 level assessment and trend assessment, and qualitative analysis).

This analysis identified 37 sources and sinks as Japan's key categories in FY2007 (Table 2.23). The same analysis was also conducted for the base year of the UNFCCC (FY1990) in response to the reviewers' recommendation. A total of 33 sources and sinks were identified as key categories in the base year (Table2.24). More detailed information is described in National Inventory Report Annex 1.

Table 2.23 Japan's key source categories in FY2007

A	IPCC Category		B Direct GHGs	L1	T1	L2	T2
#1	1A Stationary Combustion	Solid Fuels	CO_2	#1	#2	#3	#7
#2	1A Stationary Combustion	Liquid Fuels	CO_2	#2	#1	#8	#8
#3	1A3 Mobile Combustion	b. Road Transportation	CO_2	#3	#5	#4	
#4	1A Stationary Combustion	Gaseous Fuels	CO_2	#4	#3		
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO_2	#5		#6	
#6	2A Mineral Product	1. Cement Production	CO_2	#6	#6	#7	#11
#7	1A Stationary Combustion	Other Fuels	CO_2	#7	#11	#14	#14
#8	6C Waste Incineration		CO_2	#8		#2	#21
#9	1A3 Mobile Combustion	d. Navigation	CO_2	#9			
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO_2	#10		#13	
#11	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning	HFCs	#11	#8	#5	#2
#12	1A3 Mobile Combustion	a. Civil Aviation	CO_2	#12	#15		
#13	2A Mineral Product	2. Lime Production	CO_2	#13		#22	
#14	4A Enteric Fermentation		CH_4			#25	
#15	4C Rice Cultivation		CH_4			#19	#22
#16	4B Manure Management		N_2O			#12	#20
#17	1A Stationary Combustion		N_2O			#18	#17
#18	6A Solid Waste Disposal on Land		CH_4		#13	#20	#9
#19	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs			#10	
#20	4D Agricultural Soils	1. Direct Soil Emissions	N_2O			#9	#12
#21	4D Agricultural Soils	3. Indirect Emissions	N_2O			#15	#18
#22	1A3 Mobile Combustion	b. Road Transportation	N_2O			#16	#10
#23	4B Manure Management		CH_4			#17	#19
#24	6C Waste Incineration		N_2O			#11	#16
#25	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	5. Solvents	PFCs		#9		#4
#26	5E Settlements	2. Land converted to Settlements	CO_2		#18		#25
#27	5A Forest Land	2. Land converted to Forest Land	CO_2		#12		
#28	2E Production of Halocarbons and	2. Fugitive Emissions	SF_6		#14	#21	#3
#29	6B Wastewater Handling		N_2O			#23	
#30	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF_6		#7		#1
#31	2E Production of Halocarbons and	2. Fugitive Emissions	PFCs			#26	
#32	2B Chemical Industry	3. Adipic Acid	N_2O		#10		#15
#33	5B Cropland	2. Land converted to Cropland	CO_2				#24
#34	2E Production of Halocarbons and SF_6	1. By-product Emissions (Production of HCFC-22)	HFCs		#4		#13
#35	1A3 Mobile Combustion	a. Civil Aviation	N_2O			#1	#5
#36	1A3 Mobile Combustion	d. Navigation	N_2O			#24	
#37	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH_4		#16		#6

N.B. Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

Table 2.24 Japan's key source categories in FY1990

	A IPCC Category		B Direct GHGs	L1	L2
#1	1A Stationary Combustion	Liquid Fuels	CO_2	#1	#8
#2	1A Stationary Combustion	Solid Fuels	CO_2	#2	#4
#3	1A3 Mobile Combustion	b. Road Transportation	CO_2	#3	#6
#4	1A Stationary Combustion	Gaseous Fuels	CO_2	#4	
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO_2	#5	#7
#6	2A Mineral Product	1. Cement Production	CO_2	#6	#10
#7	2E Production of Halocarbons and SF_6	1. By-product Emissions (Production of HCFC-22)	HFCs	#7	#26
#8	1A3 Mobile Combustion	d. Navigation	CO_2	#8	
#9	6C Waste Incineration		CO_2	#9	#2
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO_2	#10	#19
#11	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	8. Electrical Equipment	SF_6	#11	#5
#12	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	5. Solvents	PFCs	#12	#9
#13	1A Stationary Combustion	Other Fuels	CO_2	#13	#25
#14	6A Solid Waste Disposal on Land		CH_4	#14	#15
#15	4A Enteric Fermentation		CH_4	#15	#28
#16	2B Chemical Industry	3. Adipic Acid	N_2O	#16	
#17	2A Mineral Product	2. Lime Production	CO_2	#17	#23
#18	1A3 Mobile Combustion	a. Civil Aviation	CO_2	#18	
#19	4C Rice Cultivation		CH_4		#20
#20	4B Manure Management		N_2O		#14
#21	2E Production of Halocarbons and SF_6	2. Fugitive Emissions	SF_6		#3
#22	4D Agricultural Soils	1. Direct Soil Emissions	N_2O		#11
#23	1A3 Mobile Combustion	b. Road Transportation	N_2O		#13
#24	4D Agricultural Soils	3. Indirect Emissions	N_2O		#16
#25	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs		#17
#26	4B Manure Management		CH_4		#18
#27	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH_4		#12
#28	6B Wastewater Handling		CH_4		#27
#29	6C Waste Incineration		N_2O		#21
#30	6B Wastewater Handling		N_2O		#22
#31	2B Chemical Industry	Other products except Anmonia	CO_2		#29
#32	1A3 Mobile Combustion	d. Navigation	N_2O		#24
#33	1A3 Mobile Combustion	a. Civil Aviation	N_2O		#1

N.B. Figures recorded in the column L (Level) indicate the ranking of level assessments. The data of HFCs, PFCs and SF_6 utilized for this analysis are the 1995 values.

2.6.6.2 Results of Key Category Analysis

2.6.6.2.a Key Categories

Key categories were assessed in accordance with *Good Practice Guidance (2000)* assessment methods (Tier 1 level assessment, Tier 1 trend assessment, Tier 2 level assessment and Tier 2 trend assessment).

The key category for the Land use, land-use change and forestry (LULUCF) sector were assessed in accordance with *LULUCF-GPG*. The key categories were identified for the inventory excluding LULUCF first, and then the key category analysis was repeated for the full inventory including the LULUCF categories.

As a result, 37 and 33 sources and sinks were detected as the key source categories for FY2007 and FY1990, respectively (Table 2.25 and Table 2.26).

Table 2.25 Japan's Key Categories (FY2007)

	A IPCC Category		B Direct GHGs	L1	T1	L2	T2
#1	1A Stationary Combustion	Solid Fuels	CO_2	#1	#2	#3	#7
#2	1A Stationary Combustion	Liquid Fuels	CO_2	#2	#1	#8	#8
#3	1A3 Mobile Combustion	b. Road Transportation	CO_2	#3	#5	#4	
#4	1A Stationary Combustion	Gaseous Fuels	CO_2	#4	#3		
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO_2	#5		#6	
#6	2A Mineral Product	1. Cement Production	CO_2	#6	#6	#7	#11
#7	1A Stationary Combustion	Other Fuels	CO_2	#7	#11	#14	#14
#8	6C Waste Incineration		CO_2	#8		#2	#21
#9	1A3 Mobile Combustion	d. Navigation	CO_2	#9			
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO_2	#10		#13	
#11	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning	HFCs	#11	#8	#5	#2
#12	1A3 Mobile Combustion	a. Civil Aviation	CO_2	#12	#15		
#13	2A Mineral Product	2. Lime Production	CO_2	#13		#22	
#14	4A Enteric Fermentation		CH_4			#25	
#15	4C Rice Cultivation		CH_4			#19	#22
#16	4B Manure Management		N_2O			#12	#20
#17	1A Stationary Combustion		N_2O			#18	#17
#18	6A Solid Waste Disposal on Land		CH_4		#13	#20	#9
#19	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs			#10	
#20	4D Agricultural Soils	1. Direct Soil Emissions	N_2O			#9	#12
#21	4D Agricultural Soils	3. Indirect Emissions	N_2O			#15	#18
#22	1A3 Mobile Combustion	b. Road Transportation	N_2O			#16	#10
#23	4B Manure Management		CH_4			#17	#19
#24	6C Waste Incineration		N_2O			#11	#16
#25	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	5. Solvents	PFCs		#9		#4
#26	5E Settlements	2. Land converted to Settlements	CO_2		#18		#25
#27	5A Forest Land	2. Land converted to Forest Land	CO_2		#12		
#28	2E Production of Halocarbons and	2. Fugitive Emissions	SF_6		#14	#21	#3
#29	6B Wastewater Handling		N_2O			#23	
#30	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF_6		#7		#1
#31	2E Production of Halocarbons and	2. Fugitive Emissions	PFCs			#26	
#32	2B Chemical Industry	3. Adipic Acid	N_2O		#10		#15
#33	5B Cropland	2. Land converted to Cropland	CO_2				#24
#34	2E Production of Halocarbons and SF_6	1. By-product Emissions (Production of HCFC-22)	HFCs		#4		#13
#35	1A3 Mobile Combustion	a. Civil Aviation	N_2O			#1	#5
#36	1A3 Mobile Combustion	d. Navigation	N_2O			#24	
#37	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH_4		#16		#6

N.B. Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments.

Table 2.26 Japan's Key Categories (FY1990)

	A IPCC Category		B Direct GHGs	L1	L2
#1	1A Stationary Combustion	Liquid Fuels	CO_2	#1	#8
#2	1A Stationary Combustion	Solid Fuels	CO_2	#2	#4
#3	1A3 Mobile Combustion	b. Road Transportation	CO_2	#3	#6
#4	1A Stationary Combustion	Gaseous Fuels	CO_2	#4	
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO_2	#5	#7
#6	2A Mineral Product	1. Cement Production	CO_2	#6	#10
#7	2E Production of Halocarbons and SF_6	1. By-product Emissions (Production of HCFC-22)	HFCs	#7	#26
#8	1A3 Mobile Combustion	d. Navigation	CO_2	#8	
#9	6C Waste Incineration		CO_2	#9	#2
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO_2	#10	#19
#11	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	8. Electrical Equipment	SF_6	#11	#5
#12	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	5. Solvents	PFCs	#12	#9
#13	1A Stationary Combustion	Other Fuels	CO_2	#13	#25
#14	6A Solid Waste Disposal on Land		CH_4	#14	#15
#15	4A Enteric Fermentation		CH_4	#15	#28
#16	2B Chemical Industry	3. Adipic Acid	N_2O	#16	
#17	2A Mineral Product	2. Lime Production	CO_2	#17	#23
#18	1A3 Mobile Combustion	a. Civil Aviation	CO_2	#18	
#19	4C Rice Cultivation		CH_4		#20
#20	4B Manure Management		N_2O		#14
#21	2E Production of Halocarbons and SF_6	2. Fugitive Emissions	SF_6		#3
#22	4D Agricultural Soils	1. Direct Soil Emissions	N_2O		#11
#23	1A3 Mobile Combustion	b. Road Transportation	N_2O		#13
#24	4D Agricultural Soils	3. Indirect Emissions	N_2O		#16
#25	2F(a) Consumption of Halocarbons and SF_6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs		#17
#26	4B Manure Management		CH_4		#18
#27	1B Fugitive Emission	1a i. Coal Mining and Handling (under gr.)	CH_4		#12
#28	6B Wastewater Handling		CH_4		#27
#29	6C Waste Incineration		N_2O		#21
#30	6B Wastewater Handling		N_2O		#22
#31	2B Chemical Industry	Other products except Anmonia	CO_2		#29
#32	1A3 Mobile Combustion	d. Navigation	N_2O		#24
#33	1A3 Mobile Combustion	a. Civil Aviation	N_2O		#1

N.B. Figures recorded in the Level and Trend columns indicate the ranking of individual level and trend assessments. The data of HFCs, PFCs and SF_6 utilized for this analysis are the 1995 values.

2.6.6.2.b Level Assessment

Level assessment involves an identification of categories as key by calculating the proportion of emissions and removals in each category to the total emissions and removals. The calculated values of proportion are added from the category that accounts for the largest proportion, until the sum reaches 95% for Tier 1 and 90% for Tier 2. Tier 1 level assessment uses emissions and removals from each category directly and Tier 2 level assessment analyzes the emissions and removals of each category, multiplied by the uncertainty of each category.

The key category analysis was first conducted for the inventory excluding LULUCF and the key categories for source sectors were identified (1). Then the key category analysis was repeated again

for the full inventory including the LULUCF categories and key categories for LULUCF sector were identified (2). In accordance with the *LULUCF-GPG* (p.5.30), a source category, which was identified as key in (1) but not in (2), was still regarded as key; while a source category, which was not identified as key in (1) but was done in (2), was not regarded as key (gray rows in tables below). Tier 1 level assessment of the latest emissions and removals (FY2007) gives the following 13 sub-categories as the key categories (Table 2.27). Tier 2 level assessment of the latest emissions and removals (FY2007) gives the following 26 sub-categories as the key categories (Table 2.28).

Table 2.27 Results of Tier 1 Level Assessment (FY2007)

	A IPCC Category		B Direct GHGs	D Current Year Estimate [Gg CO2 eq.]	E Level Assessment	F % Contribution to Level	Cumulative
#1	1A Stationary Combustion	Solid Fuels	CO2	451,893.02	0.309	30.9%	30.9%
#2	1A Stationary Combustion	Liquid Fuels	CO2	322,477.35	0.221	22.1%	53.0%
#3	1A3 Mobile Combustion	b. Road Transportation	CO2	217,652.78	0.149	14.9%	67.9%
#4	1A Stationary Combustion	Gaseous Fuels	CO2	203,287.27	0.139	13.9%	81.8%
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO2	81,595.45	0.056	5.6%	87.4%
#6	2A Mineral Product	1. Cement Production	CO2	30,076.22	0.021	2.1%	89.4%
#7	1A Stationary Combustion	Other Fuels	CO2	15,982.70	0.011	1.1%	90.5%
#8	6C Waste Incineration		CO2	14,226.64	0.010	1.0%	91.5%
#9	1A3 Mobile Combustion	d. Navigation	CO2	12,411.48	0.008	0.8%	92.4%
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO2	12,003.50	0.008	0.8%	93.2%
#11	2F(a) Consumption of Halocarbons	1. Refrigeration and Air Conditioning Equipment	HFCs	11,375.49	0.008	0.8%	94.0%
#12	1A3 Mobile Combustion	a. Civil Aviation	CO2	10,875.77	0.007	0.7%	94.7%
#13	2A Mineral Product	2. Lime Production	CO2	7,799.26	0.005	0.5%	95.2%

Table 2.28 Results of Tier 2 Level Assessment (FY2007)

	Category Code	A IPCC Category		B Direct GHGs	D Current Year Estimate [Gg CO2 eq.]	I Source/Sink Uncertinty	K Contribution to Total L2	Cumulative
#1	A-17	1A3 Mobile Combustion	a. Civil Aviation	N2O	109.11	10000%	0.13	13.0%
#2	F-04	6C Waste Incineration		CO2	14,226.64	50%	0.08	21.4%
#3	A-02	1A Stationary Combustion	Solid Fuels	CO2	451,893.02	1%	0.08	29.4%
#4	A-10	1A3 Mobile Combustion	b. Road Transportation	CO2	217,652.78	2%	0.06	35.3%
#5	B-20	2F(a) Consumption of Halocarbons	1. Refrigeration and Air Conditioning	HFCs	11,375.49	42%	0.06	41.0%
#6	E-01	5A Forest Land	1. Forest Land remaining Forest Land	CO2	81,595.45	6%	0.06	46.6%
#7	B-01	2A Mineral Product	1. Cement Production	CO2	30,076.22	10%	0.04	50.3%
#8	A-01	1A Stationary Combustion	Liquid Fuels	CO2	322,477.35	1%	0.04	54.0%
#9	D-05	4D Agricultural Soils	1. Direct Soil Emissions	N2O	3,348.49	90%	0.04	57.6%
#10	B-26	2F(a) Consumption of Halocarbons	7. Semiconductor Manufacture	PFCs	3,741.32	64%	0.03	60.5%
#11	F-06	6C Waste Incineration		N2O	2,296.09	103%	0.03	63.3%
#12	D-03	4B Manure Management		N2O	4,860.72	48%	0.03	66.1%
#13	B-03	2A Mineral Product	3. Limestone and Dolomite Use	CO2	12,003.50	17%	0.02	68.4%
#14	A-04	1A Stationary Combustion	Other Fuels	CO2	15,982.70	12%	0.02	70.8%
#15	D-07	4D Agricultural Soils	3. Indirect Emissions	N2O	2,976.80	64%	0.02	73.0%
#16	A-18	1A3 Mobile Combustion	b. Road Transportation	N2O	2,490.03	71%	0.02	75.1%
#17	D-02	4B Manure Management		CH4	2,394.07	64%	0.02	76.9%
#18	A-06	1A Stationary Combustion		N2O	4,564.73	33%	0.02	78.7%
#19	D-04	4C Rice Cultivation		CH4	5,654.25	23%	0.02	80.3%
#20	F-01	6A Solid Waste Disposal on Land		CH4	4,516.93	29%	0.02	81.8%
#21	B-19	2E Production of Halocarbons	2. Fugitive Emissions	SF6	1,270.43	100%	0.02	83.3%
#22	B-02	2A Mineral Product	2. Lime Production	CO2	7,799.26	16%	0.01	84.8%
#23	F-03	6B Wastewater Handling		N2O	1,159.00	93%	0.01	86.0%
#24	A-20	1A3 Mobile Combustion	d. Navigation	N2O	101.42	1000%	0.01	87.2%
#25	D-01	4A Enteric Fermentation		CH4	7,120.61	12%	0.01	88.2%
#26	B-18	2E Production of Halocarbons	2. Fugitive Emissions	PFCs	783.02	100%	0.01	89.2%
#27	B-24	2F(a) Consumption of Halocarbons	5. Solvents	PFCs	1,944.38	40%	0.01	90.1%

Tier 1 level assessment of the latest emissions and removals (FY1990) gives the following 18 sub-categories as the key categories (Table 2.29). Tier 2 level assessment of the latest emissions and removals (FY1990) gives the following 29 sub-categories as the key categories (Table 2.30).

Table 2.29 Results of Tier 1 Level Assessment (FY1990)

	A IPCC Category		B Direct GHGs	C Base Year Estimate [Gg CO2 eq.]	E kevek Assessment	F % Contribution to Level	Cumulative
#1	1A Stationary Combustion	Liquid Fuels	CO2	435,168.99	0.323	32.3%	32.3%
#2	1A Stationary Combustion	Solid Fuels	CO2	308,620.23	0.229	22.9%	55.2%
#3	1A3 Mobile Combustion	b. Road Transportation	CO2	189,227.88	0.140	14.0%	69.2%
#4	1A Stationary Combustion	Gaseous Fuels	CO2	104,300.83	0.077	7.7%	76.9%
#5	5A Forest Land	1. Forest Land remaining Forest Land	CO2	75,127.14	0.056	5.6%	82.5%
#6	2A Mineral Product	1. Cement Production	CO2	37,966.28	0.028	2.8%	85.3%
#7	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs	16,965.00	0.013	1.3%	86.6%
#8	1A3 Mobile Combustion	d. Navigation	CO2	13,730.95	0.010	1.0%	87.6%
#9	6C Waste Incineration		CO2	12,173.71	0.009	0.9%	88.5%
#10	2A Mineral Product	3. Limestone and Dolomite Use	CO2	11,527.41	0.009	0.9%	89.3%
#11	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF6	11,004.99	0.008	0.8%	90.2%
#12	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs	10,382.05	0.008	0.8%	90.9%
#13	1A Stationary Combustion	Other Fuels	CO2	8,875.30	0.007	0.7%	91.6%
#14	6A Solid Waste Disposal on Land		CH4	8,285.86	0.006	0.6%	92.2%
#15	4A Enteric Fermentation		CH4	7,674.46	0.006	0.6%	92.8%
#16	2B Chemical Industry	3. Adipic Acid	N2O	7,501.25	0.006	0.6%	93.3%
#17	2A Mineral Product	2. Lime Production	CO2	7,321.64	0.005	0.5%	93.9%
#18	1A3 Mobile Combustion	a. Civil Aviation	CO2	7,162.41	0.005	0.5%	94.4%
#19	4C Rice Cultivation		CH4	7,002.78	0.005	0.5%	94.9%
#20	4B Manure Management		N2O	5,661.40	0.004	0.4%	95.3%

Table 2.30 Results of Tier 2 Level Assessment (FY1990)

	A IPCC Category		B Direct GHGs	C Base Year Estimate [Gg CO2eq.]	I Source/Sink Uncertinty	K Contribution to Total L2	Cumulative
#1	1A3 Mobile Combustion	a. Civil Aviation	N2O	69.75	10000%	0.08	7.5%
#2	6C Waste Incineration		CO2	12,173.71	50%	0.07	14.0%
#3	2E Production of Halocarbons	2. Fugitive Emissions	SF6	4,708.30	100%	0.05	19.1%
#4	1A Stationary Combustion	Solid Fuels	CO2	308,620.23	1%	0.05	24.1%
#5	2F(a) Consumption of Halocarbons	8. Electrical Equipment	SF6	11,004.99	40%	0.05	28.9%
#6	1A3 Mobile Combustion	b. Road Transportation	CO2	189,227.88	2%	0.05	33.6%
#7	5A Forest Land	1. Forest Land remaining Forest Land	CO2	75,127.14	6%	0.05	38.2%
#8	1A Stationary Combustion	Liquid Fuels	CO2	435,168.99	1%	0.05	42.8%
#9	2F(a) Consumption of Halocarbons	5. Solvents	PFCs	10,382.05	40%	0.04	47.2%
#10	2A Mineral Product	1. Cement Production	CO2	37,966.28	10%	0.04	51.5%
#11	4D Agricultural Soils	1. Direct Soil Emissions	N2O	4,249.46	90%	0.04	55.6%
#12	1B Fugitive Emission	1a i. Coal Mining and Handling (under	CH4	2,785.23	107%	0.03	58.8%
#13	1A3 Mobile Combustion	b. Road Transportation	N2O	3,901.71	71%	0.03	61.8%
#14	4B Manure Management		N2O	5,661.40	48%	0.03	64.7%
#15	6A Solid Waste Disposal on Land		CH4	8,285.86	29%	0.03	67.3%
#16	4D Agricultural Soils	3. Indirect Emissions	N2O	3,669.26	64%	0.03	69.8%
#17	2F(a) Consumption of Halocarbons	7. Semiconductor Manufacture	PFCs	3,148.83	64%	0.02	72.0%
#18	4B Manure Management		CH4	3,104.72	64%	0.02	74.1%
#19	2A Mineral Product	3. Limestone and Dolomite Use	CO2	11,527.41	17%	0.02	76.2%
#20	4C Rice Cultivation		CH4	7,002.78	23%	0.02	77.9%
#21	6C Waste Incineration		N2O	1,517.74	103%	0.02	79.6%
#22	6B Wastewater Handling		N2O	1,289.65	93%	0.01	80.9%
#23	2A Mineral Product	2. Lime Production	CO2	7,321.64	16%	0.01	82.1%
#24	1A3 Mobile Combustion	d. Navigation	N2O	111.31	1000%	0.01	83.3%
#25	1A Stationary Combustion	Other Fuels	CO2	8,875.30	12%	0.01	84.5%
#26	2E Production of Halocarbons	1. By-product Emissions	HFCs	16,965.00	5%	0.01	85.5%
#27	6B Wastewater Handling		CH4	2,120.57	43%	0.01	86.5%
#28	4A Enteric Fermentation		CH4	7,674.46	12%	0.01	87.4%
#29	2B Chemical Industry	other products except Anmonia	CO2	1,129.29	77%	0.01	88.4%
#30	2B Chemical Industry	1. Ammonia Production	CO2	3,384.68	23%	0.01	89.2%
#31	1A Stationary Combustion		N2O	2,332.05	33%	0.01	90.1%
#32	2E Production of Halocarbons	2. Fugitive Emissions	PFCs	762.85	100%	0.01	90.9%

2.6.6.2.c Trend Assessment

The difference between the rate of change in emissions and removals in a category and the rate of change in total emissions and removals is calculated. The trend assessment is calculated by multiplying this value by the ratio of contribution of the relevant category to total emissions and removals. The calculated results, regarded as trend assessment values, are added from the category of which the proportion to the total of trend assessment values is the largest, until the total reaches 95% for Tier 1 and 90% for Tier 2. At this point, these categories are defined as the key categories. Tier 1 level assessment uses emissions and removals from each category directly and Tier 2 level

assessment analyzes the emissions and removals of each category, multiplied by the uncertainty of each category.

The key category analysis was first conducted for the inventory excluding LULUCF and the key categories for source sectors were identified (1). Then the key category analysis was repeated again for the full inventory including the LULUCF categories and key categories for LULUCF sector were identified (2). In accordance with the *LULUCF-GPG* (p.5.30), a source category, which was identified as key in (1) but not in (2), was still regarded as key; while a source category, which was not identified as key in (1) but was done in (2), was not regarded as key (gray rows in tables below).

Tier 1 trend assessment of the latest emissions and removals (FY2007) gives the following 17 sub-categories as the key categories (Table 2.31). Tier 2 trend assessment of the latest emissions and removals (FY2007) gives the following 24 sub-categories as the key categories (Table 2.32).

Table 2.31 Results of Tier 1 Trend Assessment (FY2007)

	A IPCC Category		B Direct GHGs	C Base Year Estimate [Gg CO2 eq.]	D Current Year Estimate [Gg CO2 eq.]	H % Contribution to Trend	Cumulative
#1	1A Stationary Combustion	Liquid Fuels	CO2	435169	322477	30.3%	30.3%
#2	1A Stationary Combustion	Solid Fuels	CO2	308620	451893	23.9%	54.2%
#3	1A Stationary Combustion	Gaseous Fuels	CO2	104301	203287	18.3%	72.5%
#4	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs	16965	218	3.7%	76.2%
#5	1A3 Mobile Combustion	b. Road Transportation	CO2	189228	217653	2.6%	78.8%
#6	2A Mineral Product	1. Cement Production	CO2	37966	30076	2.2%	81.0%
#7	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF6	11005	922	2.2%	83.2%
#8	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning Equipment	HFCs	840	11375	2.1%	85.4%
#9	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs	10382	1944	1.9%	87.3%
#10	2B Chemical Industry	3. Adipic Acid	N2O	7501	271	1.6%	88.9%
#11	1A Stationary Combustion	Other Fuels	CO2	8875	15983	1.3%	90.1%
#12	5A Forest Land	2. Land converted to Forest Land	CO2	5651	1272	1.0%	91.1%
#13	6A Solid Waste Disposal on Land		CH4	8286	4517	0.9%	92.0%
#14	2E Production of Halocarbons and SF6	2. Fugitive Emissions	SF6	4708	1270	0.8%	92.8%
#15	1A3 Mobile Combustion	a. Civil Aviation	CO2	7162	10876	0.6%	93.4%
#16	1B Fugitive Emission	1a i. Coal Mining and Handling (under	CH4	2785	40	0.6%	94.1%
#17	1A3 Mobile Combustion	d. Navigation	CO2	13731	12411	0.5%	94.6%
#18	5E Settlements	2. Land converted to Settlements	CO2	3548	1526	0.5%	95.0%

Table 2.32 Results of Tier 2 Trend Assessment (FY2007)

	A IPCC Category		B Direct GHGs	C Base Year Estimate [Gg CO2 eq.]	D Current Year Estimate [Gg CO2 eq.]	I Source/Sink Uncertinty	M Contribution to Total T2	Cumulative
#1	2F(a) Consumption of Halocarbons	8. Electrical Equipment	SF6	11,004.99	922.41	40%	0.10	10.3%
#2	2F(a) Consumption of Halocarbons	1. Refrigeration and Air Conditioning	HFCs	840.40	11,375.49	42%	0.10	20.5%
#3	2E Production of Halocarbons	2. Fugitive Emissions	SF6	4,708.30	1,270.43	100%	0.09	29.5%
#4	2F(a) Consumption of Halocarbons	5. Solvents	PFCs	10,382.05	1,944.38	40%	0.09	38.1%
#5	1A3 Mobile Combustion	a. Civil Aviation	N2O	69.75	109.11	10000%	0.08	45.9%
#6	1B Fugitive Emission	1a i. Coal Mining and Handling (under	CH4	2,785.23	39.82	107%	0.07	53.3%
#7	1A Stationary Combustion	Solid Fuels	CO2	308,620.23	451,893.02	1%	0.04	57.4%
#8	1A Stationary Combustion	Liquid Fuels	CO2	435,168.99	322,477.35	1%	0.03	60.7%
#9	6A Solid Waste Disposal on Land		CH4	8,285.86	4,516.93	29%	0.03	63.7%
#10	1A3 Mobile Combustion	b. Road Transportation	N2O	3,901.71	2,490.03	71%	0.03	66.5%
#11	2A Mineral Product	1. Cement Production	CO2	37,966.28	30,076.22	10%	0.03	69.2%
#12	4D Agricultural Soils	1. Direct Soil Emissions	N2O	4,249.46	3,348.49	90%	0.03	71.9%
#13	2E Production of Halocarbons	1. By-product Emissions	HFCs	16,965.00	217.62	5%	0.02	74.1%
#14	1A Stationary Combustion	Other Fuels	CO2	8,875.30	15,982.70	12%	0.02	76.0%
#15	2B Chemical Industry	3. Adipic Acid	N2O	7,501.25	270.91	9%	0.02	77.6%
#16	6C Waste Incineration		N2O	1,517.74	2,296.09	103%	0.02	79.2%
#17	1A Stationary Combustion		N2O	2,332.05	4,564.73	33%	0.02	80.8%
#18	4D Agricultural Soils	3. Indirect Emissions	N2O	3,669.26	2,976.80	64%	0.01	82.3%
#19	4B Manure Management		CH4	3,104.72	2,394.07	64%	0.01	83.7%
#20	4B Manure Management		N2O	5,661.40	4,860.72	48%	0.01	85.1%
#21	6C Waste Incineration		CO2	12,173.71	14,226.64	50%	0.01	86.3%
#22	4C Rice Cultivation		CH4	7,002.78	5,654.25	23%	0.01	87.3%
#23	6B Wastewater Handling		CH4	2,120.57	1,369.21	43%	0.01	88.3%
#24	5B Cropland	2. Land converted to Cropland	CO2	2,057.84	265.44	17%	0.01	89.1%
#25	5E Settlements	2. Land converted to Settlements	CO2	3,548.45	1,526.38	15%	0.01	89.8%
#26	2B Chemical Industry	1. Ammonia Production	CO2	3,384.68	2,296.03	23%	0.01	90.6%

Data utilized for the key category analysis are shown in Table 2.33 and Table 2.34 as references.

Table 2.33 Data used for the key category analysis (FY2007)

	A IPCC Category		B Direct GHGs	C Base Year Estimate (Gg CO2eq.)	D Current Year Estimate (Gg CO2eq.)	E Level Assessment	F % Contribution to Level	G Trend Assessment	H % Contribution to Trend	I Source/Sink Uncertinty	J Level Uncertainty (x 1000)	K Contribution to Total L2	L Trend Uncertainty (x 1000)	M Contribution to Total T2
#1	1A Stationary Combustion	Liquid Fuels	CO2	435,168.99	322,477.35	0.221	22.1%	0.0941	30.3%	1%	2.13	0.04	0.91	0.03
#2	1A Stationary Combustion	Solid Fuels	CO2	308,620.23	451,893.02	0.309	30.9%	0.0742	23.9%	1%	4.64	0.08	1.11	0.04
#3	1A Stationary Combustion	Gaseous Fuels	CO2	104,300.83	203,287.27	0.139	13.9%	0.0570	18.3%	0%	0.41	0.01	0.17	0.01
#4	1A Stationary Combustion	Other Fuels	CO2	8,875.30	15,982.70	0.011	1.1%	0.0040	1.3%	12%	1.36	0.02	0.50	0.02
#5	1A Stationary Combustion		CH4	533.48	574.39	0.000	0.0%	0.0000	0.0%	47%	0.18	0.00	0.00	0.00
#6	1A Stationary Combustion		N2O	2,332.05	4,564.73	0.003	0.3%	0.0013	0.4%	33%	1.03	0.02	0.42	0.02
#7	1A Stationary Combustion		CH4	50.77	85.63	0.000	0.0%	0.0000	0.0%	105%	0.06	0.00	0.02	0.00
#8	1A Stationary Combustion		N2O	387.23	594.42	0.000	0.0%	0.0001	0.0%	37%	0.15	0.00	0.04	0.00
#9	1A3 Mobile Combustion	a. Civil Aviation	CO2	7,162.41	10,875.77	0.007	0.7%	0.0020	0.6%	3%	0.19	0.00	0.05	0.00
#10	1A3 Mobile Combustion	b. Road Transportation	CO2	189,227.88	217,652.78	0.149	14.9%	0.0080	2.6%	2%	3.43	0.06	0.18	0.01
#11	1A3 Mobile Combustion	c. Railways	CO2	932.45	647.04	0.000	0.0%	0.0002	0.1%	2%	0.01	0.00	0.01	0.00
#12	1A3 Mobile Combustion	d. Navigation	CO2	13,730.95	12,411.48	0.008	0.8%	0.0016	0.5%	2%	0.20	0.00	0.04	0.00
#13	1A3 Mobile Combustion	a. Civil Aviation	CH4	2.94	4.84	0.000	0.0%	0.0000	0.0%	200%	0.01	0.00	0.00	0.00
#14	1A3 Mobile Combustion	b. Road Transportation	CH4	266.66	179.32	0.000	0.0%	0.0001	0.0%	64%	0.08	0.00	0.04	0.00
#15	1A3 Mobile Combustion	c. Railways	CH4	1.18	0.80	0.000	0.0%	0.0000	0.0%	14%	0.00	0.00	0.00	0.00
#16	1A3 Mobile Combustion	d. Navigation	CH4	26.33	24.26	0.000	0.0%	0.0000	0.0%	200%	0.03	0.00	0.01	0.00
#17	1A3 Mobile Combustion	a. Civil Aviation	N2O	69.75	109.11	0.000	0.0%	0.0000	0.0%	10000%	7.47	0.13	2.12	0.08
#18	1A3 Mobile Combustion	b. Road Transportation	N2O	3,901.71	2,490.03	0.002	0.2%	0.0011	0.4%	71%	1.20	0.02	0.78	0.03
#19	1A3 Mobile Combustion	c. Railways	N2O	121.38	82.77	0.000	0.0%	0.0000	0.0%	11%	0.01	0.00	0.00	0.00
#20	1A3 Mobile Combustion	d. Navigation	N2O	111.31	101.42	0.000	0.0%	0.0000	0.0%	1000%	0.69	0.01	0.12	0.00
#21	1B Fugitive Emission	1a i. Coal Mining and Handling (under	CH4	2,785.23	39.82	0.000	0.0%	0.0019	0.6%	107%	0.03	0.00	2.01	0.07
#22	1B Fugitive Emission	1a ii. Coal Mining and Handling	CH4	21.20	11.65	0.000	0.0%	0.0000	0.0%	185%	0.01	0.00	0.01	0.00
#23	1B Fugitive Emission	2a. Oil	CO2	0.14	0.11	0.000	0.0%	0.0000	0.0%	21%	0.00	0.00	0.00	0.00
#24	1B Fugitive Emission	2a. Oil	CH4	28.32	28.23	0.000	0.0%	0.0000	0.0%	17%	0.00	0.00	0.00	0.00
#25	1B Fugitive Emission	2a. Oil	N2O	0.00	0.00	0.000	0.0%	0.0000	0.0%	27%	0.00	0.00	0.00	0.00
#26	1B Fugitive Emission	2b. Natural Gas	CO2	0.25	0.46	0.000	0.0%	0.0000	0.0%	25%	0.00	0.00	0.00	0.00
#27	1B Fugitive Emission	2b. Natural Gas	CH4	187.94	324.23	0.000	0.0%	0.0001	0.0%	23%	0.05	0.00	0.02	0.00
#28	1B Fugitive Emission	2c. Venting & Flaring	CO2	36.23	36.96	0.000	0.0%	0.0000	0.0%	18%	0.00	0.00	0.00	0.00
#29	1B Fugitive Emission	2c. Venting & Flaring	CH4	14.45	12.55	0.000	0.0%	0.0000	0.0%	20%	0.00	0.00	0.00	0.00
#30	1B Fugitive Emission	2c. Venting & Flaring	N2O	0.11	0.12	0.000	0.0%	0.0000	0.0%	18%	0.00	0.00	0.00	0.00
#31	2A Mineral Product	1. Cement Production	CO2	37,966.28	30,076.22	0.021	2.1%	0.0070	2.2%	10%	2.15	0.04	0.73	0.03
#32	2A Mineral Product	2. Lime Production	CO2	7,321.64	7,799.26	0.005	0.5%	0.0001	0.0%	16%	0.84	0.01	0.01	0.00
#33	2A Mineral Product	3. Limestone and Dolomite Use	CO2	11,527.41	12,003.50	0.008	0.8%	0.0003	0.1%	17%	1.36	0.02	0.05	0.00
#34	2A Mineral Product	4. Soda Ash Production and Use	CO2	583.63	339.98	0.000	0.0%	0.0002	0.1%	16%	0.04	0.00	0.03	0.00
#35	2B Chemical Industry	1. Ammonia Production	CO2	3,384.68	2,296.03	0.002	0.2%	0.0009	0.3%	23%	0.36	0.01	0.20	0.01
#36	2B Chemical Industry	other products except Ammonia	CO2	1,129.29	1,002.83	0.001	0.1%	0.0001	0.0%	77%	0.53	0.01	0.11	0.00
#37	2B Chemical Industry	2. Nitric Acid	N2O	765.70	589.27	0.000	0.0%	0.0002	0.0%	46%	0.19	0.00	0.07	0.00
#38	2B Chemical Industry	3. Adipic Acid	N2O	7,501.25	270.91	0.000	0.0%	0.0050	1.6%	9%	0.02	0.00	0.46	0.02
#39	2B Chemical Industry	4. Carbide Production	CH4	0.42	0.66	0.000	0.0%	0.0000	0.0%	100%	0.00	0.00	0.00	0.00
#40	2B Chemical Industry	5. Carbon Black, Ethylene, Ethylene Dichloride, Styrene, Methanol, Coke	CH4	337.80	115.85	0.000	0.0%	0.0002	0.1%	89%	0.07	0.00	0.14	0.01
#41	2C Metal Production	1. Iron and Steel Production	CO2	356.09	212.02	0.000	0.0%	0.0001	0.0%	5%	0.01	0.00	0.00	0.00
#42	2C Metal Production	1. Iron and Steel Production	CH4	15.47	14.97	0.000	0.0%	0.0000	0.0%	163%	0.02	0.00	0.00	0.00
#43	2C Metal Production	2. Ferroalloys Production	CH4	3.89	2.33	0.000	0.0%	0.0000	0.0%	163%	0.00	0.00	0.00	0.00
#44	2C Metal Production	3. Aluminium Production	PFCs	69.74	14.69	0.000	0.0%	0.0000	0.0%	33%	0.00	0.00	0.01	0.00
#45	2C Metal Production	4. SF6 Used in Aluminium and Magnesium oundries	SF6	119.50	996.13	0.001	0.1%	0.0005	0.2%	5%	0.03	0.00	0.03	0.00
#46	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs	16,965.00	217.62	0.000	0.0%	0.0115	3.7%	5%	0.01	0.00	0.62	0.02
#47	2E Production of Halocarbons and SF6	2. Fugitive Emissions	HFCs	480.12	279.99	0.000	0.0%	0.0002	0.0%	100%	0.19	0.00	0.15	0.01
#48	2E Production of Halocarbons and SF6	2. Fugitive Emissions	PFCs	762.85	783.02	0.001	0.1%	0.0000	0.0%	100%	0.54	0.01	0.03	0.00
#49	2E Production of Halocarbons and SF6	2. Fugitive Emissions	SF6	4,708.30	1,270.43	0.001	0.1%	0.0024	0.8%	100%	0.87	0.02	2.43	0.09
#50	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning Equipment	HFCs	840.40	11,375.49	0.008	0.8%	0.0066	2.1%	42%	3.29	0.06	2.79	0.10
#51	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	2. Foam Blowing	HFCs	451.76	316.64	0.000	0.0%	0.0001	0.0%	51%	0.11	0.00	0.06	0.00
#52	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	3. Fire Extinguishers	HFCs	0.00	6.24	0.000	0.0%	0.0000	0.0%	64%	0.00	0.00	0.00	0.00
#53	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	4. Aerosols/ Metered Dose Inhalers	HFCs	1,365.00	849.75	0.001	0.1%	0.0004	0.1%	31%	0.18	0.00	0.12	0.00
#54	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs	10,382.05	1,944.38	0.001	0.1%	0.0059	1.9%	40%	0.53	0.01	2.35	0.09
#55	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	HFCs	158.30	164.41	0.000	0.0%	0.0000	0.0%	64%	0.07	0.00	0.00	0.00
#56	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs	3,148.83	3,741.32	0.003	0.3%	0.0002	0.1%	64%	1.64	0.03	0.13	0.00
#57	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	SF6	1,128.98	1,196.04	0.001	0.1%	0.0000	0.0%	64%	0.52	0.01	0.01	0.00
#58	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF6	11,004.99	922.41	0.001	0.1%	0.0069	2.2%	40%	0.25	0.00	2.79	0.10
#59	3 Solvent & Other Product Use	Using Laughing Gas in Hospital	N2O	287.07	244.76	0.000	0.0%	0.0000	0.0%	5%	0.01	0.00	0.00	0.00
#60	4A Enteric Fermentation		CH4	7,674.46	7,120.61	0.005	0.5%	0.0008	0.2%	12%	0.57	0.01	0.09	0.00
#61	4B Manure Management		CH4	3,104.72	2,394.07	0.002	0.2%	0.0006	0.2%	64%	1.05	0.02	0.39	0.01
#62	4B Manure Management		N2O	5,661.40	4,860.72	0.003	0.3%	0.0008	0.3%	48%	1.60	0.03	0.39	0.01
#63	4C Rice Cultivation		CH4	7,002.78	5,654.25	0.004	0.4%	0.0012	0.4%	23%	0.88	0.02	0.28	0.01
#64	4D Agricultural Soils	1. Direct Soil Emissions	N2O	4,249.46	3,348.49	0.002	0.2%	0.0008	0.3%	90%	2.06	0.04	0.71	0.03
#65	4D Agricultural Soils	2. Pasture, Range and Paddock Manure	N2O	11.91	12.12	0.000	0.0%	0.0000	0.0%	133%	0.01	0.00	0.00	0.00
#66	4D Agricultural Soils	3. Indirect Emissions	N2O	3,669.26	2,976.80	0.002	0.2%	0.0006	0.2%	64%	1.30	0.02	0.40	0.01
#67	4F Field Burning of Agricultural		CH4	129.77	102.93	0.000	0.0%	0.0000	0.0%	142%	0.10	0.00	0.03	0.00
#68	4F Field Burning of Agricultural		N2O	103.92	76.29	0.000	0.0%	0.0000	0.0%	186%	0.10	0.00	0.04	0.00
#69	5A Forest Land	1. Forest Land remaining Forest Land	CO2	75,127.14	81,595.45	0.056	5.6%	0.0001	0.0%	6%	3.20	0.06	0.01	0.00
#70	5A Forest Land	2. Land converted to Forest Land	CO2	5,650.70	1,271.57	0.001	0.1%	0.0031	1.0%	6%	0.05	0.00	0.19	0.01
#71	5A Forest Land		CH4	8.31	1.91	0.000	0.0%	0.0000	0.0%	53%	0.00	0.00	0.00	0.00
#72	5A Forest Land		N2O	0.84	0.19	0.000	0.0%	0.0000	0.0%	89%	0.00	0.00	0.00	0.00
#73	5B Cropland	1. Cropland remaining Cropland	CO2	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#74	5B Cropland	2. Land converted to Cropland	CO2	2,057.84	265.44	0.000	0.0%	0.0012	0.4%	17%	0.03	0.00	0.22	0.01
#75	5B Cropland		CH4	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#76	5B Cropland		N2O	68.27	7.86	0.000	0.0%	0.0000	0.0%	76%	0.00	0.00	0.03	0.00
#77	5C Grassland	1. Grassland remaining Grassland	CO2	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#78	5C Grassland	2. Land converted to Grassland	CO2	516.21	614.90	0.000	0.0%	0.0000	0.0%	19%	0.08	0.00	0.01	0.00
#79	5C Grassland		CH4	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#80	5C Grassland		N2O	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#81	5D Wetlands	1. Wetlands remaining Wetlands	CO2	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#82	5D Wetlands	2. Land converted to Wetlands	CO2	292.33	167.06	0.000	0.0%	0.0001	0.0%	21%	0.02	0.00	0.02	0.00
#83	5D Wetlands		CH4	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#84	5D Wetlands		N2O	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#85	5E Settlements	1. Settlements remaining Settlements	CO2	475.77	677.60	0.000	0.0%	0.0001	0.0%	82%	0.38	0.01	0.08	0.00
#86	5E Settlements	2. Land converted to Settlements	CO2	3,548.45	1,526.38	0.001	0.1%	0.0015	0.5%	15%	0.15	0.00	0.21	0.01
#87	5E Settlements		CH4	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#88	5E Settlements		N2O	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#89	5F Other Land	1. Other Land remaining Other Land	CO2	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#90	5F Other Land	2. Land converted to Other Land	CO2	956.66	607.70	0.000	0.0%	0.0003	0.1%	30%	0.12	0.00	0.08	0.00
#91	5F Other Land		CH4	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#92	5F Other Land		N2O	0.00	0.00	0.000	0.0%	0.0000	0.0%	0%	0.00	0.00	0.00	0.00
#93	5G Other	CO2 emissions from agricultural lime application	CO2	550.22	230.34	0.000	0.0%	0.0002	0.1%	51%	0.08	0.00	0.12	0.00
#94	6A Solid Waste Disposal on Land		CH4	8,285.86	4,516.93	0.003	0.3%	0.0028	0.9%	29%	0.88	0.02	0.80	0.03
#95	6B Wastewater Handling		CH4	2,120.57	1,369.21	0.001	0.1%	0.0006	0.2%	43%	0.40	0.01	0.25	0.01
#96	6B Wastewater Handling		N2O	1,289.65	1,159.00	0.001	0.1%	0.0002	0.0%	93%	0.74	0.01	0.14	0.01
#97	6C Waste Incineration		CO2	12,173.71	14,226.64	0.010	1.0%	0.0007	0.2%	50%	4.85	0.08	0.33	0.01
#98	6C Waste Incineration		CH4	13.47	9.81	0.000	0.0%	0.0000	0.0%	86%	0.01	0.00	0.00	0.00
#99	6C Waste Incineration		N2O	1,517.74	2,296.09	0.002	0.2%	0.0004	0.1%	103%	1.62	0.03	0.42	0.02
#100	6D Other		CO2	702.83	559.75	0.000	0.0%	0.0001	0.0%	25%	0.09	0.00	0.03	0.00
#101	6D Other		CH4	14.48	16.64	0.000	0.0%	0.0000	0.0%	74%	0.01	0.00	0.00	0.00
#102	6D Other		N2O	12.83	14.74	0.000	0.0%	0.0000	0.0%	86%	0.01	0.00	0.00	0.00
	TOTAL			1,348,655.72	1,461,221.92	1.00	100.0%	0.31	100.0%		57.65	1.00	27.20	1.00

Table 2.34 Data used for the key category analysis (FY1990)

	A IPCC Category		B Direct GHGs	C Base Year Estimate [Gg CO2 eq.]	E Level Assesslent	F % Contribution to Level	I Source/Sink Uncertinty	J Level Uncertainty (x 1000)	K Contribution to Total L2
#1	1A Stationary Combustion	Liquid Fuels	CO2	435,168.99	0.323	32.3%	1%	3.12	0.05
#2	1A Stationary Combustion	Solid Fuels	CO2	308,620.23	0.229	22.9%	1%	3.43	0.05
#3	1A Stationary Combustion	Gaseous Fuels	CO2	104,300.83	0.077	7.7%	0%	0.23	0.00
#4	1A Stationary Combustion	Other Fuels	CO2	8,875.30	0.007	0.7%	12%	0.82	0.01
#5	1A Stationary Combustion		CH4	533.48	0.000	0.0%	47%	0.19	0.00
#6	1A Stationary Combustion		N2O	2,332.05	0.002	0.2%	33%	0.57	0.01
#7	1A Stationary Combustion		CH4	50.77	0.000	0.0%	105%	0.04	0.00
#8	1A Stationary Combustion		N2O	387.23	0.000	0.0%	37%	0.11	0.00
#9	1A3 Mobile Combustion	a. Civil Aviation	CO2	7,162.41	0.005	0.5%	3%	0.13	0.00
#10	1A3 Mobile Combustion	b. Road Transportation	CO2	189,227.88	0.140	14.0%	2%	3.23	0.05
#11	1A3 Mobile Combustion	c. Railways	CO2	932.45	0.001	0.1%	2%	0.02	0.00
#12	1A3 Mobile Combustion	d. Navigation	CO2	13,730.95	0.010	1.0%	2%	0.24	0.00
#13	1A3 Mobile Combustion	a. Civil Aviation	CH4	2.94	0.000	0.0%	200%	0.00	0.00
#14	1A3 Mobile Combustion	b. Road Transportation	CH4	266.66	0.000	0.0%	64%	0.13	0.00
#15	1A3 Mobile Combustion	c. Railways	CH4	1.18	0.000	0.0%	14%	0.00	0.00
#16	1A3 Mobile Combustion	d. Navigation	CH4	26.33	0.000	0.0%	200%	0.04	0.00
#17	1A3 Mobile Combustion	a. Civil Aviation	N2O	69.75	0.000	0.0%	10000%	5.17	0.08
#18	1A3 Mobile Combustion	b. Road Transportation	N2O	3,901.71	0.003	0.3%	71%	2.05	0.03
#19	1A3 Mobile Combustion	c. Railways	N2O	121.38	0.000	0.0%	11%	0.01	0.00
#20	1A3 Mobile Combustion	d. Navigation	N2O	111.31	0.000	0.0%	1000%	0.83	0.01
#21	1B Fugitive Emission	1a i. Coal Mining and Handling (under	CH4	2,785.23	0.002	0.2%	107%	2.21	0.03
#22	1B Fugitive Emission	1a ii. Coal Mining and Handling	CH4	21.20	0.000	0.0%	185%	0.03	0.00
#23	1B Fugitive Emission	2a. Oil	CO2	0.14	0.000	0.0%	21%	0.00	0.00
#24	1B Fugitive Emission	2a. Oil	CH4	28.32	0.000	0.0%	17%	0.00	0.00
#25	1B Fugitive Emission	2a. Oil	N2O	0.00	0.000	0.0%	27%	0.00	0.00
#26	1B Fugitive Emission	2b. Natural Gas	CO2	0.25	0.000	0.0%	25%	0.00	0.00
#27	1B Fugitive Emission	2b. Natural Gas	CH4	187.94	0.000	0.0%	23%	0.03	0.00
#28	1B Fugitive Emission	2c. Venting & Flaring	CO2	36.23	0.000	0.0%	18%	0.00	0.00
#29	1B Fugitive Emission	2c. Venting & Flaring	CH4	14.45	0.000	0.0%	20%	0.00	0.00
#30	1B Fugitive Emission	2c. Venting & Flaring	N2O	0.11	0.000	0.0%	18%	0.00	0.00
#31	2A Mineral Product	1. Cement Production	CO2	37,966.28	0.028	2.8%	10%	2.94	0.04
#32	2A Mineral Product	2. Lime Production	CO2	7,321.64	0.005	0.5%	16%	0.86	0.01
#33	2A Mineral Product	3. Limestone and Dolomite Use	CO2	11,527.41	0.009	0.9%	17%	1.42	0.02
#34	2A Mineral Product	4. Soda Ash Production and Use	CO2	583.63	0.000	0.0%	16%	0.07	0.00
#35	2B Chemical Industry	1. Ammonia Production	CO2	3,384.68	0.003	0.3%	23%	0.58	0.01
#36	2B Chemical Industry	other products except Anmonia	CO2	1,129.29	0.001	0.1%	77%	0.65	0.01
#37	2B Chemical Industry	2. Nitric Acid	N2O	765.70	0.001	0.1%	46%	0.26	0.00
#38	2B Chemical Industry	3. Adipic Acid	N2O	7,501.25	0.006	0.6%	9%	0.51	0.01
#39	2B Chemical Industry	4. Carbide Production	CH4	0.42	0.000	0.0%	100%	0.00	0.00
#40	2B Chemical Industry	5. Carbon Black, Ethylene, Ethylene Dichloride, Styrene, Methanol, Coke	CH4	337.80	0.000	0.0%	89%	0.22	0.00
#41	2C Metal Production	1. Iron and Steel Production	CO2	356.09	0.000	0.0%	5%	0.01	0.00
#42	2C Metal Production	1. Iron and Steel Production	CH4	15.47	0.000	0.0%	163%	0.02	0.00
#43	2C Metal Production	2. Ferroalloys Production	CH4	3.89	0.000	0.0%	163%	0.00	0.00
#44	2C Metal Production	3. Aluminium Production	PFCs	69.74	0.000	0.0%	33%	0.02	0.00
#45	2C Metal Production	4. SF6 Used in Aluminium and Magnesium oundries	SF6	119.50	0.000	0.0%	5%	0.00	0.00
#46	2E Production of Halocarbons and SF6	1. By-product Emissions (Production of HCFC-22)	HFCs	16,965.00	0.013	1.3%	5%	0.68	0.01
#47	2E Production of Halocarbons and SF6	2. Fugitive Emissions	HFCs	480.12	0.000	0.0%	100%	0.36	0.01
#48	2E Production of Halocarbons and SF6	2. Fugitive Emissions	PFCs	762.85	0.001	0.1%	100%	0.57	0.01
#49	2E Production of Halocarbons and SF6	2. Fugitive Emissions	SF6	4,708.30	0.003	0.3%	100%	3.51	0.05
#50	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	1. Refrigeration and Air Conditioning Equipment	HFCs	840.40	0.001	0.1%	42%	0.26	0.00
#51	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	2. Foam Blowing	HFCs	451.76	0.000	0.0%	51%	0.17	0.00
#52	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	3. Fire Extinguishers	HFCs	0.00	0.000	0.0%	64%	0.00	0.00
#53	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	4. Aerosols/ Metered Dose Inhalers	HFCs	1,365.00	0.001	0.1%	31%	0.31	0.00
#54	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	5. Solvents	PFCs	10,382.05	0.008	0.8%	40%	3.08	0.04
#55	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	HFCs	158.30	0.000	0.0%	64%	0.08	0.00
#56	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	PFCs	3,148.83	0.002	0.2%	64%	1.49	0.02
#57	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	7. Semiconductor Manufacture	SF6	1,128.98	0.001	0.1%	64%	0.54	0.01
#58	2F(a) Consumption of Halocarbons and SF6 (actual emissions - Tier 2)	8. Electrical Equipment	SF6	11,004.99	0.008	0.8%	40%	3.28	0.05
#59	3 Solvent & Other Product Use	Using Laughing Gas in Hospital	N2O	287.07	0.000	0.0%	5%	0.01	0.00
#60	4A Enteric Fermentation		CH4	7,674.46	0.006	0.6%	12%	0.67	0.01
#61	4B Manure Management		CH4	3,104.72	0.002	0.2%	64%	1.48	0.02
#62	4B Manure Management		N2O	5,661.40	0.004	0.4%	48%	2.02	0.03
#63	4C Rice Cultivation		CH4	7,002.78	0.005	0.5%	23%	1.18	0.02
#64	4D Agricultural Soils	1. Direct Soil Emissions	N2O	4,249.46	0.003	0.3%	90%	2.84	0.04
#65	4D Agricultural Soils	2. Pasture, Range and Paddock Manure	N2O	11.91	0.000	0.0%	133%	0.01	0.00
#66	4D Agricultural Soils	3. Indirect Emissions	N2O	3,669.26	0.003	0.3%	64%	1.73	0.03
#67	4F Field Burning of Agricultural		CH4	129.77	0.000	0.0%	142%	0.14	0.00
#68	4F Field Burning of Agricultural		N2O	103.92	0.000	0.0%	186%	0.14	0.00
#69	5A Forest Land	1. Forest Land remaining Forest Land	CO2	75,127.14	0.056	5.6%	6%	3.20	0.05
#70	5A Forest Land	2. Land converted to Forest Land	CO2	5,650.70	0.004	0.4%	6%	0.26	0.00
#71	5A Forest Land		CH4	8.31	0.000	0.0%	53%	0.00	0.00
#72	5A Forest Land		N2O	0.84	0.000	0.0%	89%	0.00	0.00
#73	5B Cropland	1. Cropland remaining Cropland	CO2	0.00	0.000	0.0%	0%	0.00	0.00
#74	5B Cropland	2. Land converted to Cropland	CO2	2,057.84	0.002	0.2%	17%	0.27	0.00
#75	5B Cropland		CH4	0.00	0.000	0.0%	0%	0.00	0.00
#76	5B Cropland		N2O	68.27	0.000	0.0%	76%	0.04	0.00
#77	5C Grassland	1. Grassland remaining Grassland	CO2	0.00	0.000	0.0%	0%	0.00	0.00
#78	5C Grassland	2. Land converted to Grassland	CO2	516.21	0.000	0.0%	19%	0.07	0.00
#79	5C Grassland		CH4	0.00	0.000	0.0%	0%	0.00	0.00
#80	5C Grassland		N2O	0.00	0.000	0.0%	0%	0.00	0.00
#81	5D Wetlands	1. Wetlands remaining Wetlands	CO2	0.00	0.000	0.0%	0%	0.00	0.00
#82	5D Wetlands	2. Land converted to Wetlands	CO2	292.33	0.000	0.0%	21%	0.05	0.00
#83	5D Wetlands		CH4	0.00	0.000	0.0%	0%	0.00	0.00
#84	5D Wetlands		N2O	0.00	0.000	0.0%	0%	0.00	0.00
#85	5E Settlements	1. Settlements remaining Settlements	CO2	475.77	0.000	0.0%	82%	0.29	0.00
#86	5E Settlements	2. Land converted to Settlements	CO2	3,548.45	0.003	0.3%	15%	0.38	0.01
#87	5E Settlements		CH4	0.00	0.000	0.0%	0%	0.00	0.00
#88	5E Settlements		N2O	0.00	0.000	0.0%	0%	0.00	0.00
#89	5F Other Land	1. Other Land remaining Other Land	CO2	0.00	0.000	0.0%	0%	0.00	0.00
#90	5F Other Land	2. Land converted to Other Land	CO2	956.66	0.001	0.1%	30%	0.21	0.00
#91	5F Other Land		CH4	0.00	0.000	0.0%	0%	0.00	0.00
#92	5F Other Land		N2O	0.00	0.000	0.0%	0%	0.00	0.00
#93	5G Other	CO2 emissions from agricultural lime application	CO2	550.22	0.000	0.0%	51%	0.21	0.00
#94	6A Solid Waste Disposal on Land		CH4	8,285.86	0.006	0.6%	29%	1.75	0.03
#95	6B Wastewater Handling		CH4	2,120.57	0.002	0.2%	43%	0.67	0.01
#96	6B Wastewater Handling		N2O	1,289.65	0.001	0.1%	93%	0.89	0.01
#97	6C Waste Incineration		CO2	12,173.71	0.009	0.9%	50%	4.49	0.07
#98	6C Waste Incineration		CH4	13.47	0.000	0.0%	86%	0.01	0.00
#99	6C Waste Incineration		N2O	1,517.74	0.001	0.1%	103%	1.16	0.02
#100	6D Other		CO2	702.83	0.001	0.1%	25%	0.13	0.00
#101	6D Other		CH4	14.48	0.000	0.0%	74%	0.01	0.00
#102	6D Other		N2O	12.83	0.000	0.0%	86%	0.01	0.00
	TOTAL			1,348,655.72	1.00	100.0%		68.83	1.00

2.6.6.2.d Qualitative Analysis

Key categories identified in the qualitative analysis include the categories in which: mitigation techniques have been employed, significant variance of emissions and removals has been confirmed, a high uncertainty exists due to the solo implementation of the Tier 1 analysis of key categories, and unexpectedly high or low estimates are identified.

In Japan, the categories in which mitigation techniques have been employed, emissions and removals have been newly estimated, and estimation methods have been changed, were identified as key in terms of the qualitative analysis. In this year, the key categories were identified only based on the quantitative results of the level and trend assessments, including both Tier 1 and Tier 2.

2.6.7 Information on the QA/QC Plan including Verification and Treatment of Confidentiality Issues

The QC activities (e.g., checking estimation accuracy, archiving documents) were carried out in each step of the inventory preparation process in accordance with *Good Practice Guidance (2000)* in order to control the inventory's quality.

The evaluation and verification processes on estimation methods, which are done by experts within the Committee, were considered to be a QA activity. The experts who are not involved in any inventory preparation processes evaluated and verified the data quality from the view points of scientific knowledge and data availability.

In FY2008, the QA/QC plan was revised by taking the Expert Review Team's recommendations into consideration. Under the revised QA/QC plan, Japan reviewed the national system and process for inventory preparation including QA/QC activities, and enhanced and systematized its national system and QC activities. As a QA activity, the QA-WG was newly established in order to implement the detailed review of sources and sinks. The QA-WG is composed of experts who are not directly involved in or related to the inventory preparation process. The process includes providing and preparation of activity data, developing emission factors, estimating GHG emissions and removals, and revising the estimation methodologies.

The new aspects of the QA/QC plan are:

1. Clear descriptions of the national system for inventory preparation and the role of each relevant entity

The role and the responsibility for each entity in the inventory preparation process is clarified. The relevant entities are: MOE, GIO, relevant ministries, agencies, and organizations, the Committee, the QA-WG and selected private consulting companies.

2. New Establishment of the Inventory Quality Assurance Working Group (the QA-WG)

As a QA activity, the QA-WG is newly established in order to implement a detailed review for each source or sink. The QA-WG is composed of experts who are not directly involved in or related to the inventory preparation process.

For further information on the national system and process for inventory preparation, see sections 2.6.2 and 2.6.3 .

2.6.8 General Uncertainty Assessment, including Data on the Overall Uncertainty for the Inventory Totals

Total net GHG emissions in Japan for FY2007 were approximately 1,293 million tonnes (in CO_2

equivalents). The total emissions uncertainty was 1% and the uncertainty introduced into the trend in the total emissions was 2%. More detailed information on the uncertainty assessment is described in National Inventory Report Annex 7.

Table 2.35 Uncertainty of Japan's Total Emissions

IPCC Category	GHGs	Emissions / Removals [Gg CO_2 eq.] A	[%]	Combined Uncertainty [%] [1)] B	rank	Combined uncertainty as % of total national emissions C	rank
1A. Fuel Combustion (CO_2)	CO_2	1,235,227.4	95.5%	1%	10	0.69%	2
1A. Fuel Combustion (Stationary:CH_4,N_2O)	CH_4、N_2O	5,819.2	0.5%	27%	3	0.12%	8
1A. Fuel Combustion (Transport:CH_4,N_2O)	CH_4、N_2O	2,992.5	0.2%	371%	1	0.86%	1
1B. Fugitive Emissions from Fuels	CO_2、CH_4、N_2O	454.1	0.0%	19%	5	0.01%	9
2. Industrial Processes (CO_2,CH_4,N_2O)	CO_2、CH_4、N_2O	54,723.8	4.2%	7%	7	0.31%	7
2. Industrial Processes (HFCs,PFCs,SF_6)	HFCs、PFCs、SF_6	24,078.6	1.9%	24%	4	0.44%	4
3. Solvent & other Product Use	N_2O	244.8	0.0%	5%	9	0.00%	10
4. Agriculture	CH_4、N_2O	26,546.3	2.1%	18%	6	0.37%	5
5. LULUCF	CO_2、CH_4、N_2O	-81,352.6	-6.3%	6%	8	-0.37%	6
6. Waste	CO_2、CH_4、N_2O	24,174.8	1.9%	32%	2	0.59%	3
Total Emissions	(D)	1,292,908.9	100.0%	(E) [2)] **1%**			

2.6.9 General Assessment of Completeness

In this inventory report, emissions from some categories are not estimated and reported as "NE". In FY2006, GHG emissions and removals from categories that were previously reported as NE were newly estimated by analyzing categories such as those which possibly result in the emission of considerable amount of GHGs, as well as those which require substantial improvement in their estimation methodology. Also, some categories which were previously reported as "NE" were reviewed within the Committee and newly estimated.

Source categories reported as NE in this year's report include those whose emissions are thought to be very small, those whose emissions are unknown, and those for which emission estimation methods have not been developed. For these categories, further investigation on their emission possibility and the development of estimation methodologies will be carried out in accordance with Japan's QA/QC plan. See Annex 5 for a list of not-estimated emission source categories.

For some categories, dealing with the emission sources of HFCs, PFCs and SF_6, activity data is not available from 1990 to 1994.Those categories are therefore reported as "NE" during that period.

2.6.10 Process for Official Approval of Inventories

As described in section 2.6.3.2 above, confirmation and approval for the creation of an inventory for GHG emissions and removals is advanced through the exchange of information between relevant ministries and agencies. If a change is made to calculations, examinations will be conducted by the Committee for the Greenhouse Gas Emissions Estimation Methods, as noted in section 2.6.2.5.

As noted in section 2.6.3.2.f, the created inventory of greenhouse gas emissions and removals undergoes a quality check (QC) by a private commissioned company, then the first draft is viewed at the MOE and other relevant ministries and agencies, including such items as calculation sheets, and then the figures and calculation methods are finally confirmed by the relevant ministries and agencies. In the event that a request for corrections is submitted from the relevant ministry or agency following a check of the first draft, a second draft of the inventory will be created after the content is corrected, as described in section 2.6.3.2.g. The second draft created will then be sent again to the relevant ministries and agencies for a final check. During the final check, if there are no additional correction requests regarding previously corrected areas or any other area from the relevant

ministries and agencies, the second draft will become the final version and the figures therein are determined to be official.

In addition, as noted in section 2.6.3.2.i, the Greenhouse Gas Inventory Quality Assurance (QA) Working Group is held following the submission of the inventory, where a QA check is conducted on the inventory report's details by an expert that did not directly partake in the inventory's creation. In the event that areas in the report are indicated to require improvements during the QA working group, those items will be added to the inventory improvement plan, examinations will be conducted by the Committee for the Greenhouse Gas Emissions Estimation Methods, and they will be utilized to ameliorate inventory quality subsequently. The process illustrated above is the official examination and approval process of Japan.

Chapter 3

Policies and Measures

3.1 Promoting Efforts for Achieving Kyoto Protocol Targets

3.1.1 Background and Significance of the Revised Kyoto Protocol Target Achievement Plan

Japan has promoted countermeasures against global warming in various ways, including the establishment of the Action Program to Arrest Global Warming (1990), Basic Policy on Measures to Tackle Global Warming (1999), and the Outline for Promotion of Efforts to Prevent Global Warming (1998, 2002).

The 2002 Outline for Promotion of Efforts to Prevent Global Warming was set to be evaluated and revised in 2004. In addition, the Law Concerning the Promotion of the Measures to Cope with Global Warming (hereinafter, the "Act on Promotion of Global Warming Countermeasures") stipulated the establishment of the Kyoto Protocol Target Achievement Plan upon the effectuation of the Kyoto Protocol.

In response, the Kyoto Protocol Target Achievement Plan was drafted in April 2005 following the establishment of the Outline for Promotion of Efforts to Prevent Global Warming, Action Program to Arrest Global Warming, and Basic Policy on Measures to Tackle Global Warming. Based on the Act on Promotion of Global Warming Countermeasures, the plan was drafted in order to stipulate the measures necessary for reliably achieving the Kyoto Protocol's commitment of six percent emission cuts, and as a result of the 2004 evaluation and revision of the Outline for Promotion of Efforts to Prevent Global Warming.

In 2007, the revised Act on Promotion of Global Warming Countermeasures provided that a study shall be conducted concerning the targets and programs prescribed in the Kyoto Protocol Target Achievement Plan and that any changes to the Plan should be promptly enacted if found necessary based on the results of the study (Article 9). Therefore, the Plan was completely revised in March 2008.

Upon revising the Plan, technical considerations were made by expert councils as the Central Environment Council (Ministry of the Environment), Industrial Structure Council, Advisory Committee on Energy and Natural Resources (both of which belong to the Ministry of Economy, Trade and Infrastructure), Council for Social Infrastructure, and the Council for Transport Policy (both of which belong to the Ministry of Land, Infrastructure, Transport and Tourism).

Specifically, considerations were made for approximately one year beginning at the end of 2006 on such details as additional countermeasures and programs, after evaluating the progress of current countermeasures and programs and conducting forecasts on greenhouse gas emission amounts.

In examining such, public opinion has been reflected in these considerations by listening to the opinions of the industrial sector, local authorities, NGOs, and other bodies, while also conducting procedures for public comments. Persons were also allowed to sit in on meetings and meeting materials as well as agenda overviews were released publicly in an effort to ensure transparency of discussions.

Later in March 2008, the Global Warming Prevention Headquarters, which is composed of all Cabinet members, completed a proposal for the plan's revision and amendments to the Kyoto Protocol Target Achievement Plan were adopted by the Cabinet. This chapter will describe the policies and measures related to global warming in Japan as stipulated by this Plan.

The policies and measures listed in pages 2-62 were established using greenhouse gas emission amounts based on inventory information submitted to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in 2007 as well as the latest available information at the time.

Extracts from "Kyoto Protocol Target Achievement Plan, totally revised March 28, 2008) "

Chapter 1 Basic Direction of Promotion of Global Warming Countermeasures

Section 1 Direction of Japan's Global Warming Countermeasures

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

The 21st century is known as the "century of the environment" and the response to the global warming issue is becoming an important challenge 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.

I. Steady Achievement of the 6% Reduction Commitment under the Kyoto Protocol

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

During the Kyoto Protocol commitment period, the later we take measures, the more drastic ones we will have to adopt to attain large reductions over a short period to achieve the 6% reduction commitment. Thus, Japan intends to steadily reduce emissions by promptly implementing the measures and policies which are feasible at the present stage.

II. 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 milestone toward achieving the ultimate objective of the UNFCCC: stabilization of greenhouse gas concentrations in the atmosphere. Furthermore, Japan is proposing as a long-term global common goal "to cut greenhouse gas emissions by half from the current level by 2050" in the "Cool Earth 50," which it announced in May 2007. In order to contribute to the achievement of this goal, Japan will first work to achieve its 6% reduction commitment under the Kyoto Protocol and will further take the lead on a long-term, continuous and substantial

emissions reduction.

From this perspective, the Government positioned the measures and policies to achieve the 6% reduction commitment in overall measures toward its mid-term strategies beyond 2012 and long-term strategies up to 2050 based on the “Cool Earth 50,” and will aim to build a low-carbon society which incorporates greenhouse gas emissions reduction along with innovative technology development while ensuring the consistency of the efforts to achieve the Kyoto Protocol commitment and these mid- and long-term efforts.

Furthermore, because the causes and impacts of global warming are indeed global, Japan will continue efforts to ensure international cooperation on global warming countermeasures to lead to worldwide emissions reduction.

Section 2 Basic Philosophy of Global Warming Countermeasures

Greenhouse gas emissions are closely related to economic activities and citizens' lives. Therefore, the Government will boldly implement global warming countermeasures, founded on the basic philosophy of "compatibility between the environment and the economy."

Aiming to be a world-leading environmental nation, Japan will promote innovative technology development and creation of a low-carbon society, encourage the participation and collaboration of national and local governments, business operators and citizens, and try to ensure transparency and share information in order to achieve it.

Japan will ensure the achievement of its 6% reduction commitment by promoting countermeasures with diverse policy instruments and by strengthening progress management such as quantitative evaluations and reviews of countermeasures. Japan will also ensure

I. Compatibility Between the Environment and the Economy

So that the efforts to achieve the 6% reduction commitment under the Kyoto Protocol can also lead to Japan's economic revitalization, employment creation and other benefits, the Government 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 citizens while reducing greenhouse gas emissions, the Government will develop and disseminate energy-saving devices, improve the efficiency of energy use, further accelerate technology development, and move to reform citizens' lifestyles and working styles. In addition, the Government will boldly implement global warming countermeasures which entail transformations of wide-ranging socioeconomic systems.

II. Innovative Technology Development and Creation of a Low-carbon Society

To achieve the Kyoto Protocol commitment and also promote the long-term and continuous emissions reduction toward a "low-carbon society," it is ultimately necessary to reduce our dependency on fossil fuels.

In order to achieve these targets ensuring compatibility between the environment and the economy, Japan will aim to be a world-leading environmental nation not only by accelerating the dissemination of existing technologies and effective measures, but also by undertaking the following: improving its environmental and energy technologies such as energy conservation,

renewable energy and nuclear energy; promoting creative technological innovations; disseminating efficient devices and cutting-edge systems; and moving to reform the foundational structure of society such as citizens' lifestyles and urban and traffic systems.

III. Promotion of the Participation and Collaboration of All Actors and Ensuring of Transparency and Sharing of Information to That End

The global warming issue is deeply involved with all aspects of socioeconomic activities, communities and life of citizens, so it is necessary for all actors including the national and local governments, business operators and citizens to participate and collaborate in the efforts on this issue.

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

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

IV. 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 control of greenhouse gases, the Government will consider the fairness of the cost burden on each actor and effectively utilize diverse policy instruments such as voluntary, regulatory, economic and informational ones, while taking advantage of their special characteristics.

Particularly, to ensure wide-ranging emission control effects, the Government will place importance on incentive policies utilizing economic instruments which induce technology development and countermeasures introduction overcoming cost constraints.

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

In order to constantly assess the effectiveness of this Plan and make it reliable, each year after

formulation of this Plan, the Government will rigorously inspect the progress of the policies for each countermeasure using countermeasure evaluation indices and others, and will expeditiously revise the Plan to add or strengthen measures and policies as necessary.

To promptly take effective additional measures and policies in and after FY2010 (the middle year of the first commitment period) to achieve the target, in FY2009 the Government will comprehensively evaluate the progresses of measures and policies in this Plan and the state of emissions, based on the projection of Japan's greenhouse gas emissions during the whole first commitment period (five years).

For this reason, this Plan clearly specifies the following: targets by type of greenhouse gas or other category; individual countermeasures and their evaluation indices; estimated volume of greenhouse gas emissions reductions; each actor's roles and efforts for the countermeasures; and policies of the national and local governments (For details, refer to Chapter 4, Section 1).

VI. Ensuring of International Cooperation on Global Warming Countermeasures

Since the causes and impacts of global warming are indeed global, it is essential for all major emitting countries to endeavor to reduce greenhouse gases in an effective way so as to ensure the effectiveness of the global warming countermeasures. Not only efforts by each country, but also further efforts through international cooperation are indispensable. Therefore, Japan will unceasingly continue to put in its utmost efforts based on the "Cool Earth 50" in order to create an effective framework beyond 2012 in which all major emitters will participate.

Moreover, carbon dioxide emissions are projected to rapidly increase as a result of the future population growth and economic development on a global scale. Therefore, Japan, which has superior technological capabilities and accumulated experience in environmental conservation, will take a leading role in the world's efforts to combat global warming through international cooperation. From the viewpoints of responding to the global warming issue and freeing ourselves from fossil fuel resource constraints, it is necessary to create a "Low Carbon Society," in which citizens can feel the affluence in their life and at the same time the atmospheric greenhouse gas concentrations are stabilized at a level that has no negative impact on the climate, by substantially reducing greenhouse gas emissions from fossil fuel consumption to the level equivalent to the capacity of natural sinks.

Chapter 3 Measures and Policies to Achieve the Targets

Section 1 Basic Roles of the National and Local Governments, Business Operators and Citizens

The national government has the role of comprehensively promoting global warming countermeasures and taking the initiative in implementing such countermeasures. Local governments, business operators and citizens are required to undertake the roles appropriate for their respective positions.

Concerning the promotion of global warming countermeasures, the national government is to have the following basic roles, and local governments, business operators and citizens are required to undertake the following roles.

If all the actors 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 actor alone can be obtained.

I. Basic Roles of the National Government

1. Comprehensive Promotion of Global Warming Countermeasures by Mobilizing Diverse Policy Instruments

Taking account of the fact that it is essential to reconsider socioeconomic activities and lifestyles that involve mass production, mass consumption and mass disposal to reduce greenhouse gas emissions, the national government has the roles of forming the overall framework of Japan's global warming countermeasures and comprehensively implementing the countermeasures through promotion of this Plan. Furthermore, all national government agencies are to promote the countermeasures by sufficiently collaborating in line with this overall framework and mobilizing diverse policy instruments including voluntary, regulatory, economic and informational ones, environmental impact assessment, social capital development.

In addition, when implementing a policy whose major objective is not prevention of global warming, each national government agency will make arrangements so that it can also contribute to the control of greenhouse gas emissions.

2. Taking the Initiative in Implementing Countermeasures

The national government will take the lead in implementing measures to reduce the greenhouse gas emissions and to conserve and strengthen the removal effects concerning its own administration and undertakings, while placing importance on promoting dissemination of such measures to the entire society.

II. Basic Roles of Local Governments

1. Implementation of Countermeasures in Accordance with the Local Characteristics

Local governments will endeavor to formulate and implement comprehensive, plan-based programs for the control of greenhouse gas emissions, in accordance with the natural and social conditions of their local areas.

For example, local governments will develop pioneering, highly original and ingenious countermeasures tailored to the natural and social conditions in their areas, including low-carbon town planning, promotion of the use of public transport systems and bicycles, introduction of renewable energy such as biomass energy, and promotion of waste management closely related to local residents.

Through the revisions to the Act on Promotion of Global Warming Countermeasures, the Government will prompt prefectures, government-designated cities, core cities and special case cities to stipulate the following programs in their local government action plans: encouragement of solar and wind power utilization; promotion of activities for the control of the greenhouse gas emissions from business operators or residents in their local areas; improvement of the convenience for passengers using public transport; conservation and expansion of green spaces in urban areas; and promotion of waste generation control.

2. Taking the Initiative in Implementing Countermeasures

Local governments themselves are required to be a model in their areas by taking the initiative in implementing global warming countermeasures. To this end, they will formulate and implement action plans for their administration and undertakings, including public schools [1] and hospitals, based on the Act on Promotion of Global Warming Countermeasures.

3. Information Provision and Activity Promotion for Local Residents, etc.

When prefectural and major municipal Promotion Centers for Climate Change Action, Climate Change Action Officers or Regional Councils on Global Warming Countermeasures have been designated, commissioned or organized in order to give meticulous support to local residents and enterprises, local governments will endeavor to utilize them to provide education, support private organizations, introduce pioneering efforts and offer consultations.

III. Basic Roles of Business Operators

1. Highly Original and Ingenious Efforts

Each business operator will voluntarily and actively implement appropriate, effective and

[1] Excluded are the schools belonging to public universities established based on the Local Independent Administrative Agency Act (Act No.118 of 2003).

efficient global warming countermeasures with originality and ingenuity in a wide range of fields in the light of the nature of its business activities. Each business operator will promote efforts contributing to greenhouse gas emissions control by other actors to the extent possible. Such efforts include development of CO_2-saving[2] products and reduction of waste generation.

2. Efforts Based on the Social Role of Business Operators

Business operators, as members of society, will individually or collectively formulate voluntary plans and inspect the implementation of those plans. They will also provide environmental education to employees and collaborate with labor unions, consumer groups or community groups to work toward the control of greenhouse gases. In addition, they will cooperate with the policies of national and local governments.

3. Reduction of Environmental Burdens Throughout the Life Cycle of Products and Services Provided

Business operators providing final-consumption products will monitor greenhouse gas emissions or other data throughout the life cycle of their products and services, and will make efforts to provide ones with lower environmental burdens. They will also provide information concerning greenhouse gas reduction by their products and services.

IV. Basic Roles of Citizens

1. Control of Greenhouse Gas Emissions Arising From Daily Life

Being aware that the increase in greenhouse gas emissions in recent years is closely related to the life of citizens, namely the *residential* and *transport* (private automobile) sectors, citizens will actively work toward the reform of lifestyles involving mass consumption and mass disposal.

Specifically, citizens will monitor their own energy consumption and greenhouse gas emissions, and choose a CO_2-saving lifestyle. For example, they will try the following: taking part in the campaign "Team Minus 6%" including *Cool Biz* and *Warm Biz*, which require proper temperature setting of cooling and heating; installing heat insulation in their houses; switching to energy-saving devices; and using public transport and bicycles.

Citizens will also exert meticulous efforts such as saving electricity like standby power, and refraining from unnecessary or unhasty automobile use.

2. Participation in Global Warming Countermeasure Activities

Citizens will further deepen their understanding of the global warming issue and undertake

[2] In this Plan, *CO_2-saving* refers to the control or reduction of carbon dioxide emissions through countermeasures on the energy demand side, such as promotion of energy conservation, or countermeasures on the energy supply side, such as promotion of nuclear power and introduction of renewable energy.

efforts in collaboration with all actors. The efforts include active participation in global warming countermeasure activities such as a national campaign to promote the 3Rs (***R***educe waste generation, and ***R***euse and ***R***ecycle recyclable resources of manufactured goods and the like), forest fostering and other tree-planting campaigns.

Section 2 Global Warming Measures and Policies

I. Measures and Policies for Greenhouse Gas Emissions Reduction and Removal

1. Measures and Policies for Greenhouse Gas Emissions Reduction

(1) Energy-originated Carbon Dioxide

The Government will implement all of the measures and policies based on the following six basic philosophies.

○ Shift From an Individual Approach to an Integrated Approach

The Government will continue to promote conventional measures for individual energy-related devices or places of business, and at the same time will rethink Japan's energy supply-demand structure from an integrated, wide-ranging perspective in order to change the structure itself into a CO_2-saving one. In other words, it will endeavor to maximize CO_2-saving effects through such measures as reforming Japan's socioeconomic structure, including urban/regional structures and public transport infrastructure, and designing low-carbon cities and transport systems.

○ Transcending the Boundaries Between Actors

Each actor involved in energy supply and demand will appropriately be aware of their own roles and aim to further improve energy efficiency in collaboration with other suppliers and consumers of energy, not just within the areas they directly manage. They will work to control carbon dioxide emissions in as wide a range of sectors as possible. For example, the industrial community can actively contribute to CO_2 saving in the *consumer* and *transport* sectors.

○ Approaches From Both Supply and Demand Sides Placing Priority on Demand Side Countermeasures

In order to effectively implement CO_2-saving countermeasures, it is necessary to take measures on both energy supply and demand sides. To produce results at an early time, first of all, the Government will place priority on countermeasures on the energy demand side and set a goal of becoming an "energy-conservation nation serving as a model for the world." Although a certain amount of time is required to develop and reform infrastructure for energy supply side countermeasures, the Government will make every effort to continue their steady promotion.

○ Approaches Placing Priority on Improvement of Intensities

With a view to steady advancement of CO_2-saving countermeasures, the Government

will place priority on promoting emission control by improving the energy intensity and the carbon dioxide emissions intensity per unit of energy consumption through increasing the efficiency of energy use.

Specifically, it will work on the following: utilization of such frameworks as voluntary action plans of industry, the Energy Conservation Act and the Top-runner Program; dissemination of energy-saving devices and automobiles; introduction of highly energy-efficient buildings and houses; traffic flow management and improvement of the efficiency of logistics systems; and mutual energy accommodation at the regional level.

In order to improve the carbon dioxide emissions intensity in the *energy conversion* sector, the Government will steadily promote such efforts as implementation of nuclear power generation and introduction of renewable energy.

○ Effective Measures to Respond to the Factors Behind Increases in Emissions

Looking at carbon dioxide emissions trends by sector, the emissions from the *industrial* sector, accounting for approximately 40% of emissions on the demand side, have not shown much change, and those from the *transport* sector, accounting for around 20%, have been on a downward trend. On the other hand, the emissions from the *commercial and other* sector, accounting for about 20%, and those from the *residential* sector, accounting for approximately 10%, have greatly increased.

For this reason, the Government will steadily promote countermeasures in the *industrial* and *transport* sectors, while drastically strengthening effective countermeasures in the *commercial and other* and *residential* sectors.

○ Change of Every Citizen's Lifestyle and Working Style

Beyond the countermeasures in individual sectors, and based on not only short-term but mid- and long-term points of view, the Government will strengthen countermeasures so that every citizen will be urged to change their lifestyle and working style to give their total efforts to curtailing greenhouse gas emissions.

Table 3.1 Overview of Countermeasures Concerning Energy-originated Carbon Dioxide

Formation of low-carbon urban/regional structures and socio-economic systems		**Low-carbon Urban/Regional Designs** □ Realization of compact, low-carbon urban structures □ Measures at the block and district levels □ Promotion of area-wide energy usage □ Efforts transcending the individual boundaries between actors □ Decarbonization of urban areas through improving the thermal environment by urban greening and other heat island countermeasures □ Measures for extending the useful life of housing **Low-carbon Transport and Logistics System Designs** □ Construction of low-carbon transport systems □ Formation of low-carbon logistics systems
	Measures and policies by sector	**Efforts in the *Industrial* Sector (Manufacturers, etc.)** □ Promotion and reinforcement of voluntary action plans of industry □ Promotion of introduction of highly energy-efficient equipment and devices ○ Dissemination of energy-efficient devices in the manufacturing field ○Dissemination of fuel-efficient construction machinery in the construction field □ Thorough energy management, etc. ○ Thorough energy management in factories and workplaces ○ Implementation of emissions reduction measures for small and medium sized enterprises ○ Efforts in the agriculture, forestry and fisheries industry ○ Efforts by the industrial community in the *consumer* and *transport* sectors **Efforts in the *Commercial and Other* Sector** □Promotion and reinforcement of voluntary action plans of industry □Initiatives by public organizations ○ Initiatives by the national government ○Initiatives by local governments ○ Promotion of the initiatives by other public organizations □ CO_2 saving of buildings, equipment and devices ○ Improvement of the energy efficiency performance of buildings ○ Decarbonization of urban areas through improving the thermal environment by urban greening and other heat island countermeasures ○Dissemination of energy management systems ○ Improvement of the efficiency of devices based on the Top-runner standards ○ Support for the development and dissemination of high-efficient energy-saving devices □ Thorough energy management, etc. ○Thorough energy management in factories and workplaces ○ Implementation of emissions reduction measures for small and medium sized enterprises ○ Initiatives in water supply and sewerage systems and waste management □Development of national campaigns

Efforts in the *Residential* Sector

- Development of national campaigns
- CO_2 saving of houses, equipment and devices
  - ○ Improvement of the energy efficiency performance of houses
  - ○ Dissemination of energy management systems
  - ○ Improvement of the efficiency of devices based on the Top-runner standards
  - ○ Support for the development and dissemination of high-efficient energy-saving devices

Efforts in the *Transport* Sector

- Automobile/road traffic measures
  - ○ Improvements in the fuel efficiency of automobile, etc.
  - ○ Promotion of traffic flow management
  - ○ Promotion of the environmentally-friendly usage of vehicles
  - ○ Development of national campaigns
- Promotion of public transport utilization, etc.
  - ○ Promotion of public transport utilization
  - ○ Promotion of the development and introduction of energy-efficient railways, ships and aircrafts
- Promotion of telework and other transport substitution by information and communications technology
- Promotion and reinforcement of voluntary action plans of industry
- Improvement of the efficiency of logistics systems, etc.
  - ○ Implementation of CO_2 saving by cooperation between shippers and logistics operators
  - ○ Promotion of modal shifts, increase of truck transport efficiency, etc.
  - ○ Promotion of dissemination of the Certification Program for Green Management

Efforts in the *Energy Conversion* Sector

- Promotion and reinforcement of voluntary action plans of industry
  - ○ Reduction of carbon dioxide emissions intensity in the electric power sector
- Efforts by energy type
  - ○ Steady implementation of nuclear power generation
  - ○ Introduction and utilization expansion of natural gas
  - ○ Promotion of the efficient use of petroleum
  - ○ Promotion of the efficient use of liquefied petroleum gas
  - ○ Realization of a hydrogen society
- Measures for renewable energy
  - ○ Promotion of the introduction of renewable energy, etc. ○ Promotion of biomass utilization
  - ○ Initiatives in water supply and sewerage systems and waste management

(i) Formation of Low-carbon Urban/Regional Structures and Socioeconomic Systems

It is quite effective to incorporate efficient energy use structurally through sweeping reviews of urban/regional structures and transport systems or reviews of socioeconomic systems with collaboration among energy consumers.

Therefore, the Government will work toward building a "low-carbon society" by commencing the transformation of urban/regional structures and socioeconomic systems from a mid- and long-term perspective at the earliest possible time.

In particular, the Government will reconstruct urban structures into low-carbon ones since urban structures can have a big impact on global warming, taking into account the aims of the Improvement Plan for Cities and Urban Lives. [3]

Furthermore, the Government will formulate and improve policies based on regional voices through the invitation of proposals concerning the special zones for structural reform and the regional revival.

A. Low-carbon Urban/Regional Designs

Since the improvement of energy use efficiency is very effective in urban areas with high energy demand density, the Government will improve the energy environment of urban areas by means of area-wide energy usage or heat island countermeasures, while extending the useful life of housing, building and infrastructure. The Government will also encourage low-carbon urban/regional development by realizing cities with minimal environmental loads, or "Compact Cities," where urban functions are allocated within walking distance.

○Realization of Compact, Low-carbon Urban Structures

Aiming to realize a compact urban structure in which various urban functions are concentrated centering on public transport, the Government will ensure suitable location of large-scale customer-attracting facilities and other functions. It will also encourage the buildup of those functions by means of maintaining and revitalizing central urban districts, while promoting coordinated urban/regional transport strategies.

Furthermore, in an effort to carry out area-wide measures including the promotion of public transport utilization and the untapped energy and natural capital usage, the Government will support the establishment of effective carbon dioxide reduction plans through reduction simulations. In addition, the Government will aim to reconstruct the urban structures into low-carbon ones through improving energy efficiency of housing, building and infrastructure, extending their useful life, constructing ring roads, and implementing heat island countermeasures.

[3] Recognized at the Third Regional Meeting of the Regional Revitalization Headquarters (January 29, 2008)

The Government will promote the creation of *environmental model cities* out of around ten cities selected from all over the country, which will take on pioneering efforts by setting challenging goals for drastic greenhouse gas reductions.

○ Measures at the Block and District Levels

Taking advantage of urban development and other opportunities, the Government will promote the construction of low-carbon cities through introduction of area-wide measures at the block and district levels, for example, bringing in pioneering measures to an entire district or complex buildings, which are anticipated to lead to drastic reductions in carbon dioxide emissions by the efforts through public-private partnership.

○ Promotion of Area-wide Energy Usage

In local areas, large CO_2-saving benefits can be expected from efficient area-wide energy usage including efficient energy supply to multiple facilities and buildings, mutual energy accommodation among facilities and buildings, and utilization of untapped energy. Therefore, the Government will intensively introduce multiple renewable energy-utilizing equipment to blocks, districts or buildings, and will actively introduce and disseminate environmentally outstanding district heating and cooling, keeping in mind the characteristics of each area, the promoting actor, the feasibility of each measure, etc.

For this reason, in order for a wide range of stakeholders including national and local governments, energy suppliers, local developers to collaborate and select efficient energy based on evaluations from the perspectives of the global and city environment, and to improve the understanding and promote the cooperation of people on the demand side like building users, the Government will continue to take such measures as the promotion of area-wide energy usage under the cooperation among multiple buildings at block and district levels, by indicating areas of potential area-wide energy usage, implementing pioneering model projects, or promoting environmental improvements by information provision. The Government will also continue to implement policies including the utilization of city planning systems.

○ Efforts Transcending the Individual Boundaries Between Actors

In order to promote CO_2 saving in an entire building or facility such as multi-tenant building or housing complex, the Government will activate efforts transcending the individual boundaries between actors like building owners, tenants and energy suppliers.

For this reason, the Government will utilize information technology to promote efforts such as energy management and control for an entire area, collective energy management for multiple buildings and facility-wide energy management.

○ Decarbonization of Urban Areas Through Improving the Thermal Environment by Urban

Greening and Other Heat Island Countermeasures

The Government will promote decarbonization of urban areas through improving the thermal environment by utilizing the knowledge obtained from scientific observations, studies and researches on the heat island phenomenon and implementing comprehensive heat island policies.

The Government will try to decrease anthropogenic exhaust heat from air-conditioning equipment, automobiles or the like by promoting the improvement in energy efficiency of equipment and the utilization of untapped energy. In addition, the Government will work for the improvement of the urban lifestyle and working style including proper temperature setting of cooling and heating, which leads to the mitigation of heat island phenomenon.

From the perspective of preventing and improving the decline in evapotranspiration effect and the rise in surface temperature caused by the artificial surface covering, the Government will take the following measures to improve area-wide land coverage: keeping green areas through the creation of urban parks; greening public spaces and government and other public facilities; greening the premises of buildings through utilization of the greening region system; using spring water or reclaimed wastewater; utilizing road paving materials that can control the rise in road surface temperatures; introducing integrally such technologies as water-retentive building materials and highly reflective coatings; and preserving privately-owned green areas and agricultural lands.

In addition, with a view to forming and utilizing green islands serving as sources of cold air and securing wind passages like green and water areas, the Government will work to improve the city form by the followng measures: conserving the green areas remaining in cities; carrying out facility greening such as rooftop and wall surface greening; creating urban parks; promoting the formation of water and greenery networks through collaboration among projects on parks, roads, rivers, *sabo* (erosion and sediment control), ports or sewage systems; and building cities with small environmental burdens.

○ Measures for Extending the Useful Life of Housing

Toward the realization of a sustainable society, the Government will promote measures for *"200-year Housing,"* which is designed to have long useful life, in order to contribute to CO_2 saving and other environmental burden reduction through long-term use of housing in good condition. These measures include the encouragement of construction and appropriate maintenance of housing with superior performances in durability, ease of maintenance, energy efficiency or the like.

B. Low-Carbon Transport and Logistics System Designs

○ Construction of Low-Carbon Transport Systems

In order to increase the efficiency of transport systems, the Government, coupled with realization of a compact urban structure, will implement comprehensive measures including the following: traffic jam alleviation; traffic demand management; development of traffic safety facilities such as traffic signals; and promotion of the use of public transport systems.

○ Formation of Low-Carbon Logistics Systems

To promote the greening of the overall logistics system, the Government will strengthen and expand the efforts under the cooperation among shippers and logistics operators, while promoting *modal shifts*, [4] improvement of the truck transport efficiency or other measures.

[4] *Modal shifts* means a change (shift) in the means of transport (mode), from trucking to railway or marine transport, which is considered as an effective way to reduce CO_2 from cargo transport sector.

(ii) Measures and Policies by Sector (*Industrial*, *Consumer*, *Transport*, etc.)

Each of actors who consume energy, including business operators and individuals will make various efforts aimed at overall control of carbon dioxide emissions related to their own activities.

In doing so, each actor, being appropriately aware of the scopes of their own responsibilities, roles and efforts, will contribute to the control of carbon dioxide emissions in a wide range of sectors. Such efforts include those taken by manufacturers for the *consumer* and *transport* sectors, and information provision by retailers to consumers.

Now that energy-saving performances of individual equipment like refrigerators, air conditioners and water heaters are dramatically improving, the Government will continue to work for further improvement in their performances and wide introduction and dissemination of such highly energy-efficient equipment.

In the *energy conversion* sector, the Government will also promote the utilization of energy sources with low carbon dioxide emissions intensity and the improvement in the efficiency of energy supply.

A. Efforts in the *Industrial* Sector (Manufacturers, etc.)

Carbon dioxide emissions in the *industrial* sector in FY2005 decreased by 6.1% compared to those in FY1990. The Government will steadily continue to promote voluntary action plans and other countermeasures. In addition, business operators in this sector will contribute to CO_2 saving in the *consumer* and *transport* sectors.

(a) Promotion and Reinforcement of Voluntary Action Plans of Industry

In the *industrial* and *energy conversion* sectors, in 1997 the *Keizai Dantai Rengokai*, or *Japan Business Federation* (hereinafter referred to as "*Nippon Keidanren*") took the lead in formulating Voluntary Action Plan on the Environment, and established the target of controlling carbon dioxide emissions in FY2010 below FY1990 levels. In addition to this *Nippon Keidanren* Voluntary Action Plan on the Environment, individual businesses in sectors including *commercial and other* and *transport*, both affiliated and unaffiliated with *Nippon Keidanren*, have set up greenhouse gas emissions reduction plans (hereinafter, these individual plans are referred to as "voluntary action plans"). These voluntary action plans now cover approximately 80% of the emissions from the *industrial* and *energy conversion* sectors, and around 50% of those from all sectors.

* In setting targets of the voluntary action plan, each business[5] voluntarily selects any of

[5] The term "business" here refers to a group or organization which formulates a voluntary

the four indicators—energy consumption intensity, energy consumption, carbon dioxide emissions intensity or carbon dioxide emissions.

As of the end of March 2008, 50 businesses in the *industrial* sector, 32 in the *commercial and other* sectors, 17 in the *transport* sector and 4 in the *energy conversion* sector have quantitative targets and have undergone assessments and verifications by councils or similar bodies.

Industrial sector: 50 businesses

（Breweries, tobacco manufacturing, pharmaceutical manufacturing, starch and saccharified products, dairy industry, soft drink, baking industry, beet sugar, frozen foods, vegetable oil, pastries, sugar refining, meat processing, flour milling, coffee, convenience foods, soy sauce, canning, mayonnaise and dressing, iron and steel, chemical industry, paper manufacturing, cement, electronics and electrical equipment, auto parts, automobile, mining, lime manufacturing, rubber, dyeing, aluminium, flat glass, glass bottle, auto body, electric wire and cable, bearing, industrial machinery, copper and brass, construction equipment, limestone mining, sanitary equipment, machine tool, petroleum development, industrial vehicles, construction, housing production, shipbuilding, marine equipment, rolling stock, boating）

Commercial and other sector: 32 businesses

（Banking, life insurance, damage insurance, telecommunications, telecom service, commercial broadcasting, NHK(Japan Broadcasting Corporation), cable broadcasting, satellite broadcasting, schools, co-op, processed foods wholesale, supermarket, convenience store, department store, household appliance retailer, do-it-yourself industry, information services, chain drug store, trading company, liquefied petroleum gas, leasing, warehousing, refrigerated warehouse, hotel, international hotel, domestic hotel, automobile service, real estate, industrial waste management, newspaper, pet retailing）

Transport sector: 17 businesses

（Ship owner, trucking, scheduled airline, coastal shipping, passenger ships, taxi, bus, private railroads, JR East Japan, JR West Japan, JR Tokai, port transportation, JR Cargo, JR Kyushu, JR Hokkaido, transportation, JR Shikoku）

Energy conversion sector: 4 businesses

（Petroleum, electricity, gas, power producer and supplier）

Total: 103 businesses

NOTE: In revising this Plan (March 2008), the calculations of reduction effects by the voluntary action plans have been conducted concerning 85 out of these 103 businesses（*Industrial* sector: 49 businesses, *commercial and other*

action plan and undergoes assessments and verifications for its plan by the Government.

sector: 19 businesses, *transport* sector: 14 businesses, *energy conversion* sector: 3 businesses). The other 18 businesses have been excluded from the calculations because concerned governmental councils or similar bodies did not confirm their formulation of new plans or quantification of qualitative targets before the calculations by the Government (February 8, 2008).

These voluntary action plans by business operators have thus far produced results and the voluntary action plans of *Nippon Keidanren* are, in particular, playing a central role in countermeasures in the industrial community. The advantages of a voluntary instrument include the ease of selection of superior countermeasures for each actor based on its originality and ingenuity, the likelihood of providing incentives to pursue aggressive targets, and no procedural costs for both the Government and implementing actors. It is expected that these advantages will be further exploited in voluntary action plans by business operators.

In order for Japan to achieve its reduction commitment under the Kyoto Protocol, it is extremely important for the industrial community to advance efforts to control emissions, including the improvement of energy consumption intensity or carbon dioxide emissions intensity, so that the targets of these voluntary action plans will be achieved. For this reason, keeping in mind that the targets and content of voluntary action plans should be determined by the industrial community itself, the following efforts are encouraged from the viewpoint of meeting social demands:

1. Formulating a new plan for a business which has no plan;
2. Quantifying targets (i.e. setting quantitative targets) for a business which has qualitative targets only;
3. Undergoing strict assessments and verifications for the plan by the Government; and
4. Raising targets in the case where targets are already overachieved.

At the same time it is urged that the *Nippon Keidanren* Voluntary Action Plan targets should be fully achieved, and that individual businesses should make active efforts toward achievement of their own voluntary targets.

With regards to the businesses[6] noted below, related ministries and agencies will strongly encourage those within their jurisdiction to make the following efforts as soon as possible:

(1)Formulating a new plan;[7]

(Pachinko parlors, game centers, securities, hospitals, large-scale exhibition halls)

[6] The businesses named here are the ones for which the achievement of the efforts of (1) to (4) have not been confirmed by concerned councils or similar bodies (as for (3), assessments and verifications have not been undergone by them).

[7] When a new plan is formulated by a business which had no plan at the time of formulation of this Plan (April, 2005), such a plan is required to include quantitative targets based on the business' s actual performances and other factors, because it is necessary to evaluate emissions reduction effects quantitatively toward the achievement of the reduction commitment under the Kyoto Protocol.

(2)Quantifying qualitative targets;
（Credit unions, credit associations, dining establishments）
(3)Undergoing strict assessments and verifications by the Government; and
NOTE: As of the end of March 2008, there is no applicable business.
(4)Raising targets for businesses whose current targets are overachieved.[8]
（* indicates the businesses with intensity targets.）
（Breweries, tobacco manufacturing, vegetable oil,* sugar refining, meat processing,* convenience foods,* soy sauce, automobile, mining,* lime manufacturing, dyeing, aluminum,* flat glass, glass bottles, construction machinery,* limestone mining,* sanitary equipment, construction,* rolling stock,* department store,* do-it-yourself industry,* chain drug store,* hotel,* automobile service, industrial waste management, petroleum,* gas, power producer and supplier*）

In order to improve the transparency, credibility and probability of targets achievement with regards to these voluntary action plans, the Government will promote periodic follow-ups by concerned councils or similar bodies as assessments and verifications of these plans.

In addition to the efforts above ((1) – (4)), the Government will carry out assessments and verifications with the following viewpoints in mind.

- Since the first commitment period of the Kyoto Protocol runs from 2008 to 2012, the Government will encourage that plan targets should be met by the average values of the five-year period.
- The Government will urge businesses to denote the contents and effects of future measures (including utilization of the Kyoto Mechanisms) designed to achieve unfulfilled targets in as quantitatively and tangibly as possible. With regards to the businesses that will utilize the Kyoto Mechanisms in the case targets achievement is difficult, the Government will urge these businesses to provide as tangible an outlook as possible regarding the volume and timing of credit acquisition. Also, the businesses which utilize acquired credits for their targets achievement need to transfer those credits to the Government account for free.
- To further improve the probability of target achievement, the Government will urge that check and review should be carried out with regards to the responsibility sharing among the enterprises that constitute each business.
- Given that the Kyoto Protocol has the targets of gross greenhouse gas emissions, the Government will urge the businesses having only intensity targets to proactively consider adopting the targets of total carbon dioxide emissions as well.
- With regards to carbon dioxide emissions from places of business participating in the

[8] Although boating, JR East Japan, JR West Japan and JR Hokkaido are currently overachieving their target levels, it has been concluded that it would not be necessary to immediately raise their targets, in the results of assessments and verifications for their voluntary action plans at a joint session of the Environmental Subcommittees of both the Panel on Infrastructure Development and the Transport System Committee of the Council for Transport Policy.

voluntary action plans, the Government will press for even more proactive disclosure of information, including the presentation of examples of leading efforts in quantitative terms by utilizing emissions data from individual places of business based on the Act on Promotion of Global Warming Countermeasures.

- Since it is required to drastically strengthen measures in the *commercial and other*, *residential* and *transport* sectors, *Nippon Keidanren* will urge its participating businesses and member enterprises to promptly establish carbon dioxide emission reduction targets for their headquarters and other offices in a cross-industrial and comprehensive manner. At the same time, *Nippon Keidanren* will further promote efforts such as expansion of environmental account book use in the homes of employees belonging to its member enterprises.
- With regards to the industrial community's efforts in the *commercial* and t*ransport* sectors as well as its contributions to the emissions reduction in the *consumer* and *transport* sectors, the Government will urge quantification of these efforts to the extent possible, including quantification based on a product life cycle assessment (LCA) perspective.
- In order to transmit to consumers and overseas easy-to-understand information concerning the efforts based on the voluntary action plans, the Government will encourage international comparisons founded on highly reliable data for each business and proactive outgoing transmission regarding the efforts based on the voluntary action plans.

(b) Promotion of Introduction of Highly Energy-efficient Equipment and Devices

○Dissemination of Energy-efficient Devices in the Manufacturing Field

In addition to the introduction of various kinds of energy-efficient devices based on the voluntary action plans, the Government will take support measures intensively and provide assistance for the introduction of next-generation coke ovens in order to promote the dissemination of highly efficient industrial furnaces and other devices enabling a large energy conservation compared with conventional ones.

○ Dissemination of Fuel-efficient Construction Machinery in the Construction Field

The Government will promote CO_2 saving in the construction field. For example, it will promote the dissemination of fuel-efficient construction machinery by encouraging its use and actively utilizing it in public construction projects.

(c) Thorough Energy Management, etc.

○ Thorough Energy Management in Factories and Workplaces

In addition to the promotion and reinforcement of the voluntary action plans, energy conservation efforts for factories and other facilities have been made in the *industrial* sector by the measures based on the Energy Conservation Act.

Besides, highly energy-consuming office buildings and the like are required to make a regular report and formulate mid- and long-term plans for energy use after strengthening the regulations of the Energy Conservation Act in April 2003 in order to encourage energy management in those buildings.

Furthermore, the targets of regulation under the Energy Conservation Act were expanded in April 2006 by the integral management of heat and electricity, both of which had been dealt with separately up until that time.

From now, the Government will work for further reinforcement of effective energy conservation measures for factories, office buildings and the like, by amending the Energy Conservation Act. The amendment will aim to shift its legal system from the current regulations on a *factory/workplace* basis to comprehensive energy management on an *enterprise* basis. It will also introduce to a franchise chain consuming over a certain amount of energy the energy management of treating the entire chain as a single unit.

In addition, based on the management structure of each enterprise, the Government will promote objective valuations of the efforts by each factory or workplace by utilizing a benchmark or other indicators. At the same time, the Government will construct a mechanism in which multiple business operators will cooperate to carry out voluntary energy conservation or emissions reductions (energy/carbon dioxide joint reduction project), in such forms as the *Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises,* as described next, and the inter-enterprise accommodation of exhaust heat from factories in industrial centers like industrial complexes. The Government will also support cooperative projects with large energy conservation effects.

○ Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises

To strengthen greenhouse gas emission reduction measures for small and medium sized enterprises, the Government will provide further financial support to those companies' introduction of emission-reducing equipment.

In addition, the Government will construct a system in which large enterprises will provide technical or financial supports to small and medium sized enterprises (including moderately-large and large enterprises that do not participate in any voluntary action plan) and utilize the amount of emission reductions verified by the Government for achieving the targets of their own voluntary action plans. At the same time, the Government will urge those large enterprises to raise the targets of their plans.

While premised on the idea that participating enterprises make voluntary efforts, the Government will ensure certain strictness and additionality in verifying the amount of emissions reduction by commissioning a third-party body made up of private-sector experts to carry out the verification based on standards emulating simple verification methods applied to the Kyoto Mechanisms credits, so that this will lead to emissions reduction in the whole country. The

Government will also simplify the verification procedures from the perspective of ensuring convenience for small and medium sized enterprises.

The Government will design it to be coordinated and consistent with existing related systems (including the calculating, reporting and announcing system under the Act on Promotion of Global Warming Countermeasures and the periodic reporting system under the Energy Conservation Act).

In operating this system, the Government will see to it that small and medium sized enterprises can receive minimum existing support measures such as subsidies for equipment introduction only when their business cannot be viable solely with incomes derived through this system.

The Government will also create a simplest possible *Domestic Credits* management system, which will enable a small or medium sized enterprise and a large enterprise to jointly formulate a business plan and apply for its approval.

○ Efforts in the Agriculture, Forestry and Fisheries Industry

The Government will promote energy conservation in greenhouse horticulture by verification and dissemination of advanced heating systems utilizing woody biomass and oil-free horticultural systems, and by consideration of a rating system for energy efficient equipment and devices. It will also encourage the utilization of agricultural machinery and other devices that contribute to reductions in greenhouse gas emissions, and try to establish “local production for local consumption” models to utilize biodiesel for agricultural machinery.

The Government will promote energy conservation by setting up facilities utilizing woody biomass at lumber mills and other facilities.

The Government will encourage management improvement through promoting the acquisition of energy-efficient fishing vessels by the construction of vessels employing new energy-saving technologies such as LED (light emitting diode) fishing lamp and improved propulsion efficiency. The Government will also furnish vessel-owners with information on appropriate management and operations of these vessels for energy saving.

○ Efforts by the Industrial Community in the *Consumer* and *Transport* Sectors

The industrial community will contribute to CO_2 saving in the *consumer* and *transport* sectors through the following efforts: developing lighter and more functional materials; supplying highly energy-efficient products; improving the efficiency of logistics systems by modal shifts and shift from private trucks to commercial trucks; and urging their employees to use public transport in commuting.

B. Efforts in the *Commercial and Other* Sector

Carbon dioxide emissions in the *commercial* sector covering offices and other buildings (including service businesses such as stores) have increased by more than 40% above FY1990 levels along with the increase in floor area of those buildings. The Government will try to control these emissions through energy management under the Energy Conservation Act, steady implementation of voluntary action plans and other measures.

As energy consumption in the *commercial and other* sector can be controlled by developing and disseminating energy-efficient devices used in offices and other buildings, the Government will continue to promote further improvements in energy efficiency of those devices towards the world's highest standard of energy efficiency.

(a) Promotion and Reinforcement of Voluntary Action Plans of Industry

(As described previously: See A(a))

As of the end of March 2008, 32 businesses in the *commercial* sector had established quantitative targets and undergone assessments and verifications for their plans by concerned councils or similar bodies.

(b) Initiatives by Public Organizations

○Initiatives by the National Government

With the first commitment period of FY2008-FY2012 in mind, the Government will make leading efforts concerning its own administration and undertakings such as the purchase and utilization of goods and services, and the construction and management of buildings, based on the National Government Action Plan under the Act on Promotion of Global Warming Countermeasures and each ministry's implementation plan under this Plan,.

In particular, the Government will intensively promote *greening* of national government buildings across the country by means of photovoltaic power generation, building planting, ESCO[9] or the like.

In advancing the efforts based on the National Government Action Plan, the Government will conclude environment-conscious contracts mainly in four areas: electrical power, automobiles, ESCO and buildings, based on the Act Concerning the Promotion of Contracts Considering Reduction of Greenhouse Gases and Other Emissions by the State and Other Entities (Act No.56 of 2007; hereinafter referred to as the "Green Contract Act"), which was put into effect in November 2007, as well as its Basic Policies, which were decided by the cabinet on December 7, 2007. By this means, the Government will more reliably fulfill the targets stipulated in the National Government Action Plan and endeavor to achieve further reductions. The Basic Policies should be revised as necessary.

With regards to national government buildings, the Government will continue to promote Green Government Building[10] construction, Green Assessment and Green Renovation,[11] and thorough

[9] Energy Service Company.

[10] Green Government Building is a government building whose environmental burdens are reduced throughout its lifecycle from planning to construction to operation to abolishment.

[11] Green Assessment is the assessment of the environmental preservation performances of government buildings.

appropriate operation and management. In addition, the Government will utilize the Life Cycle Energy Management (LCEM)[12] method of air-conditioning system.[13]

Not only will the Government try to utilize bio-fuel, but it will also make efforts to take the initiative in introducing fuel-efficient vehicles such as clean diesel, clean energy and idling stop vehicles.

In order to spur demands for products that contribute to greenhouse gas emissions reduction and other eco-friendly goods and services, the Government will take the initiative in procuring such goods and services, based on the Act Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act No.100 of 2000; hereinafter referred to as the "Green Purchasing Act").

The Government will inspect the progress of the National Government Action Plan annually at the Directors' meeting of the Global Warming Prevention Headquarters, and publish the results. From the viewpoint of ensuring transparency, the Government will evaluate not only the total emissions, but the progress for each measure and for each organization by comparing the targets with the past performances. The results of this inspection will be made public all together.

The Government will work to form a "CO_2-saving government office area" around Kasumigaseki District through pioneering introduction of new technology and systems and organic collaboration among ministries and agencies.

Specifically, the Government will continue to advance the following efforts:

* Accelerated introduction of fuel cells;
* Further introduction of renewable energy such as photovoltaic power generation and wind power generation;
* Selection of energy sources that contribute to CO_2 saving;
* Introduction of heat pumps/thermal storage systems and storage batteries, which contribute to electric power load leveling, gas air conditioning, or the like;
* Introduction of water-retaining materials for pavements on government building sites at the time of repair;
* Thorough implementation of appropriate operation and management of facilities;
* Sophistication of common-use bicycle systems; and
* Further promotion of planting.

○ Initiatives by Local Governments

Green Renovation is the renovation for reducing environmental burdens of a government building throughout its lifecycle from planning to construction of renovation to operation to abolishment.

[12] Life Cycle Energy Management is the consistent management of energy throughout its lifecycle performances (e.g. setting performance requirements, verifying and improving performance).

[13] In the use of heat insulating materials, the Government is trying to use fluorocarbon-free ones by standard public works specifications (See footnote 24).

Based on the Act on Promotion of Global Warming Countermeasures, prefectures and municipalities are obliged to formulate local government action plans. They are expected to formulate these plans with reference to a manual formulated by the national government, pursuant to the provisions of the National Government Action Plan, in particular, with the following points in mind.

○Matters to be included in an action plan
- Basic matters such as plan objective(s) and period
- Comprehension of the total greenhouse gas emissions
- Concrete efforts (measures)
- Goals of efforts (measures), quantified targets regarding total greenhouse gas emissions
- Implementation/inspection systems, procedures for inspection, assessments, or publication of the plan

○ Scope
- Some local governments have large proportions of emissions from the operations of waste management, water supply and sewerage systems, publicly-owned mass transport systems, public schools and public hospitals or other facilities, as well as energy consumption in government buildings. For this reason, all the administrative affairs determined by the Local Autonomy Act (Act No.67 of 1947) should be within the scope of the plan.

  Furthermore, with regards to the affairs implemented via outsourcing or designated manager systems, local governments should request outsourcees or other contractors to take necessary measures to achieve possible greenhouse gas emissions reductions.
- In particular, in purchasing electricity for government buildings and facilities, local governments should try to save carbon dioxide by introducing a cutoff method, which bars from bidding power companies with over a certain carbon dioxide emission coefficient, based on the Green Contract Act and its Basic Policies.

○Inspection and Evaluation System
- Local governments should carry out periodical inspections and evaluations of implementation of the plan and publicize the results annually.
- In publicizing the results of inspections and evaluations, local governments should evaluate not only the total emissions but the progress for each measure and for each facility or organization by comparing the targets with the past performances. The results of these inspections should be made public all together in as much detail as possible.
- Based on the inspections and evaluations, when necessary, local governments should revise their action plans and rearrange the various schemes of operation which they set up for implementing the plans.

From the viewpoint of ensuring transparency, the national government will compile the results publicized by local governments and publish them in a comprehensive manner.

In addition, local governments will make efforts on environment-conscious contracts by, for example, creating a policy relating to promotion of environment-conscious contracts based on the Green Contract Act.

Based on the Green Purchasing Act, local governments will also work on green purchasing by,

for instance, drawing up policies for promoting procurement of eco-friendly goods and services.

○ Promotion of the Initiatives by Other Public Organizations

National and local governments will provide information to public organizations such as independent administrative agencies concerning effective global warming countermeasures tailored to their characteristics. At the same time, national and local governments will encourage these public organizations to establish action plans for greenhouse gas emissions reduction regarding their administration and undertakings in conformity with national and local governments' action plans, and to make leading efforts based on these plans. The national government will regularly monitor their efforts to the extent possible.

The independent administrative agencies, quasi-governmental corporations and incorporated national universities that are subject to the green contract provisions of the Green Contract Act will steadily conclude environment-conscious contracts.

(c) CO_2 saving of Buildings, Equipment and Devices

○ Improvement of the Energy Efficiency Performance of Buildings

As the energy efficiency performance of buildings has a large and long-term impact on carbon dioxide emissions in the *commercial and other* sector through energy consumption, the Government will continue to advance energy-saving measures at the time of new construction, while promoting energy-saving renovations which help improve the energy efficiency performance of existing building stocks.

To this end, the Government will work for the amendment of the Energy Conservation Act in order to expand the coverage of buildings subject to notification obligation concerning energy-saving measures to include certain small- to medium-sized buildings and reinforce regulations regarding energy-saving measures related to large-scale buildings.

Furthermore, while qualifying high-efficiency building systems composed of such building equipment as highly energy-efficient insulation (e.g. windows), air conditioning, lighting and water heater for the Tax System for Promoting Investment in Energy Supply-and-demand Structure Reform, the Government will make the following efforts: development and dissemination of the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE [14]) for buildings; promotion of the provision of information concerning design or construction for energy saving in buildings such as energy-saving renovation; promotion of the introduction of construction technologies related to energy-saving measures for small and medium sized enterprises; assistance for leading technology developments by private business operators and model projects introducing CO_2-saving technologies; and support to model projects aiming at the collaboration of building owners and tenants on

[14] CASBEE is a comprehensive environmental performance assessment system for houses and buildings, which integrally assesses the improvements of comfort of houses (indoor environment) and the measures to reduce environmental burdens including energy-saving ones and presents the results by easy-to-understand indices.

energy-saving measures. [15]

In addition, the Government will promote the introduction of energy-saving equipment and devices by utilizing ESCO.

○Decarbonization of Urban Areas Through Improving the Thermal Environment by Urban Greening and Other Heat Island Countermeasures

（As described previously: See (i)A）

○Dissemination of Energy Management Systems

The Government will promote the technology development and dissemination of energy management systems, which will display the state of energy use in real time and ensure the optimal operation of lighting, air conditioning, or other equipment depending on indoor conditions by utilizing information technology.

The Government will also support the introduction of energy management systems for commercial buildings by qualifying those systems for the Tax System for Promoting Investment in Energy Supply-and-demand Structure Reform.

○ Improvement of the Efficiency of Devices Based on the Top-runner Standards

The Top-runner standards have been in place since FY1998 under the Energy Conservation Act. In order to further improve the efficiency of individual types of devices, the Government will expand the range of products subject to the Top-runner standards and widen the range of application or toughen up the standards for the products already designated.

To reduce standby power consumption, the Government has encouraged voluntary efforts by the industry so far. The Government will continue to follow up on the industry's voluntary efforts in this regard.

○ Support for the Development and Dissemination of High-efficient Energy-saving Devices

In order to further improve the efficiency of individual types of devices and systems, the Government will further promote the development of energy conservation technologies.

In the hot water supply sector, which accounts for approximately 30% of household energy consumption, new types of apparatuses with particularly outstanding energy conservation performance compared to the conventional types, have been developed and commercialized. Such apparatuses include carbon dioxide refrigerant heat pump water heaters, latent heat recovery type water heaters and gas engine water heaters. To accelerate the dissemination of these apparatuses, the Government will support their introduction to promote further dissemination by business operators and encourage technology development for miniaturization or installability

[15] In the case where heat insulation materials are used for energy conservation purposes in houses and buildings, the materials containing fluorocarbons are likely to have opposite results of increasing the total greenhouse gas emissions, because of their strong greenhouse effects. Therefore, it is necessary to promote the use of fluorocarbon-free heat insulation materials.

improvement.

Furthermore, recent years have seen the development of highly-efficient commercial-use air conditioners utilizing heat pump technology, highly energy-efficient and fluorocarbon-free commercial-use water heaters and low-temperature natural refrigerant freezer units, and energy-efficient integrated systems of refrigerator, freezer and air conditioner for the use of convenience stores and other energy-intensive small- and medium-scale retail stores. The Government will work to accelerate the dissemination of these appliances in the *commercial* sector through such measures as supporting their introduction.

The introduction of energy-efficient lighting utilizing light emitting diodes (LEDs) enables significant energy conservation compared to conventional incandescent and fluorescent lights. Therefore, the Government will promote technology development toward further efficiency improvements and work to disseminate these lightings.

(d) Thorough Energy Management, etc.

○ Thorough Energy Management in Factories and Workplaces

(As described previously: See A.(c))

○ Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises

(As described previously: See A.(c))

○ Initiatives in Water Supply and Sewerage Systems and Waste Management

With regard to waterworks, the Government will carry out energy conservation measures such as introduction of highly energy-efficient devices or pump inverter controls, and implement renewable energy measures such as small-scale hydropower and solar power generation.

As for sewerage systems, the Government will implement energy-conserving measures such as the improvements to equipment operation and the introduction of efficient devices to air diffusers of reactor and sludge dehydrators, while promoting renewable energy measures such as the utilization of solid fuels and digestion gases generated from sewage sludge for power generation and the effective use of heat from sewage and treated sewage (sewage heat), etc.

Regarding waste management, the Government will further promote waste power generation and other types of energy utilization at waste treatment facilities, while at the same time encouraging the recycling of plastic container and packaging and the vehicle measures such as the introduction of bio-diesel fuel (BDF) to waste collection vehicles.

(e) Development of National Campaigns

（As described later: See II.6.）

C. Efforts in the *Residential* Sector

Even though the increase in the number of households has gradually been slowing down, carbon dioxide emissions in the *residential* sector have gone up by more than 30% above FY1990 levels due to the growth in energy consumption resulting from the increase in the number of household appliances and other factors. For this reason, the Government will work to improve the energy efficiency performances of houses, while encouraging citizens to think of global warming as their own issue, constantly review their lifestyles and make efforts for energy saving.

Since the improvement and dissemination of energy-efficient devices used in households control the energy consumption in the *residential* sector, the Government will continue to promote further improvements in the energy efficiency of such devices, aiming for the world's highest standards of energy efficiency.

(a) Development of National Campaigns

（As described later: See II.6.）

(b) CO_2 Saving of Houses, Equipment and Devices

○ Improvement of the Energy Efficiency Performance of Houses

As the energy efficiency performance of houses has a large and long-term impact on carbon dioxide emissions in the *residential* sector through energy consumption, the Government will thoroughly implement energy-saving measures at the time of new construction, while promoting energy-saving renovations which help improve the energy efficiency performance of existing housing stocks.

To this end, the Government will work for the amendment of the Energy Conservation Act, in the same manner as buildings, in order to expand the coverage of houses subject to notification obligation concerning energy-saving measures to include certain small- to medium-sized houses and reinforce regulations regarding energy-saving measures related to large-scale houses. The amendment will also aim to introduce measures to urge businesses operators who construct or sell houses to improve their energy efficiency performance.

In addition, the Government will provide support by loans through securitization framework, promote dissemination of energy-efficient houses by creative and original local efforts through the Regional Housing Grant, and establish tax relief for renovations to improve energy efficiency (e.g. the installation of double-paned window glass) in existing houses. The Government will also encourage small- to medium-sized business operators to introduce energy-saving construction technologies, and will give assistance to leading technology development by private business operators and model projects introducing CO_2-saving technologies. The Government will provide support to the introduction or renovations of model houses which introduce insulating materials and install solar power systems/solar heating devices en masse, and will familiarize the public with and give support for eco-reform practices such as the introduction of CO_2-saving materials at the time of renovations.

So that consumers can select houses with superior energy efficiency performance, the Government will expedite the provision of information to consumers by evaluating and displaying energy efficiency performance. Specifically, the Government will enhance and disseminate the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) for houses and the Housing Performance Indication System, and promote the development of comprehensive energy efficiency evaluation methods including ones for housing equipment.

In order to encourage the wider use of window glass and sash with a high energy-saving performance, the Government will smoothly put into execution a system under which the manufacturers have to display the energy-efficiency performances of their products on labels, while thoroughly publicizing their energy-saving effects by utilizing all forms of media. The Government will implement familiarization of all types of energy-saving measures that can be introduced at the time of housing renovation.

Besides, as for detached housing, the Government will promote the provision of information to each resident on the benefits of introducing energy-saving devices, equipment and building materials in accordance with the state of energy consumption. Regarding complex housing, the Government will encourage the introduction of energy-saving devices, equipment and building materials by utilizing leasing and ESCO.

○Dissemination of Energy Management Systems

(As described previously: See B.(c))

○Improvement of the Efficiency of Devices Based on the Top-runner Standards

(As described previously: See B.(c))

○ Support for the Development and Dissemination of High-efficient Energy-saving Devices

(As described previously: See B.(c))

D. Efforts in the *Transport* Sector

Carbon dioxide emissions in the *transport* sector have increased by approximately 20% above FY1990 levels but have been on a declining trend in recent years. In order to make this trend steadier, the Government will implement comprehensive measures such as automobile/road traffic measures, promotion of public transport utilization, and improvement of the efficiency of logistics systems.

(a) Automobile/Road Traffic Measures

○ Improvements in the Fuel Efficiency of Automobile, etc.

Since automobile accounts for the majority of energy consumption in the *transport* sector, the Government will promote automobile measures such as further improvements in the fuel efficiency by the world's highest technology and dissemination of highly fuel-efficient or clean energy vehicles.

With regards to the Top-runner standards, the Government will proactively promote the expansion and dissemination of automobiles conforming to the 2015 fuel consumption efficiency standards, which have already been in effect (passenger vehicles since July 2007; trucks and utility vehicles since April 2006), to promote the shift from the 2010 fuel efficiency standards to the more efficient ones.

In order to promote the dissemination of fuel-efficient vehicles (including clean diesel) and CO_2-saving clean energy vehicles (CEV)[16] (including electric, hybrid and natural gas), the Government will improve the infrastructure by developing support measures such as subsidy systems and favorable tax treatments and by utilizing assessment and publication systems on fuel efficiency performance.

The Government will also develop a mechanism by which retailers–contact points between manufacturers and consumers–will provide appropriate information on energy efficiency.

In addition, the Government will continue to provide subsidies for the introduction of idling stop devices, while improving the infrastructure by encouraging automakers to increase the number of models fitted with such devices and make efforts to promote sales of those models.

Taking into account the introduction of sulphur-free (containing no more than 10ppm of sulphur) petroleum fuel, the Government will work to improve fuel efficiency through the optimal combination with automobile technology.

○ Promotion of Traffic Flow Management

[16] *Clean energy vehicle (CEV)* is a general term for an electric, hybrid, hydrogen/fuel cell, natural gas or diesel fuel-substituting LP gas vehicle.

As the increase in traveling speeds by untying traffic jam improves effective fuel efficiency and reduces carbon dioxide emissions from automobiles, the Government will promote development of trunk road networks such as ring roads, and construction of continuous flow intersections using an overpass or underpass. The Government will also implement traffic flow management including the following: diverse and flexible expressway toll policies; traffic demand management for automobiles; Intelligent Transport Systems (ITS); traffic information provision service; illegal street parking control; roadworks reduction; countermeasures against bottleneck railroad crossings; and development of traffic safety facilities.

The Government will also promote the use of LEDs for signal lights in the above-mentioned development of traffic safety facilities.

○ Promotion of the Environmentally-friendly Usage of Vehicles

The Government will disseminate and promote eco-driving, which includes idling stop while stopping or parking, and driving at safe and constant speeds appropriate for the traffic conditions.

To this end, the Government will raise the awareness of citizens through public relations activities or the like, led by the Eco-driving Dissemination Liaison Meeting composed of four related government ministries and agencies,[17] while developing an environment for dissemination and promotion of eco-driving.

In order to promote eco-driving by commercial vehicles such as trucks, buses and taxis, the Government will endeavor to build and disseminate Eco-drive Management Systems (EMS)[18] for transport operators or the like. With a view to expanding the reach of eco-driving for further emissions reductions, the Government will also carry out a campaign to increase public awareness amongst general drivers.

In addition, the Government will improve the efficiency of commercial vehicle operations by promoting the introduction of such systems as make possible efficient dispatch and movement of taxis by the utilization of GPS and other information technologies.

By limiting the maximum speed at which large trucks travel on expressways by requiring them to install a speed control device, the Government will aim for CO_2 saving through improvements in fuel consumption efficiency.

○ Development of National Campaigns

（As described later: See II.6. concerning eco-driving, promotion of public transport utilization,

[17] National Police Agency; Ministry of Economy, Trade and Industry; Ministry of Land, Infrastructure, Transport and Tourism; and Ministry of the Environment

[18] *Eco-drive Management System(EMS)* is a system which implements planned and continuous eco-driving and its evaluation and guidance in an integrated manner in the operation of a vehicle.

etc.)

(b) Promotion of Public Transport Utilization, etc.

○ Promotion of Public Transport Utilization

The Government will make ongoing efforts to develop public transport systems such as new railway lines, Light Rail Transit (LRT)[19] and Bus Rapid Transit (BRT),[20] and to improve service and convenience by promoting IC card introduction or other computerization, facilitating connections and implementing park-and-ride schemes. At the same time, the Government will also promote measures toward the realization of seamless public transport.

In coordination with this, the Government will promote a shift in passenger transport from private cars to public transport including railways and buses by voluntary activities such as commuter transport management by business operators, implementation of ride sharing and familiarization activities for citizens. To promote these kinds of voluntary activities by business operators, the Government will advance specific measures by utilizing councils made up of people from the transport industry, the business community or the like at national and regional levels.

The Government will provide information on the results of the Environmentally Sustainable Transport (EST) model projects that have been underway since 2005 to the regions that will voluntarily aim to promote EST by limiting excessive dependence on private cars, which are a major cause of the increase in carbon dioxide emissions in the passenger sector. The Government will also plan to disseminate EST exploiting local characteristics to the entire country by providing supports to promotion of public transport utilization, introduction of low-emissions vehicles or familiarization under the cooperation between concerned ministries and agencies.

○ Promotion of the Development and Introduction of Energy-efficient Railways, Ships and Aircrafts

In the railway sector, the Government has promoted the introduction of energy-efficient vehicles which are lightweight or equipped with VVVF devices.[21] The Government will continue to promote the introduction of these types of vehicles.

In the ship sector, the Government has worked to develop and disseminate environmentally-friendly economical next-generation domestic vessels (Super Eco-Ships) and other vessels that have introduced new technologies. The Government will continue to promote the dissemination of these vessels. The Government will also establish indices for gauging the fuel

[19] *Light Rail Transit (LRT)* is an environmentally friendly, next-generation tram system with improved travel space and vehicle performance, possessing the following superior characteristics: ease of boarding/disboarding, punctuality, speed, carrying capacity and comfort.
[20] *Bus Rapid Transit(BRT)* is a high-speed bus system using bus-only lanes and the like.
[21] *VVVF device* is a mechanism that efficiently controls the motor revolutions without using electrical resistance.

efficiency of vessels to promote the dissemination of fuel-efficient vessels.

In the aviation sector, the Government has supported airlines' introduction of new energy-efficient aircrafts and improved the efficiency of flights. The Government will continue to promote such measures as introduction of these energy-efficient aircrafts and sophistication of aircraft safety systems.

(c) Promotion of Telework and Other Transport Substitution by Information and Communications Technology

The Government will promote the reduction of commuting traffic of trains, passenger vehicles or buses by encouraging flexible working styles free from place and time constraints with information and communications technology (telework) based on the Action Plan to Double the Number of Teleworking Population, which was established by the Ministries Concerned Liaison Conference on Teleworking Promotion on May 29, 2007.

(d) Promotion and Reinforcement of Voluntary Action Plans of Industry

（As described previously: See A.(a) on the businesses in the *transport* sector）

As of the end of March 2008, 17 businesses in the *transport* sector had established quantitative targets and undergone assessments and verifications for their plans by concerned councils or similar bodies.

(e) Improvement of the Efficiency of Logistics Systems, etc.

○ Implementation of CO_2 Saving by Cooperation Between Shippers and Logistics Operators

The Government will promote the greening of the entire logistics system by strengthening collaboration between shippers requesting delivery and logistics operators undertaking it and by expanding their efforts against global warming.

To this end, the Government will continue to promote energy management by shippers and logistics operators by the Energy Conservation Act. The Government will also provide support to the projects in which shippers and logistics operators collaborate on modal shifts or increase of truck transport efficiency through the Green Logistics Partnership Conference.[22] The Government will support the review of commercial practices that are supposed to have large environmental impacts and the construction of systems that increase consumers' awareness in logistics, such as the one issuing "eco-points" for improving delivery methods by home delivery service. To facilitate collaboration between shippers and logistics operators, the Government will also refine the unified methods (guidelines) for calculating carbon dioxide emissions in the logistics field, which can be utilized commonly by both parties to enable objective

[22] *Green Logistics Partnership Conference* is an organization composed of shippers, logistics operators, government and other related member enterprises and organizations, which is managed cooperatively by the Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure and Transport and Tourism and related organizations, with a view to promoting voluntary efforts of the industrial community toward the greening of logistics systems.

evaluation of the effects for each measure.

In addition, based on the Act on Promotion of Comprehensive and Efficient Logistics Operations (Act No.85 of 2005), the Government will support comprehensive and efficient implementation of logistics operations including transport, storage and distribution processing through the introduction of 3rd Party Logistics (3PL) [23] projects, joint delivery and transport, or IT utilization.

In combination with this, in order to improve the efficiency of urban logistics, the Government will provide support to councils which uncover bottlenecks and consider problem-solving measures, based on the Total Plan on Urban Logistics.

○ Promotion of Modal Shifts, Increase of Truck Transport Efficiency, etc.

To promote the greening of the entire logistics system, the Government will promote a switch from trucking to domestic shipping or railway transport which produces lower carbon dioxide emissions.

As a part of these efforts, the Government will increase the competitiveness of domestic shipping by promoting the cut of transport costs and the improvement of services through developing domestic trade terminals able to handle combined multimodal transport, and by encouraging the development and dissemination of new technologies such as next-generation domestic vessels (Super Eco-Ships).

The Government will also promote the dissemination of fuel-efficient vessels by establishing indicators to evaluate the fuel efficiency performance of vessels. Moreover, the Government will endeavor to electrify and streamline cargo-handling equipment or the like in port terminals, which are the centers of logistics, by studying the development of onshore facilities for supplying electricity to vessels on the berth. The Government will make efforts on technological development towards further reductions of carbon dioxide emissions in ports.

In the same way, the Government will increase the competitiveness of railway freight transport by working for improving the convenience of freight railways. Specifically, the Government will expand and enhance transport power and quality, and reduce the costs of terminal transport through expansion of the carrying capacity of railway transport, arrangement of train diagrams and enhancement of transport equipment and materials such as containers.

The Government will also improve the truck transport efficiency further. To this end, it will promote a switch from private trucks to commercial trucks and the use of heavy or trailer trucks, while constructing roads fit for heavy vehicles. In combination, it will improve load efficiency through elimination of congested transport and ensuring back-hauling.

[23] *3rd Party Logistics (3PL)* is a high-quality service that provides consistent logistics from shippers.

In addition, the Government will promote the development of international marine container terminals, multipurpose international terminals and infrastructure to deepen collaboration among each mode in core and hub international ports, which can also contribute to the reduction of overland transport distances of international freight.

○ Promotion of Dissemination of the Certification Program for Green Management

The Certification Program for Green Management, which certifies transport operators carrying out certain environmentally superior efforts such as fuel efficiency improvement, has contributed to improvements in the average fuel efficiency of the certified operators. The Government will further promote its dissemination.

E. Efforts in the *Energy Conversion* Sector

Although a certain amount of time is required for infrastructure development and reform in the *energy conversion* sector, the Government will commence at the earliest possible time the measures for the utilization of energy sources with low carbon dioxide emissions intensity and for the improvement of the efficiency in energy supply by working toward the environmentally conscious use of fossil fuels, while keeping in mind the stable supply of energy.

(a) Promotion and Reinforcement of Voluntary Action Plans of Industriy

（As described previously: See A.(a) on the businesses in the *energy conversion* sector）

As of the end of March 2008, four businesses in the *energy conversion* sector had established quantitative targets and undergone assessments and verifications by concerned councils or similar bodies.

○ Reduction of Carbon Dioxide Emissions Intensity in the Electric Power Sector

It is important to reduce carbon dioxide emissions intensity in the power generation sector, which accounts for a large part of Japan's energy-originated carbon dioxide emissions. Therefore, the Government will take the measures described below.

- Assessments and verifications of the achievement of the voluntary targets of the following efforts by business operators.
  - Improvement of the nuclear power plant's utilization capacity through realization of scientific and rational operation management.
  - Further improvement of the thermal efficiency of thermal power generation, environment-conscious adjustment of the operational methods of thermal power sources, etc.
  - Acquisition of credits (volume of emissions reductions) under the Kyoto Protocol through utilization of the Kyoto Mechanisms by business operators.
- Promotion of measures for electrical load leveling that result in CO_2 saving by promoting the dissemination of heat pump and thermal storage systems, storage batteries, gas air conditioners, etc.
- Steady enforcement of the Act on Special Measures Concerning New Energy Use by Electric Utilities (Act No.62 of 2002, hereinafter referred to as the "RPS Act")[24] and promotion of the conversion of obsolete coal thermal power plants into natural gas power plants.

(b) Efforts by Energy Type

○ Steady Implementation of Nuclear Power Generation

[24] The Act obligates Japanese electric utilities to use a certain amount of electricity from renewable energy, etc. It was promulgated in June 2002 and came into full force in April 2003. *RPS* stands for " Renewables Portfolio Standard."

Nuclear power does not produce carbon dioxide in the power generation process, so it occupies an extremely important position with respect to the promotion of global warming countermeasures. Based on the most fundamental premise of ensuring safety, the Government will continue to work toward the further utilization of nuclear power generation and steadily promote it as a mainstay power source for the nation under public private partnership. When doing so, the Government will steadily advance the establishment of the domestic nuclear fuel cycle as the fundamental principle of the country with a view to further improvement in the characteristics of nuclear power generation such as its outstanding supply stability. To this end, complying with the Nuclear Energy Action Plan (Nuclear Energy Subcommittee of the Electric Industry Sectional Committee of the Advisory Committee on Natural Resources and Energy report of August 8, 2005) and in accordance with the basic principles of the Framework for Nuclear Energy Policy (Japan Atomic Energy Commission decision of October 11, 2005), the Government will promote the following policies.

- In addition to the 55 nuclear power plants currently in operation, the Government will follow up on the efforts by the electric utilities in order to ensure that the two new plants under construction (Tomari Unit 3 and Shimane Unit 3) will steadily go into operation by FY2012.
- The Government will progress the development of an environment for the long-term stable operation of nuclear power generators through the following efforts: developing next-generation light water reactor technology, which can become a global standard, through public-private partnership; working with stakeholders towards the early commercialization of the Fast Breeder Reactor (FBR) cycle technology; promoting the voluntary development of uranium resources; and developing human resources for nuclear power generation.
- The Government will also implement the following: steady efforts towards the establishment of the nuclear fuel cycle including the steady implementation of MOX fuel and the full operation commencement of the Rokkasho reprocessing plant; measures for individual sites; public hearings and public relations activities; enhancement of associated industries; and reinforcement of the measures towards promotion of final disposal projects for high-level radioactive wastes.
- The Government will progress the improvements of capacity factor of nuclear power plants and the utilization of existing furnaces through realizing scientific, rational operation management based on the most fundamental premise of ensuring safety.

○ Introduction and Utilization Expansion of Natural Gas

Natural gas is a clean form of energy which has relatively small environmental burdens compared to other fossil fuels and is widely distributed in other regions than the Middle East. Therefore, the Government will promote the introduction and utilization expansion of natural gas including the shift to natural gas, while taking into account energy security and the balance with other energy sources such as nuclear power.

- In order to revitalize domestic gas distribution, the Government will comprehensively promote the development of an environment for building a natural gas supply infrastructure by private actors.
- The Government will advance the fuel conversion for industrial boilers to natural gas, and the conversion of the gas type of city gas utilities to natural gas.
- To promote the efficient use of natural gas, the Government will promote the improvement of the efficiency of gas turbines and gas engines and the introduction of natural gas cogeneration and highly efficient gas air conditioners which contribute to the leveling of electrical load.
- The Government will promote the development of technologies related to Gas-to-Liquid (GTL)[25] and Dimethyl ether (DME),[26] which can be produced from natural gas and methane hydrate.

○ Promotion of the Efficient Use of Petroleum

The Government will promote the environment-conscious and efficient use of petroleum, which will continue to serve as an energy source occupying an important position in the primary energy supply.

For this reason, the Government will promote the dissemination of more environmentally-friendly petroleum systems, including petroleum cogeneration systems and highly efficient boilers with low NO_X, as energy conservation systems that can contribute to CO_2 saving.

○ Promotion of the Efficient Use of Liquefied Petroleum Gas

The Government will promote the use of liquefied petroleum gas (LPG), which has relatively low environmental burdens and is deemed as a clean energy source along with natural gas. Therefore, the Government will promote the highly efficient use of LPG systems such as LPG cogeneration systems and gas engine boilers.

○ Realization of a Hydrogen Society

Hydrogen is an environmentally-desirable secondary energy in the sense that it is an energy medium which does not emit carbon dioxide at the use stage and can be manufactured from non-fossil fuels.

For this reason, the Government will promote measures including technological development, establishment of codes and standards, and revision of regulations regarding fuel cells and hydrogen production that are key technologies for a hydrogen society. The Government will also

[25] Gas-to-Liquid (GTL): new fuel which can substitute diesel oil, etc. manufactured using synthetic gas made from natural gas or the like.
[26] Dimethyl ether: a fuel gas manufactured using synthetic gas made from natural gas or the like. It has similar properties to LPG and can be liquefied easily. In the wider sense, it is one type of GTL products.

promote the leading introduction and dissemination of these technologies as well as technological development of hydrogen production that does not produce carbon dioxide, such as hydrogen conversion by nuclear power or renewable energy.

(c) Measures for Renewable Energy

○ Promotion of the Introduction of Renewable Energy, etc.

As renewable energy produced by sunlight and solar heat, wind power, biomass[27] or the like makes a big contribution to global warming countermeasures and helps the diversification of energy sources, the Government will promote its introduction through enhancement of governmental supports and other policies. Furthermore, the Government will evaluate the local efforts to introduce renewable energy by local production for local consumption, and will share best practices by introducing such leading efforts.

In order to promote steadier and more cost-effective introduction of renewable energy, the Government will promptly conduct a comprehensive study on the fundamental reinforcement of measures for renewable energy.

○ Heat Sector

・ The Government will take the following measures: promotion of the formulation, implementation and evaluation of comprehensive plans for introducing renewable energy by local governments; reinforcement of the promotion of biomass heat utilization in collaboration with the promotion of the Biomass Nippon Strategy; promotion of solar heat utilization; and promotion of the use of heat from waste incineration.

・ The Government will promote the dissemination of biofuels including the ones for transport by tackling such challenges as competition with food, stable supply and economic efficiency. The Government will also promote the following: utilization of economic incentives such as a biofuel associated tax system; establishment of technology utilizing as raw material cellulose such as rice straw, which does not compete with food; large-scale demonstration towards the expansion of domestic biofuel production; and technological development towards the utilization of highly-concentrated biofuels in vehicles or the like. In addition, the Government will develop a system to ensure the quality of biofuels, while supporting the cooperative efforts between people engaged in agriculture, forestry or fisheries, who produce raw material for biofuels, and biofuel manufacturers.

○ Power Generation Sector

・ The Government will take the following measures: expanded introduction of renewable energy in the public services; technological development for promoting cost reduction and efficiency improvement of photovoltaic power generation or the like; implementation of grid interconnection measures for wind power generation; smooth coordination with all

[27] Carbon dioxide emissions derived from renewable energy including biomass are not counted in the calculation of carbon dioxide emissions under the UNFCCC.

types of land use regulations including natural park regulations; promotion of the introduction of power generation from waste and biomass; steady enforcement of the RPS Act; and promotion of private-sector voluntary efforts such as green power certificates.

In addition, the Government will promote the introduction of dispersed power sources such as wind power, biomass, photovoltaic power, cogeneration systems (highly energy-efficient ones) and fuel cells, while taking into account technological challenges related to connection to the existing network. Through this approach, the Government will endeavor to realize CO_2-saving energy systems by encouraging the introduction of renewable energy sources in the regions as a whole. To this end, the Government will implement leading model projects and advance the development and demonstration of related technologies.

In conjunction with this, the Government will ensure efficient energy supply in the regions by promoting the use of untapped energy taking full advantage of the local characteristics (e.g. energy using the differences in temperature of sewage, and heat from snow and ice), or the use of exhaust heat from waste incineration.

○ Promotion of Biomass Utilization

The Government will provide information and promote local activities towards the building of biomass towns, which have systems to utilize the various local biomass resources efficiently and comprehensively for thermal and electric power, fuel or materials. At the same time, the Government will develop biomass utilization facilities and technologies for biomass energy conversion or use.

○ Initiatives in Water Supply and Sewerage Systems and Waste Management

(As described previously: See B.(d))

(2) Non-energy-originated Carbon Dioxide

To date, the Government has implemented the following measures: expansion of the use of blended cement generating lower carbon dioxide emissions in the production process; promotion of waste *reduction* and *reuse* and *recycling* of recyclable resources of manufactured goods and the like (hereinafter referred to as the "3Rs"); effective use of timber which is environment friendly and reproducible as raw material or biomass energy source; cultivation of green manure on farmland; recycling through composting; and promotion of biomass plastic use.

Carbon dioxide emissions from industrial processes such as limestone consumption and ammonia manufacture in FY2005 (53.9 million t-CO_2) were 13.5% lower than in FY1990.

Carbon dioxide emissions from the combustion of wastes (waste oil and waste plastics) in FY2005 (36.7 million t-CO_2), which account for approximately 2% of the total carbon dioxide emissions, were approximately 1.6 times higher than in FY1990.

○ Expansion of Blended Cement Use

The Government will expand the production ratio and use of cement made by blending clinker—an intermediate product of cement— with blast-furnace slag or the like.

The Government will also promote the use of blended cement, for example, by taking the lead in using it in public works carried out by the national government and other bodies based on the Green Purchasing Act.

○ Promotion of Measures to Reduce Carbon Dioxide Emissions Derived From Waste Incineration

The Government will promote the 3Rs measures towards the achievement of the targets determined in the Fundamental Plan for Establishing a Sound Material-Cycle Society (hereinafter referred to as the "Sound Material-Cycle Plan") under the Fundamental Act for Establishing a Sound Material-Cycle Society (Act No.110 of 2000, hereinafter referred to as the "Sound Material-Cycle Act") and the waste volume reduction targets based on the Waste Management and Public Cleansing Act (Act No.137 of 1970, hereinafter referred to as the "Waste Management Act"). Specifically, the Government will further promote the 3Rs on wastes and the reduction of carbon dioxide emissions resulting from waste incineration, by conducting the following: implementing measures based on the individual recycling acts; evaluating and studying those measures; providing support to projects such as ones for developing facilities contributing to global warming countermeasures; ensuring thorough separated garbage collection and introduction of charge for garbage collection by municipalities; and promoting familiarization regarding the 3Rs on wastes.

The Government will progress the reduction of carbon dioxide emissions resulting from waste incineration by promoting voluntary action plans of industrial waste generators and

industrial waste management business operators.

○ Development of National Campaigns

(As described later: See II.6. on promotion of the 3Rs)

(3) Methane and Nitrous Oxide

(i) Methane (CH_4)

To date, the Government has been making the following efforts: promotion of the 3Rs on wastes; sophistication of combustion in waste incineration facilities through such measures as promoting the introduction of continuous furnaces; improved management of cultivated fields; and improvement of livestock manure treatment methods.

Methane emissions in FY2005 (24 million t-CO_2) were 28.1% lower than in FY1990. A big contributor to this was the reduction of emissions from coal mining.

○ Reduction in the Amount of Final Waste Disposal, etc.

The Government will promote measures toward the achievement of the targets determined in the Sound Material-Cycle Plan under the Sound Material-Cycle Act and the waste volume reduction targets based on the Waste Management Act. Specifically, the Government will further promote the 3Rs on wastes and the reduction of methane emissions resulting from direct landfill disposal of waste, by conducting the following: implementing measures based on the individual recycling acts; evaluating and studying those measures; providing support to projects such as ones for developing facilities contributing to global warming countermeasures; ensuring thorough separated garbage collection and introduction of charge for garbage collection by municipalities; and promoting familiarization regarding the 3Rs on wastes. The Government will also promote the sophistication of combustion in municipal waste incineration facilities. The Government will progress the reduction of methane emissions resulting from landfill disposal by promoting voluntary action plans of industrial waste generators and industrial waste management business operators. The Government will also reduce methane emissions by decreasing illegal dumping of industrial wastes through such measures as strengthening waste management systems and fostering excellent waste management business operators.

○ Review of Organic Matter and Water Management in Rice Paddies

The Government will try to control the emissions of methane resulting from rice production (rice paddies) by shifting the management method of organic matter from “rice straw plowing” to “compost application,” while taking into account regional circumstances, and by improving the water management methods for intermittent irrigation rice paddies.

(ii) Nitrous Oxide (N_2O)

To date, as for nitrous oxide, the Government has promoted such measures as the emissions reductions in industrial processes and the sophistication of combustion in

incineration facilities for waste or sewage sludge through promoting the introduction of continuous furnaces.

Nitrous oxide emissions in FY2005 (25.5 million t-CO_2) were 22.0% lower than in FY1990. The introduction of nitrous oxide decomposer in the production process in workplaces manufacturing adipic acid— a raw material for some chemical products— largely contributed to this reduction.

○ Installation of Nitrous Oxide Decomposer in the Production Process of Adipic Acid

The Government will promote the recovery and destruction of nitrous oxide that is emitted as a by-product in manufacturing adipic acid by installing nitrous oxide decomposer.

○ Sophistication of Combustion at Sewage Sludge Incineration Facilities

The Government will reduce nitrous oxide emissions resulting from incineration of sewage sludge by sophisticating the combustion in incineration facilities. To this end, the Government will establish standards concerning the sophistication of sewage sludge combustion in sewage treatment plants and promote thorough implementation of these standards. The Government will also encourage the voluntary action plan by industrial waste management business operators.

○ Sophistication of Combustion at Municipal Waste Incineration Facilities, etc.

The Government will advance the sophistication of combustion in municipal waste incineration facilities by providing support to projects such as ones for developing facilities contributing to global warming countermeasures, promoting the installation of incineration facilities with continuous furnaces along with widening the areas of waste management, and increasing the ratio of waste disposal by continuous operation of incineration facilities. The Government will further promote the 3Rs on wastes and the reduction of nitrous oxide emissions resulting from waste incineration toward the achievement of the targets determined in the Sound Material-Cycle Plan under the Sound Material-Cycle Act and the waste volume reduction targets based on the Waste Management Act.

○ Optimization and Reduction of Fertilizer Application

The Government will promote the control of nitrous oxide emissions arising from fertilizer application through reduction in fertilizer applied, split application and utilization of slow release fertilizers.

(4) Three Fluorinated Gases (HFCs, PFCs and SF_6)

The three fluorinated gases account for approximately 1.3% of the total greenhouse gas emissions (FY2005 carbon dioxide equivalent). Some factors may increase the emissions of these gases. For example, it is projected that HFCs emissions will increase as they substitute for ozone-depleting substances whose production and consumption is being reduced under the Montreal Protocol (CFCs and HCFCs have strong greenhouse effects although they are outside the scope of the Kyoto Protocol). The Government will control the increase in emissions of these gases.

○ Promotion of Planned Efforts by Industry

In response to the "Guidelines for Measures to Limit Emissions of HFCs, etc. by Industry" (Ministry of International Trade and Industry public notice) in February 1998, 22 organizations in eight sectors have formulated voluntary action plans so far. The Government will continue to assess and verify the progress of the action plans of industry in the Industrial Structure Council, while working to improve the transparency and reliability of the action plans and increasing the certainty of targets achievement.

The Government will also take measures to support the efforts by business operators to control emissions, such as subsidizing the introduction of emissions controlling equipment, while urging the businesses having no action plans to formulate and publicize one.

○ Promotion of Development of Substitute Materials and Use of Substitute Products

The Government will promote the use of new substitute materials, substitute technologies and products, and recovery and destruction technologies for the three fluorinated gases.

To this end, the Government will carry out research and development of new substitute materials and substitute technologies. Taking into account safety, economic efficiency, energy efficiency or the like, the Government will provide information and education concerning the technologies and products using substitute materials or the products using the three fluorinated gases with smaller global warming effects.

In particular, it is expected that more HFCs, which are used as blowing agents in insulation materials, will be emitted into the atmosphere along with the promotion of measures to improve the energy efficiency performance of buildings and houses. In order to control this, the Government will formulate measures to further promote the use of fluorocarbon-free blowing agents and insulation materials. In conjunction with this, the Government will provide information on the appropriate disposal of waste insulation materials containing CFCs and other substances that are not subject to the Kyoto Protocol.

As increases are expected in SF_6 emissions in melting magnesium and HFCs emissions in using aerosol products containing HFCs, the Government will promote the development

of substitute materials and substitute technologies in these fields, and will implement familiarization on them.

The Government will further promote appropriate disposal measures for liquid PFCs or the like and development and dissemination of fluorocarbon-free technologies, including safe and highly efficient natural refrigerant freezer units.

○ Recovery of HFCs Filled as Refrigerant in Equipment Based on Relevant Acts, etc.

The Government will ensure thorough recovery and destruction of HFCs in the refrigerant field through appropriate operation of relevant acts including the Designated Home Appliances Recycling Act (Act No.97 of 1998), the Act on Ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Designated Products (Act No.64 of 2001; hereinafter referred to as the "Fluorocarbons Recovery and Destruction Act") and the Automobile Recycling Act (Act No.87 of 2002).

In particular, the Government will endeavor to increase the recovery volume of fluorocarbons from commercial refrigeration and air conditioning equipment by conducting familiarization on the revised Fluorocarbons Recovery and Destruction Act, which came into effect in October 2007. Furthermore, the Government will carry on assessments of refrigerant leakage in use of on-site fixed equipment or car air conditioners, with a view to strengthening the management system as necessary.

2. Greenhouse Gas Sink Measures and Policies

(1) Forest Sink Measures

It is necessary to ensure the attainment of the target removal by Japan's forest of 13.00 million t-C (47.67 million t-CO_2, approximately 3.8% compared to the base year total emissions) through the implementation of measures toward the achievement of the targets for full utilization of multiple functions of forests and for the supply and use of forest products, which are stipulated in the Basic Plan for Forest and Forestry decided by the Cabinet in September 2006 based on the Forest and Forestry Basic Act (Act No.161 of 1964).

According to the result of the estimation based on the assumption that the past level of forest management will continue, the target attainment will require undertaking 0.2 million ha per annum of additional forest management such as tree thinning for a six-year period starting from FY2007. Therefore, the current challenge is how to achieve this. This necessitates the efforts of the national government as a whole including consideration of cross-sectoral policies, and the cooperation and strenuous efforts of all actors, including local governments, forest owners, citizens and business operators in the forestry and timber industries.

To this end, the Government will promote support measures to accelerate forest management such as tree thinning. Taking into account the progress of consideration of cross-sectoral policies, the Government will make united efforts with the private sector to steadily and comprehensively promote forest management, timber supply, effective use of timber or other measures, which are necessary for achieving the targets of the Basic Plan for Forest and Forestry. Specific policies include the formulation of a new Act on Special Measures Concerning the Promotion of the Implementation of Thinning, etc. of Forests and the development of the "National Movement for Fostering Beautiful Forests in Japan" that has the target of undertaking 3.3 million ha of thinning in a six-year period starting from FY2007, with the understanding and cooperation of a wide range of citizens.

○ Development of Sound Forests

A. Forest management measures including additional thinning through new legal regimes or the like.
B. Promotion of efficient and effective thinning of forests by strengthening collective thinning operations, or promoting greater use of thinned wood.
C. Shift toward forests with longer cutting cycles and multistoried forests.
D. Measures to eliminate the land left denuded.
E. Programs to secure and foster essential personnel responsible for forest development.

○ Implementation of Appropriate Management and Conservation of Protection Forests, etc.

A. Appropriate operation of the regulations for land use conversion and logging and

planned designation of protection forests under the protection forests system; implementation of appropriate forest conservation and management under the protected forest system or the like.

B. Planned promotion of soil conservation projects in the regions with a high risk of mountain disasters, denuded forests in the hinterland or other areas.

C. Promotion of measures to prevent and control damage caused by forest pests and wild birds/animals; promotion of measures to prevent forest fires.

D. Expansion and enhancement of natural parks and nature conservation areas and strengthening of conservation management within these areas.

○ Implementation of Forest Fostering with the Participation of Citizens, etc.

A. Implementation of forest fostering activities by a wider range of actors, including promotion of the participation of enterprises or others in forest fostering through the development of the "National Movement for Fostering Beautiful Forests in Japan."

B. Improvement of the skills of people such as forest volunteers and upgrading of safety systems.

C. Implementation of forest environmental education.

D. Implementation of the Green Worker Program to protect flora and fauna including forests in national parks or other areas.

○ Promotion of the Use of Timber and Woody Biomass

In order to contribute to the promotion of sustainable forest management and work toward the active utilization of reproducible timber leading to the carbon dioxide emissions control by controlling the amount of fossil fuels used, the Government will implement the following measures:

A. Promotion of utilization of locally supplied timber in houses, public facilities or the like;

B. Implementation of consumer-focused programs to expand the buyer base creating actual demand for locally supplied timber;

C. Development of production, distribution and processing systems to meet consumer needs in close coordination among all concerned from forest workers to retailers; and

D. Establishment of an efficient and low-cost collection and transport system for remnant wood in forest areas and promotion of the utilization of such wood for making energy and products.

(2) Promotion of Urban Greening

Urban greening is one of the sink measures closest to the citizens' daily lives. Its promotion does not only have the effect of actual carbon dioxide removal but also brings about a large effect of familiarizing the public with the purpose of the global warming countermeasures.

The removal by urban greening can be counted for the amount of removal as

"revegetation" subject to Paragraph 4 of Article 3 of the Kyoto Protocol, outside the framework of the 13.00 million t-C, which is the upper limit of the amount of removal to be obtained through Japan's forest management (47.67 million t-CO_2, approximately 3.8% of the base year total emissions).

To this end, the Government will continue to actively promote the following: creation of urban parks; greening of public facilities such as roads, rivers, *sabo* (erosion and sediment control facilities), harbors, sewage treatment plants, public housing and government facilities; and creation of new green space on building rooftops or other places, based on comprehensive national and local government plans for the conservation and creation of greenery such as the Green Policy Outline and the Green Basic Plans drawn up by the municipalities.

As a part of these efforts, the Government will familiarize all sectors and strata of society with the value and effects of urban greening, while actively promoting the support for the creation of new greenery in urban areas by diverse actors and approaches, including urban greening with a wide-ranging participation of citizens, enterprises, NPOs or the like, and the utilization of the Authorization System of Greening Facilities Planning and the Multi-level City Parks System.

It is estimated that if these countermeasures are implemented as planned, an annual average removal volume of about 0.06% relative to the base year total emissions (0.74 million t-CO_2) will be acquired in the first commitment period.

The Government will also continue to promote in a planned manner the development of a system for reporting and verifying the volume of removals by urban greening.

II. Cross-sectoral Policies

1. Utilization of a Policy Mix Approach

The Government will utilize a policy mix approach of fully mobilizing all policy instruments, including voluntary, regulatory, economic and informational ones, taking advantage of their respective characteristics and organically combining them, in order to advance the effective and efficient reduction of greenhouse gas emissions, reduce the cost burden on the entire nation as much as possible with fairness taken into account, and achieve the multiple policy objectives of environmental conservation and economic development at the same time. The Government will promptly conduct a comprehensive study of the most appropriate form for this approach while monitoring the progress of the measures and policies of this Plan.

(1-1) Economic Instruments

Economic instruments rely on market mechanisms and induce each actor to take actions such as emission control based on economic rationality by providing economic incentives. They are expected to be effective also as economic support policies for global warming countermeasures. When using economic instruments, 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 supports, the Government will endeavor for efficient utilization of the budget, taking into account the cost-benefit performance.

(1-2) Domestic Emissions Trading Scheme

In order to accumulate knowledge and experience concerning steady, cost-efficient emissions reductions and trading, the Government has implemented since FY2005 voluntary emissions trading which provides economic incentives to the enterprises making efforts to achieve their self-determined reduction targets and utilizes the trade of emissions quotas. Following the end of the first round in the summer of 2007, from the perspective of accumulating more useful knowledge and experience with the results achieved in mind, the Government will enhance this scheme by expanding the scope of participants, diversifying participation methods and raising the efficiency of verification methods.

A domestic emissions trading scheme is an issue that must be comprehensively studied on a wide range of points such as a comparison with other methods and its effects, its possible impacts on industrial activities and national economy, and international trends in emissions trading, as well as the evaluation of specific proposals and the appropriateness of introducing such proposals, while adequately taking into account the perspective of realizing Japan's mid-term strategies on global warming and the significant emissions reduction effects of the "expansion and reinforcement of voluntary action plans," which is expected to be in place based on the FY2007 evaluation and verification as a pillar of the

measures in the *industrial* sector.

* A domestic emissions trading scheme is the system that first sets the total emissions quotas to be issued, then allocates emissions quotas to individual actors and allows such options as trading of emissions quotas with other actors and utilization of Kyoto Mechanism credits.

(1-3) Environment Tax

Since an environment tax would impose a burden on a wide range of citizens, it is an issue for which comprehensive studies must be seriously advanced, in tandem with efforts to obtain the understanding and cooperation of citizens, business operators and other actors, taking into account the specific role of the tax in the context of overall climate change policies and measures, its effects, its impact on national economy and the international competitiveness of industry, as well as the current state of climate change policies and measures in foreign countries.

2. Review of the Shift to Night-time Lifestyles and Working Styles

The Government will comprehensively consider the review of the shift to night-time lifestyles and working styles towards a fundamental change in citizens' consciousness, while taking into account the current state of the related efforts in foreign countries.

3. Introduction of Summer Time

As for summer time, the Government will progress the crystallization of points of the debate and endeavor for environmental awareness raising and public consensus building along with the development of the public debate.

4. The Mandatory Greenhouse Gas Accounting and Reporting System

The Government will promote the building of a foundation for voluntary efforts by all levels of citizens toward global warming countermeasures by having the emitters of greenhouse gases calculate their own emissions. With a view to increasing incentives and motivation for the promotion of voluntary efforts by all citizens and business operators through the publication and visualization of emissions information, the Government will also introduce a system under which the emitters of a certain volume of greenhouse gases or above will be obliged to annually report their emissions to the national government responsible for collating and publishing the reported information.

In addition, the Government will promote the control of greenhouse gas emissions through the revisions of the Act on Promotion of Global Warming Countermeasures, such as changing the system to require calculation and reporting of each enterprise unit or franchise chain unit, as well as taking a measure to reflect the Kyoto Mechanism credits

acquired by an electric utility to the utility's carbon dioxide emission coefficient.

5. Promotion of Environmental Consideration in Business Activities

Through the revision of the Act on Promotion of Global Warming Countermeasures and the formulation and publication of Guidelines for Controlling Greenhouse Gas Emissions, the Government will urge business operators to voluntarily and actively engage in environment-conscious business activities.

Large corporations are required to endeavor to publish environmental reports by the Act Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc. by Facilitating Access to Environmental Information and Other Measures (Act No.77 of 2004). Taking this and other related matters into consideration, the Government will promote the use of environmental information by business operators and citizens and work to develop the conditions for environment-conscious business activities to be highly evaluated by society and the market.

The Government will also promote the inclusion of information about business operators' greenhouse gas emissions and progress on efforts to control emissions in their environmental reports. The Government will prompt small and medium sized business operators to make environment-conscious efforts such as monitoring of carbon dioxide emissions.

The Government will promote environmental consideration in the financial sector (greening of the financial sector) through the following measures: bringing financial institutions' environmental governance to the fore on investment and loan projects; expanding Social Responsible Investment Funds (SRI Funds); disclosing information on the environmental conservation efforts by business operators or the status of environmental conservation projects; and making investments and loans considering environmental conservation efforts.

Furthermore, the Government, through collaboration among government, industry and academia, will promote the efforts toward "energy saving of IT devices" and "energy saving of society through IT," and the establishment of environmental impact assessment methodology for IT enterprises activities (Green IT Initiative). These will then be disseminated internationally.

6. Development of National Campaigns

The Government will clarify the expected roles of the national and local governments, citizens and business operators, while undertaking activities including the provision of information enabling each actor to make appropriate assessment and judgment and the familiarization promoting the practice of emissions reductions.

The Government will further strengthen the roles of the Japan Center for Climate Change Action, prefectural and major municipal Promotion Centers for Climate Change Action, Climate Change Action Officers, Regional Councils on Global Warming Countermeasures and other organizations which promote the activities of controlling greenhouse gas emissions.

○ Information Provision/Familiarization

The Government will encourage individual citizens to take voluntary actions for preventing global warming by strongly appealing to the awareness of citizens through the appropriate provision of information using diverse methods, including the proactive utilization of various mass media such as television, newspapers and the Internet, on the "I declare CO_2 reduction of 1 kg 1 day 1 person" movement, *Cool Biz*(business style to wear light clothing with the air conditioning set at 28℃ in summer), *Warm Biz* (business style to wear warm clothing with the air conditioning set at 20℃ in winter), and other efforts in the Team Minus 6% campaign.

In addition, in accordance with the Energy Conservation Act, energy suppliers and energy-efficient appliance retailers are to adequately provide the users of such appliances with information and methodology on energy saving. The Government will also encourage the industrial community to supply energy-efficient appliances.

In order to urge consumers to take actions including choice of energy-efficient appliances, the Government will promote "visualization" of carbon dioxide emissions volume at the manufacture, use or other stages of various products and services, while working to foster a sound sense of crisis through the provision of the latest scientific knowledge, and engaging in information provision and familiarization on what specific actions can contribute to the control of greenhouse gas emissions or the promotion of sink measures. Therefore, through the revision of the Act on Promotion of Global Warming Countermeasures, the Government will list measures required of business operators in the Guidelines for Controlling Greenhouse Gas Emissions and implement the following measures for all levels of citizens by a variety of approaches.

- Promoting efforts such as the Team Minus 6% campaign, in which all Japanese make joint efforts for the prevention of global warming with the participation of a broad range of actors, through promoting the large scale campaign under the motto, "I declare CO_2 reduction of 1 kg 1 day 1 person," *Cool Biz*, *Warm Biz*, or the like.
- Promoting green purchasing by business operators and citizens through such means as the provision of information concerning eco-friendly goods and services.
- Promoting measures which provide economic incentives according to the amount of environmentally considerate behavior, such as "Eco action point."
- Progressing the dissemination of carbon offset measures.
- Promoting the dissemination of energy-efficient household appliances through the

Energy -efficient Household Appliances Promotion Forum.

- Encouraging people to replace dishwashers or other appliances not subject to the Top-runner standard regulations with less energy-consuming ones.
- In addition to the "Energy Saving Labeling Program" by which consumers can easily distinguish efficiency or other performances of appliances, working on the dissemination and enhancement of the "Energy Efficient Product Retailer Assessment System," and promoting familiarization through measures like "Unified Energy Saving Labeling," in order to promote the proactive sales of energy-efficient appliances.
- Promoting the proactive provision of energy-saving information to consumers by the retailers of household appliances including electrical, gas or oil burning ones.
- Requiring electric power and gas companies to implement energy conservation promotion projects, such as the promotion of dissemination of highly-efficient devices and the provision of information on energy use, and to publicize the progress of those projects.
- Promoting voluntary refrainment from unnecessary or unhasty use of private cars and dissemination of eco-driving (e.g. idling stop while stopping or parking, driving at safe and constant speeds appropriate for the traffic conditions).
- Developing familiarization activities to promote cooperative efforts among transport business operators, the business circle and others concerning promotion of the use of public transport systems.
- Developing familiarization activities to promote cooperative efforts between shippers and logistics operators.
- Developing familiarization activities to raise public awareness of environment-friendly railway freight transport.
- Promoting the efforts of local production for local consumption that contribute to controlling the fuel consumption associated with food transport.
- Promoting biomass utilization and other global environmental conservation efforts in agriculture, forestry and fisheries industries, which also contribute to regional revitalization.
- Developing popular-participation-type greening campaigns including the development of national greening campaigns in Greenery Month or Urban Greening Month and the promotion of private-sector forest fostering and greening activities through the utilization of the funds such as the Green Fund and the Urban Greening Fund, in order to widely familiarize the public with the importance of greening as a sink measure.
- Developing familiarization activities concerning the value of utilizing local wood, such as the "Kizukai-Undo"(Familiarization with Wood Campaign).

○ Environmental Education, etc.

In order to ensure that citizens recognize and understand the importance of the global warming issue and make it a habit to take actions to prevent global warming, the Government will promote environmental conservation activities and environmental

education based on the Act for Enhancing Motivation on Environmental Conservation and Promoting of Environmental Education (Act No.130 of 2003), taking into account the United Nations Decade of Education for Sustainable Development commencing in 2005.

Specifically, in accordance with the "21st-Century Environmental Education Initiative," the Government will progress environmental education in collaboration with various actors in all locations, such as schools, regions and workplaces. It will also promote programs contributing to this, including human resources development and foothold establishment.

In particular, the Government will promote the implementation of hands-on environmental education and energy conservation activities in school facilities that play a central role in regions. For example, the Government will take such measures as introduction of fluorocarbon-free insulation materials, renovations contributing to global warming countermeasures including local wood use and introduction of renewable energy devices, while utilizing the Internet or other media to promote support for global warming countermeasures in households.

At the same time, the Government will continue to advance the development of teaching materials and programs that encourage citizens' understanding and actions in collaboration with relevant actors such as NPOs.

The Government will also promote various hands-on activities in such areas as forests, parks and green space in order to deepen understanding of the functions of forests in preventing global warming, the necessity of forest development and cyclical use of timber resources, or the value of urban greening.

III. Basic Policies

1. Development of a National System for Calculating Greenhouse Gas Emissions and Removals Based on the UNFCCC and the Kyoto Protocol

The Kyoto Protocol requires each Annex I party to develop a national system for the calculation of greenhouse gas emissions and removals no later than one year prior to the start of the first commitment period. Therefore, the Government of Japan established a national system for calculating emissions and removals in compliance with the "Guidelines for national systems" decided by the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol at its first session (COP/MOP 1).

From now, taking into account that the first commitment period commences in 2008, the related ministries led by the Ministry of the Environment will cooperate in establishing as soon as possible a system for the aggregation, calculation and publication of statistics on greenhouse gas emissions and removals.

As to the calculation of greenhouse gas emissions, the Government will continue to examine how to refine the calculation methods/processes for emission coefficients and volume of activity.

Furthermore, the related ministries led by the Ministry of the Environment will cooperate to put in place a framework for the prompt submission of a greenhouse gas emission and removal inventory by the stipulated deadline, the quality control of data, the review and approval process of inventory, the response to review of expert review teams to be dispatched based on the Kyoto Protocol, or the like.

In addition, when calculating emissions, the Government will aim to more accurately monitor the status of emissions in each sector and to meticulously examine the methods for evaluating implementation of countermeasures by each actor. To this end, the Government will advance the development of statistics used for volume of activity, the studies and researches concerning calculation of the energy consumption intensity and carbon dioxide emissions intensity, greenhouse gas measurement methods or the like, while promoting standardization (development of Japanese Industrial Standards (JIS)) based on the results of these studies and working to further refine the calculation of greenhouse gas emissions and removals.

On the other hand, when measuring, monitoring and reporting removals (or emissions) by carbon sinks, the Government will establish transparent and highly scientifically-verifiable methods in conformity with the "Good Practice Guidance for Land Use, Land-Use Change and Forestry" decided by the Conference of the Parties to the UNFCCC at its tenth session (COP10). With an eye on the application of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, the Government will promote the accumulation of information on the volume of activity and land use changes, which is

necessary to carry out continuous measurement, monitoring and reporting, as well as the studies and researches concerning greenhouse gas removal and emission mechanisms in forests and other sinks.

2. Promotion of the Development of Global Warming Countermeasure Technology

Technological development is expected to generate large effects of greenhouse gas emissions reduction in the future through dissemination of the developed technologies while achieving compatibility between the environment and the economy. Towards the Third Phase of the Science and Technology Basic Plan (Cabinet Decision of March 28, 2006) and its pillar, the strategic focusing in science and technology, the ministries related to the Sectoral Promotion Strategies, which clearly state future selection and concentration of investment and targets for each research and development issue, collaborate for its promotion comprehensively under the cooperation among government, industry and academia. Also, from a mid- and long-term perspective, the Government will promote the fusion of differing fields of technology or the reform of systems in accordance with the long-term strategic policy road map, “Innovation 25” (Cabinet Decision of June 1, 2006). In order to further promote global warming countermeasures, the related ministries collaborate, for example, for the development of technology to lower costs of equipment utilizing renewable energy including solar power.

○ Promotion of the Practical Application and Commercialization of New Technologies

Further improvement of the efficiency, cost reduction and miniaturization by technological development can lead to the promotion of countermeasures for carbon dioxide emissions reduction such as the introduction and dissemination of renewable energy and highly-efficient devices. However, the important factor affecting whether the benefits of technological development can lead to greenhouse gas reduction within the first commitment period is how quickly effective technologies for emissions reduction can be practically applied and commercialized.

For this reason, through collaboration among government, industry and academia, the Government will strongly promote the following:

- clarification and sharing of a road map for commercializing the results of research and development;
- development and demonstration of technologies that promote practical application; and
- support for pioneering efforts toward commercialization.

In so doing, the Government will work in conjunction with the policies for disseminating development results to 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 countermeasure technologies are being put into practical use through application of elemental technologies of a certain field to another or joint work across the boundaries of businesses. In order to produce as many such successful examples as possible, the Government will strongly promote efforts through cross-sectoral collaboration among government, industry and academia.

○ Promotion of Technology Development from a Mid- and Long-term Perspective

Taking into account the long-term goal of "halving global greenhouse gas emissions by 2050" proposed in the "Cool Earth 50," it is necessary to provide from an early stage sufficient support for the development of global warming countermeasures from a mid- and long-term perspective as long as sustained benefits can be expected from that development, even if it may take a long time before technological development will give results.

For example, some technologies for global warming countermeasures have a significant challenge of reducing costs associated with manufacturing or other processes to commercialize such technologies, although their technological challenges have already been overcome. In order to promote the further dissemination of such technologies and thus achieve further greenhouse gas emissions reductions, the Government will support from an early stage such technologies as follow: renewable or unused energy technologies that realize significant cost reductions and efficiently conduct energy conversion; dramatically energy-saving technology; carbon dioxide capture and storage technology that recovers carbon dioxide emitted through the use of fossil fuels and thus reduces emissions of carbon dioxide into the atmosphere.

In addition, as the "Cool Earth 50" highlights the necessity of the "innovative technology development," the Government will promote technological development from a long-term perspective under the international cooperation, aiming to achieve economic growth and greenhouse gas emissions reductions at the same time.

For example, nuclear power, which does not emit carbon dioxide in its power generation process, is currently the only clean energy source that could become a core power source in our country. Based on the most fundamental premise of ensuring safety, the Government will proactively promote the development and practical application of such technologies as the "Fast Breeder Reactor (FBR) cycle technology," which will dramatically raise the utilization rate of uranium resources and control the generation of radioactive wastes, next-generation light water reactor technology with significantly improved safety, economic efficiency and reliability, and "nuclear fusion technology," which will produce enormous energy from minimal resources.

The Government will also support the projects regarding the following technologies: ultra high energy efficiency technology; innovative technology for low-cost and high-efficiency solar power generation; fuel cells and hydrogen utilization technology; technology for efficiency improvement of coal-fired power generation and carbon dioxide

capture and storage; and green IT.

The Government will intensely promote technology for encouraging reform of urban/regional structures or socioeconomic systems to form a foundation for mid- and long-term global warming countermeasures, as well as technology supporting all kinds of countermeasures in a cross-sectoral manner.

In addition, the Government will promote basic researches in universities contributing to global warming countermeasures, bearing in mind also the perspective of continuously developing human resources in the fields in which Japan possesses strength, while respecting the voluntary efforts by universities.

Besides, the Government will meticulously promote countermeasure technologies in various fields, including the following: development of substitute materials for the three fluorinated gases; greenhouse gas emissions control technology in the agriculture, forestry and fisheries fields; and study and research on the mechanisms by which farmland removes greenhouse gases.

3. Promotion of Research on Climate Change and Strengthening of Observation and Monitoring Systems

Concerning research on global warming, the Government will strategically and intensively promote researches on the following areas: elucidation of the climate change mechanism; monitoring and future projections of global warming and development of the technology necessary for that; evaluation of environmental, social and economic impacts by global warming; and policies for greenhouse gas reduction and adaptation to global warming. In doing so, the Government will take into account the Global Warming Research Initiatives by the Council for Science and Technology Policy and other initiatives. It will also try to foster international cooperation in this regard.

The Government will strengthen the comprehensive global warming observation and monitoring systems to keep track of greenhouse gases, climate change and their impacts, taking into account the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan endorsed at the Third Earth Observation Summit (February 2005, Brussels), the Council for Science and Technology Policy's Earth Observation Promotion Strategy (decision and opinion offered of December 27, 2004), and the like.

In particular, Japan's efforts include the following: observation of atmospheric, continental and marine greenhouse gases primarily in the Asia and Oceania region; collection, exchange and analysis of various countries' observational data; observations of the continental and marine carbon cycle and ecosystems; observation of the impacts by global warming in regions vulnerable to climate change such as snow and ice zones and coastal zones; and integration of observational data and socioeconomic data.

4. Ensuring of International Partnership on Measures Against Global Warming and Promotion of International Cooperation

In implementing global warming countermeasures, it is essential to make long-term efforts to reduce greenhouse gas emissions not only by Japan but also by the entire world working together. The Kyoto Protocol is an important first step and it is necessary for the entire world to steadily implement the efforts.

To that end, Japan will continue to call on non-Parties to the Protocol to ratify it. At the same time, by utilizing its superior technological capabilities and accumulated experience of environmental conservation, Japan will provide support through a new financial mechanism (Cool Earth Partnership) to developing countries that are making efforts to achieve greenhouse gas emissions reduction and economic growth in a compatible way and to contribute to the climate stabilization. Such support will be given to the following efforts: greenhouse gas emissions reduction; forest conservation including measures against illegal logging and other deforestation and forest degradation; measures for the regions vulnerable to effects of global warming such as sea level rises and droughts; promotion of energy conservation and renewable energy; and promotion of clean energy utilization. Japan will extend its support to those developing nations which will suffer serious damage from climate change, in particular, LLDCs. Through these measures, Japan will fulfill a leading role in the global efforts.

Current global greenhouse gas emissions are more than double the capacity of natural sinks and the greenhouse gas concentrations in the atmosphere continue to increase. In order to achieve the ultimate objective of the UNFCCC, it is necessary not only for the Parties to the Kyoto Protocol to steadily fulfill their commitments under the Protocol, but for the entire world to control global emissions to the level equivalent to the capacity of natural sinks in the long term. To this end, in accordance with the “Cool Earth 50,” Japan is proposing a long-term target of cutting global emissions by half from the current level by 2050 as a common goal for the entire world.

Furthermore, towards the global target of “halving emissions by 2050,” a post-2012 framework must greatly move beyond the Kyoto Protocol. Therefore, in the “Cool Earth 50,” Japan has proposed “three principles” for designing a concrete framework for the period from 2013 following the end of the first commitment period under the Kyoto Protocol. It is important to establish a fair and effective next framework based on these principles.

＜“Three principles” for establishing an international post-2012 framework to address global warming＞

(i) All major emitters must participate, moving beyond the Kyoto Protocol, leading to the global reduction of emissions.

(ii) The framework must be flexible and diverse, taking into consideration the circumstances of each country.

(iii) The framework must achieve compatibility between environmental protection and economic growth by utilizing energy conservation and other technologies.

On a post-2012 framework, following the adoption of the "Bali Action Plan" at the thirteenth session of the Conference of the Parties to the UNFCCC (COP13) held in Bali at the end of last year, negotiations under the UNFCCC and the Kyoto Protocol are accelerating. Japan, as the chair of the G8 Summit of this year, will take initiatives and facilitate discussions on a post-2012 framework amongst stakeholder countries.

In January 2008, Japan proposed the following three points in the "Cool Earth Promotion Programme."

(i) Post-Kyoto Framework

Japan will, along with other major emitters, set a quantified national target for the greenhouse gas emissions reductions in working towards the establishment of a framework in which all major emitters participate as well as the setting of fair and equitable emissions target.

(ii) International Environment Cooperation

Japan aspires to set a global target of 30% improvement of energy efficiency by 2020 toward the most efficient use of energy. In addition, Japan establishes a new financial mechanism, Cool Earth Partnership, on the scale of US $10 billion to support developing countries' efforts.

(iii) Innovation

Japan will accelerate the development of innovative technologies indispensable for halving greenhouse gas emissions by 2050, while undertaking a rethinking for shifting Japan to a low-carbon society and playing a leading role in creating such a society on a global scale.

Particularly, in setting quantified national targets, it is important to ensure the equity of reduction obligations. To this end, the targets could be set by compiling on a sectoral basis energy efficiency as a scientific and transparent measurement and tallying up the volume of potential emission reductions that would be achieved based on the technologies to be in use in future. As to Japan's quantified national target, the Government needs to accelerate necessary work.

The Government will also promote international cooperative researches that will contribute to improvements in developing nations' problem-solving ability, while

continuing to provide appropriate support to the adaptation measures of vulnerable countries that have low capacity to respond to climate change, such as island nations and least developed countries. In addition, in order to achieve compatibility between environmental protection and economic growth in developing countries, the Government will promote cooperation through the co-benefits approach that will contribute to both pollution or waste control and greenhouse gas emissions reduction.

Section 3 Efforts Expected of Local Governments in Particular

In order to promote global warming countermeasures, it is important for local governments, which are responsible for environmental administration in local areas, to demonstrate the initiatives. It is expected that local governments will promote measures conceived locally and best suited to the conditions in each area.

I. Implementation of Comprehensive, Plan-based Programs

Based on Article 20 of the Act on Promotion of Global Warming Countermeasures, in view of the basic philosophy concerning global warming countermeasures in this Plan, local governments are expected to formulate and implement comprehensive, plan-based programs in accordance with the natural and social conditions of their local areas.

Specifically, such a program is anticipated to incorporate, by local originality and ingenuity, the following measures: urban/regional development and social capital development that contribute to greenhouse gas emissions reduction; introduction of renewable energy utilizing local resources; promotion of the active use of timber resources; forest conservation and development; timber and woody biomass use; and promotion of greening campaigns. Through this, it is expected that the development of cutting-edge model areas serving as examples for other areas will be advanced and spread to other areas.

In doing so, taking into account the difference in local circumstances such as lifestyle, industrial activities and transport, local governments are expected to exercise their originality and ingenuity to enhance or accelerate their unique efforts and establish symbolic global warming countermeasures, through utilization of the national support measures positioned in the “Global Warming Countermeasures Promotion Program for Regions” under the Regional Revival System, or the invitation of proposals for and implementation of special regulatory measures under the Special Zones for Structural Reform System.

Local governments, as the public sector closest to residents and business operators, are expected to advance community-based policies such as education or familiarization to local residents and support for the activities of private organizations.

In promoting policies, it is expected to appropriately ensure the cooperation and participation of residents, business operators and private organizations.

In taking policies, local governments are expected to collaborate with the policies of the national government in this Plan on the basis of respect for the autonomy of each local government, and to contribute to the nationwide greenhouse gas emissions reduction, while considering business operators’ effective improvements in energy efficiency on a national

scale.

Through the revisions to the Act on Promotion of Global Warming Countermeasures, the Government will prompt prefectures, government-designated cities, core cities and special case cities to stipulate, in their local government action plans, programs for controlling greenhouse gas emissions in accordance with the natural and social conditions of their local areas. In addition, local governments are to make considerations in related policies such as development of urban plans and agricultural promotion areas improvement plans, so that control of greenhouse gas emissions will be achieved in harmony with these policies' objectives and in partnership with local government action plans.

II. Efforts Expected of Prefectures in Particular

Prefectures, in particular, as the local public sector covering a wider area, are mainly expected to promote wide-area, large-scale local global warming countermeasures such as traffic flow management and promotion of efforts by commercial buildings and business operators in their areas, and to provide support for municipalities' efforts including formulation of action plans, in cooperation with prefectural and major municipal Promotion Centers for Climate Change Action, Regional Councils on Global Warming Countermeasures and Climate Change Action Officers.

The Government will back up the efforts to prevent global warming by local governments and other local actors by utilizing the "Regional Committees for Promoting Energy and Global Warming Countermeasures" (refer to Chapter 4, Section 3) established in each regional block throughout Japan.

III. Efforts Expected of Municipalities in Particular

Municipalities, in particular, as the public sector closest to local residents and business operators in their areas, are expected to cooperate with Regional Councils on Global Warming Countermeasures, analyze the natural and social conditions of their areas and advance more community-based programs that are most effective in accordance with the local characteristics, in collaboration with the national government, prefectures, local business operators or other actors. The programs mainly include the following: education and familiarization to local residents; support for the activities of private organizations; and implementation of projects to study and introduce renewable energy utilizing local resources.

Section 4 Efforts Expected of Business Operators with Large Emissions in Particular

Business operators with significantly large emissions of greenhouse gases are expected to individually or jointly formulate plans that include quantitative targets on measures for emission control, in order to promote effective countermeasures taking into account the diversities of types, sources and emission control countermeasures of greenhouse gases.

Although the contents of such plans are voluntarily determined by business operators, they are expected to pay attention to the following points in order to make their best efforts by exercising their originality and ingenuity.

- ○Controlling emissions by advancing improvement in the energy consumption intensity or carbon dioxide emissions intensity as the target of specific efforts, and carrying out analyses of those performances.
- ○Carrying out international comparisons of the intensities taking into account the characteristics of each business.
- ○Incorporating in the plan as many measures as possible to contribute to the control of greenhouse gas emissions of other actors, such as development of products with small greenhouse gas emissions, reduction of the amount of wastes, and undertaking quantitative evaluations of their contribution to emissions control in other sectors including *commercial and other*, *residential* and *transport*.
- ○A business operator that has formulated a plan should publish it and endeavor to publish the implementation status of measures taken based on it.
- ○A business operator should endeavor to improve the transparency and reliability of its plan, by undergoing an objective evaluation of the plan by a concerned governmental council or a third-party institution, and should work to improve the probability of accomplishing the plan, taking into account the results of such an evaluation.

Section 5 Measures and Policies Related to the Kyoto Mechanisms

I. Value of Promotion and Utilization of the Kyoto Mechanisms

In order to achieve the reduction commitments, prevent warming on a global scale and support the sustainable development of developing countries, the Kyoto Protocol approves the Kyoto Mechanisms[28] (Joint Implementation (JI), the Clean Development Mechanism (CDM) and emissions trading) to be utilized[29] as flexible measures that enable a party to this Protocol to use a part of greenhouse gas emission reductions or removals in another party or the emissions quota of another party toward achievement of their own reduction commitments.

To certainly and cost-effectively achieve the Kyoto Protocol commitment, Japan will appropriately utilize the Kyoto Mechanisms to acquire necessary credits, while bearing in mind the general rule that the Kyoto Mechanisms should be supplementary to domestic measures.

Given that greenhouse gas emissions are projected to dramatically increase mainly in developing countries 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.

II. Government Efforts Toward the Promotion and Utilization of the Kyoto Mechanisms

[28] 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 under Paragraph 1 of Article 6 of the Kyoto Protocol) 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 under (b) of paragraph 3 of Article 12 of the Kyoto Protocol) 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 in developed countries, etc. in accordance with the provisions of paragraph 7 of Article 3 of the Kyoto Protocol and/or, removal units (RUs), which are assigned amounts corresponding with the net changes set forth in the provisions of paragraph 3 of Article 3 of the Kyoto Protocol 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 amounts, etc. are used for emissions reduction or other environmental policy objectives is called the Green Investment Scheme (GIS) (hereinafter emission reduction units, certified emissions reductions, assigned amounts and other calculated assigned amounts listed under each item in Paragraph 6 of Article 2 of the Act on Promotion of Global Warming Countermeasures (Act No. 117 of 1998) will be generally referred to as "credits").

[29] "Utilization" of the Kyoto Mechanisms means obtaining credits generated from CDM or JI projects or credits of developed countries, etc. and counting them toward achievement of the Kyoto Protocol commitment (transferring these credits first to the account for the Government, and then to the retirement account of the national registry).

1. Basic Philosophy on the Utilization of the Kyoto Mechanisms

Since the adoption of the Kyoto Protocol in 1997, Japan has participated in the international consideration of the implementation rules for the appropriate utilization of the Kyoto Mechanisms. The Government has also been progressing such efforts as capacity building of the countries where CDM or JI projects are conducted, feasibility study of CDM or JI projects and establishment of consultation counters for promoting private business operators' efforts.

All sectors and levels of society in Japan will need to make every effort to achieve the Kyoto Protocol commitment on the basis of the domestic measures for greenhouse gas emissions reduction and carbon sinks (hereinafter referred to as "domestic measures"). These efforts notwithstanding, there will be a shortfall in Japan achieving its Kyoto Protocol commitment (1.6% relative to the base year total emissions: See Chapter 2, Section 2, 3).

It is necessary to steadily make up for this difference by utilizing the Kyoto Mechanisms to acquire credits, while respecting the general rule that the Kyoto Mechanisms should be supplementary to domestic measures.

When acquiring credits in accordance with the Kyoto Mechanisms, it is important to take into account the following perspectives: (i) acquiring these while considering cost effectiveness and reducing risks, and (ii) aiming for the prevention of warming on a global scale and the support towards the sustainable development of developing nations.

It is necessary to proceed with the Kyoto Mechanisms utilization, based on the recognition of the following conditions. First, if we commence to utilize the Kyoto Mechanisms after 2013 when the final confirmation of any shortfalls in the achievement of the Kyoto Protocol commitment will be made, we will have a very high risk that we cannot acquire the amount of credits necessary to achieve the commitment. Second, it takes three to five years for CDM and JI projects, which contribute to additional greenhouse gas emissions reduction and removal, and projects under the Green Investment Scheme (GIS), which is an emissions trading mechanism linked to specific environmental countermeasures, to progress from planning to implementation and credit issuance. In addition, other countries which are anticipated to have difficulty in achieving the Kyoto Protocol commitments through domestic measures alone, have already commenced to utilize the Kyoto Mechanisms by advancing the selection of high-quality projects or the purchase contracts of credits in a systematic manner with a view to securing the credits necessary to achieve their own commitments. It is important for Japan to pay attention to such efforts in other countries.

2. Establishing the Foundations for the Utilization of the Kyoto Mechanisms in Japan

In order for Japan to qualify for the Kyoto Mechanisms throughout the first commitment period and ensure the safety of credit trading by the private sector, the Government will appropriately operate and manage the Quota Account Inventory, by which the Government and private corporations will acquire, hold and transfer credits, in accordance with the international decisions and the Act on Promotion of Global Warming Countermeasures. Likewise, the Government will appropriately manage the domestic system for calculating greenhouse gas emissions and removals, which is necessary to qualify for the utilization of the Kyoto Mechanisms. In addition, in accordance with the international decisions, the Government will aim to report an overview of these systems and other information to the UNFCCC Secretariat without delay.

Through the revision of the Act on Promotion of Global Warming Countermeasures, the Government will also stipulate an obligated actor and procedures including implementation methods concerning the internationally agreed indemnification obligation related to the credits arising from afforestation and reforestation CDM projects.

3. Promotion of CDM, JI and GIS Projects

In order to increase the amount of credits Japan could obtain in the future and to disseminate its superior technologies worldwide, it is important to make efforts to promote the formation of specific emission control, reduction or removal projects through CDM, JI and GIS by Japanese private business operators or other actors.

(1) Contribution to the Development and Improvement of CDM and JI Schemes

Japan will actively contribute to the improvement of international rules or other work to invigorate CDM worldwide. In particular, with energy demand expected to increase along with the development of industry in developing countries, it will be a vital issue to ensure the rational use of energy. The Government will therefore continue to call on the international community to accelerate project evaluations at the CDM Executive Board and integrate methodologies regarding the CDM projects related to energy conservation and renewable energy in order to promote those projects further.

The Government will actively contribute to the formulation of JI-related international rules and the debate on the scheme operation through the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP) or other meetings. With the debate on a future framework in mind, the Government will make efforts to promote broad-based deliberations on the issue of adding nuclear power to the scope of the CDM scheme. For example, the Government will put forward this issue in international deliberations on technology transfers to developing nations.

(2) Establishment of a Specific GIS Scheme

With a view to ensuring the appropriate utilization of GIS, the Government will advance

consultations with governments of other countries and work rapidly to establish a specific scheme.

(3) Support for Discovery and Formation of Projects

Through promoting the discovery and formation of CDM/JI/GIS projects, the Government will work to ensure that Japan can obtain credits from those projects. In order to promote the smooth implementation of CDM/JI/GIS projects, the Government will deepen the understanding of the Kyoto Mechanisms in partner countries where those projects are carried out (hereinafter referred to as "host countries"), and will provide support for the capacity building on domestic systems so that host countries can meet the qualifying standard for participation in the Kyoto Mechanisms.

- On CDM/JI/GIS projects, the Government will work to discover projects utilizing promising energy and environmental technology, enhance feasibility studies or other support, and promote their implementation.
- To date, Japan, recognizing the importance of its relations with host country governments, has advanced such efforts as issuing joint statements between heads of state for the promotion of CDM/JI projects. It will continue to advance the creation of these bilateral cooperation schemes.
- Through the holding of intergovernmental talks and seminars, technical cooperation or the like, the Government will work to understand the priority fields in host countries, and will advance the support for capacity building in host countries, such as dissemination of knowledge concerning the Kyoto Mechanisms, formulation of government approval guidelines and human resources development.

4. Japan's Efforts for Credit Acquisition

On top of expending maximum efforts on domestic measures, it is necessary for the public and private sectors to collaborate appropriately in utilizing a variety of approaches effectively to acquire credits through the Kyoto Mechanisms so that Japan can make utmost effort toward the achievement of its Kyoto Protocol commitment.

(1) Establishment of the Government's Credit Acquisition System and Implementation of Credit Acquisition

The Government will appropriately advance credit acquisition toward the achievement of its Kyoto Protocol commitment. In doing so, it is important to keep the following points in mind: (i) acquiring credits while considering cost effectiveness and reducing risks, and (ii) aiming for the prevention of warming on a global scale and the support towards the sustainable development of developing nations. The acquisition of credits by the Government contributes to the overseas expansion of Japanese private business operators actively engaging in the Kyoto Mechanisms, as well as the dissemination of Japan's

superior technologies worldwide. Therefore, the Government will endeavor to obtain credits in the following way:

- The Government will make every effort to acquire credits under CDM/JI/GIS projects.

- The Governmentwill rigorously assess and manage the risks of each credit acquisition. In addition, the Government will endeavor to acquire credits while considering cost effectiveness and reducing risks through making efforts to diversify the countries and parties concerned with credit acquisition within the overall credit acquisition program or conducting public solicitations in principle.

- In acquiring credits, the Government will thoroughly consider the effects on the environment and the local residents concerned with the credit yielding project, keeping in mind international rules or the like.

- The Government will utilize the independent administrative agency, New Energy and Industrial Technology Development Organization (hereinafter referred to as "NEDO") for credits acquisition. In doing so, the Government will harness NEDO's skills such as its accumulated expert knowledge and overseas network related to the Kyoto Mechanisms in order to reduce the risks accompanying credit obtainment and ensure the long-term and stable implementation of credit acquisition by NEDO.

(2) Utilization of Public Funds Outside of the Government's Credit Acquisition Scheme

When promoting and utilizing the Kyoto Mechanisms, the Government will advance the effective utilization of ODA in conformity with international rules and on the premise of agreement by its recipient countries. The Government will also promote the effective use of other public funds. The Government will make efforts to have the credits resulting from these make the maximum contribution to the Government's credit acquisition.

5. Development of a Structure for Promotion and Utilization of the Kyoto Mechanisms

It is important for all of the concerned ministries within the Government to make joint efforts for measures and policies concerning promotion and utilization of the Kyoto Mechanisms. Therefore, the Government will strengthen the collaboration within the Government and with government-affiliated organizations in order for the concerned ministries to cooperate to advance their efforts efficiently.

With a view to strengthening the collaboration and promoting the measures and policies to be implemented, the Government will continue to utilize after FY2008 the "Meeting for Promotion and Utilization of the Kyoto Mechanisms," which is composed of the concerned ministries with the objective of comprehensive promotion and utilization of the Kyoto Mechanisms.

Each concerned ministry will proactively and voluntarily advance its respective efforts,

particularly in the following fields.

（Ministry of the Environment）

・For achieving Japan's Kyoto Protocol commitment, the Minister of the Environment, as a Vice Chairman of the Global Warming Prevention Headquarters, will take the initiative in all aspects of promotion and utilization of the Kyoto Mechanisms by the Government.

・The Ministry of the Environment will proactively work on promotion and utilization of the Kyoto Mechanisms from the viewpoints of promoting efforts toward project formation by private business operators or other actors and contributing to the sustainable development of the host country through CDM/JI projects.

・The Minister of the Environment, as a competent minister of NEDO's credit acquisition activities, will proactively work on the acquisition of credits through NEDO together with the Minister of Economy, Trade and Industry.

(Ministry of Economy, Trade and Industry)

・For achieving Japan's Kyoto Protocol commitment, the Minister of Economy, Trade and Industry, as a Vice Chairman of the Global Warming Prevention Headquarters, will take the initiative in all aspects of promotion and utilization of the Kyoto Mechanisms by the Government.

・The Ministry of Economy, Trade and Industry will proactively work on promotion and utilization of the Kyoto Mechanisms from the viewpoints of promoting efforts toward project formation by private business operators or other actors, disseminating Japan's energy and environmental technology internationally, and alleviating energy use restrictions.

・The Minister of Economy, Trade and Industry, as a competent minister of NEDO's credit acquisition activities, will proactively work on the acquisition of credits through NEDO together with the Minister of the Environment.

・The Ministry of Economy, Trade and Industry will proactively work on promotion and utilization of the Kyoto Mechanisms by use of ODA in conformity with international rules and on the premise of agreement by its recipient countries.

(Ministry of Foreign Affairs)

・From the viewpoint of complying with international treaties, the Ministry of Foreign Affairs will proactively work on all aspects of promotion and utilization of the Kyoto Mechanisms by the Government for achieving Japan's Kyoto Protocol commitment.

・The Ministry of Foreign Affairs will take the initiative in promoting and utilizing the Kyoto Mechanisms through coordinating negotiations and consensus formation 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 participating in international organizations.

・The Ministry of Foreign Affairs will proactively work on promotion and utilization of the Kyoto Mechanisms by use of ODA in conformity with international rules and on the premise of agreement by its recipient countries.

(Ministry of Land, Infrastructure, Transport and Tourism)
- The Ministry of Land, Infrastructure, Transport and Tourism will proactively work on 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 proactively work on promotion and utilization of the Kyoto Mechanisms in the forest sector.

(Ministry of Finance)
- From the viewpoint of international financing, the Ministry of Finance will proactively work on promotion and utilization of the Kyoto Mechanisms by supporting the vigorous activities of multilateral development finance organizations and by utilizing the Japan Bank for International Cooperation.
- The Ministry of Finance will proactively work on promotion and utilization of the Kyoto Mechanisms by use of ODA in conformity with international rules and on the premise of agreement by theist recipient countries.

Furthermore, independent administrative agencies, government-affiliated financial institutions, diplomatic missions abroad and other government-affiliated organizations responsible for implementing measures and policies on the Kyoto Mechanisms are to collaborate in working on promotion and utilization of the Kyoto Mechanisms.

III. Utilization of the Kyoto Mechanisms by Private Business Operators

Positive evaluation can be given to the efforts by private business operators to control domestic greenhouse gas emissions and voluntarily utilize the Kyoto Mechanisms at their own expenses to achieve their own targets including voluntary action plans, from the perspectives of cost effectiveness and global emissions reduction using superior technology.

In order to promote such utilization of the Kyoto Mechanisms by private business operators, in addition to the measures in II.3 above, the Government will carry out the following policies: provision of consultations and information; support at the project discovery and formation stages; development of instruction manuals on the use of the Kyoto Mechanisms; effective utilization of the systems of lending to the formation of so-called carbon funds; facilitation of credit acquisition; and development of the institutional base for voluntary retirement of credits.

Reference: Accounting and Tax Treatment of Private Business Operators Utilizing the Kyoto Mechanisms

The accounting and tax treatment of private business operators voluntarily utilizing the Kyoto Mechanisms is as follows.

(1) Treatment in Corporate Accounting

Based on the Working Report No.15 “Current Treatment Concerning Account Processing for Emissions Trading” (Accounting Standards Board of Japan, November 30, 2004), credits are counted as “intangible fixed assets” or “investments and other assets” at the time of acquisition and are processed as “selling and general administrative costs” in the fiscal year in which they are retired.

(2) Treatment under the Corporation Tax Act

Taxable income, unless otherwise stipulated by the Act, “is to be calculated in compliance with the standards of accounting processes generally recognized to be fair and reasonable” (Corporation Tax Act (Act No.34 of 1965) Article 22, Paragraph 4). The tax treatment of credits, in principle, is to be handled in compliance with the above accounting standards.

Table 3.2 National Registry

This table describes the national registry that provides supplementary information as stated in Article 7.2 of the Kyoto Protocol. The following information is based on Decision 13/CP.10 ANNEX II para 1 [30].

Item	Content
(a) The name and contact information of the registry administrator designated by the Party to maintain the national registry	[Name] ・ Mr. Masayuki Naoshima, Minister of Economy, Trade and Industry ・ Mr. Sakihito Ozawa, Minister of the Environment [Contact information] ・ Mr. Toshiaki Nagata, Kyoto Mechanism Promotion Office, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry (TEL: +81-3-3501-1757, E-mail: kyomecha-tourokubo@meti.go.jp) ・ Mr. Yasushi Ninomiya, Market Mechanism Office, Global Environment Bureau, Ministry of the Environment (TEL: +81-3-5521-8354, 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] A server equipped with disk array storage from Sun Microsystems, Inc. is used as the database server. Disk array storage is a mirroring framework that allows for replacing a failed hard disk without stopping the operation. The software of the database server is implemented

[30] FCCC/CP/2004/10/Add.2, p.p.15-16

Item	Content
	with Oracle relation database management system. [Capacity] The database server possesses sufficient data capacity based on forecasted workload during the first commitment period. In the event necessary capacity increases, additional hard disks could be attached to the database server.
(d) A description of how the national registry conforms to technical standards for data exchange between registry systems for the purpose of ensuring the accurate, highly transparent, and efficient exchange of data between national registries, the CDM registry, and the transaction log	・In 2006, certain Data Exchange Standards (DES) prepared by the UNFCCC Secretariat was updated four times (versions 1.1a, 1.1b, 1.1c, and 1.1 Final). The national registry was revamped to comply with the new version, including correcting response codes and the WSDL. ・In October 2007, DES annex E (list of checks to be undertaken by the ITL, version 1.1.001) was released, and the internal checks for the national registry were changed in order to be consistent with the updated Annex E ・In August 2008, part of the DES was updated as new checks were added relating to the commitment period reserve associated with the "joint achievement," which is defined in Article4 of the Kyoto Protocol. DES annex E (version 1.1.2) was released and the internal checks of the national registry was updated in order to be consistent with the updated DES. ・In March 2009, version 1.4 of the technical specifications for the standard electronic format (SEF) was released. A function was therefore added to output XML files containing information on unit holdings and transactions undertaken, which allows the registry administrators to generate the SEF.
(e) A description of the procedures employed in the national registry to minimize discrepancies in the issuance, transfer, acquisition, cancellation, and	[Means to minimize discrepancies] The following are some of the checks implemented in the registry to minimize discrepancies: (1) Data type validity for information input manually

Item	Content
retirement of ERUs, CERs, tCERs, lCERs, AAUs and/or RMUs, as well as in the supplementing of tCERs and 1CERs. In addition, the procedure taken to forcefully terminate transactions when a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions.	(e.g. numbers, alpha-numerics) (2) Data value validity for complying with Kyoto unit types. (e.g. whether an expiry date is set for tCERs) (3) The existence validity of corresponding Kyoto units in transferring accounts at the time of transaction. [Procedures for forced termination of discrepant transactions] The transactions are automatically terminated when discrepancies were identified for them. [Procedure in the event of a failure to terminate discrepant transactions] The registry logs information on failed transactions for which discrepancies were identified and forced terminations subsequently failed. The system administrator periodically checks the archive logs to resolve problems. In addition, in the event that there was a failure to terminate the discrepant transaction, the monitoring system automatically detects the failure and notifies the system administrator of it via email..
(f) An overview of security measures employed to prevent unauthorized tampering, operator errors and update methods oversight	・VPN communication and SSL encryption were selected for use in accordance with the DES (Version 1.0). ・Fingerprint authentication was introduced to limit users that can operate the terminals of the registry administrators, and access was restricted by providing the registry administrators with a private connection. ・The information security of the current national registry was audited by a corporation that acquired BS7799/ISMS certification, which is an international standard for security management.

Item	Content
	・The servers of the national registry system are established in a Integrated data center with a 24-hour surveillance system. ・All PCs and servers used for the national registry are installed with virus detection software and virus pattern files are automatically updated on a regular basis.
(g) A list of information publically assessable through the user interface of the national registry	・Account information and a list of authorized legal entities (up-to date information and by account type). ・Total amount of Kyoto units held and issued for each calendar year (by unit type, by account type). ・Total amount of Kyoto units held for each calendar year at the beginning and end of each year (by unit type, by account type) ・ Total amount of Kyoto units subject to external transfers for each calendar year (by unit type, by partner party) ・Total amount of Kyoto units which were expired, cancelled and replaced for each calendar year (by unit type, by transaction type) ・Summary information on transactions undertaken for each calendar year (by unit type) ・Information on corrected transactions (by unit type)
(h) The Internet address of the national registry's interface	http://www.registry.go.jp/index_e.html
(i) A description of measures taken to safeguard, maintain, and recover data in order to ensure that data storage is	[Data protection] The national registry is set at an IntegratedInternet data center (IDC) with the following characteristics:

Item	Content
preserved and registry services are recovered in the event of a disaster	・An anti-seismic building with high aseismic capacity. ・Electrical facilities that guarantee over 24 hours of continuous operation in times of power failures. ・Fire-resistant construction possessing a gas-type fire extinguishing system. [Data management] Online backup as well as redundant configuration of duplicates is implemented. [Data recovery] Separate system recovery manuals have been created for both hardware and software failure. In addition, disaster recovery exercises are conducted regularly and procedures are checked in order to recover the system promptly and infallibly in times of failure.
(j) The results of tests developed for testing the performance, procedures, and security measures of the national registry conducted in accordance with the provisions of Decision 19/CP.7 relating to technical standards for data exchange between registry systems	In July 2007, a test was conducted between the ITL and national registry of Japan based on DES annex H Version 1.1.002. The test was a success as the anticipated results were achieved in each of the test areas. In addition, the following tests were conducted between the ITL and the national registry before and after theGo-Live. -Go-live test In November 2007, a test was conducted in preparation for the Japanese registry connecting to the ITL for live operation. The test was completed without any problems and the live operation commenced. -ETS Go-live test In October 2008, a test was conducted in accordance for the CITL and national registries of the EU connecting to the ITL for live operation. The test was completed without any problems. -SEF coordinated testing In December 2008, predefined test transactions

Item	Content
	were conducted in a test environment. SEF results were outputted by the national registry of Japan and consistency was confirmed between the SEF generated by the registry and the one by the ITL -Developers test Tests using the developer environment and registry environment provided by the UNFCCC are conducted as necessary. Before conducting the tests listed above, internal tests were conducted to check the functionality, operability, performance, security, and reliability of the registry system.

3.1.2 Domestic and Regional Planning, Legislative Proceedings, and Execution and Management Procedures

An outline of Japan's major legal and other systems necessary for implementing global warming countermeasures is provided below.

Name of legal or other system	Outline
Law Concerning the Promotion of the Measures to Cope with Global Warming	[History] Formulation: 1998; Revisions: 2002, 2005, 2006, 2008 [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 of greenhouse gas emissions (2005). -Undertakings towards promoting and utilizing the Kyoto Mechanism (2006). -Revision of systems for calculation, reporting, and public disclosure of greenhouse gas emissions. -Formulation of the policies on emission limitation, and enrichment of action plans of local governments (2008). [Major organizations involved in its execution] -Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment (MOE) -Office management division of each ministry and office (calculation, reporting, and public disclosure systems) -Environment departments and bureaus of local public organizations
Law Concerning the Rational Use of Energy (in short, the "Energy	[History] Formulation: 1979 Major revisions: 1993, 1998, 2002, 2005, 2008 [Major measures]

Conservation Law")	-Establishment of criteria for energy conservation at factory plants, specification of plants designated for energy management using thermal and electric power above a certain level, requiring the selection of energy managers and the recording of energy usage, establishment of energy conservation criteria for houses and other buildings, establishment of criteria on the energy consumption efficiency rate of machinery and appliances, and requiring the labeling of energy consumption efficiency rate (1979). -Establishment of the Basic Principles Concerning the Rational Use of Energy, and requiring 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 Type 1 Designated Energy Management Factories, while newly establishing plants will be Type 2 Designated Energy Management Factories). Submission of medium- and long-term plans on energy conservation for Type 1 Designated Energy Management Factory are required, as is the 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 Type 1 Designated Energy Management Factories), and requiring the submission of energy conservation measures for buildings (non-housing) above a certain size (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 (with a designation for those above a certain size), submission requirements for plans on energy conservation and periodic reporting on the energy use situation, and submission requirements for energy conservation measures for housing above a certain size (2005). -Change from energy management by factory and workplace to energy management by business, requirement of the same business-based energy

	management for certain franchise businesses, requirement of electing energy management supervisors and energy management plan promoters, introduction of sector-based benchmarks and joint energy conservation projects, introduction of protocol and penalties in the event that the energy saving measures of large-scaled buildings are particularly insufficient, requirement of reporting, etc. of energy saving measures for certain small- to medium-sized buildings, and introducing measures to promote upgrades in the energy saving performance for businesses that construct and sell houses (guarantee through recommendations, orders, etc. for businesses that construct and sell multiple houses) (2008). [Major organizations involved in its execution] -Energy Efficiency and Conservation Division, Agency for Natural Resources and Energy, Ministry of Economy, Trade, and Industry (METI) -Environmental Policy Division, Housing Production Division, and Building Guidance Division, Policy Bureau, Ministry of Land, Infrastructure and Transport (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 (the "RPS Law")	[History] Formulation: 2002 [Major measures] -Requirement of electric utilities to use a certain ratio 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	[History] Formulation: 2005 [Major measures] -Formulation and approval of the Comprehensive Efficiency Plan for the integration and streamlining of distribution operations, and in relation to this, assistance measures for project approval, fund procurement, etc.

Operations (the "Comprehensive Distribution Efficiency Law")	[Major organizations involved in its execution] -Office of Directors (Cargo Facilities), Director-General for Policy Planning, MLIT -Distribution and Logistics Systems Policy Office, Commerce and Distribution Policy Group, Commerce and Information Policy Bureau, METI -Regional bureaus of the responsible office and ministries -Responsible departments and bureaus of local public organizations
Bill on the Promotion of the Use of Non-fossil Energy Sources and Effective Use of Fossil Energy Materials by Energy Suppliers "	[History] Formulation: 2009 [Major measures] Requires energy suppliers above a certain size (electrical power suppliers, gas service providers, and oil businesses) to use non-fossil energy sources—such as sunlight, nuclear power, waterpower, thermal power, and biomass—as well as to effectively use fossil energy resources. [Major organizations involved in its execution] General Policy Division, Agency for Natural Resources and Energy, METI Natural Resources and Fuel Department and the Electricity and Gas Industry Department, Agency for Natural Resources and Energy, METI
Approval system for Kyoto Mechanism projects	[History] Formulation: 2002 [Major measures] -Approval for 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.)

3.2 Promoting Efforts Aimed at Creating a Low-Carbon Society

Japan has proposed to share globally the long-term goal of "halving total global greenhouse gas emissions by 2050 from its current level of emissions".

It will be indispensable to have not only participation of the major economies but also efforts of all countries in some way. Japan, as one of the developed countries which should contribute more than developing countries, should set a long-term goal of reducing 60 to 80 percent of its current level of emissions by 2050, so as to realize a low-carbon society that we can proudly present to the world.

A basic policy was laid down for realizing such a low-carbon society in a speech by then Prime Minister Yasuo Fukuda (June 9, 2008) and in proposals from the Council on Global Warming Issue (June 16, 2008). In July 2008, the Action Plan for Achieving a Low-Carbon Society was formulated in order to clarify concrete measures for each policy item indicated in the prime minister's speech and committee proposal.

Below, this chapter will describe the policies and measures relating to achieving a low-carbon society as stipulated in this plan. These policies and measures were established using the latest available information at the time of establishment.

Extracts form "Action Plan for Achieving a Low-carbon Society, July 29, 2008"

I Japan's targets

In order to halve the global greenhouse gas emissions by 2050 with the aim of achieving a low-carbon society, it is essential that all countries, not only the major economies, address this issue. Japan sets the long-term goal of reducing 60 to 80 percent of its current level of emissions by 2050.

In order to achieve the long-term goal of halving emissions by 2050, we will work to ensure that the world's total emissions peak in roughly the next 10 to 20 years.

Moreover, regarding the post-2012 framework, Japan will aim to build international agreement on fair and equitable rules, and will announce its quantified national emission reduction target at an appropriate time next year.

1. Building agreement on a fair, equitable, and effective post-2012 framework

Japan will aim for an agreement at the Fifteenth Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP15), to be held in 2009, on a fair and effective post-2012 framework with participation of all relevant countries which includes major economies such as the U.S., China, and India, in order to ensure that global emissions peak in the next 10 to 20 years and to achieve at least 50% reduction of global emissions by 2050.

To achieve this, Japan will promote discussions of the working group under the United Nations (the Ad Hoc Working Group on Long-term Cooperative Action) in accordance with the Bali Action Plan agreed at COP13. Japan will also deepen discussions at the G8 Summit and other multilateral platforms and at bilateral meetings on sharing a long-term goal, setting fair quantified national targets based on the sectoral approach, and ways of improving global energy efficiency through technology transfer. The results of these discussions are to be reflected as appropriate in the discussions in the UN.

2. Setting quantified national targets

Japan aims at obtaining the understanding of other countries regarding the sectoral approach for setting fair quantified national targets, in order to establish this approach as a common methodology at the international level. Japan will announce its quantified national target, at an appropriate time next year, together with points of controversy such as a review of the base year.

Japan will promote the understanding of other countries toward the method of setting quantified national targets based on the sectoral approach, through various platforms, such as the G8 Summit, Meeting of Major Economies (MEM), and bilateral meetings. At the same time, Japan will also introduce applied case study such as the long-term energy demand forecast, and will call on other countries to analyze the actual extent of their reduction potentials and to report on the results at COP14.

The workshop on the sectoral approach to be held during the meeting of the Ad Hoc Working Group on Long-term Cooperative Action in Ghana, August 2008 and the second international workshop on sectoral emission reduction potentials by a bottom up basis, to be held this autumn, both offer significant opportunities for establishing a common methodology. Japan intends to use both workshops to promote further understanding of the sectoral approach.

Japan’s aim on both occasions is to gain understanding from other countries in order to establish a common methodology, taking into account other countries’ evaluations of the sectoral approach and also other points including base year and the treatment of carbon sinks such as forests.

From a perspective of ensuring the participation of all the major economies and of ensuring

fairness, Japan's own quantitative national targets will be decided at an appropriate time next year, taking into consideration the status of the negotiations.

3. Support for other countries' efforts

(1) The dissemination of technologies through the sectoral approach and support through co-benefits

Through the sectoral approach, Japan proactively disseminates environmentally friendly and energy-conserving technologies, in which Japan has advantages, globally, including developing countries.

To achieve this, Japan works with the International Energy Authority (IEA) and at the Asia-Pacific Partnership on Clean Development and Climate (APP) to identify and share best practices sector by sector. Japan also makes use of multilateral and bilateral frameworks to carry out technological cooperation with China, India, and other countries such as the demonstration projects of energy-saving installations and the dispatch of expert personnel, and also to remove barries to technical cooperation.

In order to strengthen international collaboration to reduce greenhouse gas and air pollutant emissions from the transport sector, Japan is hosting the Ministerial Conference on Global Environment and Energy in Transport. Based on the outcomes of the Conference, Japan will work to promote cooperative measures such as sharing best practices, facilitating new technologies and measures, and enhancing capacity building in developing countries.

Moreover, Japan will work to achieve in developing countries sustainable development, low-carbon, low-pollution, and sound material-cycle societies, and create societies adapted to climate change and can coexist with nature.

To achieve this, Japan will promote the Clean Asia Initiative, and promote the implementation of co-benefit projects in China and Indonesia, conduct the feasibility study of recovery/recycling of the fluorocarbons in the waste refrigeration equipment in East Asia, cooperate toward an inventory of developing countries, and bolster Asia's capacity to build low-carbon, and sound material-cycle societies .

(2) The Cool Earth Partnership

Japan will promote the Cool Earth Partnership, which will give support to developing countries regarding mitigation measures, adaptation measures, and access to clean energy. This program will make on the scale of 10 billion dollars available over five years to developing countries aiming to achieve greenhouse gas emission reductions and economic growth and working to contribute to

climate stability.

As part of this program, Japan will make use of the Climate Change Japanese ODA Loan (In July 2008, the Government of Japan decided to extend ODA loans up to the total amount of 30.8 billion yen to Indonesia as the first case), Program Grant Aid for Environment and Climate Change, Trade and Investment Insurance for Preventing Global Warming, and Japan- UNDP Joint Framework. At the same time, Japan will further extend the aid in the form of ODA loan grant aid (non-project grants have already been extended to Madagascar, Senegal, and Guyana) and technical cooperation, as well as ODA through international organizations such as the Asian Development Bank. And other official finance rather than ODA will also be made available through institutions such as the Japan Bank for International Cooperation and Nippon Export and Investment Insurance. Aid will be allocated, for example, to forest conservation and natural disaster prevention in response to climate change, co-benefit measures, and measures toward energy conservation or new energy development.

Japan will call on African countries for a Japan-Africa Cool Earth Partnership and will hold policy consultations with them, and will continue to proactively promote partnership with developing countries such as Tuvalu and Laos.

Through such assistance outlined above, Japan will facilitate the negotiation process to provide encouragement to developing countries to join the post-2012 framework.

(3) Establishment of a multilateral fund

With the initiative from Japan, the U.S., and the U.K., the Climate Investment Funds were established as a multilateral fund within the World Bank, on July 1, 2008. This fund will support efforts by developing countries to tackle climate change, including mitigation measures to reduce greenhouse gas emissions, such as the installation of solar and wind power generation, improvements to the energy efficiency of thermal power stations, the use of low-emission public transport, and improvements to the efficiency of electricity use in buildings and industry, as well as adaptation measures to cope with the adverse effects of climate change. Japan will make use of the opportunities afforded by bilateral and multilateral platforms to call on interested countries other than itself, the U.S. and the U.K to make a contribution to the fund.

Japan will pursue early operationalization of the fund, and will take an active part in its operation in order to carry out effective and efficient assistance to developing countries.

II The dissemination of innovative technologies and existing advanced technologies

Encouragement will be given to the development of major innovative technologies and the dissemination of existing advanced technologies in order to move toward a low-carbon society and achieve long-term targets.

1 Development of innovative technologies

(1) Steady enforcement of the roadmap to innovative technology development

It will not be possible to achieve drastic cuts in greenhouse gas emissions only through the dissemination of existing technologies or of technologies that are just the extension of what already exists. Japan will thus develop innovative technologies as set out in the Low Carbon Technology Plan (May 19, 2008) and the Cool Earth—Innovative Energy Technology Program (March 5, 2008). These are technologies that are innovative in terms of structures, materials, systems, etc., going beyond existing technologies, and will contribute to substantial global reductions of greenhouse gases by 2050.

Over the next five years, Japan will invest around 30 billion dollars in implementing the technological roadmaps set out in the Low Carbon Technology Plan; this encompasses fast-breeder reactor cycle technology; technologies for the use of biomass; low-fuel consumption (and low-noise) aircraft; high-efficiency ships; improved traffic and goods distribution efficiency through the Intelligent Transport Systems (ITS); and international contributions to earth observation, climate change projection and impact assessment.

Among them, the necessary budget will also be secured for the development of 21 innovative energy technologies set out in the Cool Earth—Innovative Energy Technology Program. These include: innovative photovoltaic power generation that gives significant improvements in efficiency and reductions in cost (the aim is to establish photovoltaic cell technology from 2030 using new materials and new structures that will improve generating efficiency by over 40 percent and give a generating cost of seven yen per kilowatt-hour); plug-in hybrid cars and electric cars; innovative steelmaking processes that reduce emissions through technology that uses hydrogen as a reducing agent instead of coke and technology to capture carbon dioxide (the aim is to start basic research in fiscal 2008, carry out verification experiments in fiscal 2013, and to establish and apply technology to cut emissions from steelworks by approximately 30 percent by fiscal 2030, depending on the cost at the time of hydrogen production and carbon dioxide capture and storage); advanced nuclear power technologies such as next-generation light water reactors; fuel cell technology (the aim is to bring costs down to 400,000 yen per kilowatt, increase durability to 90,000 hours, and put fuel cells into widespread use by around 2020−2030); and effective, ultra-efficient heat pump technology for air conditioning and hot water, which account for roughly 50 percent of carbon dioxide emissions from the household sector (the aim is to reduce the cost to

three quarters of current levels and increase efficiency by 50 percent by 2030, and to halve the cost and double the efficiency by 2050).

Japan will promote the implementation of technologies as appropriate for realizing technology roadmaps with international collaboration and role sharing among the public and private sectors; at the same time, it will carry out regular reviews of the roadmap. Japan will also work toward the smooth dissemination of the results of technology development as appropriate.

(2) Upgrading coal use

In comparison to oil or natural gas, coal is cheap and its reserves are plentiful; however, coal emits large quantities of carbon dioxide when burned. For this reason, Japan is promoting the development of clean combustion technology that can increase the efficiency of power generation and reduce emissions, and carbon capture and storage (CCS) technology, which returns carbon dioxide to the ground by storing it underground so that it is not emitted into the atmosphere.

Regarding clean combustion technology, Japan will promote the necessary technological development and carry out verification tests toward achieving the targets of a 48 percent increase in the generation efficiency of Integrated Gasification Combined Cycle (IGCC) power generation by around 2015, with a long-term target of its 57 percent increase, and a 55 percent increase in the generation efficiency of Integrated Gasification Fuel Cell Combined Cycle (IGFC) power generation by around 2025, with a long-term target of its 65 percent increase.

CCS technology has the potential for massive emissions reductions in thermal power generation, which accounts for roughly 30 percent of Japan’s emissions, and in the steelmaking process, which accounts for roughly 10 percent. Japan will promote the development of this technology with the target of the cost of capture and storage in the order of 2,000 yen per ton by around 2015, falling to 1,000 yen or so in the 2020s. At the same time, Japan will commence verification tests on a large scale at an early stage from 2009 onward, with the aim of implementation by 2020. Regarding application, Japan will work to resolve issues such as enhancing environmental impact assessments and monitoring, putting legislation in place, and ensuring public approval.

Ultimately, the aim is to combine these technologies to bring emissions down to virtually zero. Full-scale verification tests will be carried out of an integrated system for separation, collection, transport, and storage of carbon dioxide from coal-fired power stations, in order to bring about coal-fired power generation with no emissions of carbon dioxide at all.

(3) Bringing about an International Partnership for Environment and Energy

Developing innovative technologies requires considerable expenditure in terms of money and personnel. Japan will work to accelerate the development and encourage the dissemination of its

results by sharing roles among countries under international cooperation.

In order to achieve this, Japan will expand investment in energy research and development, globally share the technology development roadmaps, strengthen existing international collaboration, and launch new international collaboration, as agreed in the G8 Hokkaido Toyako Summit Leaders Declaration. Japan will also facilitate the appropriate dissemination of technology to developing countries by encouraging the participation of motivated developing countries from the development stage.

Specifically, in fiscal 2008 Japan will commence the work of sharing information on the research and development policies of different countries in collaboration with the IEA, in order to formulate a roadmap in fiscal 2010 that can be shared internationally and will form the core of the International Partnership for Environment and Energy.

2. Dissemination of existing advanced technologies

(1) Huge increase in the installation of solar power generation facilities

Among the different types of renewable energy, solar power generation in particular offers a huge potential supply and is capable of becoming a major part of the domestically-produced energy of Japan, which currently has a low rate of energy self-reliance. Japan is thus aiming to become once again the world leader in solar generation, and is promoting a huge increase in the installation of solar power generation facilities with the target of increasing the amount of installations 10-fold by 2020 and 40-fold by 2030.

To make this increase possible, it will be necessary to bring the price down substantially through technological innovation and creation of demand. At the same time, it is necessary to promote technology to mitigate the effects on the power system, which will be a major issue with a big increase in installations. With regard to price, the aim is to roughly halve the current price of a solar power generation system within three to five years.

Japan will consider bold measures to support the introduction of solar energy and new pricing systems, taking as an example the renewable energy policies of Germany and other countries. Specifically, there will be far-reaching support for the installation of solar power generation facilities in the domestic, industrial, and public sectors, support for the research and development of innovative solar cell technology, and support for planning the construction of mega solar power generation facilities by electricity companies. The government will also encourage collaboration with local public bodies and collaboration between companies manufacturing solar systems and companies building houses, and will make further use of private-sector capital such as tradable green certificates or citizens' investment. At the same time, the government will promote the development of power system stabilization technology to mitigate the effects of solar power on the

national grid, and the development of high-capacity, low-cost storage cell technology. Examination of approaches to sharing the cost burden of renewable energy introduction and power system stabilization commenced in July 2008, and conclusions are expected to be reached by the spring of 2009.

(2) Raising the proportion of zero-emission energy sources to over 50 percent

Measures for the electrical power generation sector are extremely important, as this sector accounts for approximately 30 percent of Japan's greenhouse gas emissions. As part of the measures for electricity supply, on the basis of the Long-term Energy Supply and Demand Outlook (May 2008), the proportion of electricity generated from zero-emission sources (renewable energy, nuclear power generation, etc.) will be increased from 40 percent, the level in 2006, to over 50 percent by around 2020. With regard to solar power generation in particular, the aim is to increase the amount of installations 10-fold over the fiscal 2005 level—in crude oil terms, an increase from 350,000 kiloliters to 3.5 million kiloliters. With regard to nuclear power, there will be steady construction of new facilities—construction of 13 facilities is currently being planned, of which nine are planned for construction by 2017.

Specifically, the government will provide support for solar power system installation across the various sectors, and will support research and development, as well as planning for the construction of mega solar power generation facilities by electricity companies. At the same time, it will examine approaches to sharing the cost burden. With regard to nuclear power, the government will aim to improve the utilization capacity to the level of major nuclear-using countries and will promote steady construction of new facilities, with ensuring complete safety as a fundamental premise.

With regard to wind power, the government will support terrestrial installations, and will promote studies of new technology for wind power generation at sea. Hydroelectric generation is calculated to have the potential for an increase of 7 billion kilowatt-hours by 2030,[31] on the basis of which development surveys and improvements to construction assistance will be examined. Additionally, with regard to geothermal and other renewable energy types, the government will promote local energy production for local consumption, support new energy venture businesses, and encourage independent initiatives.

The government will also share local best practices by evaluating initiatives by local public bodies to produce renewable energy locally for local consumption through means such as solar generation, micro-hydroelectric generation, biomass, wind generation, and snow and ice that take local characteristics into account. The best of these will be selected for the "Renewable Energy Top 100" for two or three years. Regarding power generation from waste, the government will boost

[31] Interim report by the Hydroelectric Study Group, July 25, 2008.

the significant amount of energy recovery and will study economic incentives.

Moreover, in order to ensure the smooth trading of electricity generated through the above measures, trial trading of carbon dioxide-free electricity on the Japan Electric Power Exchange will commence by April 2009 at the latest.

In addition, the current targets under the Renewables Portfolio Standard Law (Act No. 62 of 2002) will be robustly enforced, while examination of targets up until fiscal 2018 will commence by fiscal 2010.

(3) Introduction of next-generation vehicles

In order to cut emissions from the transportation sector, which accounts for approximately 20 percent of emissions, while also bolstering the technological strength and competitiveness of the Japanese auto industry, the government will aim at achieving the ambitious target of increasing the present proportion of one in 50 new car sales accounted for by next-generation vehicles (hybrid vehicles, electric vehicles, plug-in hybrid vehicles, fuel cell vehicles, clean diesel vehicles, compressed natural gas [CNG] vehicles, etc.) to one in every two new car sales by 2020.

Specifically, the government will create initial demand by providing support for introduction such as covering part of the cost, and will promote higher performance and lower cost through research and development of next-generation cells and fuel cells, the fundamental technology for electric vehicles, plug-in hybrid vehicles, and fuel cell vehicles (the aim is to increase the capacity of next-generation cells by 50 percent over current levels and bring the cost down to one seventh of the current price by 2015, and to increase capacity seven-fold and reduce the cost to one fortieth by 2030). At the same time, the government will encourage comprehensive efforts that include putting in place recharging infrastructure, including high-speed recharging facilities in order to resolve the worry of batteries running down (for example, high-speed recharging could make it possible to reduce the approximately seven-hour domestic recharging time to approximately 30 minutes); promoting traffic flow measures such as the Intelligent Transport Systems (ITS); and improving the perception of clean diesel cars and encouraging their uptake. The government will also encourage the commercialization of next-generation, low- emission trucks and buses.

(4) Changing from incandescent light bulbs to low-energy lamps

Incandescent light bulbs commonly used in homes are to be replaced by products such as bulb-shaped fluorescent lamps, which offer superior energy efficiency, by around 2012.

Bulb-shaped fluorescent lamps consume one fifth of the electricity of incandescent light bulbs and have a product life span six to ten times as long, so that with the period of use included they offer excellent value. Nonetheless, with the product price approximately 10 times that of a conventional

bulb, the large price differential represents a heavy burden at the time of installation. There is also the issue that conventional bulbs cannot readily be replaced by fluorescent lamps in some variable or ornamental lighting applications.

To resolve these issues, the government, manufacturers, distributors, and consumer groups have collaborated to call on consumers to replace their light bulbs by providing consumers with information about the benefits of energy-efficient lighting through initiatives such as the introduction of the Day of Lighting (October 21), the Energy-saving Lighting Forum, and Team Minus 6%.

The government will also carry out research and development of next-generation lighting using organic electroluminescence (organic EL), which offers the possibility of even greater energy savings than fluorescent lamps. At the same time, manufacturers will work to improve performance and usability, and develop products for use in applications where it is difficult to replace conventional light bulbs. Distributors will make proactive efforts to provide information about energy-efficient lamps and market them.

(5) Accelerating the introduction of energy-efficient televisions, water heaters, air-conditioning, and refrigerators

The government will work to spread energy-efficient devices that meet the "top-runner" standards, which include televisions that achieve a 15.3 percent improvement in efficiency from fiscal 2004 to fiscal 2008, air conditioners that achieve a 22.4 percent improvement in efficiency from fiscal 2004 to fiscal 2010, and refrigerators that that achieve a 21.0 percent improvement in efficiency from fiscal 2004 to fiscal 2010. With regard to high-efficiency water heaters, the government will aim for accelerated uptake of between 4.46 million and 5.2 million units for carbon dioxide refrigerant heat pump water heaters and between 2.91 million and 3.26 million units for condensing gas-fired water heaters.

Specifically, the government will review and bolster the "top-runner" standards in accordance with the Act on the Rational Use of Energy (also known as the Energy-saving Law, Act No. 49 of 1979). Regarding televisions, which will reach their target year in fiscal 2008, new standards will be examined during fiscal 2008 in order to bolster the standards at an early stage. Standards will be steadily bolstered in this way for all devices that reach their target year, and additional standards will be examined for other devices, such as commercial-use refrigerators, routers, and combination printer-copier-scanner-fax devices.

Moreover, research and development will be carried out into large-size liquid crystal and plasma displays, semiconductors, and innovative energy-efficient air conditioners using refrigerants that do not contribute much to the greenhouse effect, and the government will give support for the installation of high-efficiency water heaters and energy-efficient refrigeration equipment with

natural refrigerants.

In addition, the government will work toward the provision of information to consumers by manufacturers, distributors, and consumer groups from their respective standpoints through the energy-efficient labeling system, the energy-efficient products sellers evaluation system, the Team Minus 6% initiative, and the activities of the Energy-efficient Appliances Popularization Forum; the government will also enhance the standards for uniform energy-efficient appliance labeling and increase the range of appliances that come under the scheme.

A study will be carried out during fiscal 2008 of the construction of a system to disclose the reduction in carbon dioxide emissions achieved through the use of energy-efficient appliances, so that producers, consumers, and sellers of the respective products can feel that there is an incentive.

(6) Promoting energy-efficient housing and office buildings, and "200-year Housing"

With regard to energy-efficient housing and office buildings, the goal is that all newly constructed housing and office buildings will be energy efficient. To achieve this, the revised Energy-saving Law (Act No. 47 of 2008) will be properly enforced; this law includes extending the criteria for obligatory reports on energy-efficiency measures, the introduction of directives for the construction of large-scale housing or buildings, and measures to encourage housing businesses to improve the energy efficiency of houses built for sale. The government will examine the creation of standards for water heaters and other devices, and methods of assessing and displaying energy performance that are easy for the consumer to understand. Assistance will also be made available for constructing or improving energy-efficient housing and office buildings through the implementation of taxation and budgetary measures.

The introduction of renewable energy to office buildings will be accelerated through measures that include increased assistance for introducing energy-efficient devices.

Regarding the promotion of "200-year Housing", the aim is to reduce the burden on the environment and lighten the load on the people by switching to a richer, eco-friendlier lifestyle through the creation of a stock of high-quality housing that can be used for many years. To achieve this, legislative systems will be put in place and assistance given through the implementation of taxation and budgetary measures as well as financing at each stage of housing construction, maintenance, distribution, and financing.

(7) Promotion of nuclear power

Nuclear power emits no carbon dioxide during the electricity generation process, and as a key low-carbon energy source it will occupy an extremely important position in the promotion of

global warming counter-measures. The government is thus aiming to improve the utilization capacity to the level of major nuclear-using countries, while at the same time steadily constructing new facilities—construction of 13 facilities is currently being planned, of which nine are planned for construction by 2017—with ensuring complete safety as a fundamental premise. Through these initiatives, the aim is to greatly increase the proportion of electricity coming from nuclear generation, as part of the effort to increase the proportion of electricity output from zero-emission sources to over 50 percent by around 2020. The government also aims to establish a nuclear fuel cycle as well as to implement the fast breeder reactor cycle at an early stage.

To achieve this, the government will make the necessary improvements to the environment to assist initiatives by power companies aimed at improving the utilization capacity to the level of major Western nuclear-using countries, with ensuring complete safety as a fundamental premise. At the same time, with regard to the new and additional facilities being planned, including the three currently under construction (Tomari no. 3 reactor, Shimane no. 3 reactor, and Oma reactor), as well as the 55 reactors currently in operation, the government will conduct follow-up checks of the initiatives of electricity companies. Also, the government will promote development of next-generation light-water reactor technology in the light of expected demand for replacement of existing light water reactors around 2030, and also from the perspective of the global market.

Regarding fast breeder reactor cycle technology, the Monju prototype reactor will restart during fiscal 2008, and research and development will be promoted with the aim of constructing a demonstration reactor and related fuel cycle facilities by 2025 and introducing the technology on a commercial basis from around 2050. There will also be steady efforts toward establishing a nuclear fuel cycle, which will include implementation of plutonium-thermal reactor technology and the start of full-scale operations at the Rokkasho reprocessing plant. Moreover, from a long-term perspective, research and development of nuclear fusion will be promoted.

(8) Providing outstanding nuclear power safety technology and expertise to the world

Japan will contribute to the international trend toward introducing nuclear energy emanating from the viewpoint of climate change and energy security, through the use of its outstanding nuclear power technology and by means of intergovernmental cooperation and international activities of the nuclear industry, while ensuring nuclear non-proliferation/safeguards, safety, and security (3S) as a prerequisite for peaceful uses of nuclear energy.

Specifically, Japan will continue to promote more actively from fiscal 2008 assistance for and cooperation with countries planning to introduce or expand nuclear power, with regard to infrastructure development including 3S, ensuring of which is indispensable for international cooperation on nuclear energy. Assistance and international cooperation will be extended through multilateral frameworks such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development(OECD/NEA), as

well as bilateral frameworks. At the same time, Japan will consider establishing frameworks for the transfer of nuclear materials and equipment, including bilateral agreements, taking into account current infrastructure development situation, specific needs and other related issues in each individual country. The government will also make use of government financial institutions to support the international activities of the Japanese nuclear power industry. Japan will also continue to participate in activities of the IAEA such as developing international safety standards and will continue to be engaged in information and personnel exchanges through platforms such as bilateral information exchanges meetings with the authorities responsible for nuclear safety regulations in countries such as the US, France, and China.

(9) Implementing Japan's own initiatives

The government will be at the forefront in implementing and enforcing advanced global warming countermeasures, with the aim of developing its initiatives into a propulsive force behind the realization of a low-carbon society inclusive of the private sector. These initiatives will be disseminated to local public bodies, including independent administrative institutions, public schools, and hospitals, and then to the private sector. This will lead to a movement among the Japanese people toward bringing about a low-carbon society.

Specifically, on the basis of the Plan Stipulating Measures to Curb Greenhouse Gas Emissions Relating to the Work of the Government (decided by the Cabinet on May 30, 2007), the government will steadily increase its use of low-emission vehicles and energy-efficient office appliances, and will promote emissions countermeasures in the construction and maintenance of its buildings, including energy-efficient lighting and air-conditioning, and the introduction of solar power generation. Through these measures, by 2010−2012 there will be an average cut of 8 percent over 2001 levels in greenhouse gases emitted through government activity.

The government is also working toward realization of a "Kasumigaseki Low-carbon Society" in Tokyo's Kasumigaseki district, which is the center of the Japanese government. The introduction of solar power into government buildings, improved energy efficiency through reconstruction, and heat island countermeasures are all being examined. These measures will be compiled to coincide with the formulation of the development plan for a new Central Government Building as site of the Ministry of Finance and the Central Government Building No.4, and targets for improvements in energy efficiency will be set.

III Framework to move the whole country toward reduced carbon

In order to reduce emissions in all sectors, the government will price carbon dioxide and make use of market mechanisms, and at the same time will encourage the provision of information about carbon dioxide emissions.

1. Emissions trading

The government will commence an experimental introduction of an integrated domestic market for emissions trading this autumn, with the inclusion of as many sectors and companies as possible. The government will design the system of the experimental introduction, taking into account the consistency with the Kyoto Protocol Target Achievement Plan and with the Voluntary Action Plans which is one of the countermeasures in the Target Achievement Plan, focusing on a scheme in which participating sectors and companies set their targets by energy intensity or emission volume and trade various types of emissions allowances and credits to achieve their targets, making use of existing and under considered systems, and expecting the participation of as many sectors and companies as possible. Considering issues such as target setting, types of tradable emissions allowances and credits, and monitoring and verification methods, study team from the relevant ministries will consider designs of an experimental introduction during September, and commence an experimental introduction around October.

The government intends to use the experience thus gained, to identify the conditions nessesary to be met, the issues of design to be dealt with and other relevant matters in the event an emissions trading scheme is to be fully introduced.

2. Tax system

(1) Making the tax system greener

In discussions scheduled this autumn on a fundamental reform of the tax system, in addition to the usage of earmarked revenues for road construction after its shift into general revenues, the government will carry out a cross-sectional review of the whole tax system, including environmental taxes, and make the tax system greener from a perspective of promoting reduced carbon.

As an example, tax incentives to curb greenhouse gas emissions from cars, household appliances, housing and building will be examined.

(2) Global environment tax

The government will carry out a study on a possible modality of an internationally coordinated global environmental tax system that would serve as a financial resource for joint development of

innovative technology and implementation of aid projects in developing countries mainly by developed countries. The study will include review of the discussion carried out so far in international institutions and of various challenges. The government will make public of some outcome of the study around the end of the current fiscal year.

3. Visualization

(1) Disseminating the "carbon footprint" system, etc.

The government aims to make visible to the consumer the greenhouse gas emissions associated with as many goods, foodstuffs, and services as possible. In this regard, the approach to visualizing emissions from foodstuffs will be examined considering the concept of "food mileage."

Specifically, visualization involves a "carbon footprint" system that displays the greenhouse gas emissions associated with the life cycle like the complete process from manufacture of goods or production of a foodstuff to transportation and disposal, or the emissions associated with the use of a service. The aim is for guidelines for calculating emissions, ensuring their credibility, and displaying them to be compiled during fiscal 2008, and for the trial implementation to be started in the following fiscal year.

The government will use the results of this trial to further crystallize area-specific guidelines for goods, foodstuffs, and services, and will promote the spread of goods, foodstuffs, and services that display the greenhouse gas emissions associated with them.

In drawing up the guidelines, the government will give sufficient consideration to international consistency on the basis of World Trade Organization (WTO) agreements, and Japan will make proactive contributions to the discussions toward establishing international standards on the carbon footprint system under the International Organization for Standardization (ISO).

(2) Creating rules for carbon offsetting and carbon accounting

The government will raise awareness of businesses and citizens toward carbon offsetting[32] and carbon accounting, and disseminate these initiatives widely.

As for carbon offsetting, model carbon offsetting projects will be implemented since FY 2008, taking into account the consistency of carbon offsetting with existing systems and initiatives, and considering common rules that will be necessary to disseminate carbon offsetting (the methods for calculating the amount of emissions to be offset and the amount of emissions reductions to be used

[32] Activities to recognize one's greenhouse gas emissions, make voluntary efforts to reduce them and subsequently offset the whole or a part of such emissions that cannot readily be reduced by buying greenhouse gas emission reductions or absorption that have been achieved elsewhere, or by implementing projects or activities to reduce greenhouse gas emissions or absorb greenhouse gases elsewhere.

in offsetting, the way to ensure the certainty of the reductions, the way to prevent double counting of the reductions, etc.). The results of the considerations will be made public around FY 2008.

Carbon accounting, which involves disclosure of both greenhouse gas emissions and emission reductions from business activities converted into carbon equivalents, is integral to corporate environmental information disclosure. Implementation methods and rules will be examined during FY 2008, and the findings will be made public.

4. Formulating standards and frameworks to facilitate flow of capital into environmental businesses

The government will implement continuous initiatives to make Japan's capital markets internationally attractive to overseas businesses and investors, and will also work to create an environment encouraging investment from individual investors. Furthermore, , standards and frameworks will be formulated to facilitate the flow of domestic and foreign capital to environmental businesses, aiming Japanese financial and capital markets to be top runners in environmental friendliness.

In order to strengthen competitiveness of environmental businesses by attracting more capital, comprehensive methods for assessing the environmental initiatives of companies, possibility of using such initiatives for the stock index, and ways to disclose comparable environmental information, will be further examined during FY2008, and policies regarding assessment methods and measures for disclosing comparable environmental information will be announced after FY2009.

Following primary financing initiatives will be implemented:

- The government will establish the Innovation Network Corporation of Japan to ensure the smooth provision of domestic and foreign long-term "risk money" (high-risk, high-return investments).
- The government will give financial support to environmental funds, loans based on environmental ratings, etc.
- Guidelines will be drawn up to promote private investment and private financing initiatives (community funds, etc.) involving investment and loans aimed at projects to collect private funds for environmental conservation.

The government will clarify the scope and categories of environmental finance, encourage Japanese financial institutions to participate in the Principles for Responsible Investment (PRI) and promote disclosure of environmental finance initiatives. The government will ask for financial institutions to report initiatives such as environment-related financing and eco-funds, and will bring together case studies of leading approaches and cases worthy of dissemination.

Also, as well as carrying out leading research on the mutual relationship between climate change and social economy, the government will construct an international network of institutions involved in low-carbon society research.

IV Support for regional and citizens' initiatives

In order to bring about a low-carbon society, the government will carry out efforts to encourage regional pacesetting initiatives as well as understanding and action on the part of individual citizens.

1. Reducing carbon by using the functions of agriculture, forestry and fisheries

Regions with rural areas have a major part to play in bringing about a low-carbon society, as they represent sources for the provision of biomass and their forests act as carbon sinks. In order to give free rein to these capabilities, the government will promote local production for local consumption to help reduce the energy used for transportation, it will promote the improvement and use of forest resources which act as carbon sinks and sources of wood products, and it will promote measures to cut greenhouse gas emissions in the fields of agriculture, forestry and fisheries. Such measures may also be expected to have beneficial effects with regard to issues such as regional revitalization and improving the food self-sufficiency rate.

Regarding biomass, the government aims to expand the number of municipalities which has created Biomass Town plan to 300 by fiscal year 2010. It will also introduce measures to enhance the production of biofuels that do not compete with food production; promote the production of ethanol from rice straw and waste wood; examine the use of extensive ethanol for transportation use and promote the provision and use of untapped woody biomass.

Regarding local production for local consumption, the government will give support to local production for local consumption model towns in order to promote initiatives aimed mainly at the use of local agricultural and marine products in school lunch and the setting up of points for direct sales of local produce. Support will also be given for producing biofuel from waste cooking oil.

Regarding the improvement and use of forest resources, the government will carry out initiatives to improve forests through thinning, expand the use of local materials in housing construction, and expand the use of materials and energy from untapped biomass resources. In order to improve the carbon sink functions of farmland, the use of model districts for verification, etc., will be examined.

2. Creating low-carbon cities and regions

(1) Making use of local characteristics to create low-carbon cities and regions

An effective approach for making society overall low-carbon is to implement finely-tuned, integrated measures making use of the particular characteristics of individual cities and regions, thus creating advanced models which can be spread across the whole country.

To achieve this, 10 or so cities will be selected as environmental models during fiscal 2008 (six cities have already been selected as of July); support will be given for their initiatives with follow-ups conducted to assess the results, and outstanding cases will be developed on a nationwide basis. There will also be collaboration with cities overseas making proactive environmental efforts, and outstanding initiatives from Japan will be publicized overseas.

Bringing about intensive urban structure and promoting the use of public transportation are integral to the creation of low-carbon cities and regions. The government will give support to the formulation of regional planning to cut greenhouse gas emissions, to the implementation of measures based on this planning, to securing suitable locations for urban functions such as large-scale facilities used by many people, and to building up urban functions by improving and revitalizing city centers. The government will also improve the convenience of public transport by opening new railway lines and introducing Light Rail Transit (LRT) and Bus Rail Transit (BRT) systems, and will promote comprehensive urban and regional transportation strategies.

In addition, the government will conserve green areas and promote urban greening, encourage the effective use of the resources and energy of drainage systems, promote shared energy use at district or block level, and facilitate the effective use of the various resources and energy sources of rural areas.

(2) Traffic and transportation networks with low carbon dioxide emissions

With the aim of bringing about traffic and transportation networks with low carbon dioxide emissions, the government will encourage the use of public transport, transition toward intensive urban structure, encourage bicycle use, increase the efficiency of goods distribution by shifting from the use of trucks to modes of transportation with lower environmental impact (modal shift), and facilitate the smoother flow of traffic.

To achieve these aims, the government will put in place rail and bus networks that have low carbon dioxide emissions, and will concentrate urban functions. Specifically, the government will improve the convenience of public transportation by improving or securing wide-area and main-line bus routes, and putting into place new railway lines, LRT systems, and other infrastructure.

The government will also promote a modal shift toward rail and sea transportation of goods, which both have low carbon dioxide emissions, and promote reductions in overland distances in road transportation of international cargo. Specifically, the government will carry out projects to boost rail cargo transportation capacity; enhance the functioning of ports, which are the hubs for sea, rail, and road transport; strengthen collaboration between transportation organizations; and promote initiatives such as the Green Partnership.

Furthermore, the government will carry out traffic flow measures in order to effectively improve fuel consumption by permitting greater speed. Specifically, the government will promote congestion measures such as the construction of ring roads, introduce flexible toll policy at expressways, and improve the environment for bicycle use.

In addition, the government will work to further reduce the carbon dioxide emissions of the different means of transportation by promoting the creation of low-carbon maritime transport systems and the spread and development of energy-efficient railway systems and low-carbon trucks and buses, as well as by giving support to the introduction of eco-drive management systems and promoting green, intelligent transportation.

Also, the government will give its support to initiatives that bring about low-carbon transportation networks based on planning for local public bodies to take a lead in curbing carbon dioxide emissions.

3. Frameworks for learning about low-carbon and sustainable societies

The government will incorporate frameworks for teaching and learning about low-carbon and sustainable societies into every educational level and situation, throughout people's lives, by collaborating with groups and individuals working with environmental issues, enhancing opportunities for Education for Sustainable Development (ESD), and promoting education that helps reduce emissions from schools and communities under the 21st Century Environmental Education Plan.

The government will further promote ESD including environmental education in school education by promoting environmental education appropriate to each educational stage through hands-on experience and other methods based on the revised government curriculum guidelines; by enhancing initiatives for learning and putting into practice specific methods for creating a low-carbon society; by increasing to 500 the number of UNESCO Associated Schools that are centers for promoting ESD; and by promoting school facilities with ecological considerations. In higher education, the government will implement the Environmental Leaders Education Program and foster Asian environmental human resources through collaborative consortiums of industry, academia, government, and the private sector.

Regarding families and communities, the government will collaborate with schools to endorse and disseminate superior initiatives for ESD that require the joint effort of the whole community, and will promote the training of coordinators. The government will also promote ESD including environmental education through the After School Environmental Education Project 21 (ASEEP21) and the Ecofamily project, which encourages the use of environmental education tools such as environmental household account books.

4. Urging changes to business styles and lifestyles

(1) Diligent energy saving, use of IT, promotion of the 3Rs

In order to bring about changes in business styles and lifestyles, the government will promote initiatives that allow people to actually feel in their daily lives the advances in the creation of a low-carbon society. These include diligent energy-saving initiatives that involve a continual awareness of carbon reduction, and styles of living, way of working, and business utilizing Green IT that allow people to feel the compatibility of convenience and low carbon. Initiatives toward things such as car sharing, which involves a shift in consciousness from ownership to utilization of functions, and the 3 Rs (reduce, reuse, recycle) will be promoted. Also, the government will encourage public debate to reevaluate lifestyles that involve staying awake until increasingly late hours.

Regarding diligent energy-saving initiatives, the government's Team Minus 6% campaign will collaborate with various media such as music, film, fashion, and sports to save electricity through Cool Biz (in fiscal 2008 the Cool Biz + campaign called for people to adopt one further action to help prevent global warming) and Warm Biz, and the government will work to spread domestic activities such as the use of reusable shopping bags and eco-cooking, as well as eco-driving. Advertising and events will also be carried out using photographs and visual images to spread awareness of global warming and to put across initiatives toward a low-carbon society in a readily understandable format.

Moreover, the government will disseminate examples of energy-saving ideas through its National Energy-saving Campaign, and will develop a nationwide Eco-Action-Point scheme, under which people can acquire points through the purchase of energy-efficient appliances or other products or services that contribute to reducing greenhouse gas emissions; these points can later be exchanged for goods, etc.

Regarding the use of IT, a model for a sustainable nation with ubiquitous networks founded on environmental principles will be developed and verified in "ubiquitous special zones," and the use of IT for saving energy in society will be demonstrated. This will allow the establishment of initiatives to reduce carbon dioxide emissions from homes, businesses, and social infrastructure, as well as methods to assess the results of emissions reductions.

A group to study the dissemination of car sharing will be launched during fiscal 2008, and by examining ways to resolve the issues and increase convenience, the scheme will be made attractive in both environmental and economic terms. At the same time, Environmentally Sustainable Transport (EST) will be spread by measures such as encouraging people to shift toward means of transport with low environmental impact.

With regard to the 3Rs, in order to improve resource productivity and so on, the government will work toward creating frameworks concentrating on reduce and reuse, charging for household waste, reducing disposable plastic bags in Japan and calling for other countries to follow suit, and thorough separation of different types of waste. The government will also carry out studies relating to the Act on the Promotion of Effective Utilization of Resources (Act No. 48 of 1991), and will implement model projects in order to create superior precedents of resource-efficient manufacturing through collaboration among the companies in the supply chain.

(2) Study of daylight saving time introduction

The government will specify the points of controversy with regard to daylight saving time in order to build the national consensus necessary for its introduction.

Specifically, the government will carry out a basic survey of the results and costs of introducing the system, and will examine the need for improving the control and information systems relating to administrative tasks and private-sector businesses, taking into consideration the status of studies of a daylight saving time bill.

In the event that daylight saving time is to be introduced, the government will ensure that citizens and businesses are fully informed, and as things like adjusting international flight timetables, modifying traffic lights and other traffic safety facilities, modifying the control and information systems of private-sector businesses, and dealing with work schedules will be particularly important issues, necessary measures for them will be put in place.

(3) Cool Earth Day

July 7 every year has been designated Cool Earth Day in Japan, when the steps toward the low-carbon society are shared among the Japanese people.

Every year various PR activities and events like the Tanabata (Star Festival) Light Down, which was held in fiscal 2008, will be held to encourage a shift in the awareness of the Japanese people toward the low-carbon society.

Specifically, the number of facilities participating in the Tanabata Light Down in different parts of Japan will be increased through advertising in newspapers and other media, the holding of count-down events, encouraging the understanding of children toward global warming through activities to spread information in schools, and the promotion of initiatives to make people think about local production for local consumption.

Moreover, the government will implement year-round efforts through the Team Minus 6%

activities, such as calling on citizens to participate in national efforts to prevent global warming (the "six actions" such as Cool Biz and electricity usage habits, carbon dioxide reduction of one kilogram per person), and holding various PR activities and events to encourage understanding among the people toward the low-carbon society.

(4) Support for initiatives by NGOs and community groups

The government will collaborate with a variety of different actors, such as NGOs, community groups, citizens, companies, and the administration, with the aim of established and spreading across the country activities that are rooted in the community, such as region-wide citizens' movements, thus creating a society in which individuals act starting from what is closest at hand.

To achieve this, the government will support the initiatives of organizations of different types, such as the Centers for Climate Change Actions and regional committees, and the initiatives of climate change action officers. It will also support environmental conservation initiatives carried out through partnerships of regional NGOs, NPOs, companies, regional public bodies, etc. Moreover, the government will support community funds that give financial and non-financial support to the initiatives of organizations, NGOs, etc., that have close links to the community and demonstrate leadership; it will support businesses consulting on the emission reduction initiatives of companies and individuals; and it will facilitate such initiatives. The government will also support, through regional industry-university-government collaboration, the development of new products and services that contribute to bringing about a low-carbon society, and the expansion of markets for these products and services, by promoting Industrial Cluster Project.

Specifically, the government will elicit initiatives that use local creativity and ideas and disseminate them nationally; it will call for action on the part of the people through the challenge to reduce carbon dioxide emissions by one kilogram per person per day, etc.; it will give support to the diverse environmental conservation activities of NGOs and NPOs through consultations and information provision by intermediate support organizations; it will formulate guidelines for community funds; it will carry out projects giving incentives for region-wide citizens' movements; and it will give support to strengthening regional networks between industry, academia, and the government.

*The following are the major changes in the situation including progress made to items related to the Action Plan for Achieving a Low-carbon Society following its establishment.

<**I Japan's targets**: related to "Setting quantified national targets">

○In October 2008, national debate was held on the "multiple options" presented in the results of a scientific and theoretical analysis conducted by the Mid-term Target Committee, which is a subcommittee of the Council on the Global Warming Issue. In consideration of the results, on

June 10, 2009, then Prime Minister Taro Aso announced the mid-term target of cutting emissions by 15% by 2020 compared to levels in 2005.

Also, at the United Nations Summit on Climate Change on September 22, 2009 Prime Minister Yukio Hatoyama announced that Japan would aim to reduce its emissions by 25% by 2020, if compared to the 1990 level, premised on the formulation of a fair and effective international framework by all major economies and agreement on their ambitious targets.

<**I Japan's targets**: related to "Support for others countries' efforts">

○At the United Nations Summit on Climate Change on September 22, 2009, Prime Minister Yukio Hatoyama voiced that vast amount of financial resources would be required to resolve the climate change problem, in particular to support adaptation efforts by vulnerable developing countries and small island countries. The Prime Minister thereupon announced that Japan is prepared to provide more financial and technical assistance than in the past, in accordance with the progress of the international negotiations. In addition, in regards to assistance to developing countries the Prime Minister expressed that 1) the developed countries, must contribute through substantial, new and additional public and private financing. 2) we must develop rules that will facilitate international recognition of developing countries' emissions reductions, in particular those achieved through financial assistance, in a measurable, reportable and verifiable manner. 3) on assistance to developing countries, consideration should be given to innovative mechanisms to be implemented in a predictable manner. And an international system should be established of information on and matching of available bilateral and multilateral financing. 4)Japan proposes to establish a framework to promote the transfer of low-carbon technologies which ensures the protection of intellectual property rights. These were proposed under the title of the Hatoyama Initiative, and the Prime Minister addressed that Japan will exert every effort for the success of COP15, in the course of formulating this initiative.

<**II The dissemination of innovative technologies and existing advanced technologies**: related to "(1) Huge increase in the installation of solar power generation facilities" under "2. Dissemination of existing advanced technologies">

○The economic crisis countermeasures compiled on April 10, 2009 (A Joint Meeting of the Government and Ruling Parties Council on New Economic Countermeasures and the Ministerial Meeting on Economic Measures) indicated raising the target implementation levels of solar power generation by twentyfold by around 2020. This policy was also maintained in

the Strategy for Opening Up a New Future (compiled by the Cabinet Office and Ministry of Economy, Trade and Industry on April 17, 2009) as well as the Economic and Fiscal Reform 2009 (approved by the Cabinet on June 23, 2009).

At the United Nations Summit on Climate Change on September 22, 2009, Prime Minister Yukio Hatoyama announced that Japan would aim to reduce its emissions by 25% by 2020, if compared to the 1990 level, premised on the formulation of a fair and effective international framework by all major economies and agreement on their ambitious targets. The prime minister was resolved to exercise the political will required to deliver on this promise by mobilizing all available policy tools. These will include the introduction of a domestic emission trading mechanism and a feed in tariff for renewable energy, as well as the consideration of a global warming tax.

○The subcommittee on the electric utility industry of the Advisory Committee on Energy and Natural Resources produced a certain degree of agreement on a policy for the cost burden necessary for implementing reusable energy and system stabilization in consideration of discussion held in the Study Group on Low Carbon Power Supply System.

<**III Framework to move the whole country toward reduced carbon**: related to "1. Emissions trading">

○"Experimental introduction of an integrated domestic market for emissions trading," which was planned for launch from October 2008, has begun recruitment of participants since October 21, 2008, following the Global Warming Prevention Headquarters Decision.

As a result of active efforts to encourage corporations to participate in the experimental introduction, such as by holding explanatory meetings in various places throughout Japan and for all industry types, as of July 6, 2009,

1) 521 "target setting participants" that set targets such including electrical power companies,

2) 68 "trading participants" that exclusively trade allowances such as commercial firms,

3) and 126 companies as domestic credit supply businesses,

a total of 715 companies, applied to participate.

*Japan's Voluntary Emissions Trading Scheme (JVETS), launched by Ministry of the Environment in 2005, became one of the types in the experimental introduction (176 companies of the participants in number 1 above).

○At the United Nations Summit on Climate Change on September 22, 2009, Prime Minister Yukio Hatoyama announced that Japan would aim to reduce its emissions by 25% by 2020, if compared to the 1990 level, premised on the formulation of a fair and effective international

framework by all major economies and agreement on their ambitious targets. The prime minister thus expressed his political resolve and determination to aim for the achievement of the mid-term target by mobilizing all available policy tools, including the introduction of domestic emissions trading mechanism and a feed-in tariff for renewable energy, as well as the consideration of global warming tax. On the establishment of the domestic emissions trading market, Prime Minister Hatoyama also spoke of promoting exchange of information on systems of other countries, and holding discussions on the issue, bearing in mind the impact on international competitiveness as well as possible future linkages among countries.

<**III Framework to move the whole country toward reduced carbon**: related to "(1) Making the tax system greener" under "2. Tax system">

○The FY2009 Tax Reform Act (Act No. 13, 2009), enacted in March 2009, created measures for temporary cut in Motor Vehicle Tonnage Tax, in addition to existing local measures, which increase/decrease tax on vehicles according to their burden on environment. The Act also expanded a tax reduction for energy efficient houses.

Furthermore, a supplementary provision of this Act stipulated that efforts are to be made to make the overall tax system "greener" (i.e. revisions to contribute to reducing the environmental burden) from the perspective of facilitating the development of a low carbon society.

○At the United Nations Summit on Climate Change on September 22, 2009, Prime Minister Yukio Hatoyama announced that Japan would aim to cut emissions by 25% by 2020 if compared to the 1990 level, premised on the formulation of a fair and effective international framework by all major economies and agreement on their ambitious targets. The prime minister was resolved to exercise the political will required to deliver on this promise by mobilizing all available policy tools. These will include the introduction of a domestic emission trading mechanism and a feed in tariff for renewable energy, as well as the consideration of a global warming tax.

<**III Framework to move the whole country toward reduced carbon**: related to "(2) Global environmental tax" under "2. Tax system">

○In March 2009, the Study Group on Global Environmental Taxes compiled and publicized a report on the various fund procurement methods that have hitherto been proposed at the global level (including non-tax system related matters as well).

<**III Framework to move the whole country toward reduced carbon**: related to "(1) Disseminating the "carbon footprint" system, etc." under "3. Visualization">

○In fiscal 2008, a study group was held to consider the role of the system and methods for calculating and displaying CO2 emission amounts. The study group established the Guidelines on the Carbon Footprint System, which is a policy for the system, and drafted the Standards for Establishing Product Category Rules (PCR) for creating measurement rules for emission amounts of products and services.

○In fiscal 2009, a trial project aimed at constructing an effective system was implemented under the premise of actually having products with carbon footprint labels circulated into the market. In September, the PCR were approved for uruchi rice (Japonica rice), powder detergent for clothing, and canola oil as the first set of PCR in the trial project. Also, in October, verification was conducted on the calculation results and display method for the carbon footprint system based on these PCR, allowing for products labelled with carbon footprints to be circulated in the market.

<**III Framework to move the whole country toward low carbon society**: related to "(2) Creating rules for carbon offsetting and carbon accounting" under "3. Visualization">

○Nine pilot projects were launched promoting carbon offsetting programs. In addition, from Sept 2008, various guidelines and standards for proper carbon offsetting program were established, including verification and carbon offset labeling.

○In November 2008, Carbon offsetting credit (J-VER) scheme was launched to certify domestic emission reduction and removals by sinks as highly reliable credits that can be used for carbon offsetting. In addition, a certification criterion for forest management was established that includes fossil fuel substitutes utilizing such materials as woody biomass as well as tree thinning.

<**IV Support for regional and citizens' initiatives**: related to "(1) Making use of local characteristics to create low-carbon cities and regions" under "2. Creating low-carbon cities and regions">

○By January 2009, 13 environmental model cities were selected and the Promotion Council for the Low Carbon Cities was established in December 2008 as a venue for promoting fine examples nationwide and creating partnerships with overseas cities (168 groups have joined as of October 5, 2009).

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 (hereinafter the "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 the 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.

The Target Achievement Plan adopted by the Cabinet in April 2005, as its basic approach, placed particular importance on the assessment and review process, and stated that in FY2007, one year before the start of the first commitment period, the Government will comprehensively evaluate the progresses of measures and policies in the Target Achievement Plan and the state of emissions and conduct a review of the Plan as a whole.

To that end, in November 2006, the Government began deliberations on the assessment and review of the Target Achievement Plan at the Central Environment Council, the Industrial Structure Council and other forums. They considered the assessment of progress of measures and policies in each sector, conducted hearings from experts, relevant ministries and agencies and other organizations concerned, and considered the review of countermeasures and policies in each sector. Based on these efforts, the Government estimated the outlook for total greenhouse gas emissions in FY2010 assuming that the countermeasures and policies currently adopted and those planned for the future continue to be implemented under the current domestic situation (hereinafter the "existing countermeasures scenario").

As a result, it was estimated that with emissions of energy-originated CO_2 likely to rise 4.6-5.9 percent over the base year of the Kyoto Protocol and total emissions including greenhouse gases other than energy-originated CO_2 likely to increase 0.9-2.1 percent over the base year, total emissions would not decline by 0.6 percent from the base year in FY2010, the target year under the Target Achievement Plan as countermeasures to reduce greenhouse gas emissions. (The Interim Report on the Assessment and Review of the Kyoto Protocol Target Achievement Plan, September 2007)

Thus, the Government continued to deliberate on the addition and strengthening of countermeasures and policies necessary to enhance the probability of achieving Japan's commitment of reducing total emissions by 6 percent under the Kyoto Protocol and reviewed the Target Achievement Plan.

Consequently, the Government formulated a totally revised version of the Target Achievement Plan in March 2008. The totally revised Plan indicates the total emission outlook of greenhouse gases in FY2010 when additional countermeasures and policies are implemented (hereinafter "enhanced countermeasures scenario").

Table 4.1 Setup of Cases in the Estimation of Future Outlook

Cases	Meaning
Existing countermeasures scenario (With measures)	Future forecast premised on the latest future outlook for the society and economy at the time of assessment (FY2007) and the implementation of policies and measures decided prior to the time of assessment (Kyoto Protocol Target Achievement Plan, April 2005)
Enhanced countermeasures scenario (With additional measures)	Future forecast premised on the latest future outlook for the society and economy at the time of assessment (FY2007) and the implementation of additional policies and measures planned after the time of assessment (Kyoto Protocol Target Achievement Plan, March 2008)

This future outlook was estimated on the basis of the latest information available in FY2007, the year for the assessment and review of the Target Achievement Plan. Emissions used were based on the inventory information submitted to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) and the latest available information was used for other information as well. In addition, the subject year for forecast is FY2010, the middle year of the first commitment period.

Table 4.2 Future Outlook and Results by Category of Greenhouse Gas Emission
(Existing Countermeasures Scenario)

(Unit: Million tCO_2)

Classification	Kyoto Protocol base year	Estimates for FY2010				Target Achievement Plan
		Higher Case		Lower Case		
		Emissions	% Change against base year	Emissions	% Change against base year	
Energy-originated CO_2	1,059	1,107	4.6%	1,122	5.9%	
Industrial sector	482	438	-9.1%	441	-8.5%	
Civilian (Commercial and other sector)	164	211	28.5%	215	30.9%	
Civilian (Residential sector)	127	145	13.4%	148	16.1%	
Transport sector	217	245	12.7%	249	14.5%	
Energy industries sector	68	68	0.9%	69	1.0%	
Non-energy-originated CO_2	85	86	1.7%	86	1.7%	
CH_4	33	23	-31.5%	23	-31.5%	
N_2O	33	25	-23.7%	25	-23.6%	
Three fluorinated gases	51	32	-38.1%	32	-38.1%	1,253
Total emissions	1,261	1,273	0.9%	1,287	2.1%	(-0.6%)

* Base-year total emissions ratio = (emissions for each case in each sector - base year emissions in each sector) / base year total emissions)

* When the estimates are rendered uncertain by differing assumptions, the estimates, including the most probable estimates, are categorized into the two cases of “Higher Case” and “Lower Case.”

Source: Interim Report on the Assessment and Review of the Kyoto Protocol Target Achievement Plan, September 2007

Table 4.3 Future Outlook and Results by Category of Greenhouse Gas Emission
(Enhanced Countermeasures Case)

(Unit: Million tCO_2)

	Kyoto Protocol Base Year	Target Emissions in FY2010*	
		Emissions	**Base-year total emissions ratio**
Energy-originated CO_2	1,059	1,076 – 1,089	**+1.3% – +2.3%**
Industrial sector	482	424 – 428	-4.6% – -4.3%
Commercial and other sector	164	208 – 210	+3.4% – +3.6%
Residential sector	127	138 – 141	+0.9% – +1.1%
Transport sector	217	240 – 243	+1.8% – +2.0%
Energy industries sector	68	66	-0.1%
Non-energy-originated CO_2, CH_4, N_2O	151	132	**-1.5%**
Non-energy-originated CO_2	85	85	0.0%
CH_4	33	23	-0.9%
N_2O	33	25	-0.6%
Three fluorinated gases	51	31	**-1.6%**
HFC	20	22	0.1%
PFC	14	5	-0.7%
SF_6	17	4	-1.0%
Greenhouse Gas Emissions	1,261	1,239 – 1,252	**-1.8% – -0.8%**

* Due to rounding, the totals in the table above may not match the sum of the columns.

* The target emissions are set for both the case when countermeasures achieved the maximum of assumed effects and the case when countermeasures achieved the minimum of assumed effects. Needless to say, the Government pursues the case where countermeasures achieve the maximum effects, but the targets are set so as to achieve the Kyoto Protocol targets even when countermeasures produce the minimum effects.

Source: Kyoto Protocol Target Achievement Plan, March 2008

Chapter 3 of this report describes the countermeasures and policies considered in both cases and their respective effects that can be expected. This chapter indicates the future outlook, anticipating the overall effects brought about by these countermeasures and policies.

The classification applied here is different from the classification used in Chapter 2. This classification is commonly employed in Japan for the purpose of conducting the assessment of progress by sector and the review of countermeasures and policies in a steady manner, while taking into account the activities of each entity and the utilization of statistics. Special attention should be paid to energy-originated CO_2 as it indicates emissions of CO_2 involved in the generation of electricity and heat distributed by each sector in final consumption (indirect emissions). All emissions by sector in this chapter are shown in the form of indirect emissions.

The future outlook based on the revised version of the Target Achievement Plan (March 2008), the

latest Plan for Japan, is shown below.

4.2 Future Outlook

Japan's base year total greenhouse gas emissions (hereinafter referred to as the "base year total emissions") were 1.261 billion t-CO_2. In order to achieve the 6% reduction commitment, it is necessary to reduce annual average total emissions to 1.186 billion t-CO_2 per year in the first commitment period.

On the other hand, Japan's total emissions of greenhouse gases in FY2005 were 1.359 billion t-CO_2, a 7.7% increase over base year level. Japan now has to reduce emissions by 13.7% to achieve its reduction commitment.

The main reason for this is because the emissions of energy-originated carbon dioxide, which account for approximately 90% of Japan's greenhouse gas emissions, have greatly increased (an increase of 11.3% in FY2005 relative to the base year total emissions), even though there has been progress in the reduction of methane, nitrous oxide and the three fluorinated gases. The factors behind the increase in energy-originated carbon dioxide emissions include the following; the cessation of nuclear power generation in the second half of 2002 and other one-off factors; the economic expansion of China; the transformation of industrial structure; increased energy consumption in offices and households due to an expansion of the floor area of office and other buildings; and increased numbers of personal computers, home appliances or the like. The emissions from the *industrial* sector, which account for around 40% of carbon dioxide emissions, have not shown much change, and those from the *transport* sector, which account for roughly 20%, have increased by about 20% as compared to FY1990 level but have been on a downward trend for the last few years. On the other hand, the emissions from the *commercial and other* sector, which account for approximately 20%, and those from the *residential* sector, which account for around 10%, have greatly increased.

4.2.1 Future Outlook for Energy-Originated CO_2

The emissions of energy-originated carbon dioxide, which account for 90% of Japan's greenhouse gas emissions, can statistically be divided into five sectors: *industrial,*[4] *commercial and other,*[5] *residential, transport*, and *energy conversion*.[6] It is also possible to look at the effects of measures and policies for each of these sectors. Approximate targets of future emissions in each sector are shown in Table 3. Provisional calculations show that these approximate targets can be achieved if Japan maintains the currently forecast level of economic growth,[7] all countermeasures on the energy supply side produce the anticipated results, and all countermeasures in each sector on the energy demand side also produce the

[4] Factories, agriculture, construction, etc.
[5] Office buildings, retail stores, hospitals, schools, etc.
[6] Self-consumption at power plants and petroleum processing facilities, etc.
[7] *Course and Strategy of the Japanese Economy* (Cabinet Decision of January 18, 2008)

anticipated results. Table 3 gives the upper and lower limits of approximate targets: the upper limit will be reached if the countermeasures demonstrate their maximum effects, and the lower limit will be reached if they show their minimum effects. Although the Government will certainly aim to maximize their effects, the targets have been set to meet the Kyoto Protocol target even if the countermeasures have their minimum effects.

The approximate target for energy-originated carbon dioxide emissions in FY2010 is 1.3-2.3% above base year (FY1990) level as the ratio to the base year total emissions (approximately 1,076 to 1,089 million t-CO_2).

* It is estimated that emissions will increase by economic growth and other factors if no measures or policies are taken. Thus, the approximate targets provisionally calculated and established for each sector will be achieved through measures and policies to reduce emissions from FY2005 levels by 25 to 29 million t-CO_2 in the *industrial* sector, by 29 to 31 million t-CO_2 in the *commercial and other* sector, by 32 to 35 million t-CO_2 in the *residential* sector, by 14 to 17 million t-CO_2 in the *transport* sector, and by 13 million t-CO_2 in the *energy conversion* sector.

Table 4.4 Approximate Targets of Energy-originated Carbon Dioxide in Each Sector

Estimated results		Base year (FY1990)	FY2005 level of emissions		Approximate targets[Note] in each sector in FY2010		<Reference> Differences between FY2010 targets and FY2005 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 by sector)	million t-CO_2	(Percentage change relative to base year by sector)	
		1,059	1,201		1,076 –1,089		
Energy-originated CO_2	*Industrial* sector	482	452	(-6.1%)	424–428	(-12.1%) – (-11.3%)	It is estimated that if no measures or policies are taken, emissions will increase through increases in the volume of production resulting from economic growth or other factors. Provisional calculations show that emissions can be reduced by 25 to 29 million tons from FY2005 level through measures and policies.

	Commercial and other sector	164	239	(+45.4%)	208–210	(+26.5%) – (+27.9%)	It is estimated that if no measures or policies are taken, emissions will increase through increases in the floor area in buildings or other factors. Provisional calculations show that emissions can be reduced by 29 to 31 million tons from FY2005 level through measures and policies.
	Residential sector	127	174	(+36.4%)	138–141	(+8.5%) – (+10.9%)	It is estimated that if no measures or policies are taken, emissions will increase through increases in the number of households and the device ownership rate per household or other factors. Provisional calculations show that emissions can be reduced by 32 to 35 million tons from FY2005 level through measures and policies.
	Transport sector	217	257	(+18.1%)	240–243	(+10.3%) – (+11.9%)	It is estimated that if no measures or policies are taken, emissions will increase through increases in the number of automobiles owned or other factors. Provisional calculations show that emissions can be reduced by 14 to 17 million tons from FY2005 level through measures and policies.
	Energy conversion sector	68	79	(+16.5%)	66	(-2.3%)	This is self-consumption at power plants, petroleum processing facilities or the like. Provisional calculations show that emissions can be reduced by 13 million tons from FY2005 level by continuing to steadily promote efficient energy use in these facilities.

*In each column, the numbers in all sectors may not add up exactly to the total due to rounding.

Note: The upper and lower limits of approximate targets are provided: the upper limit will be reached if the countermeasures demonstrate their maximum effects, and the lower limit will be reached if they show their minimum effects. Although the Government will certainly aim to maximize their effects, the targets have been set to meet the Kyoto Protocol target even if the countermeasures have their minimum effects.

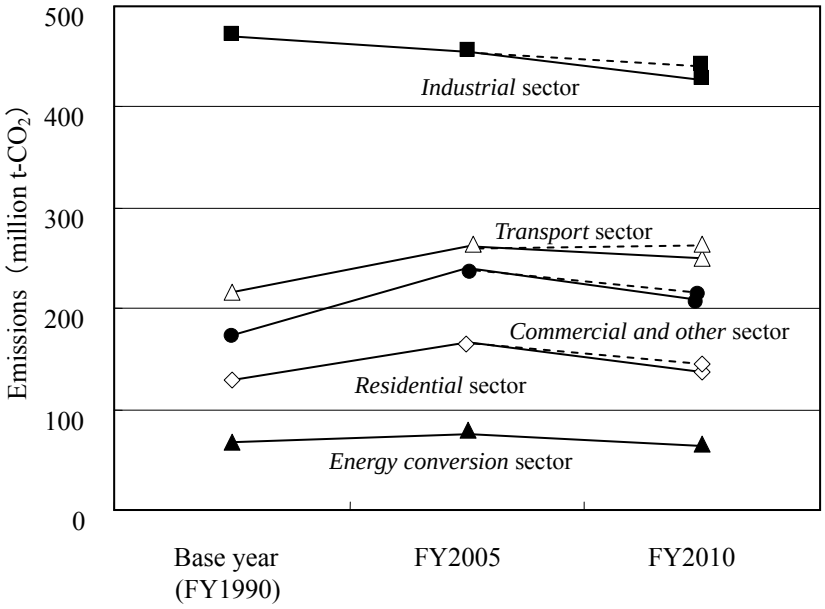


Figure 4.1 Approximate Targets of Energy-originated Carbon Dioxide Emissions in Each Sector

4.2.2 Future Outlook for Non-energy-originated Carbon Dioxide

The target for non-energy-originated carbon dioxide[8] emissions is 0.04% below base year (FY1990) level as the ratio to the base year total emissions (approximately 85 million t-CO_2).

Table 4.5 Emissions and Targets of Non-energy-originated Carbon Dioxide

(Unit: Million tCO_2)

	Base year	FY2005		Approximate Target Emissions in FY2010	
	Emissions	Emissions	**Base-year total emissions ratio**	Emissions	**Base-year total emissions ratio**
Non-energy-originated Carbon Dioxide	85	91	+0.4%	85	-0.0%

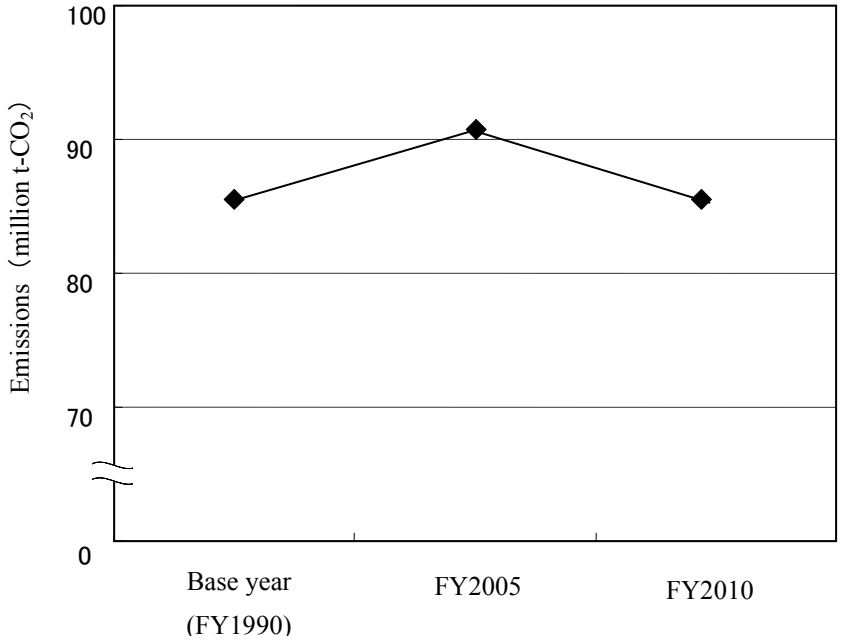


Figure 4.2 Emissions and Target for Non-energy-originated Carbon Dioxide

[8] When promoting countermeasures, it is sometimes necessary to strike a balance among non-energy-originated carbon dioxide, methane and nitrous oxide, because, for example, effective countermeasures for reducing methane emissions in the treatment of human waste can increase nitrous oxide emissions.

4.2.3 Future Outlook for Methane

The target for methane emissions is 0.9% below base year (FY1990) level as the ratio to the base year total emissions (approximately 23 million t-CO_2).

Table 4.6 Emissions and Targets of Methane

(Unit: Million tCO_2)

	Base year	FY2005		Approximate Target Emissions in FY2010	
	Emissions	Emissions	**Base-year total emissions ratio**	Emissions	**Base-year total emissions ratio**
CH_4	33	24	-0.7%	23	-0.9%

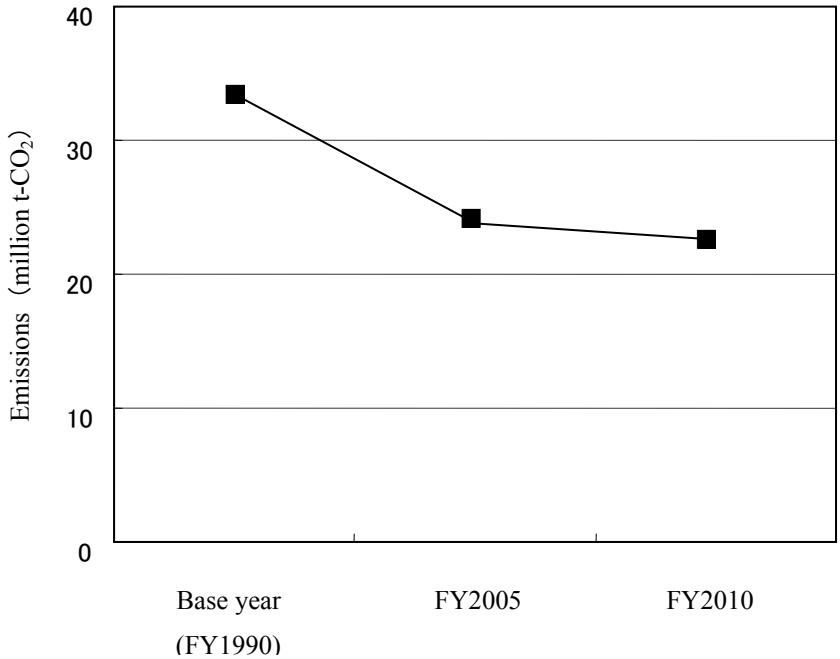


Figure 4.3 Emissions and Target for Methane

4.2.4 Future Outlook for Nitrous Oxide

The target for nitrous oxide is 0.6% below base year (FY1990) level as the ratio to the base year total emissions (approximately 25 million t-CO_2).

Table 4.7 Emissions and Targets of Nitrous Oxide

(Unit: Million tCO_2)

	Base year	FY2005		Approximate Target Emissions in FY2010	
	Emissions	Emissions	**Base-year total emissions ratio**	Emissions	**Base-year total emissions ratio**
N_2O	33	25	-0.6%	25	-0.6%

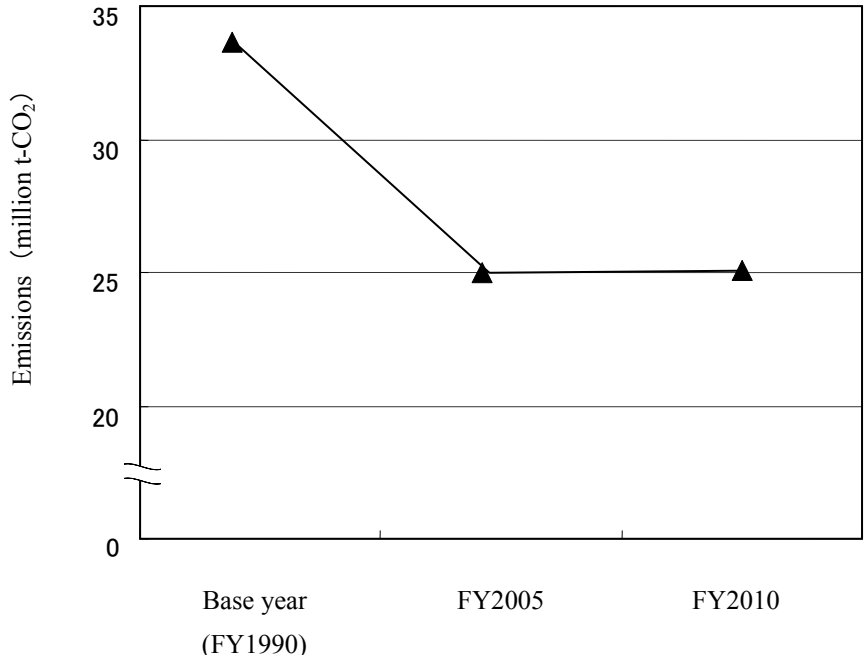


Figure 4.4 Emissions and Target for Nitrous Oxide

4.2.5 Future Outlook for Three Fluorinated Gases

The target for the three fluorinated gases (HFCs, PFCs and SF_6) is 1.6% below base year (CY1995) level as the ratio to the base year total emissions (approximately 31 million t-CO_2).

In some cases, measures and policies are implemented for all of these three fluorinated gases because they are used interchangeably in some businesses. Therefore, it is appropriate to combine measures and policies according to technology and market conditions so as to minimize the social costs and obtain the maximal results. For this reason, the figures for each gas are shown as rough indications of the breakdown in order to more steadily achieve the target of "1.6%" reduction for the three fluorinated gases collectively, on the assumption of the current technology and market conditions. It is necessary to keep in mind the fact that these figures would fluctuate depending on future changes in these conditions.

Table 4.8 Emissions and Target for the Three Fluorinated Gases and Rough Indications of the Breakdown for Each Gas

(Unit: Million tCO_2)

	Base year (CY1995)	CY2005		Target for the three fluorinated gases and rough indications of the breakdown for each gas	
	Emissions	Emissions	Ratio to the base year total emissions	Emissions	Ratio to the base year total emissions
Three fluorinated gases	51	18	-2.6%	31	-1.6%
HFCs	20	7	(-1.0%)	22	(+0.1%)
PFCs	14	6	(-0.6%)	5	(-0.7%)
SF_6	17	4	(-1.0%)	4	(-1.0%)

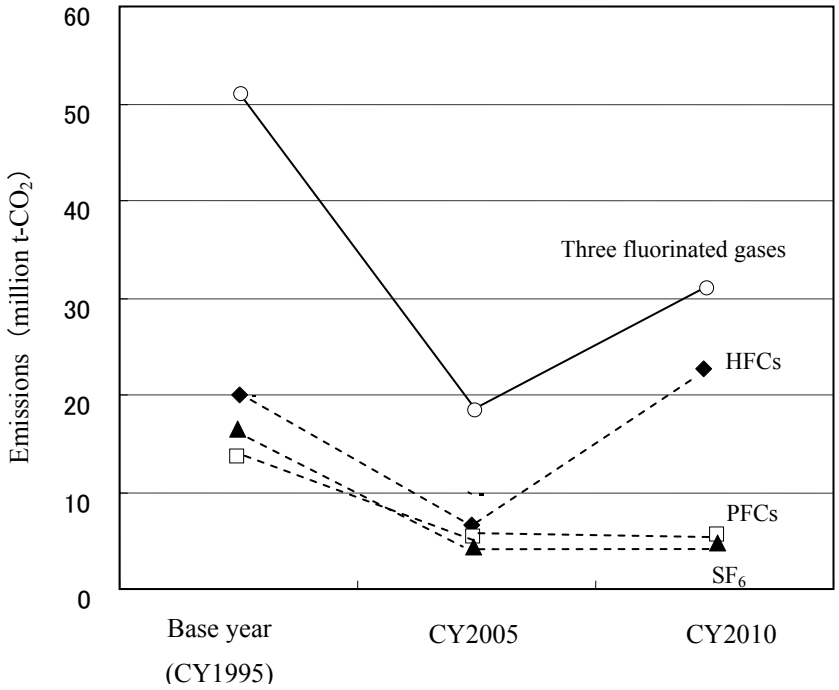


Figure4.5 Emissions and Target for the Three Fluorinated Gases and Rough Indications of the Breakdown for Each Gas

Table4.9 Approximate Targets of Greenhouse Gas Emissions in FY2010

	Base year	FY2005		Approximate targets of emissions in FY2010[Note]	
	million $t\text{-}CO_2$	million $t\text{-}CO_2$	Ratio to the base year total emissions	million $t\text{-}CO_2$	Ratio to the base year total emissions
Energy-originated CO_2	1,059	1,201	**11.30%**	1,076–1,089	**(+1.3%) – (+2.3%)**
Industrial sector	482	452	-2.30%	424–428	(- 4.6%) – (- 4.3%)
Commercial and other sector	164	239	5.90%	208–210	(+3.4%) – (+3.6%)
Residential sector	127	174	3.70%	138–141	(+0.9%) – (+1.1%)
Transport sector	217	257	3.10%	240–243	(+1.8%) – (+2.0%)
Energy conversion sector	68	79	0.90%	66	(-0.1%)
Non-energy-originated CO_2, CH_4, N_2O	151	140	**-0.90%**	132	**(-1.5%)**
Non-energy-originated CO_2	85	91	0.40%	85	(-0.0%)
CH_4	33	24	-0.70%	23	(-0.9%)
N_2O	33	25	-0.60%	25	(-0.6%)
Three fluorinated gases	51	18	**-2.60%**	31	**(-1.6%)**
HFCs	20	7	-1.00%	22	(+0.1%)
PFCs	14	6	-0.60%	5	(-0.7%)
SF_6	17	4	-1.00%	4	(-1.0%)
Greenhouse gas emissions	1,261	1,359	**7.70%**	1,239–1,252	**(-1.8%) – (-0.8%)**

* In each column, the numbers in all sectors may not add up exactly to the total due to rounding.

Note: The upper and lower limits of approximate targets are provided: the upper limit will be reached if the countermeasures demonstrate their maximum effects, and the lower limit will be reached if they show their minimum effects. Although the Government will certainly aim to maximize their effects, the targets have been set to meet the Kyoto Protocol target even if the countermeasures have their minimum effects.

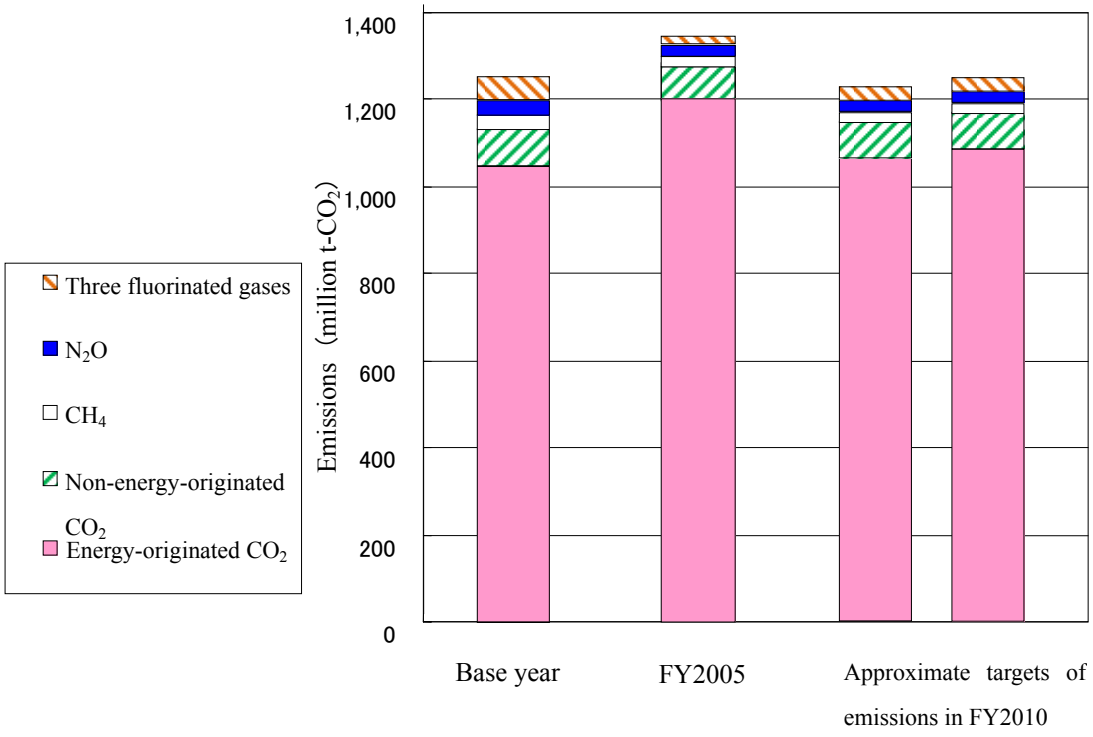


Figure 4.6 Approximate Targets of Greenhouse Gas Emissions by Gas Type

4.2.6 Future Outlook for Greenhouse Gas Sinks

The target for sinks is to ensure removal of 13 million t-C (47.67 million t-CO_2; approximately 3.8% compared to the base year total emissions), which was decided on at the Seventh Conference of the Parties to the UNFCCC (COP7) as the amount of removal by Japan's forest management, for all forests subject to Article 3, Paragraph 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 time the Kyoto Protocol Target Achievement Plan was revised, 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 specific grounding to achieve the 6% reduction commitment under the Kyoto Protocol, this Plan provides nationwide countermeasure evaluation indices, estimated volumes of emissions reductions, national policies to promote countermeasures, and examples of policies that local governments are expected to implement, for each countermeasure to achieve the targets by type of greenhouse gas or other category and the approximate targets for energy-originated carbon dioxide emissions in each sector described in Section 2. These are shown in tabular form for each sector and category (Refer to Appendix 1).

Countermeasure evaluation indices are stipulated as targets for individual countermeasures designed to achieve the targets by type of greenhouse gas and the approximate targets for energy-originated carbon dioxide emissions in each sector.

The estimated volume of reductions in greenhouse gas emissions (carbon dioxide equivalent) resulting from a certain countermeasure is calculated by encompassing factors other than the results of the countermeasure in question. Therefore, the assumptions of calculation at the time of drafting this Plan are clarified to make ex-post verifications possible.

4.3 Method of Estimation

4.3.1 Energy-originated CO_2

(1) Overview of Models

To estimate energy-originated CO_2 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.

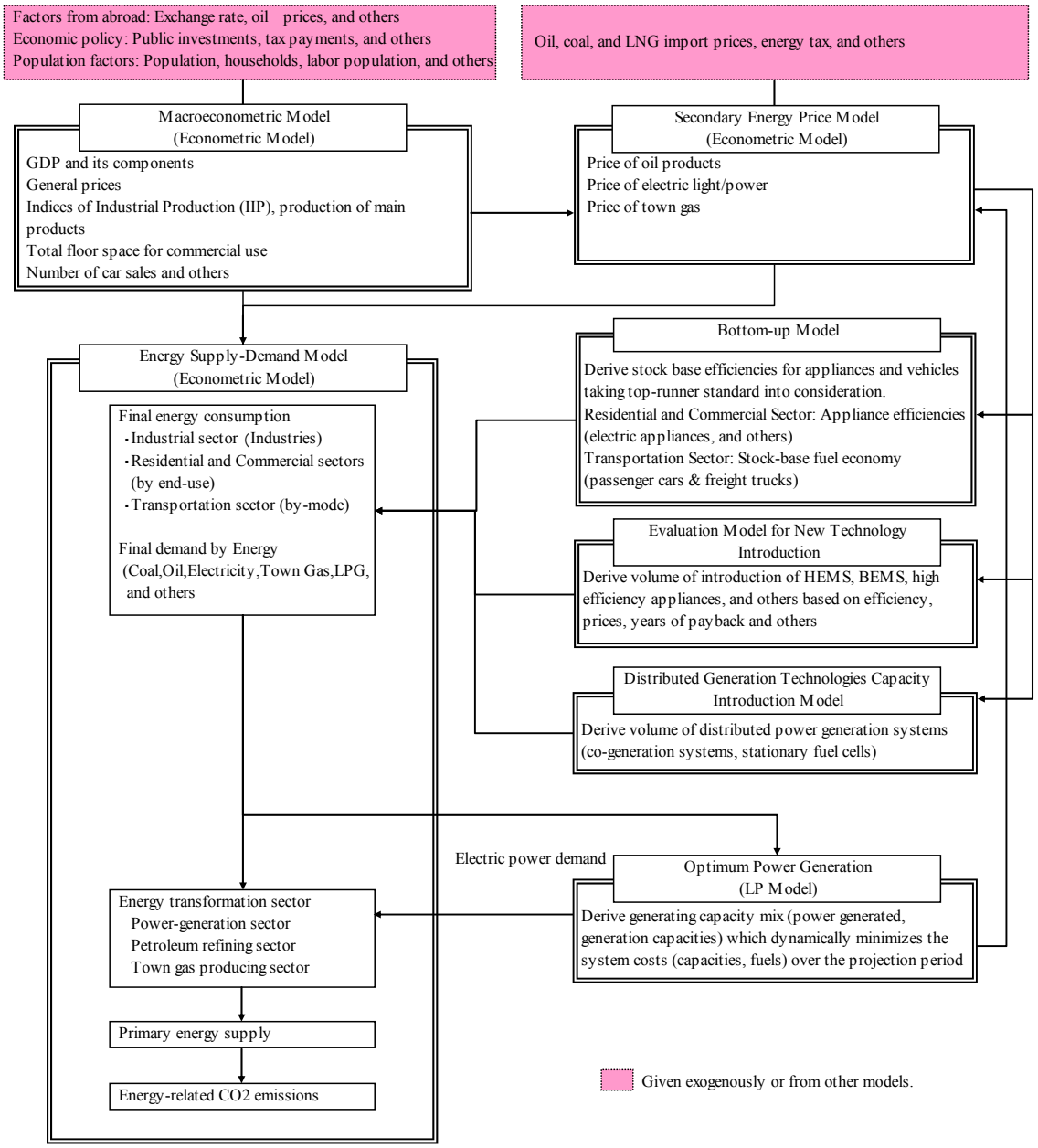


Figure 4.7 Overview of the Models

[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 transport 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 CO_2 emission based on primary energy consumption of each energy source.

- Sectoral final energy consumption, primary energy supply by energy source, and CO_2 emission, etc.

(2) Outlook on Macro Frame

The macro frame of the outlook for 2010 is assumed as follows.

(i) Population and Labor Force

The population is assumed to decline after its peak in FY2004, based on the "medium variant" population projection publicized by the National Institute of Population and Social Security Research in December 2006.

FY	1990	1995	2000	2005	2010
Total population (10,000 people)	12,361	12,557	12,693	12,777	12,718
Labor force (10,000 people)	6,414	6,672	6,772	6,654	6,443

Note 1: The total population peaked in FY2004 (127.79 million people), based on "medium variant birth and death" estimates.

Note 2: Labor force reached to a peak of 67.94 million people inFY1997.

(ii) Standard Currency Exchange Rate

The exchange rate is assumed to remain at ¥110=US$1, in reference to the Direction and Strategy for the Japanese Economy (decided by the Cabinet in January 2008), etc.

(iii) Energy Prices

The energy price is assumed as below between FY2005 and FY2010, in reference to the Direction and Strategy for the Japanese Economy, etc.

(In real terms)
Petroleum: 56$/b → 79$/b (Based on dollar value in US$2005)
LNG: 330$/t → 565$/t
Coal: 63$/t → 63$/t

(iv) Economic Growth

Based on the prospects indicated in the Direction and Strategy for the Japanese Economy and its references (prepared by the Cabinet Office), the real GDP growth rate is assumed to remain in the lower half of the 2 percent level through FY2010.

FY	2005	2006	2007	2008	2009	2010
Real GDP Growth Rate (%)	2.4%	2.3%	1.3%	2.0%	2.3%	2.5%

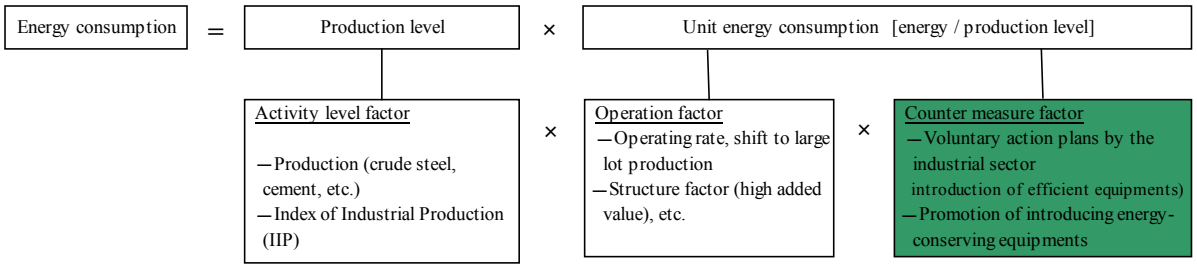
(v) Final Demand Components (Macro Components)

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 expenditures, taking into account the Direction and Strategy for the Japanese Economy.

(3) Trends and Calculation Methodology by Sector

(i) Industrial Sector

[a] Basic Structure of the Industrial Sector



[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, amid the strengthening of production capacity in Asia and slowing domestic demand, the overall production level is showing a trend of slight increase toward 2010, supported by external demand, particularly from China. At the same time, the Index of Industrial Production (IIP) will generally increase due to the growing tendency toward higher value added.

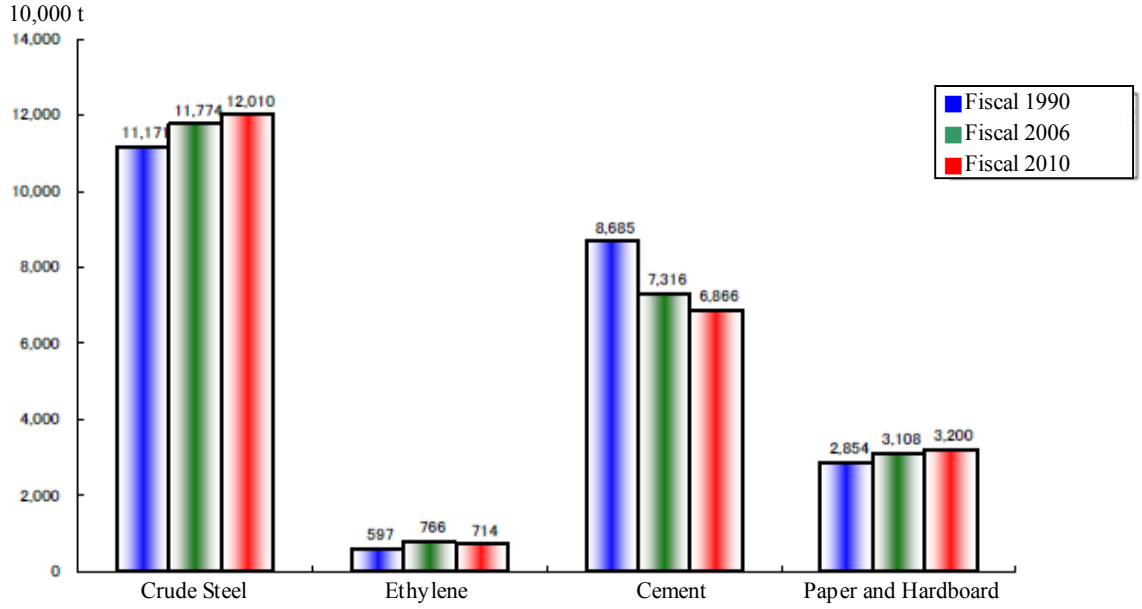


Figure 4.8 Production Estimate on Four Major Energy Consuming Industries

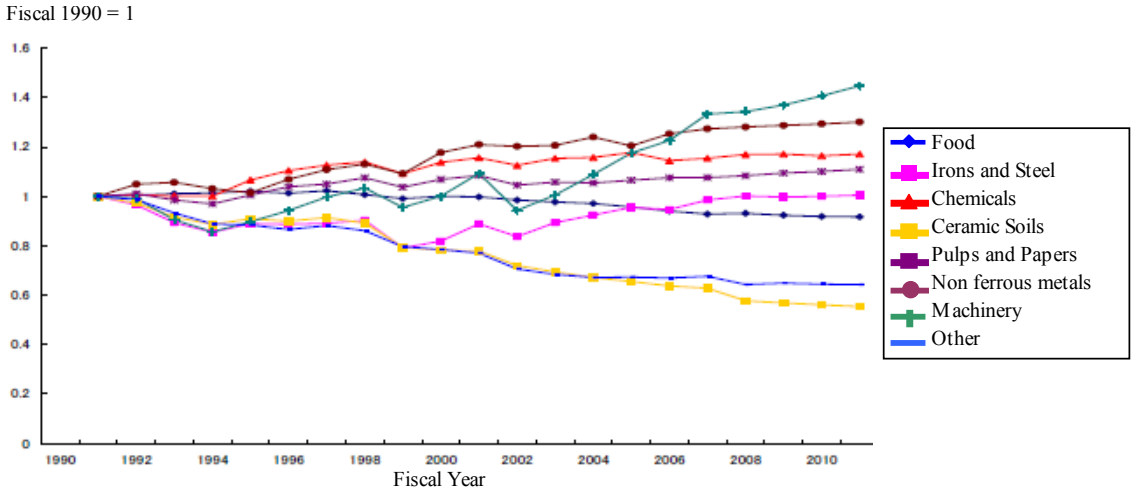
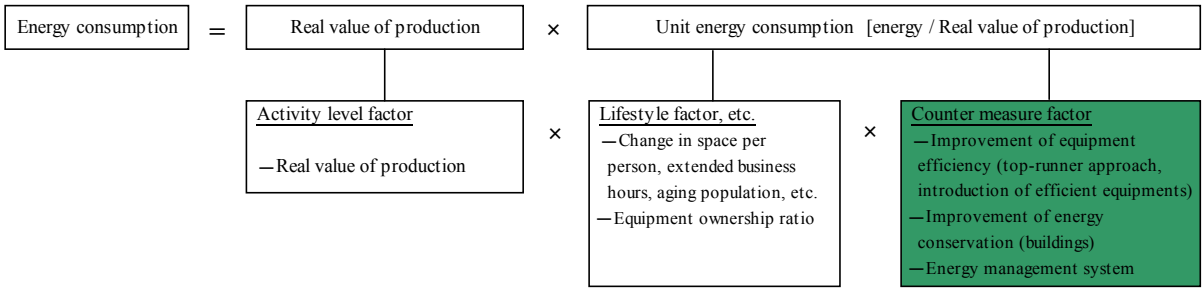


Figure 4.9 Index of Industrial Production (IIP) Assumption

(2) Commercial and Other Sector

[a] Basic Structure of the Commercial Sector



[b] Value of Services Production, Lifestyle Factor, etc.

- The value of production in the services industry will increase against the backdrop of the aging of the population and the shift in preferences toward services.
- In line with the graying population, medical and welfare-related services will expand steadily.

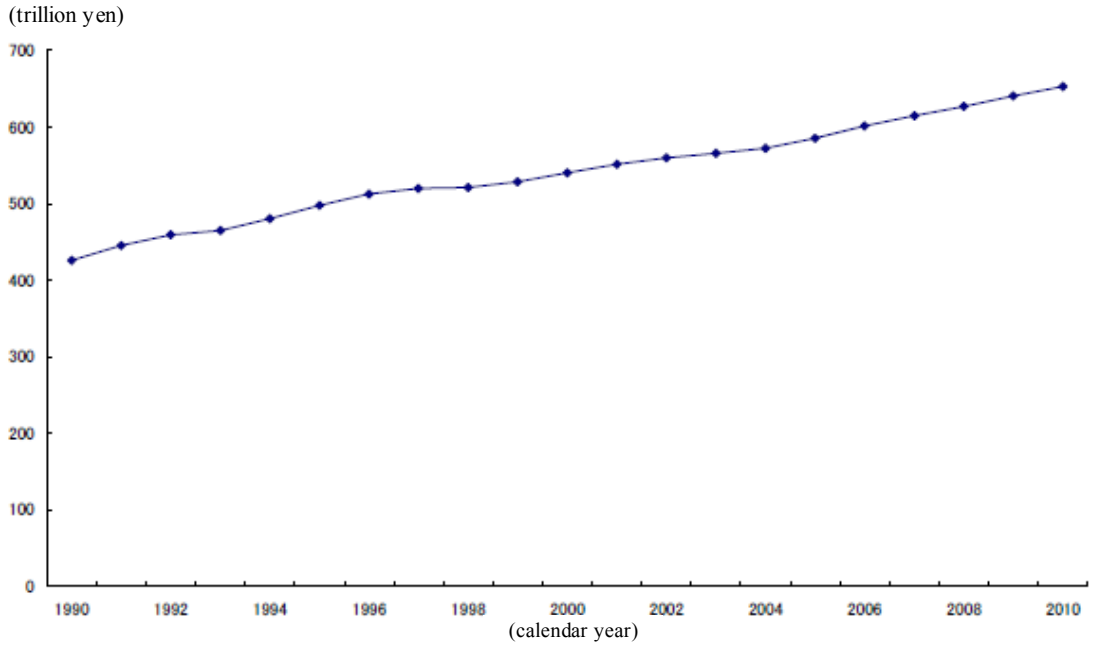
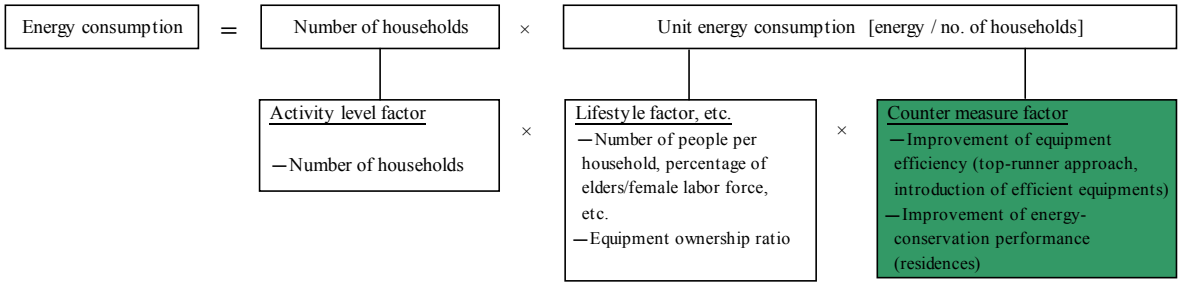


Figure 4.10 Real Value of Production in the Services Industry

(iii) Household (Residential) Sector

[a] Basic Structure of the Household Sector



[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.

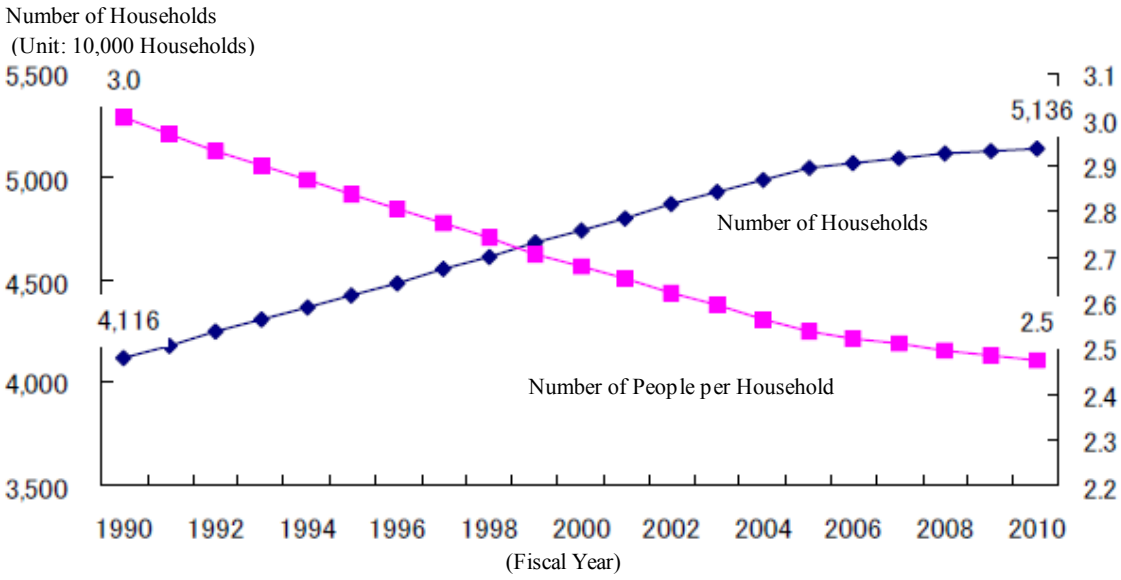


Figure 4.11 Number of Households and Number of People per Household

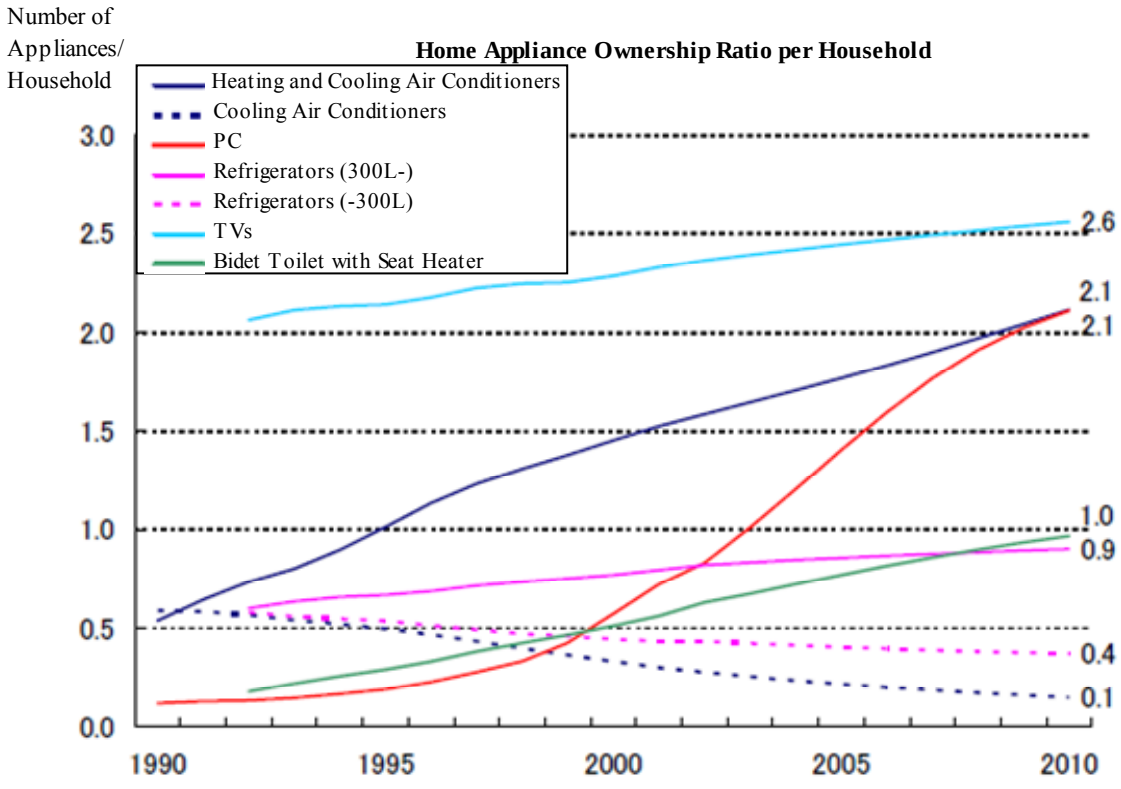
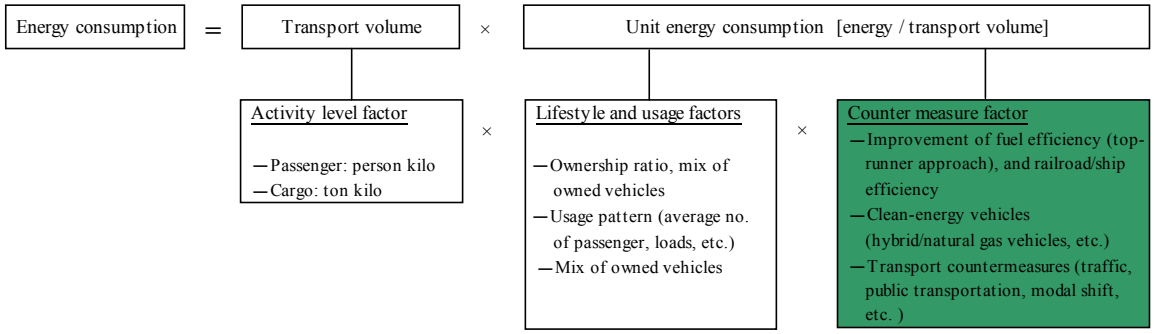


Figure 4.12 Home Appliance Ownership Ratio per Household

(iv) Transport Sector (Passenger and Cargo)

[a] Basic Structure of the Transport Sector



[b] Transport Volume

- Passenger transportation will increase. Cargo transportation will recover moderately on the back of improving economic activities.

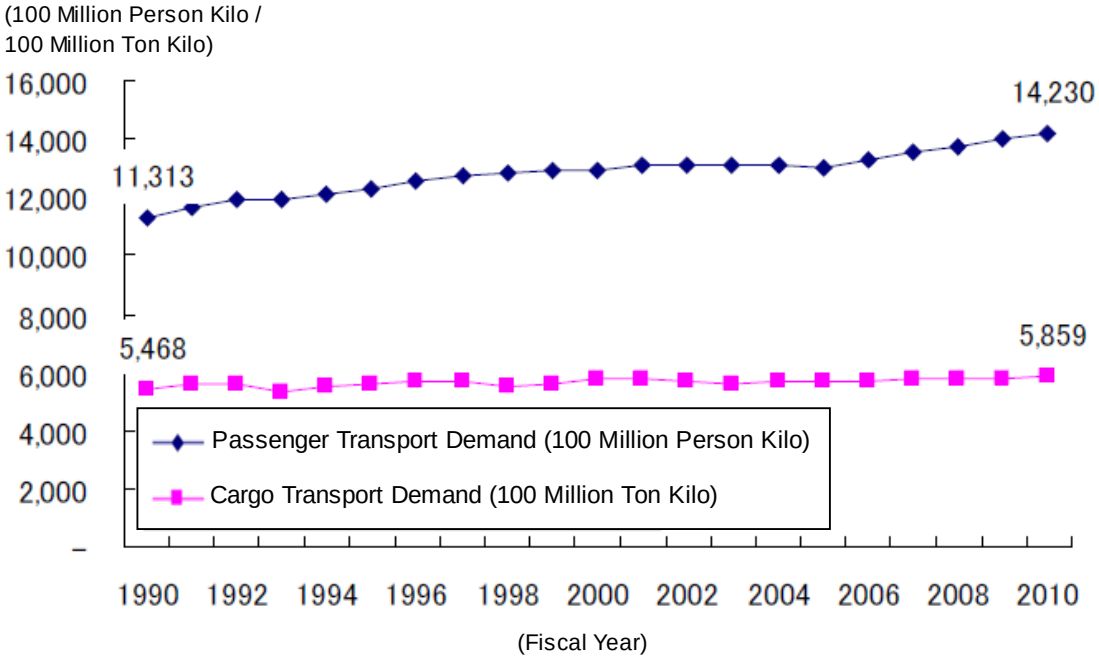


Figure 4.13 Transition of Transport Demand

4.3.2 Non-energy-originated CO_2, CH_4, and N_2O

Greenhouse gas emissions in FY2010 are estimated using the method and classification of calculation adopted by Japan's National Greenhouse Gas Inventories Programme (in principle, the calculation is made using the formula <emission coefficient in FY2010> x <amount of activity in FY2010> for each sector and gas).

○ Amount of activity in FY2010
Estimated for each sector (see below).

[Fuel-burning sector]
The amount of activity used for the estimation of energy-originated CO_2 is used.

[Sector for leakage from fuels/industrial process sector (other than three fluorinated gasses including HFCs)/sector for utilizing solvents and other products]
The amount of activity in these sectors is estimated principally on the basis of the outlook for socioeconomic activity, but estimated based on past trends for sectors without estimated values or those not linked to the amount of socioeconomic activity.

[Agricultural sector]
For livestock and crop species for which target values for FY2015 are provided by the Basic Plan for Food, Agriculture and Rural Areas, the values between values for FY2005 and target values for FY2015 are estimated through the interpolation of these two sets of values. For other livestock and crop species, the estimation is based on the extrapolation of past trends.

[Waste sector]
Assuming the promotion of waste reduction targets under the Waste Management and Public Cleansing Act and the Master Plan for Promotion of Recycling-Oriented Society, the amount of activity is estimated by taking into account the population for general waste and industry-related indicators (amounts of raw materials produced, index of industrial production, industry production outlook, etc.) for industrial waste.

○ Outline of the method of estimation

(1) Non-energy-originated CO_2

- Expansion of Blended Cement Utilization
  Emission associated in cement production = amount of clinker production × emission coefficient
- Promotion of Countermeasures for Emission of CO_2 Derived from Waste Incineration
  Emission associated in waste incineration = amount of incineration by category × emission coefficient by category

(2) CH_4

- Disposal of waste

[1] CH_4 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] CH_4 emissions associated with incineration of general waste and industrial waste

Emissions associated with general waste incineration = amount of waste incineration by incineration method x emission coefficient by incineration method

Emissions associated with industrial waste incineration = amount of waste incineration by waste type x emission coefficient by waste type

- Shift in organic matter management method in rice cultivation

Emissions from rice paddies (intermittent irrigation rice paddies) = Σ (area of rice paddies x ratio of intermittent irrigation rice paddies x ratio of area by soil type x ratio of organic matter management method x emission coefficient by sold type and organic matter management method)

- Mobile emission sources

Automobiles: Emissions associated with driving = mileage x emission coefficient per mileage

Airplanes, ships and railroads: Emissions associated with operations = fuel consumption x emission coefficient per fuel consumption

- Fixed emission sources

Emissions associated with fuel burning at fixed emission sources =Σ (fuel consumption by fuel type, furnace type and sector x emission coefficient by fuel type and furnace type)

(3) N_2O

- Installation of a N_2O Decomposer in the Manufacturing Process of Adipic Acid

Emission associated with manufacture of adipic acid = production volume of adipic acid × emission coefficient

- Incineration of sewage sludge

Emissions associated with incineration of sewage sludge = Amount of sewage sludge incineration x amount of sewage sludge incineration by aggregating agent type, furnace type and temperature x corresponding emission coefficient

- Incineration of general waste and industrial waste

Emissions associated with general waste incineration = amount of waste incineration by incineration method x emission coefficient by incineration method

Emissions associated with industrial waste incineration = amount of waste incineration by waste type x emission coefficient by waste type

・Reduction in the amount of fertilizers applied to agricultural land

Emissions associated with the application of chemical fertilizers to soil of agricultural land = amount of nitrogen contained in chemical fertilizers applied to soil of agricultural land x emission coefficient x 44/28

- Mobile emission sources

  Automobiles: Emissions associated with driving = mileage x emission coefficient per mileage

  Airplanes, ships and railroads: Emissions associated with operations = fuel consumption x emission coefficient per fuel consumption

- Fixed emission sources

Emissions associated with fuel burning at fixed emission sources =Σ (fuel consumption by fuel type, furnace type and sector x emission coefficient by fuel type and furnace type)

Table 4.10 Premise Utilized in Estimating Future Prospects

		Unit	Performance Value				Target Value
			FY 1990	FY 1995	FY 2000	FY 2005	FY 2010
Cement production		1,000 t	86,849	97,496	82,373	73,931	69,820
Paddy planting area		1,000 ha	2,055	2,106	1,763	1,702	1,669
Number of feeding livestock	Dairy cow	10,000	207	193	173	164	163
	Beef cow	10,000	281	290	281	276	308
	Swine	10,000	1,134	990	979	962	950

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 interpolated based on target values for FY2015 under 'Basic Plan for Food, Agriculture and Rural Areas'

Livestock feeding headage: Performance value 'Statistical Survey on Livestock'; Estimated value: linearly interpolated based on target values for FY2015 under 'Basic Plan for Food, Agriculture and Rural Areas'

4.3.3 Three Fluorinated Gases

Emission of the three fluorinated gases, such as HFC, is 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 are substitutes for ozone depleting substances of which production and consumption is 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 systematic efforts by industries, development of alternative substances and the recovery under law of HFC filled in appliances as refrigerant (see 3.1.3.2 I.1.(4)), it was estimated that by 2010, there would be a reduction of 34 million tCO_2 and an increase from total emission in the base year could be contained to 2 percent. This plan was revised in FY2004 and FY2007, with a new target set to

reducing a total of 76 million tCO_2 and suppressing total emissions to 1.6 percent less than the level in the base year.

4.3.4 CO_2 in Land-Use Change and Forestry Sector

Regarding forest sinks, Japan aims to secure 13 million tC of sink by forest management activities under Article 3, paragraphs 3 and 4 of the Kyoto Protocol. This target i.e. equal to the upper limit on accountable removals by "forest management" agreed at the Seventh Conference of the Parties to the UN Framework Convention on Climate Change (COP 7, Marakesh Accord).

As for the methodologies for accounting the removals by forests, Japan has developed methodologies in accordance with the formulation of the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry in 2003. .

The future outlook and targets were estimated on the basis of the following assumptions:

[a] Forest management activities under Article 3, paragraph 4 of the Kyoto Protocol

- Ikusei-rin forests: Forest management measures implemented since 1990 in order to keep forests in a proper condition (succession, soil preparation, land surface disturbance, planting, etc), fostering (undercutting, improvement cutting), thinning, regeneration cutting
- Tennensei-rin forests: protection and conservation measures such as tree cutting and land conversion regulations under law

[b] Average removals per unit area (estimated based on data of growth of major tree species)

- Average removals by Ikusei-rin forests: 1.35 tC/ha
- Average removals by Tennensei-rin forests: 0.42 tC/ha

[c] Forest area for forest management coverage necessary to secure sinks of 13 million tC

- Ikusei-rin forests: 7.55 million ha (secure management coverage area by forest management measures such as tree thinning)
- Tennensei-rin forests: 6.60 million ha（secure management coverage area by expanding the area of protection forests）

[d] Outlook and targets of forest sinks

<Ikusei-rin forests>

Removals by Ikusei-rin forests are accounted for when thinning and other forest management activities are taken

7.55 million ha×1.35 tC / ha (average removals by Ikusei-rin forests) ≒ 10.2 million tC

<Tennensei-rin forests>

Removals from Tennensei-rin forests are accounted for when maximum efforts are made to expand the area of protection forests

6.6 million ha ×0.42 tC / ha (average removals by Tennensei-rin forests) ≒ 2.8 million tC

Removals likely to be secured by forest management activities are estimated as below:

10.2 million + 2.8 million = 13 million tC

In order to achieve the target of 13 million t-C of forest sinks, Japan has been implementing forest management activities such as 550,000 hectares of thinning over a six-year period between FY2007 and FY2012. This means additional 200,000 hectares of thinning to the previous level of 350,000 hectares, and result in total of 3.3 million hectares over six years.

4.4 Future Prospects of CO_2 Generated from International Bunker Fuel Sold in Japan

A forecast of CO_2 emissions in 2015 attributed to international aviation bunker fuels sold in Japan has been made.
The following assumptions were used in the forecast.

[a] Assuming that Japan has a 1.8 percent annual economic growth rate until 2015, the forecast of the volume of international air transportation to and from Japan is forecast as shown in the following table.

Table 4.11 Actual Figures from 2005 and Predictions for 2015 regarding the Volume of International Air-Transport to and from Japan.

	Total number of passengers (10,000 people)	Total Cargo weight (1,000t)
2005	5,650	3,370
2015 (forecast)	7,714	5,058

Source: Report by the Air Transport Subcommittee, the Council for Transport Policy – 'Concerning Measures for Future Development and Operations of Airports and Air Navigation System'

[b] For the average distance of air-transport of passengers and cargo, apply average figure between 1990 and 2005.

[c] For the average weight of CO_2 per ton-kilometer of air-transport, apply average figure between 1990 and 2005.

The predicted CO_2 emission in 2015 from the international aviation bunker fuel sold in Japan based on the preceding hypotheses is approximately 33.64 (million tCO_2).

Regarding the above prediction, it is necessary to note that the numbers bear uncertainty due to the following reasons.

[a] The predicted values may change depending on how the premised conditions are set. The prediction of air-transport volume is premised by the predicted annual economic growth rate until 2015 at 1.8 percent, which in itself bears uncertainty. Also it uses the past average values as it is difficult to predict advances in future technologythat would lead to the decrease of CO_2 emission per ton-kilometer of air-transport..

[b] The total volume of air-transport used in calculating the prediction is the total volume of international air-transport to and from Japan. Therefore the effect of air-transport to Japan that is assumed to be refueled outside of Japan cannot be completely excluded from the calculation of CO_2 emission of international aviation bunker 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 CO_2 emission generated from marine bunker fuel sold in Japan.

Table 4.12 Actual Figures and Future Prospects of CO_2 from International Bunker Fuel Sold in Japan

(Unit: Million tCO_2)

Classification	Results			Future Prospects
	1990	2005	Rate of increase or decrease	2015
International aviation	13.2	21.3	+61 %	33.6
Oceangoing shipping	17.5	22.1	+26.3%	―

(Created by: Ministry of Land, Infrastructure, Transport and Tourism)

4.5 Effects of Policies and Measures

Under the Target Achievement Plan completely revised in March 2008, the Global Warming Prevention Headquarters or the Directors' Meeting of the Global Warming Prevention Headquarters, twice a year around June and before the end of the year, reviews the progress in all measures listed in the Target Achievement Plan and considers a strengthening of measures.

The contents of the results of the latest review, "Progress in the Kyoto Protocol Target Achievement Plan" (Global Warming Prevention Headquarters, July 2009) are described below.

4.5.1 Method to Review Progress

(1) Method to Manage Progress under the Kyoto Protocol Target Achievement Plan

The Target Achievement Plan states that the Global Warming Prevention Headquarters "will rigorously inspect the progress of policies implemented by the Government for individual countermeasures annually." Since accurate inspections need the data about the latest conditions, each ministry and agency will strive to promptly calculate actual figures required for conducting inspections, including countermeasure evaluation indices, volume of emission reductions and other related indices (hereinafter referred to as "countermeasure evaluation indices and others").

The plan further states: "Specifically, every year around June, the Global Warming Prevention Headquarters will clarify the actual figures of the year before the previous year of inspection for all countermeasure evaluation indices and others (including the previous year's actual figures if possible), and will at the same time indicate the projected countermeasure evaluation indices and others for greenhouse gases from the year of review until 2012 (for each year if data are available). At this time, the Headquarters will specify the status of the policies implemented in the previous year in order to support the projections as well as the policies scheduled to be implemented in that year."

(2) Inspections by each ministry and agency

The latest report on the inspections of the progress was put together by the Global Warming Prevention Headquarters after hearing comments on the policies and measures implemented at advisory councils of responsible ministries and agencies.

Advisory councils related to the responsible ministries and agencies, which held their respective meetings to deliberate on the progress of the Target Achievement Plan, include: Global Environment Subcommittee, Planning Committee, Council of Food, Agriculture and Rural Area Policies; Global Environment Subcommittee, Policy Committee, Forestry Policy Council; Global Environment Subcommittee, Planning Committee, Fisheries Policy Council; Global Environmental Subcommittee, Environmental Committee, Industrial Structure Council; Global Warming Prevention Measures Subcommittee, Chemicals and

Bio-Industry Committee, Industrial Structure Council; Environment Committee, Panel of Infrastructure Development; Environment Subcommittee, Transportation System Committee, Council for Transport Policy; and Global Environment committee, Central Environment Council.

4.5.2 Progress in Measures

(1) Total emissions and necessary reductions of greenhouse gases for Japan

Japan's total greenhouse gas emissions reached some 1,374 million tonnes in terms of CO_2 in FY2007, representing an increase of 9 percent compared with the base year. Thus, in order to achieve sector-by-sector targets under the Target Achievement Plan between FY2007 and FY2010, it is necessary to reduce emissions of energy-originated CO_2 by 9.2-10.0 percent in the industrial sector (share of total emissions in the base year: 38 percent), by 11.1-12.0 percent in the commercial sector (share: 13 percent), by 21.5-23.1 percent in the household sector (share: 10 percent), by 2.4-3.8 percent in the transport sector (share: 17 percent) and by 20.1 percent in the energy conversion sector (share: 5 percent).

As for non-energy-originated CO_2 (share: 7 percent), CH_4 (share: 3 percent) and N_2O (share: 3 percent), as emission levels have already achieved targets for FY2010, it is necessary to continue to implement measures so as not to allow them to increase in the future.

For the three fluorinated gases (share: 4 percent), it is necessary to contain the rise to 28.7 percent, though there are several factors contributing to the increase, including an expected growth of HFC emissions due to the progressing substitution from ozone layer-depleting substances.

Furthermore, as additional forest development of 200,000 ha a year is needed over a six-year period between FY2007 and FY2012 as forest sink measures, the Government plans to develop forests at the rate of 780,000 ha a year from FY2008 onward. With 750,000 ha of forests developed in FY2007, it is necessary to continue with forest development and secure forest sinks equivalent to 3.8 percent of total emissions in the base year.

As for the utilization of the Kyoto Mechanism, Japan concluded contracts to acquire credits equivalent to 95.10 million tCO_2 by April 1, 2009, with the acquisition of the bulk of the target amount of some 100 million tonnes already in sight. Japan will continue efforts to acquire credits while paying heed to the principle of complementarity.

See 4.5.3 for details about the state of emissions.

(2) Progress in each measure and policy

In the latest inspections, the Government kept tabs on emission reductions under policies and measures and countermeasure evaluation indices incorporated in the Target Achievement Plan from FY2000 through

FY2007 in principle (and those for FY2008 if possible), as well as estimates from FY2008 to FY2012[1] as long as data were available. The Government also assessed the performance trends in light of these estimates and surveyed the status of additional and enhanced measures and policies, putting them together in Appendix 2.

As a result, the performance trends of most of the measures proved largely as estimated. For the measures whose performance trends fell short of the expectations, the Government has been urging relevant organizations to step up efforts under their respective voluntary action plans and also adding and strengthening other measures and policies. Total emissions of greenhouse gases in FY2007 increased 9 percent over the base year. This is primarily because of a major impact of the deterioration in unit CO_2 emissions in the electric power sector on the increase in total emissions due to a significant decline in utilized capacity of nuclear power plants stemming from the suspension of operations of the Kashiwazaki Kariha nuclear power plant of the Tokyo Electric Power Co. in Niigata Prefecture in the wake of the Chuetsu Offshore Earthquake in 2007. Regarding unit CO_2 emissions in the electric power sector, the Federation of Electric Power Companies plans to achieve the estimated reductions in the first commitment period under the Target Achievement Plan through continued (1) promotion of nuclear power generation on the basis of securing safety and restoring trust; (2) further enhancement of thermal efficiency of thermal power generation and consideration of operational methods for thermal power sources; and (3) utilization of the Kyoto Mechanism.

Going forward, from the summer of 2009 the Government will present the outlook for total greenhouse gas emissions in Japan for the entire first commitment period (five years), comprehensively evaluate the progress of measures and policies set forth in the Target Achievement Plan and the status of emissions, and take necessary measures. The Government will continue to strive to steadily promote measures and policies, and in order to make a comprehensive evaluation feasible, regarding measures and policies for which the Government has yet to see the outlook for countermeasure evaluation indices for each year from FY2008 to FY2012, it is necessary to obtain the outlook for countermeasure evaluation indices for each fiscal year promptly.

Furthermore, since there still are measures and policies for which the degree of progress is not known at the present stage due to the unavailability of data of actual results or those for which performance data is produced late, extra efforts need to be made to obtain performance data at an early date and develop data expeditiously.

[1] Values for each fiscal year of “countermeasure evaluation indices” and “estimated emission reductions” in Appendix table of the Target Achievement Plan. For measures for which the relevant appendices show only the average value for the first commitment period, the value for each fiscal year of the relevant measures considered after the Cabinet’s adoption of the Target Achievement Plan are presented.

4.5.3 Transition and Outlook of Japan's Greenhouse Gas Emissions

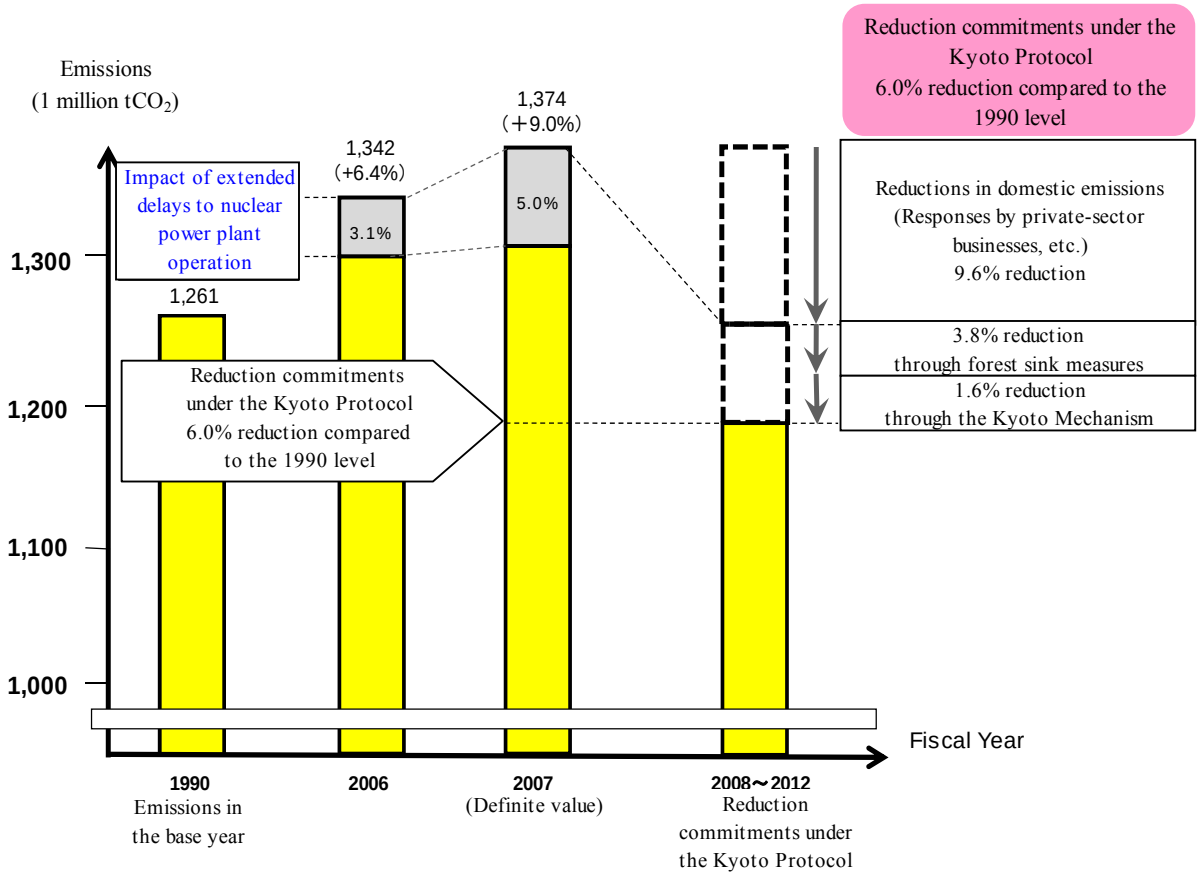


Figure 4.14 Transition and Outlook of Japan's Greenhouse Gas Emissions

Table 4.13 State of Greenhouse Gas Emissions

(Unit: Million tCO_2)

	Base Year (Ratio to Total Emissions)	Actual Performance in FY2007 (% Change from the Base year)	Targets for FY2010 (Necessary Reductions from FY2007 Levels)
Energy-originated CO_2	1,059 (84%)	1,219 (+15.1%)	1,076 – 1,089 (-10.7 – -11.8%)
Industrial sector	482 (38%)	471 (-2.3%)	424 – 428 (-9.2 – -10.0%)
Commercial and other sector	164 (13%)	236 (+43.8%)	208 – 210 (-11.1 – -12.0%)
Residential sector	127 (10%)	180 (+41.2%)	138 – 141 (-21.5 – -23.1%)
Transport sector	217 (17%)	249 (+14.6%)	240 – 243 (-2.4 – -3.8%)
Energy industries sector	67.9 (5%)	83.0 (+22.2%)	66 (-20.1%)
Non-energy-originated CO_2	85.1 (7%)	84.5 (-0.6%)	85 (0%)
CH_4	33.4 (3%)	22.6 (-32.3%)	23 (0%)
N_2O	32.6 (3%)	23.8 (-27.1%)	25 (+4.0 – +4.2%)
Three fluorinated gases	51.2 (4%)	24.1 (-53.0%)	31 (+28.7%)
Total	1,261 (100%)	1,374 (+9.0%)	1,239 – 1,252 (-8.9 – -9.9%)

* Base-year figures are calculated by the method of calculation used for a report on assigned amounts submitted to the UNFCCC secretariat in August 2006.
* The actual results for FY2007 are the greenhouse gas emissions (definite value) for FY2007 announced in April 2009.
* Targets for FY2010 are targets calculated using the method of calculation at the time of revision to the Target Achievement Plan.

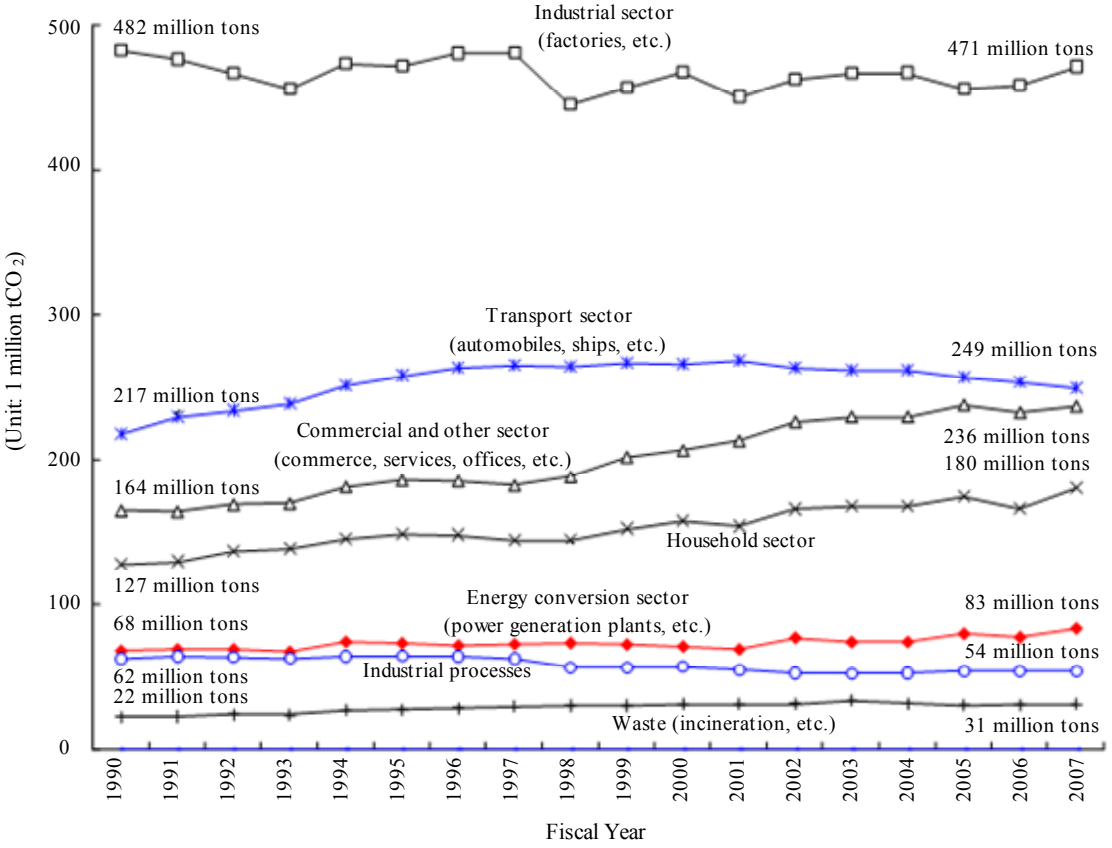


Figure 4.15 State of Greenhouse Gas Emissions

4.5.4 Progress in Measures and Policies Concerning Greenhouse Gas Reductions and Absorptions

Regarding individual measures and policies presented in the Kyoto Protocol Target Achievement Plan, the following list shows the results of consideration of the changes in the actual values of countermeasure evaluation indices and their future outlook as well as the need for additional and stronger measures and policies (see Appendix 2, the table of inspection results, at the bottom of this report).

While the Government conducts a detailed consideration of individual measures and policies in its annual inspection, these reports are omitted here because they are so voluminous. For details, see “Progress in the Kyoto Protocol Target Achievement Plan” (Global Warming Prevention Headquarters, July 2009) (http://www.kantei.go.jp/jp/singi/ondanka/). (However, reference materials are available only in Japanese language because of time and cost constraints as inspections are conducted twice a year.)

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 and presents an organized analysis in order to clarify the impacts on the country.

Research to date indicates that climate change could significantly impact natural disasters, the water resources, food supplies, natural ecosystems, public health, and urban life, as well as various other sectors in Japan. Wise Adaption to Climate Change, a report by the Committee on Climate Change Impacts and Adaptation Research of the Ministry of Environment, for instance, points out that the impact of climate change is already appearing in Japan, and has rapidly emerged since the beginning of the 21st century. It is projected that climate change will significantly further impact the public's lives in a broad range of areas. Some examples of this are: increased frequency of heavy rain, intensified typhoons, increased water-related damage from rising ocean levels, disasters resulting from storm surges, increased number of sediment disasters, more frequent and intense droughts resulting from extremely low rainfall and significant decreases in snow, an increased risk of heat stroke, hyperthermic stress, infectious diseases, and air pollution, elevated household expenditures caused heightened agricultural crop prices and cooling and heating costs in addition to increased discomfort and stress caused by extremely hot days and tropical nights, the loss of natural scenery, recreational spaces, and a decrease in seasonal change..

When coupling the inherent vulnerability of both Japan's nature and society with these impacts mentioned above, the results show that the safety and stability of Japanese society could be severely impacted. Effective and efficient adaptation measures in response to the negative impact of climate change are thus deemed necessary. At the same time, there needs to be future research and consideration paid to regional-level climate change projections and impact evaluations, which are necessary for considering adaptation measures on a more intimate level.

Among the vast and diverse impacts of global warming, this chapter only addresses a very small number of items for which concrete research results have already been obtained. The results concentrate on the points of the aforementioned report. In addition, it should be noted that among the "impacts observed to date," there are items for which it cannot be definitively discerned at

present whether said items are the result of climate change. Accordingly, in using this report for evaluating performance under Article 4.1 (b) and (e) of the Framework Convention on Climate Change, sufficient consideration should be paid to the points above.

5.1 Impacts on Japan's Climate

5.1.1 Impacts on Temperature

The potential impacts of global warming on Japan's climate are evaluated based on two projections. One was the High-Resolution Coupled Ocean Atmosphere Climate Model (K-1 model) implemented by a 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) using the Earth Simulator. Another projections were 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 Fourth 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. Comparing 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, the results on average were 3.0°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, there was a 17 percent increase for Scenario B1 and a 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 Characteristics 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 days with minimum temperature less than 0°C across Japan.
- Increase in the number of nights with minimum temperature of 25°C or higher across Japan.
- Increase in the number of days of heavy rainfall with daily precipitation of 100mm or more 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, an increase in the number of days with no precipitation.

The above-mentioned projections do not contradict the scientific findings shared in the IPCC Fourth Assessment Report.

5.2 Impacts on Natural Disasters

5.2.1 Impacts Observed to Date

The impacts on water-related disasters can be broadly separated into 1) flooding, landslides, etc. in river areas, and 2) disasters such as those resulting from storm surges in coastal areas. The number of times that daily rainfall amounts of 100 mm to 200 mm has influenced flooding, landslides, and other water-related disasters has increased significantly over the past 100 years. In recent years, there have been frequent occurrences of major rains totaling over 1,000 mm as well as localized major rains exceeding 100 mm in rainfall per hour. These have led to large-scale flooding and landslides in various areas throughout Japan on a yearly basis. In addition, as a phenomenon related to the rise of sea levels, which impacts disasters spawned from storm surges and such, the number of times that the corridor of Itsukushima Shinto Shrine, a World Heritage Site, has submerged underwater has significantly increased in the past few decades.

For this report, information on droughts is included in the Impacts on the Water Environment and Water Resources section.

- Occurrences of flood damage resulting from major rains totaling 1,000 mm or over.
- Flooding and submersion damage resulting from localized major rains exceeding 100 mm per hour.
- Increase in frequency of short-term strong rains exceeding 50 mm per hour.
- Occurrence of underground flood damage in urban areas.
- Increase in the number of times Itsukushima Shinto Shrine's corridor was submerged[1].
- Damage relating to storm surges resulting from typhoon no. 23 on the Nabae Coast of Kochi Prefecture.

[1] This is according to visually taken records in the shrine's Shrine Office Journal. It should be noted that these numbers vary by the year.

- Damage resulting from tidal waves on the Shimoniikawa Coast due to low-pressure systems in 2008.

5.2.2 Projected Impacts

It is projected at a high possibility for precipitation in high-latitude regions to increase, extremely heavy rains to occur more frequently, and there is a stronger potential for tropical cyclones to become more intense.

An estimate conducted to compare the highest annual daily precipitation in Japan today to that of 100 years from now has revealed that the rate of change from GCM20 predictions (A1B Scenario) was generally between 1.1 and 1.2 fold, and increased to nearly 1.5 at maximum.

If precipitation levels rise in the future, it is projected that the flood safety control level, which indicates the degree of safety of rivers in flood-control plans, will notably decrease, while the danger of flooding and overspilling in watershed areas will increase. For instance, it is predicted that the frequency of the flood safety control level targeted in current plans for rivers will drop from once from every 100 years to once every 30 years, thereby nearly tripling the frequency of flooding. It is also projected that increases in the amount of both short-term rainfall and total rainfall will lead to more frequent sediment disasters, including mudslides and landslides, changes in the period of occurrence for these disasters, and an increase in the intensity of such disasters.

Heat will cause sea levels to continue to rise for a few centuries, as it takes time for heat to disperse to deeper layers. Sea levels will actually increase even if the concentration of greenhouse gasses stabilizes. In addition, the intensification of typhoons will also cause sea levels to rise due to decreases in pressures while wind will cause larger drifts and waves. Therefore, the danger of storm surges is projected to increase due to both the rise in sea levels and the intensity and change in paths of typhoons. Meanwhile, coastal landscapes, which are formed by counterbalancing shifts in sediment towards and away from the coast, will recede beyond the increased water level due to changes in this counterbalance spawned by rising seas levels. Projections also indicate that shore erosion will advance further due to the increased number of high waves that accompany intensified typhoons.

[Examples of main projected impacts]

- Enhanced intensity of typhoons.
- Increased danger of flooding and overspilling in watershed areas.
- More frequent sediment disasters, in addition to changes in the time and scale of their occurrence.
- Changes in the areas where damage related to storm surges occurs due to change in paths of typhoons.

- Increased number of high waves due to intensified typhoons.
- Increased danger of storm surges due to rising sea levels and intensified typhoons.
- The advancement of shore erosion spawning from increases in high waves accompanying rising sea levels and intensified typhoons (a one-meter increase in sea levels will cause 90% of sandy beaches to disappear).

5.3 Impacts on the Water Environment and Water Resources

5.3.1 Impacts Observed to Date

The direct impacts on the water environment and water resources appear as changes in water amounts, temperature, and quality for each type of water resource—i.e., rivers, lakes, dammed lakes, groundwater, etc. These changes affect the natural ecosystem, society's aquatic system, and the water demand structure. It is difficult to clearly discern at present whether these phenomena are the result of climate change. However, changes in the frequency of abnormal weather and fluctuations in rainfall and snowfall have been recorded and reported, and these changes may further amplify if climate change continues. Furthermore, a characteristic of the water environment and water resources sector is the impact that changes in water amounts and quality have on a vast spectrum of other sectors, including agricultural production, natural ecosystems, disaster prevention, and health.

- Restrictions on water intake and supply due to record-setting low rainfall, as well as stoppages on tap water supply.
- Abnormal occurrence of blue-green algae in lakes (impacts water usage and the ecosystems of water areas).
- Increased use of groundwater accompanying drought, also leading to the occurrence of ground sinking.
- Reduction in the possible amount of water that can be stably supplied from dams.

5.3.2 Projected Impacts

Projected impacts included those resulting from changes in normal weather events as well as fluctuations in the frequency and intensity of extreme weather events. There is also the potential that the changes in average water temperature and precipitation amounts will lead to such phenomena as changes in stream flow, reductions in snowfall, changes in snow melting times, altered lake water levels, and changes in water quality. These phenomena could impact water supply and the natural ecosystem. Moreover, increased frequency and intensity of extreme weather events—such as significantly low rainfall—may cause heightened risk for drought.

In the event that a rise in seas levels is assumed, groundwater salination in coastal areas is also projected as an impact.

[Examples of main projected impacts]

- Increased risk for drought.
- Increased water temperature of rivers, lakes, dammed lakes, and groundwater. Higher probability of blue-green algae appearing.
- Groundwater salination owing to rising sea levels, etc.

5.4 Impacts on Food

5.4.1 Impacts Observed to Date

Impacts on food occur as a result of impacts on the agricultural, livestock, and fishing industries. Until the present these impacts have included 1) high temperatures causing immature and cracked rice grains as well as drops in quality and taste, 2) increased freezing and frost damage to barley caused by early flower budding and reduced revenues owing to shorter grain filling periods, and 3) increased pest damage to soybeans and damage incurred by hot and arid climates. With regards to fruit trees, a decrease in quality and preservation ability has been recognized along with increases in damage to tea from freezing and frost as well as larger numbers of pests. In the livestock industry, a decline in conception rate, milk production, and development has been seen. Impacts to the fishing industry include an increase in fish varieties coming from the south, changes in harvest season, and sluggish aquafarming.

- Immature rice grains (brown rice turning white), etc. occurring from the Tohoku region southward.
- Cracked rice grains (brown rice that has cracked) occurring at high frequency in the Tohoku and Hokuriku regions
- Higher temperatures in the winter season causing barley flowers and stems to sprout earlier than normal, as well as an increase in freezing and frost damage due to this.
- Separation between the skin and fruit portions of tangerines caused by high temperatures and low rainfall. Discoloration of grapes due to high temperatures.
- Answers to a survey regarding the current situation of agricultural impacts from global warming conducted on National Agriculture and Food Research Organizations in all of Japan’s 47 prefectures indicated that impacts thought to stem from global warming are in some form apparent in fruit trees (all prefectures), vegetables and flowers (90 percent of prefectures), and livestock (about 40 percent of prefectures).
- Belated seaweed harvesting season owing to lower water temperatures in autumn, etc.

5.4.2 Projected Impacts

In agriculture, predictions show that the decline in rice quality will become more serious, the proper time for wet-rice cultivation could become staggered (making cultivation occur later in warm southwest regions to the west of the Kanto region and earlier in all other regions), and that the staggered cultivation of wet-rice will lead to reductions in the average national harvest amounts. Projections also indicate that high temperatures will cause such impacts as reductions in barley and soybean harvests as well as movement in the areas where fruit trees can be suitably harvested. Increased agricultural labor may also become necessary to prevent pests and weeds as they become higher in number. Moreover, there is concern that drops in snowfall and earlier snowmelts will significantly impact water use from early spring forward in agricultural regions that rely on melting snow as a water resource. Predictions also show an increase in damage from sea breezes accompanying typhoons. Projections in the fishing industry indicate the possibility for the habitats of northern fish varieties to move further northward, an expanding habitat for southern fish varieties, a shift in locations suited to aquafarming, and increases in infectious diseases among farmed fish.

[Examples of main projected impacts]

- More serious problems pertaining to rice grain-filling (reduction in quality and grain weight).
- Shift of regions suited for apple cultivation to the north (possibility that cultivation will no longer be viable in the central plains of the Tohoku region).
- Pests moving northward due to higher temperatures.
- Impact on the rice planting season owing to drops in snowfall and earlier snowmelts.
- Decreased habitat for salmon species and shift of herring habitat northward.
- Stunted growth of saury due to worsening feeding environment, accompanied by an increase in egg production as a result of a increase the feeding environment during the egg-laying season (on the Pacific Ocean side of Eastern Japan).
- Shift of regions suited for torafugu globefish cultivation to the north.

5.5 Impacts on the Natural Ecosystem

5.5.1 Impacts Observed to Date

Impacts on natural ecosystems can be broadly separated into impacts on the various sub-ecosystems, such as forests, alpine regions, fresh waters, oceans, coastal regions, and marshes, as well as the impact on biodiversity. Changes have been reported in the distribution of living organisms as well as the foundations of ecosystems, such as vegetation and water. In addition, natural ecosystems were tremendously impacted by human activities before being impacted by

climate change, and there is concern that climate change will inflict the final blow to areas where ecosystems have already been depleted from human activity.

- Decline of beech tree forests, decrease in beech tree reproduction, pine wilt disease in *satoyama* regions, decline of alpine region vegetation.
- Drying of high moors and decline in snowfield vegetation.
- Changes in ecosystems due to factors such as stagnating vertical circulation of lakes and drops in dissolved oxygen at lake bottoms.
- Shrinking distribution areas for cold-water fish in freshwater areas.
- Increase in southern fish species, decrease in northern fish species, and bleaching and extinction of coral in coastal areas.
- Impact on biological production from higher temperatures in the Okhotsk and other seas as well as drops in dissolved oxygen.
- Earlier blooming times for camellia, plum, dandelions, cherry blossoms, and similar flowers and later color changes for gingko and maple tree leaves, in addition to later defoliation.
- Belated blooming of flowers in Kyushu due to lack of cold-shock dormancy awakening.

5.5.2 Projected Impacts

Predictions show that the impacts observed until now in forest, alpine region, freshwater, ocean, coastal region, and marsh ecosystems will continue to advance in the future. The distribution of many organisms is expected to shift northward, however it is highly likely that this northward shift will be deterred by the fragmentation of habitats. There is also the possibility for irreversible impact depending on the degree of climate change, such as the extinction of species owing to their loss of refuge areas and environments. The stagnation of vertical circulation in lakes will spread, engendering multiple changes with the impact from water pollution and exotic species. Acidification will advance in oceans, impacting plankton and calcified organisms.

[Examples of main projected impacts]

- Decline in distribution suited to beech trees, as well as subalpine and subarctic conifer forests. Rapid decline in alpine vegetation.
- Expansion of bamboo groves as well as pine wilt disease in the Tohoku region.
- Increase in carbon dioxide emissions from forest soil in cold regions.
- Expansion of vertical circulation stagnation in lakes and oceans.
- Changes in species distribution and entry of new exotic species in freshwater areas.
- Competition and intercrossing between related species following the northward shift of southern species and subspecies.
- Reductions in sea ice in the Okhotsk Sea, leading to changes in the food chain and the migration route of migrating organisms.
- More significant impact on plankton and calcified organisms such as coral due to the

acidification of oceans.

- Increased bleaching of coral and decline in sandy beaches.

5.6 Impacts on Human Health

5.6.1 Impacts Observed to Date

The impacts on human health can be broadly separated into direct impacts resulting from heat and indirect impacts from phenomena including infectious diseases, air pollution, large-scale natural disasters and pests. Regarding the impacts from heat, reports have been made on increased mortality rates for patients with cardiovascular disease and respiratory disease, as well as a higher number of patients suffering from heat stroke. In regards to infectious diseases, reports have been made on the changes in the distribution of pathways for infectious diseases such as a northward shift in domestic distribution of tiger mosquitoes, which are carriers of dengue fever and other diseases, as well as the infiltration of sources from Southeast Asia carrying the new Japanese encephalitis. In addition, reports have been made that the seawater detection area for waterborne bacteria transmission is shifting northward as well.

- Increase in excess mortality caused by heat stress.
- In 2007, many cities recorded record-high numbers of heat stroke patients[2] (Over 5,000 patients in Tokyo and 17 other government-designated cities).
- Expanded distribution region for the tiger mosquito, which is a carrier of dengue fever and other diseases, and the infiltration of new Japanese encephalitis vectors from Southeast Asia.
- Northern shift of seawater detection area for the vibrio vulnificus bacteria.

5.6.2 Projected Impacts

Projections on the impacts of heat indicate an increased mortality risk from heat stress and particularly a rise in the number of cardiovascular disease patients. Projections also show an increase in the number of heat stroke patients, as well as such phenomena as the rise in nighttime sleep disorders owing to a larger number of tropical nights. These heat-spawned impacts are expected to be especially significant for elderly people. Projections on the impacts on infectious diseases include northern shifts in the distribution region for tiger mosquitoes in the Tohoku region and Hokkaido, as well as the spread of epidemic risks of dengue fever and Chikungunya fever throughout all of Japan due to the infiltration of dengue mosquitoes. Also, it is expected that the occurrence area of Japanese encephalitis would shift northward.

[2]The number of heat stroke patients here is the number of patients transported in ambulances under the jurisdiction of the Fire and Disaster Management Agency and the Fire Bureau. Patients that received treatment directly from medical institutions without using an ambulance and patients that did not receive treatment are not included in this number.

[Examples of main projected impacts]

- Increase in excess mortality caused by heat stress.
- Rise in the number of heat stroke patients (future prediction based on Tokyo).
- The possibility of expanded distribution regions for tiger and dengue mosquitoes, which are vectors of dengue fever, etc.

5.7 Impacts on Public and Urban Life

5.7.1 Impacts Observed to Date

The impacts of climate change on the lives of the public in general and on urban life in particular are closely related to each individual citizen and are present in their everyday lives. The question of how the impacts noted in sections 5.2 through 5.6 affect peoples lives can be organized into stage-based classifications of public life, particularly: safety, healthy, economically affluent, comfortable, and receptive to culture and history.

- Increase in international prices for wheat, corn, soybeans, etc. [3]
- Early blooming of plum, cherry, and other blossoms and delaying of autumnal leaves and defoliating .
- Impact on sightseeing and sports industries (ski resorts, etc.) due to changes in the natural environment and weather conditions.
- Increased records of Suwa Lake not freezing over and no formation of “Omiwatari,” the band of raised ice across the lake caused by the explosion of expanded ice.
- More frequent underwater submersions of the corridor at Itsukushima Shrine.
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5.7.2 Projected Impacts

Public and urban life is predicted to be widely impacted by climate change, including impacts relating to the safety and wellbeing, impacts on economic lifestyles, and impacts on the higher emotional demands of the public. These impacts are believed to affect residential areas (city and agricultural areas) and their constituents (individual, household, elderly people, educational institutions, local governments, etc.) in different ways and to varying degrees.

[Examples of main projected impacts]

- Loss of life, assets (houses, etc.), and communities due to damage from abnormal weather.
- Impacts on regional transportation modes, communication facilities, etc. due to abnormal weather.

[3] In addition to the impact from climate change, the rise in international prices is also related to such factors as the increased food demand owing to the economic development of massively populated nations such as China and India, as well as a rise in global demand for cereal crops and the such as raw material for biofuel.

- Increase in mortality, heat stroke, and infectious diseases due to heat waves.
- Stronger burden on household expenditures due to heightening agricultural crop prices and longer usage times for air conditioning.
- Raised levels of stress and discomfort in everyday life owing to a larger number of extremely hot days and tropical nights.
- Impacts on the tourism industry and recreational opportunities spawning from changes in ecosystems, including less alpine vegetation, loss of sandy beaches, and the reduction of marshes.
- Impacts on the sports industry resulting from declining and later seasons for snowfall.
- Lack of snow, changes in the season that cherry blossoms bloom, etc. eliciting impacts on community culture and the loss of regard for the seasons.

5.8 Adaptation Measures

With regards to adaptation towards addressing climate change, a report by Working Group II within the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) stated that, “Even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which makes adaptation essential, particularly in addressing near-term impacts.”[4]

In June 2008, the Committee on Climate Change Impacts and Adaptation Research of the Ministry of the Environment produced a report entitled Wise Adaption to Climate Change. This report indicated that in order to ensure an effective and efficient “wise adaption” to properly address the negative impacts of climate change, which tremendously affect the lives of all Japanese citizens, it is important to 1) utilize the latest results from regional vulnerability assessments, monitoring, etc., 2) consider and integrate various adaptation measure options, 3) Consider that temperature width and leeway are potentially addressable by adaptation measures with views on the short and long term, 4) properly incorporate adaptation measures into existing policies, if relevant, such as disaster prevention plans, and 5) to make natural and socioeconomic systems more flexible and responsive. In addition, the report noted the need to swiftly conduct these considerations from a preventative viewpoint.

[4]The United Nations Framework Convention on Climate Change establishes its ultimate objective as being the, “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system,” (Article 2). In aim to achieve this ultimate objective it is first important to allot the utmost efforts to appeasing climate change. Just as indicated in the Fourth Assessment Report by the IPCC, adaptive and appeasing efforts cannot avoid every impact of climate change if employed individually. However, utilizing both efforts in a mutually complementary manner will allow for significantly reducing the risk of climate change (Synthesis Report, Summary for Policymakers, pg.19).

Efforts were later made to conduct effective and efficient adaptation measures by partnering with administrative organizations, including the establishment of a liaison conference with relevant government ministries concerning adaptation. The Cabinet Office's Council for Science and Technology Policy established a task force in March 2009 to plan the direction of technological development aimed at realizing a society adaptive to climate change. This task force compiled a mid-term report in June 2009 and submitted it to the Council. The report established the following as issues that should be swiftly addressed in the future, along with technology aimed at addressing these issues: 1) strengthening infrastructure to realize a "green society" and expanding environmentally safe domestic demand, and 2) urban development for environmentally-advanced cities that are leaders in the international community, and creating a futuristic city that citizens will want to live in. The task force plans to conduct its final report in FY2009.

5.8.1 Adaptation Efforts for Natural Disasters

○ The role of adaptive measures in the water-related disaster sector for climate change accompanying global warming (Report)

In June 2008, the Council for Social Infrastructure of the Ministry of Land, Infrastructure, Transport and Tourism produced the report "The role of adaptive measures in the water-related disaster sector for climate change accompanying global warming" regarding the role of adaptation measures in the water-related disaster sector.

For adaptive measures to such disasters as floods, storm surges, and landslides, the report noted the adequate combination of 1) adaptive measures to facilities, 2) adaptive measures conducted in unison with community development, and 3) adaptive measures focused on handling crisis management. As large deviations in predictions exist against a backdrop of uncertainty about mitigation measure efforts and changes in social conditions, the report also suggested that monitoring be conducted with the purpose of assessing climate change.

Adaptive measures to facilities include: developing flood control facilities such as dams and flood spaces, revamping river channels by creating levees, thorough utilization of existing river management facilities, and establishing balancing reservoirs, rainwater storage facilities, and other facilities in water areas.

Adaptive measures conducted in unison with community development include: regulations and guidance on land use in disaster-prone areas as well as unified flood control measures, along with

an intensive urban development that allows for easily implementing said measures.

Finally, adaptive measures focused on handling crisis management include the formation of regional disaster-prevention networks, used for securing roads in times of disaster, provision of hazard maps, and enhancing river information provision for flood warnings.

In considering adaptive measures, proper combinations will be selected after evaluating the risk of water-related disasters that could occur from climate change, and these measures will be steadily implemented based on an implementation roadmap. In addition, an adaptive response system will be created by adequately monitoring fluctuations in precarious climate change phenomena, as well of social conditions. Revisions of the content and combinations of adaptive measures will be made accordingly when monitoring results and improvements in projection accuracy.

○ “The role of port policy in regards to climate change resulting from global warming” (March 25, 2009 Report)

This report organizes the basic understanding of changes in marine phenomenon and increases in disaster risk in coastal regions that accompany climate change and other factors resulting from global warming. The report also stipulates a basic direction and fundamental policies for ports in order to respond to these issues.

○ Large scale storm surge and flooding scenario in Tokyo Bay

A storm surge and flooding scenario was conducted in order to verify the present protective ability against such events and assess the risk of long-term climate change along the Tokyo Bay coastline, and the results have been publicly released. There are now plans to pull together counter policy measures for reducing the risk of disasters, such as damage to areas behind the bay incurred by storm surges, and for maintenance of port activities.

○ Reducing flood damage in cities

Efforts will be made to develop sewer systems and rainwater storage facilities to better respond to disasters resulting from heavy rain, which will intensify with climate change.

5.8.2 Adaptation Efforts in the Water Environment and Water Resources Sector

○ Promotion of rainwater and reclaimed water use

The use of rainwater and reclaimed water will be promoted in order to respond to the risk of drought, which will increase with climate change.

5.8.3 Adaptation Efforts in the Food Sector

○ Development of adaptive technologies in the agricultural, forest, and fishery sectors

It is important to prioritize the development of adaptive technologies to such phenomena as high temperature injury in consideration of the needs of production sites, as well as to conduct research in a planned manner that takes into account the projected impacts of global warming.

- Varieties that respond to high temperature injury, a problem that should be resolved in the short-term at production sites, are being cultivated and cultivation technologies are being improved in a planned manner.
- Varieties adjusted to the progression of future warming are being cultivated, cultivation as well as breeding and aquafarming technologies are being developed, and management methods for land improvement facilities that respond to changes in water demand that accompany a shift in cropping seasons are being established in a planned manner.
- It is planned that technologies responding to agricultural dangers (drought, flooding, etc.) as well as other disasters in agricultural lands, mountain areas, coastal areas, and fishing ports resulting from climate change will be developed in a planned manner.
- It is planned that technologies will be developed to predict the occurrence of and to handle new infectious diseases, pests, foreign fish species, and noxious organisms, which bear an increasing risk of impact on the agriculture, forest, and fishery industries due to the progression of global warming.
- It is necessary to continue scientific discussion on the limit (threshold) of warming impacts from a mid- to long-term perspective. Changes in production location and product serve as an index for making decisions, and these discussions should also include the viewpoint of agricultural, forest, and fishery ecosystems.

○ Promotion of global warming adaptive measures in the agricultural sector

- In June 2007, the Report on Adaptive Measures to Global Warming by Item was created.

  (The report introduced adaptive measures from a technological perspective, covering currently used as well as newly developed technologies.)

- In September 2009, the 2008 Survey Report on the Impacts of Global Warming was created.

(This report is a survey of the impacts of and adaptive measures to global warming in fiscal 2008. The same report has been created every year since fiscal 2006.)

- From 2008 the verification and spread of stable agricultural production technologies adapted to global warming was launched as part of the Project for Comprehensive Countermeasures to Global Warming for Agricultural Production. This was an effort to promote the verification and spread of agricultural production technologies that avoid high temperature injuries as a result of the impact of global warming.

From 2009 the Project for Establishing a Strategic Response System for Global Warming was launched as part of the Project for Comprehensive Countermeasures to Global Warming for Agricultural Production. This was an effort to develop a promotional structure for global warming adaptive measures that would offer a strategic response, while also supporting the efforts of model production regions via area diagnosis and technical guidance.

○ Development and promotion of adaptive measures in the fishing sector

Adaptive measures to global warming will be promoted in the fishing sector by developing impact assessment methods via the coastal fishing environment. These will be monitored by automated observation buoys utilizing swift and simple methods. Molecular biology methods will be used to monitor toxic and harmful plankton. In addition, aquafarming fish types that are highly resistant to high water temperatures will be assessed and selected utilizing genomic information such as DNA markers.

5.8.4 Adaptation Efforts for Natural Ecosystems

- In order to assess the impacts on Japan's ecosystems from global warming, monitoring sites have been installed in nearly 1,000 locations throughout the country, including areas such as alpines regions, marshes, tidelands, and coral reefs, for which the impact of global warming is thought to be particularly prominent. These sites are used to promptly record such changes through the implementation of the Project to Promote Regional Monitoring of Important Ecosystems (Monitoring Site 1000). In addition, other projects such as for natural restoration are being implemented in river areas to preserve, restore, and create a favorable natural environment. Time-based monitoring is underway via the National Survey On Natural Environment In River And Watershore to assess the changes in river environments.
- The adaptation efforts of major players including the national government, local public authorities, researchers, and NPOs and NGOs will be promoted by disseminating basic information necessary for adapting to global warming.
- An investigative commission was held three times between January and March 2009 to discuss such issues as the role of an ecological network, which is believed to contribute to boosting the capacity for adapting to environmental changes such as climate change. During these sessions the commission deliberated on a nationwide framework for Eco Net.

5.8.5 Adaptation Efforts in the Health Sector

- In regards to heat stroke prevention, efforts are being made to create materials such as manuals and leaflets, distribute them to relevant organizations, and educating the public about heat stroke, as such measures have been deemed important. In addition, information is provided via flash bulletin on websites regarding projected and preliminary heat index figures

(WBGT) as well as details about the occurrence of heat stroke patients, which contribute to preventing heat stroke. The Ministry Liaison Conference on Heatstroke is also held between related ministry offices in order to deliberate on efficient and effective measures to counter heatstroke as well as to share information.

References

IPCC (2007): The Fourth Assessment Report

The Committee on Climate Change Impacts and Adaptation Research, Ministry of the Environment (2008): Wise Adaption to Climate Change

Council for Social Infrastructure, Ministry of Land, Infrastructure, Transport and Tourism (2008): The role of adaptive measures in the water-related disaster sector for climate change accompanying global warming (Report)

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. One of the main priorities addressed by the ODA is global issues, including environmental problems. The charter states that, as a principle of ODA implementation, "environmental conservation and development should be pursued in tandem." Japan's Medium-Term Policy on ODA, announced in February2005, also makes global issues, including environmental problems, a priority issue that must be addressed. In this way the Government of Japan is trying to realize sustainable development on a global scale by supporting the self-ownership of developing countries.

Japan has communicated concrete proposals to the world through initiatives of the prime minister, including Cool Earth 50 (May 2007) and Cool Earth Promotion Program (January 2008, Davos Summit).

Cool Earth 50 expresses intent to provide wide assistance for developing nations that aspire to control greenhouse gas emissions while achieving economic growth. The initiative asserts that assistance will be provided such as for cutting greenhouse gas emissions, conserving forests, countermeasures in areas vulnerable to the impacts of warming, including rises in sea levels and drought, and the promotion of using clean energies, while utilizing Japan's technology and experience and paying thorough consideration to the circumstances of developing nations.

In addition, in order to implement tangible measures for realizing Cool Earth 50, in January 2008, Japan constructed Cool Earth Partnerships with developing countries. Under the Cool Earth Promotion Program, Japan announced that it would actively cooperate on efforts for cutting emissions (including energy-saving efforts), extend assistance to developing countries that are seriously damaged from climate change, and strengthen solidarity with developing countries while cutting greenhouse gas emissions on a global-scale.

At the United Nations Summit on Climate Change on September 2009, Prime Minister Yukio Hatoyama voiced that vast amount of financial resources would be required to resolve the climate change problem, in particular to support adaptive measures in vulnerable developing nations and island states. The prime minister thereupon announced that Japan is prepared to provide more financial and technical assistance than in the past, in accordance with the progress of the international negotiations. In addition, the Prime Minister expressed that developed countries must contribute through substantial, new and additional public and private financing and other principles, and these undertakings were proposed under the title of the Hatoyama Initiative.

6.1 Measures Concerning New and Additional Financial Resources Pursuant to Article 4.3 of the Convention

- Cooperation to the Global Environment Facility (GEF)

  Japan contributed US$410 million (total funds equaling US$2.02 billion) to the GEF during Phase I (1994-1998, GEF-1), US$410 million (total funds equaling US$2.75 billion) during Phase II (1998-2002, GEF-2), and US$420 million (total funds equaling US$3 billion) during Phase III (2002-2006, GEF-3). It is currently Phase IV (2006-2010, GEF-4) and US$310 million (total funds equaling US$3.13 billion) have been contributed to date.

- Cooperation to IPCC

  Japan has provided the IPCC with CHF180,000 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 (2007: ¥114.448 million; 2008: ¥150.113 million). In addition, Japan has contributed to IPCC personnel, including Takahiko Hiraishi, who is the chair of the IPCC Task Force on National Greenhouse Gas Inventories, as well as three head coordinating writers, 21 head writers, and five referee editors who participated in drafting the Fourth Assessment Report, which was completed and released in 2007.

6.2 Assistance to Developing Countries Particularly Vulnerable to Adverse Effects of Climate Change

- 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, with 1.17 billion in SDR payment base until the present (from the pilot phase that began in July 1991 until the end of November 2009).

- Contributions to the Least Developed Countries Fund

  The Least Developed Countries Fund supports such efforts as the preparation and implementation of National Adaptation Programmes of Action (NAPA) by least developed countries. Japan contributed US$250,000 to this fund in March 2007.

- Cooperation for the Adaptation Fund

  Japan contributed the clerical expenses (US$13,093 in 2008) of the Adaptation Fund as a grant until

2009, when the Adaptation Fund's carbon credits will become available for sale. In addition, Japan is making personnel contributions. The director of the Research and Information Office at the Ministry of the Environment has served as a board member of the Adaptation Fund since 2008.

6.3 Assistance through Bilateral and Regional Frameworks and Multilateral Channels

6.3.1 Bilateral Assistance

6.3.1.1 Initiatives by Japan

- The Hatoyama Initiative

  At the United Nations Summit on Climate Change on September 2009, Prime Minister Yukio Hatoyama voiced that vast amount of financial resources would be required to resolve the climate change problem, in particular to support adaptive measures in vulnerable developing nations and island states. The Prime Minister thereupon announced that Japan is prepared to provide more financial and technical assistance than in the past, in accordance with the progress of the international negotiations.. In addition, in regards to assistance to developing nations the Prime Minister expressed that 1) the developed countries, including Japan, must contribute through substantial, new and additional public and private financing. 2) we must develop rules that will facilitate international recognition of developing countries' emissions reductions, in particular those achieved through financial assistance, in a measurable, reportable and verifiable manner. 3) on assistance to developing countries, consideration should be given to innovative mechanisms to be implemented in a predictable manner. And an international system should be established under the auspices of the UN climate change regime. This system should facilitate one-stop provision of information on and matching of available bilateral and multilateral financing, while securing transparency and effective utilization of assistance. 4)Japan proposes to establish a framework to promote the transfer of low-carbon technologies which ensures the protection of intellectual property rights.. These undertakings were proposed under the title of the Hatoyama Initiative, and the Prime Minister addressed that Japan will exert every effort for the success of Copenhagen, in the course of formulating this initiative

- Cool Earth Partnership (overview)

  In January 2008, Japan utilized roughly US$10 billion in funds to construct Cool Earth Partnerships with developing countries that work to contribute to stabilizing the climate while achieving both emission reductions and economic growth. Japan then announced that it would provide assistance in

the climate change sector, and will fund roughly ¥250 billion over a five-year period beginning in 2008 through grant aid, such as Grant Aid for Environmental Programs, which was newly established in 2008 as a countermeasure for climate change. Moreover, yen loans as countermeasures against climate change were created in order to implement programs and projects that combat global warming in various countries, whereupon Japan is to provide approximately ¥500 billion in funds at a special interest rate over a five-year period from 2008. Japan is also to provide a maximum of roughly ¥500 billion over a five-year period from 2008 to greenhouse gas cutting projects in developing nations through investments and warranties provided by the Facility for Asia Cooperation and Environment (FACE) of the Japan Bank for International Cooperation (JBIC), trade insurance provided by the Nippon Export and Investment Insurance (NEXI), and the New Energy and Industrial Technology Development Organization (NEDO), as well as funds called on from the private sector.

These schemes are mobilized in unison to provide technical assistance for forest conservation and disaster prevention projects as well as for drafting disaster prevention and adaptation plans in response to climate change, among other initiatives. Other utilities include providing village development assistance including electrification via clean energies such as sunlight, and providing assistance for countermeasures against disasters such as drought and flooding.

One specific example is the provision of the Climate Change Program Loan to assist climate change countermeasures in Indonesia via policy dialogue. Other examples include the construction of a highly efficient power plant, construction of new power distribution facilities, and measures for the reduction of power distribution loss via revamping efforts in Bangladesh, as well as Grant Aid for Environment Programs to provide Kenya with flood countermeasures and for assistance to emergency water-supply measures in various African countries. In addition, the Cool Earth Seminar was launched, where capacity building was implemented for the environmental ministries and other bodies in approximately 30 developing countries.

- The Kyoto Initiative

  Japan launched the Kyoto Initiative in December 1997 at the 3rd Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change. Under this initiative, Japan provides assistance for developing nations related to countermeasures against global warming, while focusing on the three pillars of (1) cooperation in capacity development (3,000 people in five years), (2) ODA loans at the most concessional conditions (interest rate of 0.75 percent, repayment period of 40 years), and (3) exploitation and transfer of Japanese technology and know-how.

  As of present, approximately 8,200 people have been trained in the five years beginning in FY 1998 through such measures as training in Japan, training in third-party countries, dispatching specialists,

and dispatching the Japan Overseas Cooperation Volunteers. In addition, 123 ODA loans projects (worth for approximately ¥1.61 trillion) with concessional conditions related to global warming countermeasures were implemented between December 1997 and December 2008**.**

- Japan's Action on Adaptation: Building Capacity and Ownership

  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.

  ・Assistance through Promotion of Development Projects
  ・Capacity Building for Government Officials in Developing Countries
  ・Promotion of Climate Change Research and Personnel Development in Modeling Activities

- Assistance for Developing Countries and Measures for Adaptation in the Areas of National Land Development and Environmental Issues

  - Disaster Risk Reduction and National Land Development

  Initiative for Disaster Reduction through ODA: Japan announced its basic policy and concrete actions concerning international cooperation on disaster risk reduction through ODA at the United Nations World Conference on Disaster Reduction held in Kobe in January 2005.

  - Water Issues

  Water and Sanitation Broad Partnership Initiative (WASABI): In Mach 2006, Japan announced its basic policy, and concrete efforts on ODA relating to water and sanitation. In pursuit of sustainable water use and strengthening the perspective of human security, Japan has provided assistance for efforts including (1) promotion of integrated water resources management, (2) provision of safe drinking water and sanitation, (3) support regarding water use for food production and other purposes, (4) water pollution prevention and ecosystem conservation, and (5) mitigation of damage from water-related disasters.

  - Forests

  Asia Forest Partnership (AFP): With the objective of promoting sustainable forest management in Asia and Oceania, this partnership was launched in 2002 between Asian and Oceanic nations (mainly ASEAN), developed countries and international organizations, NGOs, and other entities to cooperate on activities including countermeasures against illegal logging, preventing forest fires, and rehabilitating (reforesting) degraded lands.

  The two key themes for Phase II starting from 2008 are (1) reducing forest loss and

degradation and enhancing forest cover to maintain the provision of forest products and ecosystem services, including mitigation of and adaptation to climate change, watershed and land resource protection, and conserving biological diversity and (2) combating illegal logging and associated trade.

- Global Environmental Problems

Environmental Conservation Initiative for Sustainable Development (EcoISD): This initiative was launched at the 2002 World Summit on Sustainable Development (WSSD). Japan has been implementing international environmental cooperation mainly through ODA in providing assistance for global warming countermeasures, conservation management of nature reserves and other areas, forests, desertification prevention, and natural resource management as high priority issues.

- Agricultural Issues

Assistance for New Rice for Africa (NERICA): NERICA projects aim to develop and disseminate high yielding upland rice varieties suitable for semi-arid regions, by cross-breeding African rice (which is resistant to diseases, weeds and drought) with Asian rice (which has high yield potential).

Financial assistance is being provided for research and development conducted by Africa Rice Center (AfricaRice) through contributions from the Consultative Group on International Agricultural Research (CGIAR) and the Japan-UNDP Partnership Fund. Joint research is also underway between AfricaRice and agricultural research institutions in Japan. Moreover, Japan is promoting NERICA rice by, for example, dispatching specialists through JICA to countries such as Uganda and providing assistance for NERICA rice cultivation tests in various African countries.

6.3.1.2 Specific Assistance Measures

- 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 to provide these courses in the future.

- 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 these courses since they were inaugurated. JICA will continue to provide these courses in the future.

- 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 capacity building of government project staff, mainly in the areas of gaining an understanding of the rules and the roles to be played by the developing countries provided by the Kyoto Mechanism. This course will continue to be provided to ten personnel from ten countries per year.

- Technical Cooperation for Development Planning (Development Survey)

  Assistance is being provided for promoting adaptation and mitigating measures for developing countries that have regional conditions vulnerable to the impacts of warming. This is conducted through implementing development survey projects that assist the drafting of these countries’ development plans along with the development of systems and policies. One example of adaptation measure assistance is the comprehensive agricultural survey conducted in Cambodia’s Prek Thnot River basin, which includes assistance for improving agricultural management technology for boosting agricultural production, developing irrigation facilities, and establishing a flood warning system. These efforts have engendered expectations for mitigating damage in the event that the seasonal fluctuation in rainfall becomes significant due to climate change.

  An example of mitigating measure assistance includes development plan surveys for women’s assistance in the oasis regions of Mauritania, which are conducted with the objective of presenting a regional development policy for better living and alleviating poverty. The installation of upgraded furnaces and other goods are being promoted, and it is anticipated that the improvement of fuel efficiency in households will contribute to controlling forest decline and, as a result, lead to curbing superfluous greenhouse gas emissions.

- Loan Aid

  Financial assistance is being provided for mitigating measures, etc. employed by developing countries through low-interest, long-term yen loans, which are extended as a part of official development assistance.

  In particular, Yen Loans for Climate Change Countermeasures have been provided since 2008 as an assistance measure based on the Cool Earth Partnership and with the objective of further actively assisting developing nations that will seriously address climate change with Japan. A special preferred interest rate is applied to these loans, which is offered to partner countries to which Japan

can provide yen loans. Specifically, Japan has provided cooperation for climate change countermeasures in Indonesia and Bangladesh until present.

- 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.

  One specific example is the assistance provided for creating a conservational forest on the coast of Senegal. In 2008, Grant Aid for Environment Programs was constructed as part of the Cool Earth Partnership in order to actively assist developing countries that aim to cut emission while also achieving economic growth. Based on this initiative, combinations of hard (facilities, etc.) and soft (training, etc.) assistance are provided. Further examples include assistance for countermeasures in Bangladesh and for implementing a water supply project in Ethiopia. Currently, additional assistance is being considered for the future that utilizes Japan's sophisticated environmental technologies, such as solar power generation.

- 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. This is conducted by combining the dispatch of experts, acceptance of trainees and provision of equipment.

  In 2008, joint research was conducted between research institutes in Japan and developing countries to produce results that lead to problem resolution. At the same time, Science and Technology Cooperation on Global Issues was created in an effort to develop the capacity of research institutes in developing nations, whereupon projects such as the Wild Fire and Carbon Management in Peat Forest in Indonesia and the Eco-technological Management of Tuvalu against Sea Level Rise were implemented.

  In addition, cooperation is underway in various countries for the preservation and restoration of forests, including forest resource management assistance utilizing satellite information in Indonesia (The Project for the Support on Forest Resources Management through leveraging Satellite Image Information), as well as a project utilizing ALOS satellite imagery to promote forest conservation and prevent illegal logging in the Brazilian Amazon (Utilization of ALOS Images to Protect Brazilian Amazon Forest and Combat against Illegal Deforestation).

- 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).

- Promoting the Co-benefits Approach

  Between Japan-China and Japan-Indonesia, joint research and model projects have been conducted using a co-benefits approach that addresses both climate change and environmental pollution, which is a pressing issue in developing nations. These joint activities are based on “the Statement on the Joint Implementation of Co-Benefits Studies and Model Projects by the Ministry of the Environment of Japan and the Ministry of Environmental Protection of the People’s Republic of China” and “the Joint Statement on Environmental Protection through Co-Benefits Approach by the Ministry of the Environment of Japan and the State Ministry of Environment, Republic of Indonesia” , which were agreed by the Environmental Ministers in December 2007.

- JBIC Facility for Asia Cooperation and Environment

  The JBIC Facility for Asia Cooperation and Environment was established in April 2008. The facility utilizes funds and the guarantee functions of JBIC with the objective of mobilizing private capital as much as possible in supporting projects that contribute to mitigating measures for climate change. The facility was established in order to assist funding support for energy conservation and new energy projects, as well as to assist funding for individual projects in the aforementioned sectors while guaranteeing financing from private sector financial institutions.

  In addition, the Leading Investment to Future Environment Initiative (LIFE), which utilizes JBIC, was announced in March 2009, where it was indicated that a total of US$5 billion in assistance would be provided over a two-year period for environmental investments implemented by developing countries’ governments and the private sector. This initiative centers on developing countries in Asia.

- Creation of Trade and Investment Insurance for Preventing Global Warming

  Nippon Export and Investment Insurance (NEXI) created Trade and Investment Insurance for Preventing Global Warming as part of the efforts in order to contribute to reducing greenhouse gas emissions through such measures as the transfer of energy conservation technology and new energy technology of Japan. NEXI started accepting underwriting of Trade and Investment Insurance for Preventing Global Warming in January 2009.

  The Insurance provides the following specific forms of assistance; (1) promoting use by setting a credit line of ¥2 trillion for a ten-year period, (2) increasing user convenience by applying the Insurance to a wide scope of projects that contribute to climate stabilization through trade-related facilities and equipment, or investments and financing abroad that contribute to reducing greenhouse gasses, (3) establishing an option for 100 percent coverage of country risk (political risk), thereby reducing risk related to project implementation.

- 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, public applications are received from private organizations, NGOs, and other institutions, and applicant surveys are conducted for waste management, biomass use, energy conservation, reusable energy, or other projects that are considered to be highly feasible and will have co-benefits such as decreasing environmental pollution (from 1998).

- Promotion of Co-benefits CDM Projects

  Co-benefits CDM projects are projects that reduce greenhouse gas emissions in developing countries while also improving environmental pollution problems prominent in developing countries, such as air pollution, water pollution, and waste management issues, in addition to realizing sustainable development. From FY2008 model projects were established as subsidy projects, and assistance is currently being provided for two projects in Malaysia and Thailand. The promotion of co-benefits technology and other measures were noted in the April 2009 The Innovation for Green Economy and Society" and at the May 2009 G8 Environment Ministers' Meeting, and these projects are to be continued in the future.

6.3.2 Assistance through Regional Frameworks

- Asia-Pacific Partnership on Clean Development and Climate (APP)

  This is a public-private partnership established in July 2005 with such objectives as addressing the increasing energy demand energy security and the climate change problem of the Asia-Pacific region. Currently, seven countries are participating in the partnership: Japan, Australia, China, India, Republic of Korea, United States, and Canada.

  Task forces have been established for the APP in eight sectors, which covers nearly 60 percent of CO_2 emissions in participating countries. Each task force is working to develop, spread, and transfer clean and efficient technologies that reduce greenhouse gas emissions and encourage economic growth. Specifically, the task forces are working to reduce greenhouse gas emissions through such efforts as sharing knowledge on technologies that are highly effective at reducting emissions, as well as conducting emission cutting potential analyses.

  In particular, the Steel Task Force and Cement Task Force , of which Japan is the chair of both, are conducting such efforts as energy conservation and environmental diagnoses, where specialists are dispatched to China and India to consider improvements and offer advice on issues.

- Asia-Pacific Network for Global Change Research (APN)

  The APN is an inter-governmental network whose major objectives are 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, which improves the capacity of researchers by hosting workshops, providing support for the participation of researchers in international research meetings, and training researchers. Key areas subject to project assistance research at the APN include climate as well as changes in atmospheric, terrestrial, and marine domains. In addition, from FY2009 efforts have been made to upgrade and expand the research assistance program focusing on the issue of scientific capacity building for climate change impact and vulnerability assessments in developing countries.

- 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 as well as 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.

  The eighteenth seminar held in March 2009 was attended by roughly 50 officials and specialists that serve as directors of climate change and development planning in 14 countries and ten organizations. At the seminar an active exchange of views took place on measurable, reportable, and verifiable actions (MRV), greenhouse gas emission data (inventory), the co-benefits approach, and adaptation measures based on scientific knowledge. As a result it was agreed that leadership by advanced nations in cutting emissions as well as proactive actions by developing countries will be necessary in order to cut global emissions overall. The following efforts were also agreed to be necessary.

  ・The actions of developing countries should be properly evaluated, and a well-understood framework should be constructed, developing a system related to MRV actions for a framework beginning from 2013 as well as creating an inventory.

  ・The realization of co-benefits (synergistic effects) in mitigating measures and mainstreaming the development of adaptation measures is necessary in order to fulfill the development needs of developing countries while instituting both mitigating and adaptation measures against climate change.

6.3.3 Assistance through Multilateral Channels

6.3.3.1 Cool Earth Partnership (contributions through international organizations)

- Japan-UNDP Joint Framework for Building Partnership to Address Climate Change in Africa
  This is an adaptation assistance framework providing US$92.1 million for about 20 African countries that was established at the Fourth Tokyo International Conference on African Development (TICAD IV) in May 2008 by Japan together with the UNDP, which is a co- organizer for TICAD, based on the Cool Earth Partnership. The Joint Framework includes introduction of a long-term national planning mechanism to address the impacts of climate change, building institutional frameworks to manage climate change risks, and implementation of adaptation measure. Currently UNDP is formulating country specific proposals, by coordinating with each government, towards actual implementation.

- Japan-UNDP Partnership Fund
  Assistance is currently being provided through the Japan-UNDP Partnership Fund for community-based climate change adaptation in Namibia and Niger (US$400,000, approved September 2008), enhancing the capacity of the clean development mechanism in Burkina Faso (US$300,000, approved December 2008), and enhancing the capacity of the clean development mechanism under the Kyoto Protocol in Rwanda (US$300,000, approved December 2008).

- UNV/Japan Trust Fund
  Assistance is being provided through the UNV/Japan Trust Fund for Community-based Adaptation in Climate Change in Bolivia, Guatemala, Jamaica, Morocco, Namibia, Niger, and Samoa (US$1 million, approved January 2009).

- ADB (ACEF)
  This is a fund established within the Asian Development Bank (ADB) in January 2008 through Japanese contributions in order to assist a response to such issues as climate change in member developing countries (establishment was announced at the 2007 Annual Meeting of the Board of Governors in Kyoto). This fund provides assistance for individual efforts aimed at cutting greenhouse gas emissions by ADB member developing countries through utilizing reusable energy and energy-saving technologies.

6.3.3.2 Climate Investment Funds (CIF)

These funds were established by Japan, the United States, and the United Kingdom as an assistance measure for efforts tackling the climate change problem in developing countries. Japan has encouraged the funds to ensure as many donor countries as possible, and has pledged to contribute a maximum of US$1.2 billion. Japan also participates in the fund's administrative committee, thereby actively contributing to the fund's operations.

6.3.3.3 Climate Change Countermeasures Assistance through the PHRD Fund

Through the Japan Policy and Human Resources Development Fund (PHRD Fund), established in partnership with the World Bank, Japan is contributing to the World Bank's Forest Carbon Partnership Facility (FCPF). The FCPF is a facility that supports pilot projects that enable emission cuts resulting from forest conservation to be transferred into carbon credits. In addition, from 2005 the PHRD has funded future climate forecast training at the Meteorological Research Institute and Japan Agency for Marin-Earth Science and Technology (JAMSTEC). The training is conducted for eight countries in Latin America and incorporates rises in temperature and sea level using the Earth Simulator, a supercomputer.

6.4 Measures Related to Transfer of Technology

6.4.1 Government Measures for the Promotion, Facilitation and Financing of the Transfer of Technology

- Asia-Pacific Partnership on Clean Development and Climate (APP) (as previously mentioned)

- 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)

- 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 to look 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. Japan has played a central role as an establishing member since its launch.

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. Specifically, 90 seminars, workshops, and side events were held by March 2009, and participation numbered over 6,000 people.

In addition, the Private Financing Advisory Network (PFAN), a public-private partnership, was launched with the objective of expanding fund procurement opportunities by business developers related to clean energy, reusable energy, and energy streamlining projects and to promote the transfer of technologies to developing and economically transitioning countries. A finance forum is being held with the purpose of building the capacity of business developers and matching investors.

- 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 engaged in efforts to promote the Green Aid Plan (GAP), which aims to enhance the awareness of the governments of Asian countries on environmental measures by engaging in policy dialogues with the partner countries, and to construct systems 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 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 the 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 and such to exploit and transfer Japanese technology and know-how. To date, 68 projects have been implemented in developing countries in the Asia Pacific region.

- Support for the International Tropical Timber Organization (ITTO)

  The ITTO conducts such activities as restoring depleted forests, sustainable forest management, and creating standards and indices for countermeasures against illegal logging that hinders sustainable forest management. These efforts are conducted for countries producing tropical timber in order that they may properly and efficiently utilize and conserve tropical forests. Japan provided assistance equaling approximately US$35.3 million for nearly 140 projects between 2004 and 2008.

- 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. Since FY2005 Japan has made voluntary contributions for accurately assessing and analyzing the current situation of forest management in Asian countries. Assistance is being provided for Strengthening Monitoring, Assessment and Reporting (MAR) on Sustainable Forest Management (SFM) in Asia, which was implemented in order to have the results from the aforementioned analyses fed back into forest policy.

- CDM Afforestation Related Projects

  The following efforts are being made as infrastructure development that contributes to implementing CDM afforestation projects by private sector businesses, etc.: (1) information collection on developing countries, (2) development of guidance for validation screenings, and (3) development of personnel in charge of planning of CDM afforestation plans.

- Project for Strengthening the Promotional Structure of Sustainable Forest Management in Siberia and the Far East

  In regards to forest sink activities conducted under the Kyoto Joint Implementation mechanism, a basic survey was conducted in order to assess technical problems, etc. in implementing projects in Siberia and the Far East.

6.4.2 Government Support Measures to Develop and Enhance the Capabilities and Technologies of Developing Countries

- 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 its member countries, financial and technological support, and promotion of information sharing, in order to achieve its Year 2000 Objective, of "all tropical timber and tropical timber product exports coming 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. 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.

- United Nations Forum on Forests Follow-up Partner Country Experts' Meeting on Forests

  International experts' meetings were held three times between 2006 and 2008 in order to support sustainable forest management efforts in developing nations, mainly in Asia. In 2006, the 17th Montréal Process Working Group meeting and the Workshop on Strengthening Monitoring, Assessment, and Reporting (MAR) on Sustainable Forest Management (SFM) in Asia were held in

order to consider such items as utilization of criteria and indicators for assessing sustainable forest management. In 2007, the 7th Meeting of the Asia Forest Partnership (AFP) was held in order to promote sustainable forest management in Asia.

- SBSTA Workshop

  Japan hosted an international workshop under SBSTA in June 2008 to discuss methodological issues, etc. for reducing emissions from deforestation and forest degradation in developing countries (REDD).

- Promotion of the Asia Forest Partnership

  The Asia Forest Partnership (AFP) is a partnership for Asia-Pacific countries (mostly ASEAN countries), developed nations and international organizations, NGOs, and other entities to cooperate on such activities as countermeasures against illegal logging, forest fire prevention, and the rehabilitation and reforestation of degraded lands. The objective of the AFP is to promote sustainable forest management in the Asia-Pacific region, and it was officially launched in 2002 at the Johannesburg Summit (World Summit on Sustainable Development (WSSD)). The two key themes for Phase II starting from 2008 are (1) reducing forest loss and degradation and enhancing forest cover to maintain the provision of forest products and ecosystem services, including mitigation of and adaptation to climate change, watershed and land resource protection, and conserving biological diversity and (2) combating illegal logging and associated trade.

  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 afforestation activities in developing countries undertaken by Japan’s private sector entities such as NGOs through awarding grants for previous studies and providing technical assistance through dispatching experts, and.holding international seminars. Since 2005, private sector’s efforts have been further assisted through building a network on the web to facilitate exchange of information and coordinate activities among organizations interested in afforestation in developing countries and through giving technical guidance to develop model projects for small-scale afforestation.

- Observation of Forestry Statuses Using Satellite Data

  Research and development, together with capacity building in developing countries, has been conducted to assess deforestation and forest degradation in developing countries using such means as satellite imagery.

- Flood Forecasting, etc. Utilizing Satellite Data

  In order to predict floods in regions with poor hydrological information, a flood forecast system (GFAS/IFAS) utilizing information including rainfall amounts observed by artificial satellite is provided on a website via grant aid. The Public Works Research Institute ICHARM is holding workshops on using the system.

6.4.3 Prevention of Acid Rain

Nitrogen oxide, which is one of the causative substances of acid rain, is considered as a contributer to tropospheric ozone production, one of the factors leading to warming. Thus countermeasures aimed at preventing acid rain contribute to preventing warming. Furthermore, by preventing damage to forests, countermeasures against acid rain contribute to the preservation of forests as sinks for CO_2, which is the most widespread greenhouse gas.

- Acid Rain Monitoring Network in East Asia

  In aim to create a framework for acid rain countermeasures in the entire East Asian region through international cooperation, the Network commenced regular operations in January 2001, following a preparatory phase conducted from April 1998 with the participation of 13 countries: Cambodia, China, Indonesia, Japan, Laos, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand, and Vietnam. The aim is to foster a common understanding among the participating countries on the current status of the acid rain issue in East Asia by preparing and evaluating reliable data that can be compared between the countries using a standardized method.

6.4.4 Prevention of Desertification

The importance of countermeasures to the problem of desertification, the degradation of land in arid regions that are vulnerable to climate change, has been pointed out from the perspective of adaptation to climate change as well as that of mitigating climate change, so as to reduce the accumulation of carbon in arid regions. Japan has traditionally promoted various projects related to addressing desertification through such means as bilateral official development assistance (ODA), including for the conservation of water resources, forest conservation and reforestation, agricultural development, and 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 that are affected by desertification can effectively implement the Convention. In addition, as a signatory country, Japan has considered the role of comprehensive desertification prevention measures from the perspective of contributing further to the implementation of the Convention to Combat Desertification, as well as for social and economic aspects. As part of these efforts, Japan has conducted a pilot study on constructing an early warning system that includes research on assessing and monitoring desertification using desertification indices. The results from

the study were announced at the Committee on Science and Technology under the auspices of the Convention to Combat Desertification.

6.5 Promoting International Cooperation in the Private Sector

- Cooperative Activities by Private Organizations

  Many of Japan's environmental protection technologies were developed by private corporations, and the role carried out by private corporations in technology transfers, such as direct investments in developing countries, is significant. The Japanese Government, various domestic NGOs, and groups such as the Japan Wildlife Research Center, International Lake Environment Committee, Overseas Environmental Cooperation Center, the Organization for Industrial, Spiritual and Cultural Advancement-International (OISCA-International), Nippon Keidanren, Japan International Volunteer Center, and Nippon International Cooperation for Community Development implement environmental protection projects and are conducting efforts to promote international environment cooperation, including holding symposiums, lectures, and seminars, in addition to assisting environmental conservation activities.

  Moreover, NGOs are providing afforestation cooperation in various forms in developing countries, including forestation guidance, dispatching forestation volunteers, and providing environmental education. For instance, the Green Earth Network (GEN), Japan Association for Greening Deserts, Defense of Green Earth Foundation (DGEF), Green Earth Center, International Society for Mangrove Ecosystems, Action for Mangrove Reforestation, OISCA, International Charcoal Cooperative Association, and other organizations are carrying out important roles in promoting forest and forest industry cooperation in various ways through thorough grassroots level response.

- 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; OISCA; the Federation of Economic Organizations; the Japan International Volunteer Center and the Nippon International Cooperation for Community Development) 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; 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 being provided to environmental conservation projects conducted by private organizations, such as NGOs, via such means as Partnership Grant Aid for Japanese NGO Projects and Grant Assistance for Grassroots Human Security Projects, which are offered by the Ministry of Foreign Affairs, as well as JICA Technical Cooperation for Grassroots Projects.

- Japan Kyoto Mechanisms Acceleration Program (JKAP) (as previously mentioned)

6.6 Considerations in Undertaking International Cooperative 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. 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 technical cooperation projects and preliminary studies of grant aid projects.

  The then Japan Bank for International Cooperation (JBIC) enforced the revised JBIC Guidelines for Environmental and Social Consideration in October 2003 for yen loan projects.

  These guidelines were formulated through a highly transparent and open process that reflected

proposals from Universities, non-governmental organizations (NGOs). Furthermore, these guidelines are groundbreaking in that they include objection procedures for local people. They also incorporate consideration for both natural environment and social issues, as well as provisions for information disclosure.

In concert with the launch of the new JICA on October 1st 2008, efforts are underway to unify the old JICA and JBIC guidelines. A draft is currently being created for new guidelines while acquiring the necessary advice from a committee composed of Universities, NGOs, the private sectors, and related ministries. There are also plans to seek public comments in the future. Discussion regarding the new guidelines is advancing while considering the prompt implementation of operations. There is also a basic need to publicize information at an early stage and further enrich the content of environmental and social considerations.

- Development and Dissemination of “the Manual for Quantitative Evaluation of the Co-Benefits Approach to Climate Change Projects”

  In order to include environmental consideration in climate change projects including CDM, “the Manual for Quantitative Evaluation of the Co-Benefits Approach to Climate Change Projects” was developed to present methods for quantitative evaluation of co-benefits in terms of environmental pollution mitigation.

Table 6.1 Contributions to the Global Environment Facility and OtherMultilateral Institutions and Programs (GEF)

Institution or program	Contribution				
	2004	2005	2006	2007	2008
Global Environment Facility (GEF) 1. GEF Trust Fund 2. Least Developed Country Fund (LDCF)	121	121	84 250,000 *3	84	84
Multilateral institutions:					
1. World Bank	44	122	115	96	82
2. International Finance Corporation	3	13	5	3	2
3. African Development Bank	1	1	13	13	9
4. Asian Development Bank	58	53	55	75	69
5. European Bank for Reconstruction and Development	4	4	4	4	3
6. Inter-American Development Bank	11	14	12	11	9
7. United Nations Development Programme-	95	88	83	87	82
8. United Nations Environment Programme	4	3	3	3	3
9. United Nations Framework Convention on Climate Change---Supplementary Fund	140,955 *3	231,505 *3	270,153 *3	1,044,761 *3	1,082,204 *3
10. International Tropical Timber Organization (ITTO)	2	2	5	7	7

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 figures listed above are the contribution for each year expressed in units of hundred millions of yen. Units are truncated. However, figures for “2. Least Developed Country Fund (LDCF)” under the Global Environment Facility (GEF) and the United Nations Framework Convention on Climate Change---Supplementary Fund, which is composed of multiple organizations names, are in dollar units.

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 2007 (Loan aid)

(US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China			134.13		146.86		160.44	441.43						
2.India		115.31	214.31					329.62						
3.Indonesia	220.85							220.85						
4.Viet Nam		177.31						177.31						
5.Kenya	47.71							47.71						
6.Samoa	39.03							39.03						
7.Morocco							26.87	26.87						
Total	307.59	292.61	348.44	0.00	146.86	0.00	187.31	1282.81						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.2 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2007 (Grant Aid)

(Commitment base: US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.Philippines	6.18						5.17	11.35						
2.Indonesia							7.47	7.47						
3. Asia (unclassified)			0.50					0.50						
4.Guyana			0.54					0.54						
5.Peru			0.08					0.08						
6.Papua New Guinea			0.35					0.35						
Total	6.18	0.00	1.47	0.00	0.00	0.00	12.64	20.29						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.3 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2007 (Technical Cooperation)

(Commitment base: US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China	0.03		1.57		0.00		1.63	3.23						
2.Viet Nam	0.14		1.95				0.30	2.39						
3.Mexico	0.02			0.07	0.37		1.43	1.90						
4.Mongolia	0.00						1.75	1.75						
5.Egypt							1.67	1.67						
6.Philippines			0.87				0.74	1.61						
7.Syria							1.28	1.28						
8.Algeria					0.04		1.06	1.1						
9.Thailand	0.00		0.05				0.92	0.97						
10.Peru	0.59						0.27	0.86						
11.Others	1.79		2.86	0.39	2.94		3.94	11.91						
Total	2.59	0.00	7.29	0.46	3.35	0.00	14.99	28.68						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.4 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2006 (Loan aid)

(US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.India		512.06	119.73	30.01				661.80						
2.Indonesia	246.02	16.06						262.08						
3.paraquay	183.87							183.87						
4.China			63.87				78.81	142.67						
5.Egypt	91.62							91.62						
6.mongolia						25.61		25.61						
								0.00						
Total	521.51	528.12	183.60	30.01	0.00	25.61		1367.65						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.5 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2006 (Grant Aid)

(Commitment base: US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China			1.87				6.81	8.69						
2.Myanmar							2.84	2.84						
								0.00						
								0.00						
								0.00						
Total	0.00	0.00	1.87	0.00	0.00	0.00	9.65	11.52						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.6 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2006 (Technical Cooperation)

(Commitment base: US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China	1.34		0.00	0.01	0.01		1.08	2.45						
2.Viet Nam	0.01		1.73				0.06	1.81						
3.The Dominican Republic	0.02				1.34			1.36						
4.Ghana	1.23							1.23						
5.Nigeria	1.14							1.14						
6.Mexico						0.00	1.10	1.10						
7.Palau					1.09			1.09						
8.Syria							0.94	0.94						
9.Egypt	0.00			0.01			0.86	0.87						
10.Nepal	0.00				0.70		0.06	0.77						
11.Others	1.86		1.48	0.09	1.59	0.06	3.40	8.48						
Total	5.62		3.22	0.10	4.73	0.06	7.50	21.23						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.7 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2005 (Loan aid)

(US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.Turkey		896.75						896.75						
2.India		175.22	227.31					402.53						
3.Indonesia	272.70							272.70						
4.Azarbaijan	265.94							265.94						
5.China			59.06				135.61	194.68						
6.Armenia	144.58							144.58						
7.Tunisia	15.72							15.72						
								0.00						
Total	698.94	1071.97	286.38	0.00	0.00	0.00	135.61	2192.90						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were extracted from areas thought to correspond from CRS purpose codes.

Table 6.2.8 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2005 (Grant Aid)

(Commitment base: US$ millions)

	Mitigation								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China			3.35					3.35						
2.Ghana							0.42	0.42						
								0.00						
								0.00						
								0.00						
Total	0.00	0.00	3.35	0.00	0.00	0.00	0.42	3.77						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for adaptation is difficult to extract since adequate data is not available in DAC/CRS and other data.

3) Sectors were derived from areas thought to correspond from CRS purpose codes.

Table 6.2.9 Bilateral and intra-regional economic cooperation related to the implementation of the Convention for 2005 (Technical Cooperation)

(Commitment base: US$ thousands)

	Reduction								Application					
Country/Region Receiving Assistance	Energy	Transport	Forestry	Agriculture	Waste disposal	Industrial	Others	Subtotal	Capacity building	Management of coastal regions	Other vulnerability assessment	Other vulnerability assessment	Subtotal	Total
1.China	1.44					0.01	1.68	3.14						
2.Nepal	0.01				2.14		0.03	2.17						
3.Bangladesh	0.04						2.13	2.17						
4.Cuba	0.02				1.66	0.02	0.02	1.71						
5.Syria	0.01				0.02		1.37	1.40						
6.Malaysia	0.02				0.01		0.90	0.94						
7.Mexico	0.03				0.05	0.02	0.81	0.91						
8.Nigeria	0.88						0.01	0.90						
9.Indonesia	0.01		0.75	0.01			0.09	0.87						
10.Laos	0.86						0.01	0.87						
11.Others	2.78		2.42	0.75	1.29	0.35	3.22	10.81						
Total	6.10		3.17	0.77	5.16	0.40	10.27	25.87						

Notes:

1) Mitigations were created based on Rio markers founded on DAC and CRS data (decimals are rounded to the thousandth).

2) The amount allocated for application is difficult to extract since adequate data is not available in DAC/CRS and other data.

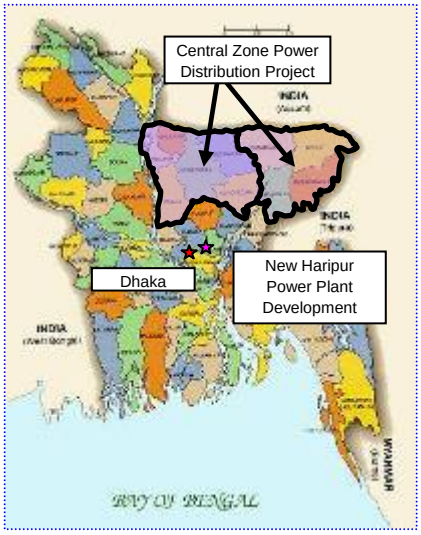
3) Sectors were extracted from areas thought to correspond from CRS purpose code

Table 6.3 Examples of Economic Cooperation Projects and Programs related to Implementing the Convention

Mitigating measures

Yen Loans for Climate Change Countermeasures

Bangladesh: New Haripur Power Plant Development Project, Central Zone Power Distribution Project



(1) New Haripur Power Plant Development Project (Phase II)

(22.21 billion yen)
(Planned location for new Haripur power plant construction)

Project Overview

This project is for the construction of and technical assistance for a highly efficient combined-cycle thermal power plant (360 MW) in Narayanganj Town, located in the suburbs of Dhaka, which will control CO2 emissions. Increased power generation paired with streamlined operations and maintenance will contribute to stable power supply. Thus CO2 emissions are expected to be reduced significantly compared to traditional power generation facilities.

(2) Central Zone Power Distribution Project

(9.715 billion yen)

(Power distribution in Bangladesh)

Project Overview

This project will construct and revamp a new power distribution network in central Bangladesh in the Greater Mymensingh and Sylhet districts. It will also provide assistance in developing the organizational infrastructure of the state-run power distribution network so as to decrease power loss during distribution, thereby cutting CO2 emission levels.

Mitigating measures

Grant Aid for Environment Programs

Bangladesh: The Programme for Improvement of Solid Waste Management in Dhaka City toward the Low Carbon Society

Development of Human Resources

Environmental education for Drivers etc. (Awareness on Global Warming)

Technical Assistance for Maintenance

Capacity Development of Dhaka City

Provision of Waste Collection Vehicles

Change to CNG Vehicles → CO2 Reduction

Maintenance

Tools and Equipment for Workshop

Formulation of CNG Promotion Plan

Waste collection trucks

Current truck

Natural gas powered truck (actual trucks may appear different)

Amount donated: 1.215 billion yen

Adaptation measures

Grant Aid and Loan Assistance

Bangladesh: -Seamless Assistance- Cyclone and flood countermeasures, emergency assistance, rehabilitation and reconstruction assistance

Cyclone shelters

-Project for Construction of Multipurpose Cyclone Shelters (grant aid):

A total of 81 cyclone shelters were constructed cooperatively in response to damage incurred during the 1991 cyclone. These shelters are utilized as primary schools during normal times. This project helped to equip these shelters against damage from the high tides that accompany cyclones, while also improving school facilities.

Occurrence of Cyclone Sidr

Cyclone Sidr
Occurred on November 15th, 2007 Maximum wind velocity: 69 m/s (250 km/h)
Minimum atmospheric pressure: 944 hpa

Bangladesh was directly hit by two major floods in July and September 2007, and then again by Cyclone Sidr in November. These disasters hit a vast number of victims, while also significantly damaging infrastructure such as roads and levees.

Seamless assistance provided

[Emergency Assistance]
—Provision of emergency relief supplies <grant> (November 2007): tents, blankets, water, etc.
—Provision of emergency grant aid assistance <grant> (November 2007): assistance through international organizations

[Rehabilitation Assistance]
—Emergency rehabilitation project for disaster damage <loan> (February 2008): The necessary funds were provided for importing goods vital to sustainable activities, such as agriculture. Also, roads, levees and other facilities were promptly restored.

[Assistance for reconstruction and countermeasures against future disasters]
— Needs assessment survey on cyclone disaster reconstruction assistance (December 2007): An assessment was conducted to consider mid- to long-term assistance needs.
—Project for Construction of Multipurpose Cyclone Shelters in disaster areas of Cyclone Sidr <grant> (June 2008): Under this project, there are plans to build 36 additional shelters in four provinces that were particularly damaged from the cyclone.

Adaptation measures

Programme Grant Aid for Environment and Climate Change

Kenya: The Project for Community-Based Flood Disaster Management to Adapt to Climate Change in the Nyando River Basin

Project Outline

This project is consist of construction for basic infrastructure (e.g. culvert bridge, weir, evacuation center, etc.) and promotion of public awareness for prevention of flood disaster in the 24 villages in Nyando River Basin in Kenya, based on the adaptation programme to climate change.

Location Map of Study Area

Construction for Bank Protection Works

Community Flood Management Training for Evacuation.

Adaptation measures

Development Survey → Grant Aid

Cambodia: Comprehensive Agricultural Development of Prek Thnot River Basin, Project for Improvement of Roleang Chrey Headworks

Project Overview

Prek Thnot River Basin is a major rice-producing area. However, production is unstable as the ratio of irrigated land remains low. Droughts in the dry season and flood damage in the rainy season are frequent, making this a region vulnerable from low production and self-sufficiency.

< Comprehensive Agricultural Development of Prek Thnot River Basin>

Between July 2005 and August 2008 a development survey was conducted in the basin with the objective of 1) considering measures for better agricultural production through the effective use of water resources (draft of the master plan), 2) providing project assistance for upgrading existing irrigation facilities that carry a high level of priority and urgency (FS survey), 3) establishing a flood warning plan and considering measures to reduce the damage incurred from flooding, 4) drafting plans for partner country counterparts and improving the technology related to irrigation management, spreading agriculture, etc. (employing a pilot project).
In the future, if climate change leads to greater fluctuations in rainfall and to the increased intensity and frequency of disasters such as drought and flooding, there is concern that the region will face a more serious level of production decline. However, based on the results of this survey, if irrigation facilities are developed and water resources are utilized effectively, it is anticipated that the resistance capacity against flooding and drought will increase. Furthermore, if the flood-warning plan proposed in this survey is actually drafted, it is expected to prevent flood disasters resulting from climate change from growing more serious.

< Project for Improvement of Roleang Chrey Headworks>

Under this project, assistance will be provided via grant aid for constructional improvements to facilities that have deteriorated and show marked decline in functional performance after a development survey is conducted 34 years following their construction (June 2009 EN). This will accordingly lead to reduced damage from flooding as well as proper and stable water supply in downstream irrigation areas

Mitigating measures

Mitigation Measure Assistance using Japanese ODA Loans (CDM Project)

Egypt: Zafarana Wind Power Plant Project

Project description	Authorized	Loan amount (million JPY)	Interest rate	Redemption period / deferment period
A wind power plant is being newly constructed in the Zafarana area, 220km southeast of the Egyptian capital of Cairo, on the coast of the Red Sea (With 120MW output, this plant will generate roughly twice the power of Japan's largest-scale wind power station at Soya [57MW])	October 2003	13,497	0.75%	40/10 years

- Registered as CDM project in June 2007 (The first large-scale ODA project in the world to become a CDM project)
- GHG reductions resulting from this project: Approx. 250,000 tons annually
- These reductions are comparable to the volume of CO2 absorbed by a forest roughly the size of Tokyo's 23 wards

(Image)

Cross-sectoral

Yen Loans for Climate Change Countermeasures

Indonesia: Climate Change Program Loan

Program Overview

Policy talks were held between the governments of Japan and Indonesia on climate change, whereafter a Policy Action Plan that contributes to climate change countermeasures was established and agreed on between the two governments. The plan is based on the National Action Plan Addressing Climate Change, which was drafted by the Indonesian Government. This program provides yen loans to Indonesia after an assessment of disbursements for the aforementioned action policy actions, which will be implemented by the Indonesian Government. Approximately 30.8 billion yen was provided in 2008, and during the aforementioned assessment, progress management monitoring was conducted on the agreed policy actions, while advice was offered relating to areas that need improvement. This program can be utilized as a base for clarifying the issues that require attention for policy actions and to achieve urgent objectives, while also incorporating the proper assistance in a timely fashion. The Agence Francaise de Developpement (AFD) of France, a co-financer for the program, is also participating in monitoring activities.

Policy Actions in Indonesia (examples)

Forest Sector

1) A pilot project will be launched ahead of a new market mechanism to prevent the decline of forests (Reducing Emissions from Deforestation and Forest Degradation (REDD)).
2) Efforts will be made to strengthen CO2 absorption capacity through the forest sector by firmly managing forested sites, including preventative measures against forest fires and the recovery of peatlands.

Water Resources Sector

The following measures will be implemented in order to enforce optimal management of water areas so as to adapt to the impacts of climate change.

1) Drafting integrated water resource management plans.

Energy Sector

<Power generation related>
Improvement of systems relating to reusable energy development, including geothermal power development.
<Industrial, domestic (household), and commercial sectors>
1) Related laws and ordinances will be developed aimed at improving energy efficiency.
2) Efforts will be made to improve data collection for energy consumption in the major industrial sectors (steel, cement, etc.). A roadmap will also be created aimed at cutting CO2 emissions. CO2 emission reduction regulations will be established that include targets for each sector.

Other

Policies and systems relating to CDM, co-benefits approach, early weather warning systems, etc. will be constructed and upgraded as part of cross-sectoral efforts in the agricultural sector, for national land use plans, and for other issues.

Chapter 7

Research and Systematic Observation

7.1 Comprehensive Government Policies and Fundraising for Research and Systematic Observation

In 1990, The Government of Japan established a budgeting system for the Global Environment Research Fund. This fund was for the research, observation and technological development concerning global environmental issues, for the comprehensive promotion of various types of research and studies on global environmental conservation, and for carrying out interdisciplinary and international global environmental research through cooperation among relevant ministries and agencies. In April 2001, the Global Environment Research Account for National Institutes was created to promote studies on global warming from both medium- 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. The Plan strives to comprehensively and systematically promote measures for environmental conservation with a view towards the mid-21st century. It cites the promotion of global warming-related measures as one of its key strategic programs. It also specifies related measures for the government to take by including sections on “improvements in research and studies, monitoring, and observation, and promotion of proper technologies” and “ensuring international cooperation concerning research and studies, monitoring, and observation.”

In March 2001, the Government of Japan adopted 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 Environmental Sciences was selected as one of four priority fields for allocating research and development resources. Accordingly, a sectoral promotion strategy for Environmental Sciences was decided in September 2001 by the Council for Science and Technology Policy (CSTP), chaired by the Prime Minister. The Council was established in 2001 as a central resource for comprehensive science and technology policy, strengthening coordination among related ministries and agencies in this sector. Under this promotion strategy, it was decided that the government as a whole will make it a top priority to “carry out observation and projection 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 methods to avoid or minimize any detrimental effects” in its global warming-related research.

Along with the above strategy, Japan has been comprehensively promoting observation and projection studies on global changes including global warming. In March 2002, the country began operating the world's highest performance supercomputer system, the Earth Simulator, used for studying global warming projections and changes in the Earth's interior. The Earth Simulator's functions were updated in March 2009 for higher-precision projection studies.
In November 2004, in order to strategically promote comprehensive research in the climate change field and based upon outcomes from research activities until then, the Strategic Promotion of Climate Change Research Policy was compiled by the Global Warming Research Initiative, a directive for environmental research under the CSTP.

Furthermore, in March 2006, the Government of Japan adopted the Third Science and Technology Basic Plan (from 2006 to 2010) and the academic field of Environmental Sciences was again cited as one of the four priority fields for allocating research and development resources. The Basic Plan also set out specific policy objectives that the science and technology sector should pursue, and cited "overcoming of global warming and energy problems" as one such objective.

In 2008, the Government of Japan adopted the Cool Earth-Innovative Energy Technology Program and the Environment and Energy Technology Innovation Plan, both of which serve as the nation's technological strategy toward realizing a low-carbon society. The plans set out a roadmap for developing and spreading key technologies that will contribute to reductions in greenhouse gas emissions in energy-consuming sectors, including the energy supply and industrial sectors, the civilian sector (such as households and offices), and the transport sector. In July 2008, the Cabinet adopted the Action Plan for Achieving a Low-Carbon Society as an action plan for implementing these measures.

The results of global warming projection and process studies under the "Kyosei" Project have greatly contributed to the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) released in 2007. The "Kyosei" Project used both the Earth Simulator and results from other global warming-related natural science studies, including scenario-based climate change studies funded by the Special Coordination Fund for Promoting Science and Technology, Grants-in-Aid for Scientific Research (Kakenhi), and ordinary budget funds. In order to also contribute to the Fifth Assessment Report of the IPCC, Japan launched the *"KAKUSHIN Program"* (Innovative Program of Climate Change Projection for the 21st Century) as a new five-year program to succeed the "Kyosei" Project in FY2007, and to continue research activities using the Earth Simulator.

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, and the following international and national observation activities are under way.

Internationally, at the Third Earth Observation Summit held in February 2005 in Brussels in accordance with an agreement reached at the June 2003 Group of Eight (G-8) Summit in Evian, France, the 10-Year Implementation Plan of the Global Earth Observation System of Systems (GEOSS) was formulated. Japan has been proactively contributing to GEOSS development by serving as a member of the Executive Committee of the Group on Earth Observations (GEO) and also co-chairing the GEO Architecture and Data Committee.

Domestically, in response to the 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 (MEXT) in February 2005 in order to annually elaborate upon the Earth Observation Implementation Policy. Currently the relevant ministries and agencies, as well as other concerned organizations, are working together toward the realization of a comprehensive, needs-driven Earth observation, based on the Implementation Policy, to be revised annually. In addition, under the Earth Observation Promotion Plan, a competitive research funding program started in April 2005, allows Japan to effectively implement research and development programs which directly contribute to the establishment of advanced Earth observation systems and GEOSS development through mobilizing highly competent research institutes.

Furthermore, in the Kyoto Protocol Target Achievement Plan formulated by the government in April 2005 and based on The Law Concerning the Promotion of Measures to Cope with Global Warming, there is a section on the “promotion of research on climate change and strengthening of observation and monitoring systems.” The plan states that it is a basic policy of the Government of Japan to strengthen comprehensive observation and monitoring systems.

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 in September 2001, individual research projects which had been implemented by various ministries were integrated into the following research programs. Consequently the

related research and development has been collaboratively promoted among industry, academia and government:

a Comprehensive monitoring program for global warming
b Research program for projecting 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 greenhouse gas emissions caused by human activities, such as energy generation
f Policy research program for controlling global warming

○ The Third Science and Technology Basic Plan (from 2006 to 2010) adopted by the Cabinet in March 2006 again cited the academic field of Environmental Sciences as one of the four priority fields for allocating research and development resources. The Basic Plan also set out specific policy objectives that the science and technology sector should pursue, and cited "overcoming of global warming and energy problems" as one such objective.

○ 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 research and studies based upon the appropriate international division of tasks, and otherwise promotes joint research and other initiatives with overseas research organizations.

○ Through the Asia-Pacific Network for Global Change Research (APN), Japan promotes research on global environmental change in the Asia-Pacific region in cooperation with researchers throughout the region, thus developing and improving 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 help realize sustainable development on a global scale, particularly with regard to the Asia-Pacific region.

○ As agreed at the G-8 L'Aquila Summit, the Government of Japan will continue to contribute to the development of GEOSS, promote the establishment of an integrated observation network employing satellite, oceanic and land observation systems, particularly in the Asia-Pacific region, monitor and evaluate the impact of climate change in the Asia-Pacific region, and provide information to national governments.

7.2.2 Priority Fields

Regarding research and studies on climate change and global warming, the Government of Japan, while taking into consideration the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, is comprehensively promoting research and studies on the observation and projection of global warming and its impact, the fixation, sequestration and reduction of greenhouse gases, global warming control policies and other countermeasures, and adaptation measures for environmental changes associated with global warming. In particular, since the issue of uncertainties of climate change projections were identified by the Fourth Assessment Report (AR4) of the IPCC, Japan has been addressing the reduction of these uncertainties mainly through the *"KAKUSHIN Program"* and by the Global Environment Research Fund. The latest results from this endeavor are expected to contribute to the Fifth Assessment Report of the IPCC, and some of the projection results are provided to developing countries for their regional adaptation studies. Furthermore, as bilateral cooperation, Japan-EU workshops and Japan-US workshops on global change projection studies are held biennially, in order to exchange information and compare projection results. The Government of Japan will also formulate guidelines for the compliance of the post-Kyoto Protocol and establish methods for assessing the absorption of greenhouse gases by forests.

The Government of Japan will also give priority to the promotion of research into the following areas: [1] climate, [2] ecosystems, biodiversity and land use, [3] changes in the atmospheric, terrestrial and marine domains, [4] utilization of resources and the path to sustainable development, and [5] cross-sectoral issues and collaboration between science and policy, in accordance with the strategic plan adopted at the Tenth Inter-Governmental Meeting of the Asia-Pacific Network for Global Change Research (APN), where these were identified as priority research subjects 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 and studies have been carried out on the following subjects: study on the spatio-temporal variability and climate change impact of ozone and black carbon in Asia; analysis of seawater temperature in the Asian monsoon region based on coral dentroclimatology; study on highly uncertain physical processes in climate models, such as the indirect effect of aerosols and the effect of radioactivity forced through clouds. In the Innovative Program of Climate Change Projection for the 21st Century, process studies focusing on the ecosystem on land and the mixed layers in the atmosphere or in the ocean are under way, with research results reflected in the development of climate models.

7.2.3.2 Climate Change Projection Modeling and Projection Studies

Climate change projection studies in the areas of sophistication of projection models, quantification of uncertainties, and impact assessment in natural disasters have been conducted under the *"KAKUSHIN Program"* using the Earth Simulator. The studies fall under the following five themes: (1) Projection of long-term climate change (up to 2300); (2) projection for the near future (20 to 30 years); (3) projection of extreme events (typhoons, torrential rains, etc.); (4) sophistication of the cloud resolution model; and (5) parameterization of marine microphysics.

Research carried out through the Global Environment Research Fund includes the followin g: integrated research on climate change scenarios to increase public awareness and contrib ute to the policy process; investigation of physical and chemical properties of aerosol by advance technologies for improvement of prediction of climate change.

7.2.3.3 Studies on Climate Change Impact

Research has been carried out on the following themes: comprehensive assessment of clim ate change impacts to determine the dangerous level of global warming and appropriate st abilization target of atmospheric GHG concentration; experimental study of ocean acidificat ion impact on benthic calcifies; current situation of biodiversity crisis in the forest-alpine ecotone and its mechanism under global change; and impact assessment of global warming on the circulation and ecosystem of large lakes.

7.2.3.4 Socioeconomic Analysis, Including Analysis of both Climate Change Impact and its Anticipated Reaction

Research has been carried out on the following themes: research project on establishing of methodology to evaluate middle to long term environmental policy options toward asian low-carbon society; research on development of integrated scenarios on climate change and

assessment of climate policies using Asia-Pacific Integrated Model; and analysis of climate change policies.

7.2.3.5 Research and Development on Reduction and Adaptive Technology

Research has been carried out on the following themes: adaptive measures to changes in geomorphology and water resources on atoll island countries; assessment of combined effects of rising temperature and ozone concentration on rice production and quality, and its application for mitigation of food supply risk in Asian countries; biofuel use strategies for sustainable development; scenarios and policies proposal for energy saving in residential/non-residential buildings toward creating a low-carbon society.

Furthermore, for the promotion of international research, at the G8 Environment Ministers' Meeting in Kobe in May 2008, the Government of Japan proposed the International Research Network for Low Carbon Societies (LCS-RNet) as one of the Kobe Initiatives, and its establishment was approved at the G8 Environment Ministers' Meeting held in Syracuse, Italy, in April 2009. Currently, a total of 10 organizations from six countries, including Japan, are participating in LCS-RNet. Research institutes of participating countries are expected to share information on research about low-carbon societies, promote research cooperation, and contribute to international policy-making processes on climate change, including the G8, by communicating research outcomes and recommendations..

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. Bearing in mind Japan's contribution to the development of GEOSS based on the 10-Year Implementation Plan, organizations that carry out such observations and monitoring should adopt methods consistent with international observation and monitoring projects. In addition, the results of their activities should be available to ensure that the data is utilized effectively.

○ Again bearing in mind the contribution to the development of GEOSS, the Government of

Japan participates and cooperates in international observation and monitoring programs conducted under the Global Environmental Monitoring System (GEMS), the Global Atmosphere Watch (GAW) Program, the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and the Joint World Meteorological Organization (WMO)/UNESCO Intergovernmental Oceanographic Commission (IOC) Technical Commission for Oceanography and Marine Meteorology (JCOMM). It also conducts wide-area observations and monitoring based on the appropriate sharing of international tasks. In addition, the government is also working to promote the Asia-Pacific Network for Global Change Research (APN) and to facilitate the implementation of observations 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, aircraft, ship and ground-based observations in cooperation with international organizations and research projects through GEOSS.

7.3.2 Priority Fields

The Government of Japan places special priority on promoting the observations and monitoring necessary to identify the causes, status and impacts of global warming and climate changes.

Observations and monitoring related to climate changes and global warming cover a wide area (and can include the entire globe), so Japan has actively been promoting the development of effective methods such as the utilization of various satellite sensors, as well as operating geostationary meteorological satellites.

7.3.3 Main Systematic Observations

7.3.3.1 Atmospheric Climate Observing Systems Including Atmospheric Constituent Measurement Systems

Homogeneous and high quality climate observations have been implemented over 150

meteorological stations in Japan for more than several decades. CLIMAT reports (the reporting format of monthly values from a land station set by the WMO) from some of these stations are exchanged internationally on a monthly basis. Japan, in a joint effort with Germany, has been monitoring the reception rates and data quality of CLIMAT reports from all over the world under the framework of the WMO. Japan has also been providing climate change-related information, based on climate data collected and analyzed through the above activities, in quasi-real time both within and outside Japan. Data from geostationary meteorological satellites, such as cloud amount, are used to monitor long-term changes in global radiation, and associated climate change. The Precipitation Radar (PR) aboard the Tropical Rainfall Measuring Mission (TRMM) satellite provides data for rainfall distribution in tropical and subtropical zones. In order to contribute to the further promotion of measures against global warming, including the grasping of the region-by-region status of greenhouse gas absorption and emissions, Japan launched the Greenhouse Gases Observing Satellite (GOSAT) in January 2009 and will start publishing observation data in the future. Furthermore, Japan has been promoting the following activities: research and development of a Dual-Frequency Precipitation Radar (DPR) for the Global Precipitation Measurement (GPM) project in order to internationally contribute in the field of global observations; research on the Global Climate Observation Mission (GCOM), which makes continuous global observations of climate changes and the circulation of water using microwave and multi-band optical radiometers; research on satellite-mounted sensors for observations of greenhouse gasses with higher accuracy; development of a comprehensive system to trace, analyze and forecast the changes in the Sun as well as Earth's upper atmosphere; international joint research for the development of comprehensive observation systems for the middle atmosphere; joint research into global environmental measurement technologies 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 Participation in the Global Atmospheric Observing System

	GSN	GUAN	GAW	Others
Number of stations	14	7	7	
Number of operating stations	14	7	7	
Number of stations operating to GCOS standards	14	1	7	
Number of stations expected to be operational in 2010	14	7	7	
Number of stations providing data to International Data Center	14	7	7	

*As of January 1, 2009, including the Showa Station in the Antarctica

Table 7.2 Atmospheric Observing Systems for Climate at Land Surface
(Land Surface Meteorological Observations)

System	Climate parameters	Total stations	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 2010
			Fully	Partly	No	30-50 years	50-100 years	More than 100 years	Fully	Partly	No		
Stations useful for national climate monitoring purposes	Atmospheric pressure	157	○			18 [18]	79 [79]	60 [60]	○			157 [100]	157
	Cloud	77	○			4 [4]	23 [73]	50 [0]	○			77 [100]	77
	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
	global solar radiation	59	○			59 [59]	0 [0]	0 [0]	○			59 [100]	59
	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 internationally		53											
CLIMAT reporting Stations		53											

*As of January 1, 2009, including the Showa Station in the Antarctica

Table 7.3 Available Homogenous Data Sets for Land Surface Meteorological Observations

Data set name	Climate Parameters	Stations and Region covered	Time period	Contact
Surface meteorological observation monthly and 10-day mean/total data file	Atmospheric pressure, clouds, weather, humidity, precipitation, global solar radiation, sunshine duration, temperature, wind	156 stations in Japan	1961-2008	Japan Meteorological Agency
Surface meteorological observation daily mean/total data file	As above	As above	1880s-2008	Japan Meteorological Agency
Surface meteorological observation monthly mean/total data file	As above	As above	1880s-2008	Japan Meteorological Agency

*As of January 1, 2009,

Table 7.4 Atmospheric Observing System (Upper Air Meteorological Observations)

System	Total stations	Appropriate for characterizing national/regional climates?			Times Series Stations [digitized]				Adequate Quality Control produres?			Meta data available Total stations [digitized (%)]	Continuity Stations expected to be operational in 2010
		Fully	Partly	No	5-10 years	10-30 years	30-50 years	More than 50 years	Fully	Partly	No		
Radiosonde Stations	17	○			0	0	8 [8]	9 [9]	○			17 [100]	17
Stations reporting internationally	17												
CLIMAT TEMP Reporting Stations	17												
Wind profiler stations	31			0	0	0	0	○				31 [100]	31

*As of January 1, 2009, including the Showa Station in the Antarctica

Table 7.5 Available Homogenous Data Sets for Upper Air Meteorological Observations

Data set name	Climate Parameters	Stations and Area covered	Time series	Contact
Upper air meteorological observation daily mean/total data file	Humidity, temperature, wind, altitude	16 stations in Japan Data at standard atmospheric pressure levels	1981-2008	Japan Meteorological Agency
Upper air meteorological observation monthly mean/total data file	As above	As above	1951-2008	Japan Meteorological Agency

*As of January 1, 2009

Table 7.6 Atmospheric Constituent Observing Systems for Climate

System	Total stations	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 2010
		Fully	Partly	No	10-20 years	20-30 years	30-50 years	More than 50 years	Fully	Partly	No		
CO_2	5	○			4 [4]	1[1]	0	0	○			5 [100]	5
Vertical CO_2 distribution	4	○			4 [4]				○			4 [100]	4
Surface ozone	7	○			5 [5]	0	0	0	○			8[100]	8
Total ozone	6	○			2 [2]	2[2]	2 [2]	0	○			6 [100]	6
Vertical ozone distribution	6	○			2 [2]	0	2 [2]	2[2]	○			6[100]	6
Other greenhouse gases	7	○			6 [4]	0	0	0	○			7[100]	7
Aerosols	8	○			4 [4]	2[2]	0	0	○			8[100]	8
Vertical aerosols distribution	21	○			0	0	0	0	○			21 [100]	21

*As of January 1, 2009

Total of the Meteorological Agency's observation stations (including the Showa Station in the Antarctica) and the National Institute for Environmental Studies' observation stations

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, the North-East Asian Regional Global

Ocean Observing System (NEAR-GOOS).

Furthermore, Japan has been making efforts to enhance the observation and monitoring systems, and other measurements, to determine time-and-space-related distributions of CO_2 in the ocean, while continuous observation has been implemented at nationwide observation points to monitor the change in the sea levels. Oceanographic observations have also been carried out to monitor oceanic changes associated with climate changes in the western North Pacific. With the aim of sophisticating climate change projection models, 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, Japan has been promoting the following activities: preparation of the foundation 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 marine environmental observations; research on the Global Climate Observation Mission (GCOM), which makes continuous global observations, including the ocean, using microwave and multi-band optical radiometers; provision of data on the rainfall distribution in tropical and subtropical zones using the Precipitation Radar (PR) aboard the Tropical Rainfall Measuring Mission (TRMM) satellite; research and development of a Dual-Frequency Precipitation Radar (DPR) to be mounted on the main satellite for the Global Precipitation Measuring (GPM) project; research on the Global Climate Observation Mission (GCOM), which makes continuous global observations of climate changes and the circulation of water using microwave and multi-band optical radiometers; and research into remote sensing technologies.

Table 7.7 Participation in the Global Ocean Observing System

	VOS	SOOP	Tide gauges	SFC drifters	Sub-SFC floats	Moored buoy	ASAP
Number of stations	485	37*3	15*2	27*1	355*3	18*1	5
Number of stations providing data to International Data Center	59*4	37*3	15*2	27*1	355*3	18*1	5
Number of stations expected to be operational in 2010	The same as at present or more	37*3	15*2	27	355*3	18	5

*1: As of July 16, 2009

*2: Tide gauges registered with the Global Sea Level Observing System (GLOSS), including the Showa Station in the Antarctica

*3: As of July 15, 2009

*4: The number of ships that sent observation table data to the GCC in fiscal 2008

7.3.3.3 Terrestrial Observing System for Climate

Japan is continuously strengthening its observation and monitoring systems and other measures to scrutinize the temporal and spatial distribution of greenhouse gases such as CO_2, CH_4, N_2O, CFCs, and tropospheric ozone, and has also been carrying out the following: monitoring of greenhouse gas flux in northern forests; observation of CO_2 and CH_4 by the Greenhouse Gases Observing Satellite (GOSAT); launch and operation of the Advanced Land Observing Satellite (ALOS); provision of data on the rainfall distribution in tropical and subtropical zones using the Precipitation Radar (PR) aboard the Tropical Rainfall Measuring Mission (TRMM) satellite; operation of the Advanced Microwave Scanning Radiometer-E (AMSR-E) for marine environmental observations; research and development of a Dual-Frequency Precipitation Radar (DPR) to be mounted on the main satellite for the Global Precipitation Measuring (GPM) project; research on the Global Climate Observation Mission (GCOM), which makes continuous global observations of climate changes and the circulation of water using microwave and multi-band optical radiometers; research into satellite-mounted sensors for enhancement of the accuracy of observation of greenhouse gases; research on the Global Climate Observation Mission (GCOM), which makes continuous global observations, including the land surface, using multi-band optical radiometers; and research into remote exploration technologies that carry 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, Relevant Data and Monitoring Systems

Japan has been conducting joint research on global environmental observations and promoting technical transfers in order to build observation networks in areas lacking such facilities in Asia. Japan has also been promoting “science and technology diplomacy,” such as the establishment of strategic environmental monitoring systems using satellites in the Asia-Pacific region, pilot projects concerning the utilization of satellite data through the Asia-Pacific Earth Observation Pilot Project, and capacity development.

Chapter 8

Education, Training, and Public Awareness

8.1 Approaches to Policies and Measures

CO_2 emissions have been consistently increasing in recent years in the residential, commercial and transport sectors, which are all closely related to public life. To mitigate global warming, everyone must shift from the "mass consumption and disposal lifestyle" to one of resource and energy conservation. At the same time, the use of non-fossil fuel energy, including new, renewable, and nuclear energy, should be considered.

To that end, opportunities to learn about global warming, as well as the energy issues closely involved, 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. Japan is also committed to increasing the support for environmental NGOs, which promise to play a leading role as advisors in public efforts to address global warming.

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. The Government of Japan will also 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 subsequently came into full force in October 2004 after a Cabinet Decision on its basic policy (held on September 24, 2004). At Japan's proposal, the United Nations Decade of Education for Sustainable Development (UNESD) (2005-2014) was launched. The Government of Japan established the Interministerial Meeting within the Cabinet and formulated Japan's Action Plan for the "United Nations Decade of Education for Sustainable Development" in March 2006. Furthermore, in accordance with the "21st Century Environmental Education Initiatives—To Provide Environmental Education for Anyone, Anywhere, and at anytime (Triple-A initiatives)" under the "Becoming a Leading

Environmental Nation in the 21st Century: Japan's Strategy for a Sustainable Society" (adopted by the Cabinet on June 1, 2007), the Government of Japan strengthens cooperation among relevant ministries and agencies and promotes a diversification of high-quality lifelong environmental learning opportunities in households, schools, communities and businesses.

In order to have efforts to prevent global warming take root in people's daily lives, the Government of Japan proactively provide venues and opportunities in households, schools, communities and businesses to learn about the importance of protecting global environment, links between the global warming problem and people's everyday life, energy problems closely associated with global warming and concrete examples of practicable efforts to mitigate 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 regional role. This will be done through measures such as renovation, including the introduction of heat insulation materials and the utilization of locally harvested timber that would contribute to global warming countermeasures, the introduction of new energy devices, and the use of the Internet to promote the support of 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 the public in collaboration with concerned entities such as NPOs.

In addition, the Government of Japan will promote various hands-on activities in forests and green park areas in order to deepen understanding of their role in preventing global warming, and show the necessity of forest development, the cyclical use of timber resources, and the value of urban greening, among others topics.

8.2.2 Specific Measures

- Promotion of Environmental Education Provided by Schools

  By revising the Courses of Study for elementary and junior high schools in March 2008 and for high schools in March 2009, Japan upgraded the contents of environmental education, focusing on closely related subjects such as social studies, science, and technical and homemaking courses. As a specific measure to promote environmental education, the Government of Japan also conducted research and studies on this new type of environmental education, sponsored environmental learning fairs and basic training seminars for teachers and citizens serving as environmental education leaders, and certified GLOBE (Global Learning and Observations to Benefit the Environment) model schools and environmentally friendly school facilities (eco-schools).

  Moreover, given the significance of various hands-on activities, including those that focus on experiences in nature's stages of growth in order to foster the social development of students, the

government is implementing projects contributory to environmental education and studies, including Long-term Stay Experiences in Nature (Rural Contact Lifestyle Experience Promotion School) and Cultivating Schoolchildren with Shining Hearts. The government is striving to further enhance environmental education in schools. 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 educational standard 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
  In order to help build up cooperation among community centers and other relevant organizations in respective regions so as to better address environmental issues and thus increase learning activities, the Government of Japan is undertaking projects to provide prioritized support to particularly excellent regional efforts and disseminate information on such efforts nationwide to promote similar efforts.

  The government is also promoting environmental education at youth education facilities, providing young people with opportunities for hands-on environmental education in rich natural environments, and with activities for experiences in nature.

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 such activity, the government is promoting environmental education and environmental studies policies in diverse places such as households, regional communities, parks, and national forests. The policies include 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 commenced. Through this project information is provided and teaching materials are distributed using the Internet, and events provide places for hands-on activities.

- 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. In FY2008 there were 4,126 clubs with 184,710 children participating.

- 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 in various environmental conservation activities by communing 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. In FY2008, the project was conducted at a total of 18 national parks and other places.

- Environmental Education at Urban Parks

  Since 1996 the government has been running a project to prepare "environmentally friendly parks" as centers for public environmental activities and for 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 various forest experience activities aimed at children, establishing model school forests for the development and utilization of school forests, and providing forest experience study utilizing the planning capacity of NPOs. They are also supporting the development of a structure for the promotion of forest environmental education activities. For example, the government is constructing a network for environmental education about the use of timber.

The government has also established Recreational Forests as places in national forests for hands-on activities led by schools. Hands-on activities sponsored by the Regional Forest Offices and District forest offices and providing information and technical instruction are also being implemented.

- Promotion of the United Nations Decade of Education for Sustainable Development (UNDESD)

  The Government of Japan is taking such initiatives as the development of human resources and consideration of a registration system to support "practices in communities," a priority area of activities in the initial phase of the domestic implementation plan for ESD, as well as the development of programs at universities supporting "practices at institutions of higher education," the establishment of a government-industry-academia consortium for environmental leadership, and the Environmental Leadership Initiative for Asian Sustainability in order to strengthen the network of universities in Asia.

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

lifestyle, and public awareness and action is required to do so.

The Government of Japan will encourage voluntary actions in each individual citizen by strongly appealing to public awareness. This will be done through the appropriate provision of information using diverse methods. In doing so, the government will work to foster a sound sense of crisis, using 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 across all sectors of society, including businesses, and to allow the public to absolutely understand specific global warming prevention actions, 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 the public to work as one to prevent global warming. With respect to countermeasures concerning the reduction of greenhouse gas emissions, it has organically campaigned, using the Internet, television, newspapers, and radio, urging people to take six specific warming prevention actions including setting heaters and air conditioners to appropriate temperatures.

  And one example of these efforts, 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 28C° in the summer and set the heating to 20C° in the winter and work comfortably and efficiently at those room temperatures.

- Measures through the Japan Center for Climate Change Actions and Prefectural Centers for Climate Change Actions

  In accordance with the Law Concerning the Promotion of the Measures to Cope with Global Warming enacted in April 1999 and revised in June 2008, the Japan Center for Climate Change Actions and Prefectural Centers for Climate Change Actions have been engaged in activities to help raise public awareness and publicize global warming countermeasures.

  The Japan Environment Association was designated as the Japan Center for Climate Change Actions in July 1999 as one of the bases to support nationwide and community-based activities in order enhance public awareness about global warming. As of July 2009, a total of 45 regional centers for climate change actions have been designated across Japan, serving as promoters of

global warming countermeasures in their respective 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 related to daily life 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. The national and local governments are stipulating their goods and services procurement policies in line with this Basic Policy and implementing priority procurement of environmentally friendly goods and services. The law also requires local governments, businesses and the public 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 5, which is Japan's annual Environment Day. Specific activities include: the Eco-Life Fair, an environmental exhibition; Eco Car World, a low-emission vehicle exhibition; various lectures, symposiums and events; preparation and distribution of pamphlets and posters; the commendation of parties who provide outstanding environmental conservation services; and public relations campaigns using such media as television, radio, newspapers and magazines.

- 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 contribute to global warming prevention; 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 is associated with the International Day for the Preservation of the Ozone Layer on September 16. Various ozone layer conservation and global warming prevention-related activities have been promoted, including those focused on reducing emissions of ozone layer depleting substances and three fluorinated gases, such as HCFs. Some types of activities include the distribution of brochures and posters, holding of briefing meetings on the Fluorocarbons Recovery and Destruction Law to raise public awareness about the recovery of CFCs, and the commendation of companies and organizations that have contributed to ozone layer conservation and the mitigation of global warming.

● Measures Centering on the 3R Promotion Month

October has been designated Japan's 3R (reduce, reuse and recycle) Promotion Month, when the central and local governments promote various activities to help raise public awareness about 3R activities. Specific examples of activities and events for the month include the holding of the 3R Promotion National Convention, the Awards for Achievement in Promoting 3R Activities, presented at the convention, the 3R Poster Contest for the commendation by the Minister of the Environment, and the Awards for Resource-Recycling Technologies and Systems, designed to promote recycling businesses.

● Promotion of Visualization of Greenhouse Gas Emissions by Building the Carbon Footprint System

In order to help promote businesses' efforts to efficiently reduce greenhouse gas emissions as well as to induce consumer behaviors to promote emission reductions through choices of lower-emission products and services, the Government of Japan is promoting the creation and spread of the carbon footprint system, which displays greenhouse gas emissions generated throughout a product or service's life cycle from the procurement of raw materials to its disposal and recycling in terms of the CO_2 amount emitted, all done in a simple and easy-to-understand manner.

● Awareness Campaign for Energy Conservation

The Council for Promoting Energy and Resource Conservation-Related Measures, in order to promote cooperation on energy conservation measures in all sectors of society, decides the "summer (winter) energy conservation measures" every year and strengthens its awareness campaigns in conjunction with various ministries and agencies during these seasons when energy consumption tends to increase.

Furthermore, in order to promote energy-saving in both the household and business sectors, the

government adopted “Strengthening the National Movement for Energy Conservation” in 2007, undertaking public relations activities to inform the public of concrete energy-saving behaviors in an easy-to-understand manner though such events as contests that introduce energy-conservation ideas that can be implemented in households and schools and that have an actual measurable impact.

- Awareness Campaign for 3R

  In order to disseminate and promote 3R (reduce, reuse and recycle), the Government of Japan operates the website “Re-style” to help enhance public awareness through the Internet.

- 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) awarded 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 and teachers are supplied, and symposiums and seminars are held to effectively carry out public relations activities aimed at promoting a mutual understanding about 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. A variety of seminars are held, pamphlets and posters are prepared 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 the development of public participation greening campaigns such as national greening campaigns in Greenery Month, Urban Greening Month, etc. as well as promoting the establishment of a private sector forest, greening activities funded through charity collections, and urban greening funds.

- Development of the “National Movement for Fostering Beautiful Forests in Japan”

With broad-based public understanding and cooperation, the government is promoting the building of a rich, green, recycling-oriented society that promotes appropriate forest development through the use of timber, the fostering of energetic people and robust communities to support forests, and broad-based participation by urban citizens and businesses in afforestation activities.

- Awareness Campaign for Transport Sector Environmental Issues

  Environmental measures for the transport sector are being 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. This information is distributed 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.

- 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 its current status and future estimates, such as the Climate Change Monitoring Report, Global Warming Projections, and the Report on Climate Change.

  In October 2005, the Report on Climate Change was publicized after an interval of 6 years to provide the latest scientific knowledge on climate change and global warming.

  Furthermore, Japanese editions of the Summary for Policymakers (SPM) and Technical Summary (TS) of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) have also been prepared and published.

● Promotion of Eco Action Point

In order to facilitate initiatives to provide economic incentives so each member of the public can help to mitigate global warming, as incorporated in the “Becoming a Leading Environmental Nation in the 21st Century: Japan’s Strategy for a Sustainable Society” and the Kyoto Protocol Target Achievement Plan, the Government of Japan is promoting the Eco Action Point system, a mechanism where consumers can accumulate eco points by purchasing products or services contributory to reducing greenhouse gas emissions or for making energy-saving actions and then exchanging those points for goods and services.

The government will support the launch of model projects selected on an application basis in FY2008-2009 for full-fledged operations with participation by as many consumers and businesses as possible.

The government provides financial support only for the cost of launching model projects, with participating businesses will foot the bills for points to be exchanged for other goods and services later. The government hopes that Eco Action Point Projects will be self-sufficient after several years of official support.

● Project to Promote the Spread of Green Appliances Using Eco Action Points

The Government of Japan started this project under the supplementary budget for FY2009 for the purposes of (1) promoting global warming countermeasures in the household and business sectors where CO_2 emissions have increased 40 percent over the base year; (2) revitalizing economic activities by stimulating demand for products of the consumer electronics industry with many supporting industries; and (3) facilitating the spread of terrestrial digital media broadcasting (T-DMB) television sets.

Consumers who buy government-designated home electronics appliances (air-conditioners, refrigerators and T-DMB TVs) get eco points they can accumulate and exchange for a variety of goods and services later as a measure to promote energy-saving home electronics appliances. Government subsidies partly finance points provided to consumers. This eco-point project is applicable to appliances bought on and after May 15, 2009.

8.4 Support for Environmental NGOs

8.4.1 Outline

The vital activity and healthy development of environmental NGOs and similar private groups are indispensable for the success of 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

● Recycling-Oriented Society Regional Support Projects

The Ministry of the Environment is soliciting applications for forward-thinking projects that NGOs, NPOs and other private-sector entities and businesses undertake through collaboration with local

governments toward establishing a recycling-oriented society that can serve as models for other areas as "recycling-oriented society regional support projects." By implementing these as demonstration projects, the Ministry is striving to discover and support regional efforts toward forming a recycling-oriented society.

- Japan Fund for the Global Environment

  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 global warming prevention, recycling and nature conservation-related activities undertaken by environmental NGOs both within and outside Japan. In FY2008, the Fund made donations of 718.70 million yen to a total of 205 projects.

- Funds for the Conservation of the Local Environment by Local Government

  Local governments also support the environmental conservation activities by NGOs and similar groups through their respective funds for the conservation of the local environment.

- Measures 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 Ministry of the Environment in October 1996. The Centre compiles the results of research and builds 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, among other things, the facilitation of international symposiums that focus on the roles of NGOs in arresting global warming. The Centre also runs an information service on the global warming problem with a wide range of materials from Japan and abroad. Moreover, it has established seven regional environmental partnership offices across Japan.

- Environmental Counselor Registration System

  The Environmental Counselor Registration System began in 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 FY2008, the number of people registered as environmental counselors had reached 4,620.

- Support for Private Afforestation Projects

  The Forestry Agency has been supporting private afforestation projects via the Japan International Forestry Promotion and 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.

Appendix I

"Kyoto Protocol Target Achievement Plan", totally revised March 28, 2008, appendix table

Table-1 List of Measures and Policies on Energy-originated Carbon Dioxide

Table-2 List of Measures and Policies on Non-energy-originated Carbon Dioxide

Table-3 List of Measures and Policies on Methane and Nitrous Oxide

Table-4 List of Measures and Policies on Three Fluorinated Gases

Table-5 List of Measures and Policies on Greenhouse Gas Sinks

Table-6 Cross-sectoral Policies

(Appendix 1) Table-1 List of Measures and Policies on Energy-originated Carbon Dioxide

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(i) Low-carbon Urban/Regional Structures and Socioeconomic Systems A. Low-carbon Urban/Regional Designs						
○ Realization of Compact, Low-carbon Urban Structures						
Realization of compact urban structures	2008 - 2009 - 2010 - 2011 - 2012 -	Local government: -Implementing businesses related to town development -Appropriately utilizing city planning systems	-Promoting buildup of urban functions by means of maintaning and revitalizing central urban districts -Supporting businesses related to town development -Strengthening site restrictions for large-scale customer-attracting facilities with city planning systems -Considering evaluation methods and guidelines for accurately monitoring and projecting CO_2 reduction effects, etc. -Providing comprehensive support for programs and businesses based on coordinated urban/regional transport strategies	Local government: -Implementing businesses related to town development -Appropriately utilizing city planning systems	(10,000t-CO_2) 2008 - 2009 - 2010 - 2011 - 2012 -	-
Realization of cities with minimal environmental loads (Compact City)	No. of regions with CO_2 reduction plans (unit: location) 2008 20 2009 2010 2011 2012	Local government and business operator: -Developing public transport systems and expanding their utilization -Utilizing untapped energy and natural capital	- Supporting the establishment of effective CO_2 reduction plans through reduction simulations on area-wide measures including the promotion of public transport utilization and the untapped energy and natural capital usage	-Promoting public transport utilization -Utilizing renewable energy -Developing green areas	(10,000t-CO_2) 2008 - 2009 - 2010 - 2011 - 2012 -	Efficiency improvement of planned promotion of effective area-wide measures

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Utilization of the Special Zones for Structural Reform System for global warming countermeasures	No. of approved plans for relevant special zones		Local government: -Making a proposal for a special regulatory measure -Applying for approval for a special zone -Developing businesses by utilizing the special regulatory measure Private business operator, etc: -Making a proposal for a special regulatory measure -Developing businesses by utilizing the special regulatory measure	○ Proposal for a special regulatory measure -Inviting proposals for a special regulatory measure in a special zone and requests for regulatory reform to be implemented nationwide, twice yearly (spring and fall), in each one-month period designated as "Intensive invitation month for special zone and regulatory reform proposals." -During the same periods as the above invitation of proposals, encouraging proposals by conducting a "caravan," in which national government officials will visit each local area to explain about the system and the way for proposal and to provide consultation for specific proposals and requests from private enterprises, NPOs, local governments, etc. ○ Application for approval for a special zone -Inviting applications for approval for a special zone basically three times yearly, around May, September and January.	○ Establishing a forum to confer with relevant organizations for business development utilizing a special regulatory measure ○ Developing an environment, including informing local residents for business development utilizing a special regulatory measure	($10,000t-CO_2$)		○ The estimated volume of emissions reductions for this countermeasure has been calculated by summing up the estimated volumes of emissions reductions of all the programs each ministry will implement with the Special Zones for Structural Reform System. Therefore, this estimated volume is duplicative. ○ The Assessment and Investigation Committee of the Headquarters for the Promotion of Special Zones for Structural Reform will assess in FY2008 whether to expand the special measures below nationwide. In the case the Committee determines to expand any of the measures nationwide and cancels its special zone plan, the effects of similar measures newly implemented in other areas cannot be monitored in this scheme. They will be calculated only by the ministries in charge of the regulation.
	2008	2				2008	5.3	
	2009	2				2009	5.3	
	2010	2				2010	5.3	
	2011	2				2011	5.3	
	2012	2				2012	5.3	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Establishment of the "Global Warming Countermeasures Promotion Program for Regions"	-		Local government: -Applying for approval for a regional revival plan utilizing the policies listed in the Program Local stakeholder (business operator, consumer, etc.): -Working to reduce greenhouse gases in accordance with the regional revival plan	Supporting local efforts based on the "Global Warming Countermeasures Promotion Program for Regions," which systemizes each ministry's policies encouraging proactive efforts to reduce greenhouse gases with local originality and ingenuity	Establishing and implementing a regional revival plan utilizing the policies listed in the Program	($10,000t\text{-}CO_2$)		
	2008					2008	-	
	2009					2009	-	
	2010					2010	-	
	2011					2011	-	
	2012					2012	-	
○ Measures at the Block and District Levels								
○ Promotion of Area-wide Energy Usage								
Promotion of area-wide energy usage	Efficiency improvement through area-wide usage (including parts of "promotion of renewable energy measures," "promotion of introduction of cogeneration and fuel cells," "dissemination of highly-efficient commercial-use air conditioners," etc.		Business operator: -Implementing businesses matching consumer needs -Implementing efficiency improvement through introduction of high-efficient devices -Implementing technology development, such as improvements in system efficiency -Verifying the introduced systems in terms of energy efficiency, environmental performance, etc.	-Creating a promotional framework by establishing a committee -Implementing a leading model project -Developing an introduction manual -Implementing environmental improvement -Providing assistance through such systems as low-interest loan and subsidy	-Promoting area-wide energy usage with city planning systems	Efficiency improvement through area-wide usage (including parts of "promotion of renewable energy measures," "promotion of introduction of cogeneration and fuel cells," "dissemination of highly-efficient commercial-use air conditioners," etc.		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Efforts Transcending the Individual Boundaries Between Actors						
Promotion of global warming countermeasures for tenant buildings or the like at local levels	Included in "improvement of the energy efficiency performance of buidlings" and "dissemination of energy management systems"	Building owner, tenant, etc: -Promoting cooperative efforts	−Implementing model projects supporting cooperation between building owners, tenants, etc.	-Publicizing good practices by using Regional Councils -Providing consultation service -Utilizing support systems for small and medium sized enterprises	Included in "improvement of the energy efficiency performance of buidlings" and "dissemination of energy management systems"	
○ Decarbonization of Urban Areas Through Improving the Thermal Environment by Urban Greening and Other Heat Island Countermeasures						
Decarbonization of urban areas through improving the thermal environment by urban greening and other heat island countermeasures	Area of green roofs (ha) 2008: 73 2009: 98 2010: 123 2011: 149 2012: 174	Private enterprise: -Implementing projects constributing to heat island countermeasures and CO_2 emissions reduction	-Subsidizing private projects through the pilot project for Cool City central blocks -Indirectly subsidizing private projects through the comprehensive assistance project for developing green spaces environment -Implementing tax breaks through the Authorization System of Greening Facilities Planning		($10,000t-CO_2$) 2008: 0.3-1.4 2009: 0.4-1.8 2010: 0.5-2.3 2011: 0.6-2.8 2012: 0.7-3.2	Assumptions made in calculation ○ Area of green roofs Nationwide 52ha (FY2002), 105ha (FY2004), 160ha (FY2006) ○ CO_2 emissions intensity of electricity 0.425 ($kg-CO_2/kWh$) (base value) Although many heat island countermeasures are being taken, we have calculated the estimated volume of emissions reductions from dissemination of rooftop greening only because of lack of knowledge on the CO_2 emissions reduction effects from other countermeasures than rooftop greening.

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Measures for Extending the Useful Life of Housing						
(i) Low-carbon Urban/Regional Structures and Socioeconomic Systems B. Low-carbon Transport and Logistics System Designs						
○ Construction of Low-carbon Transport Systems						
○ Formation of Low-carbon Logistics Systems						
(ii) Measures and Policies by Sector (*Industrial*, *Consumer*, *Transport*, etc.) A. Efforts in the *Industrial* Sector (Manufacturers, etc.) (a) Promotion and Reinforcement of Voluntary Action Plans of Industry						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Promotion and Reinforcement of Voluntary Action Plans of Industry (Businesses in the *Industrial* Sector)						
Steady implementation and assessment and verification of voluntary action plans	Appropriate implementation of strict assessments and verifications by the Government from the viewpoint of improving the transparency, credibility and probability of targets achievement of voluntary action plans of the *Nippon Keidanren* and individual businesses	(Nippon Keidanren, each business) -Working to control emissions such as improving energy consumption intensity through steady implementation of its voluntary action plan, and achieving the target in the plan (Nippon Keidanren) -Establishing CO_2 emission reduction targets for the headquarters and other offices of its participating businesses and member enterprises. -Promoting efforts such as expansion of environmental account book use in the homes of employees belonging to its member enterprises (Each business) (1) Formulating a new plan by a business which has no plan (2) Quantifying targets by a business which has qualitative targets only (3) Raising targets in the case where targets are already overachieved	Encouraging the businesses to make the following efforts through strict assessments and verifications by the Government: (1) Formulating a new plan by a business which has no plan; (2) Quantifying targets by a business which has qualitative targets only; (3) Undergoing strict assessments and verifications by the Government; and (4)Raising targets in the case where targets are already overachieved.	-	(10,000t-CO_2)	- It is assumed that the targets in the voluntary action plans by all businesses will be achieved. - The calculations of reduction effects have been conducted for the 49 businesses marked with a circle(○).

2008	
2009	
2010	approx. 6,530
2011	
2012	

Businesses Within the Jurisdiction of the Ministry of Finance

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Brewers Association of Japan	CO_2 emissions	FY1990	-6%
○ Japan Tobacco Inc.	CO_2 emissions	FY1995	-32% (FY2008)

Businesses Within the Jurisdiction of the Ministry of Health, Labor and Welfare

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Federation of Pharmaceutical Manufacturers' Associations of Japan / Japan Pharmaceutical Manufacturers Association	CO_2 emissions	FY1990	±0%

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*

Businesses Within the Jurisdiction of the Ministry of Agriculture, Forestry and Fisheries			
Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Japan Starch and Saccharification Industry Association	CO_2 emissions intensity	FY2005	-3%
○ Japan Dairy Industry Association	energy consumption intensity	FY2000	-0.5% (annual rate)
○ Japan Soft Drink Association	CO_2 emissions intensity	FY1990	-6%
○ Japan Baking Industry Association	CO_2 emissions intensity	FY2004	-1% (annual rate)
○ Japan Beet Sugar Association	CO_2 emissions intensity	FY2000	-3%
○ Japan Frozen Food Association	CO_2 emissions intensity	FY1990	-10%
○ Japan Oilseed Processors Association	CO_2 emissions intensity	FY1990	-15%
○ All Nippon Kashi Association	CO_2 emissions	FY1990	-6%
○ Japan Sugar Refiners' Association	CO_2 emissions	FY1990	-22%
○ Japan Ham and Sausage Cooperative Association	CO_2 emissions intensity	FY2003	-5%
○ Flour Millers Association	CO_2 emissions intensity	FY1990	-5%
○ All Japan Coffee Association	CO_2 emissions intensity	FY2005	-3%
○ Japan Convenience Foods Industry Association	CO_2 emissions intensity	FY1990	-24%
○ Japan Soy Sauce Association	CO_2 emissions	FY1990	-6%
○ Japan Canners Association	energy consumption intensity	FY1990	±0%
○ Japan Mayonnaise and Dressing Association	CO_2 emissions intensity	FY1990	-30%
Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry			
Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Japan Iron and Steel Federation	energy consumption	FY1990	-10%
○ Japan Chemical Industry Association	CO_2 emissions intensity	FY1990	-20%
○ Japan Paper Association	CO_2 emissions intensity	FY1990	-16%
	energy consumption intensity	FY1990	-20%
○ Japan Cement Association	energy consumption intensity	FY1990	-3.8%
○ 4 electrical/electronics-related groups	CO_2 emissions intensity	FY1990	-35%
○ Japan Auto Parts Industries Association	CO_2 emissions	FY1990	-7%
	CO_2 emissions intensity	FY1990	-20%
○ Japan Automobile Manufacturers Association	CO_2 emissions	FY1990	-12.5%
○ Japan Mining Industry Association	energy consumption intensity	FY1990	-12%
○ Lime Manufacture Association	CO_2 emissions	FY1990	-8%
	energy consumption	FY1990	-8%
○ Japan Rubber Manufacturers Association	CO_2 emissions	FY1990	-6%
	energy consumption intensity	FY1990	-8%

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
	Business (Plan Formulator)		Performance Indicator	Base Year	Target Level	
	○	Japan Textile Finishers' Association	CO_2 emissions	FY1990	-41%	
			energy consumption	FY1990	-37%	
	○	Japan Aluminium Association	energy consumption intensity	FY1995	-11%	
	○	Flat Glass Manufacturers Association of Japan	CO_2 emissions	FY1990	-22%	
			energy consumption	FY1990	-21%	
	○	Japan Glass Bottle Association	CO_2 emissions	FY1990	-40%	
			energy consumption	FY1990	-30%	
	○	Japan Auto-Body Industries Association	CO_2 emissions	FY1990	-10%	
	○	Japanese Electric Wire & Cable Makers' Association	(copper/aluminium) energy consumption	FY1990	-27%	
			(fiber optic) energy intensity	FY1990	-77%	
	○	Japan Bearing Industrial Association	CO_2 emissions intensity	FY1997	-13%	
	○	Japan Society of Industrial Machinery Manufacturer	CO_2 emissions	FY1997	-12.2%	
	○	Japan Copper and Brass Association	energy consumption intensity	FY1995	-9.05%	
	○	Japan Construction Equipment Manufacturers Association	energy consumption intensity	FY1990	-15%	
	○	Limestone Association of Japan	energy consumption intensity	FY1990	-10.3%	
	○	Japan Sanitary Equipment Industry Association	CO_2 emissions	FY1990	-25%	
	○	Japan Machine Tool Builders' Association	energy consumption	FY1997	-6%	
			energy consumption intensity	FY1997	-6%	
	○	Japan Petroleum Development Association	CO_2 emissions intensity	FY1990	-20%	
	○	Japan Industrial Vehicles Association	CO_2 emissions	FY1990	-10%	
	Businesses Within the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism					
	Business (Plan Formulator)		Performance Indicator	Base Year	Target Level	
	○	Shipbuilders' Association of Japan / Cooperative Association of Japan Shipbuilders	energy consumption intensity	FY1990	−10%	
	○	Japan Marine Equipment Association	energy consumption intensity	FY1990	−20%	
	○	Japan Boating Industry Association	energy consumption intensity	FY2002	−18%	
	○	Japan Association of Rolling Stock Industries	CO_2 emissions intensity	FY1990	−10%	
	○	Japan Federation of Construction Contractors / Japan Civil Engineering Contractors' Association, Inc. /Building Contractors Society	CO_2 emissions intensity	FY1990	−12%	
	○	Japan Federation of Housing Organizations	CO_2 emissions	FY1990	−20%	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial*, *Consumer*, *Transport*, etc.) A. Efforts in the *Industrial* Sector (Manufacturers, etc.) (b) Promotion of Introduction of Highly Energy-efficient Equipment and Devices						
○ Dissemination of Energy-efficient Devices in the Manufacturing Field						
Dissemination of energy-efficient devices in the manufacturing field	(a) Highly efficient industrial furnace (unit) (b) Highly efficient boiler (unit) 2008: 2009: 2010: (a) approx. 1,000-1,500 (b) approx. 11,000-15,000 2011: 2012:	Business operator: -Introducing energy-efficient equipment	-Implementing support measures for the introduction of energy-efficient equipment by business operators	-Introduction support -Familiarization	($10,000t-CO_2$) 2008: 2009: 2010: 340-490 2011: 2012:	-Amount of energy saved with highly efficient industrial furnaces (small and medium sized enterprises) -Amount of energy saved with highly efficient boilers (small and medium sized enterprises) -Amount of energy saved with next-generation coke ovens
○ Dissemination of Fuel-efficient Construction Machinery in the Construction Field						
Dissemination of Fuel-efficient Construction Machinery in the Construction Field	Dissemination rate of fuel-efficient construction 2008: 21 2009: 25 2010: 30 2011: 35 2012: 41	Manufacturer: -Developing technology of fuel-efficient construction machinery and providing information to builders Builder: -Utilizing fuel-efficient construction machinery	-Commencing operation of the system to designate fuel-efficient construction machinery -Utilizing fuel-efficient construction machinery in public construction projects -Providing information to builders -Implementing support measures for dissemination of fuel-efficient construction machinery	−Utilizing fuel-efficient construction machinery in public construction projects	($10,000t-CO_2$) 2008: 14 2009: 17 2010: 20 2011: 23 2012: 27	-Total emissions volume from construction machinery: 11.11 million t-CO_2/year -Percentage of emissions from the construction machinery subject to the policies in total emissions volume: 60% (backhoe, tractor shovel, bulldozer) -Reduction rate of CO_2 emissions from the construction machinery subject to the policies: 10%

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport,* etc.) A. Efforts in the *Industrial* Sector (Manufacturers, etc.) (c) Thorough Energy Management, etc.						
○ Thorough Energy Management in Factories and Workplaces						
Thorough energy management in factories and workplaces	(a) Effect of the Energy Conservation Act (10,000kl; crude oil equivalent) (b) Cooperation among multiple business operators (10,000kl; crude oil equivalent) 2008: 2009: 2010: (a) 210 (b) 45-100 2011: 2012:	Business operator: -Energy-saving effort	-Appropriately administrating the Energy Conservation Act	-	($10,000t\text{-}CO_2$) 2008: 2009: 2010: 820-980 2011: 2012:	-Improvement of energy consumption intensities of the business operators that will be newly regulated by the revision of the Energy Conservation Act to the current levels of the second class designated factories -Implementation of around three or four projects annually under cooperation among multiple business operators in major industrial complexes, starting from priority ones
○ Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises						
Implementation of emissions reduction measures for small and medium sized enterprises	No. of verifications 2008: 485 2009: 1,455 2010: 2,910 2011: - 2012: -	Large enterprise: -Purchasing domestic credits -Providing financial support to the efforts to reduce greenhouse gas emissions by small and medium sized enterprises Small and medium sized enterprise: -Reducing greenhouse gas emissions Third-party body: -Verifying the volume of emissions reductions	-Establishing a system to enable the transfer of the volume of emissions reductions from small and medium sized enterprises to large ones -Urging large enterprises to raise the targets of their voluntary action plans through this scheme (anticipating raises equivalent to at least 1.69 million t-CO_2)	-	($10,000t\text{-}CO_2$) 2008: 30 2009: 91 2010: 182 2011: - 2012: -	-Percentage of the enterprises carrying out equipment investment with payout time of over three years: 7.65% -Percentage of the enterprises that have used subsidies or public financing for equipment investment: 27.9% -Reduction volume per project for CO_2 emissions reduction by a small or medium sized company: 313t-CO_2/year-project

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Efforts in the Agriculture, Forestry and Fisheries Industry						
Measures to reduce greenhouse gas emissions in greenhouse horticulture /agricultural machinery	(1) No. of energy-saving devices introduced (2) No. of energy-saving equipment introduced (3) No. of energy-saving model facilities introduced (4) No. of energy-saving agricultural machinery 2008: (1) 22,400 (2) 21,344 (3) 18 (4) 52,418 (5) 5 2009: (1) 30,420 (2) 28,514 (3) 33 (4) 71,718 (5) 5 2010: (1) 38,440 (2) 35,684 (3) 48 (4) 90,418 (5) 5 2011: (1) 45,790 (2) 42,854 (3) 48 (4) 110,818 (5) 5	Manufacturer: -Developing equipment, device and material contributing to greenhouse gas emissions reduction Dealer: -Selling equipment, device and material contributing to greenhouse gas emissions reduction National private organization: -Rating energy efficiency for equipment, device and material contributing to greenhouse gas emissions reduction -Providing information to farmers Farmer: -Choosing energy-saving equipment, device and material -Practicing energy-saving production management techniques	-Supporting the model introduction of advanced energy-saving heating systems -Supporting the rating of energy-saving material and device -Supporting the utilization of methane fermentation from domestic animal waste to greenhouse horticulture -Supporting the introduction of oil-free greenhouse horticultural systems -Establishing an Exploratory Committee on Energy-saving Measures for Greenhouse Horticulture to formulate Check Sheet for Energy-saving Production Management in Greenhouse Horticulture and Manual for Energy-saving Production Management in Greenhouse Horticulture -Requesting relevant organizations to create a campaign policy to accelerate energy-saving efforts in greenhouse horticulture -Promoting the dissemination of agricultural machinery contributing to greenhouse gas emissions reduction -Supporting the establishment of local models to utilize biodiesel for agricultural machinery	-Familiarization -Promoting policies for oil-saving or oil-free greenhouse horticulture	($10,000t\text{-}CO_2$) 2008: 10 2009: 13.7 2010: 17.4 2011: 20.6	Assumptions made in calculation (cumulative in FY2010 relative to FY2005 as base year) (1) Introduction of energy-saving greenhouse horticulture equipment -No. of areas with energy-saving greenhouse horticulture equipment introduced: 45 (2) Introduction of oil substitution systems -No. of areas with oil substitution systems introduced: 3 (3) Introduction of high-efficient heaters -No. of high-efficient heaters introduced: 3,490 (4) Introduction of energy-saving equipment and material a. No. of multiple-staged, variable temperature devices introduced: 34,950 b. No. of locations with an air circulation device introduced: 32,630 c. No. of locations with a multilayer coated device introduced: 3,054 (5) Dissemination of energy-saving agricultural machinery -No. of energy-saving agricultural machines (grain FIR dryer, high speed tiller) disseminated: 90,418 -Rate of reduction in energy consumption by introducing energy-saving agricultural machinery: 10%, 15% (6) Utilization of biodisel for agricultural machinery -No. of model areas: 5

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
	2012	(1) 53,140 (2) 50,024 (3) 48 (4) 131,718 (5) 5				2012	23.8	
Energy-saving measures for fishing vessels	Increasing rate of the fishing vessels with energy-saving technology introduced out of all fishing vessels (compared to		Manufacturer, dealer: -Developing energy-saving vessels, equipment, etc. -Providing information to fishery operators Fishery operator: -Choosing energy-saving equipment in renewing fishing vessels	-Promoting development and practical application of energy-saving technologies for fishing vessels -Promoting their dissemination by acquiring energy-saving and labor-saving substituting vessels or other measures.	- Familiarization	(10,000t-CO_2)		-Emissions volume based on the fuel consumption by fishing vessels in FY2005: 6.78 million t-CO_2 -Annual replacement rate of fishing vessels: approx. 1%/year -Energy-saving effect by replacing fishing vessels: 10% compared to a substituted vessel
	2008	4.2				2008	approx. 2.8	
	2009	5.6				2009	approx. 3.8	
	2010	7				2010	approx. 4.7	
	2011	8.4				2011	approx. 5.7	
	2012	9.8				2012	approx. 6.6	
○ Efforts by the Industrial Community in the *Consumer* and *Transport* Sectors								

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*

(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport* , etc.)

B. Efforts in the *Commercial and Other* Sector

(a) Promotion and Reinforcement of Voluntary Action Plans of Industry

○ Promotion and Reinforcement of Voluntary Action Plans of Industry (Businesses in the *Commercial* Sector)

(10,000t-CO_2)	
2008	
2009	
2010	130*
2011	
2012	

- It is assumed that the targets in the voluntary action plans by all businesses will be achieved.
- The calculations of reduction effects have been conducted for the 19 businesses marked with a circle(○).

These effects are duplicative with those of other energy-saving

Businesses Within the Jurisdiction of the Financial Services Agency

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Japanese Bankers Association	energy consumption	FY2000	-12%
○ Life Insurance Association of Japan	energy consumption	FY2006	-2%
○ General Insurance Association of Japan	energy consumption	FY2000	-18%

Businesses Within the Jurisdiction of the Ministry of Internal Affairs and Communications

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Telecommunications Carriers Association	energy consumption intensity	FY1990	-30%
○ Telecom Service Association of Japan	energy consumptionintensity	FY2006	-1%
○ National Association of Commercial Broadcasters in Japan	CO_2 emissions intensity	FY2004	-10%
○ NHK (Japan Broadcasting Corporation)	CO_2 emissions intensity	FY2006	-8%
○ Japan Cable and Telecommunications Association	energy consumption intensity	FY2006	-6%
○ Japan Satellite Broadcasting Association	energy consumption intensity	FY2006	-10%

Businesses Within the Jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Federation of All Japan Private Schools	CO_2 emission	FY2007	-1% (annual rate)

Businesses Within the Jurisdiction of the Ministry of Health, Labor and Welfare

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Japanese Consumers' Co-operative Union	CO_2 emissions intensity	FY2002	-3.4% (FY2009)

Businesses Within the Jurisdiction of the Ministry of Agriculture, Forestry and Fisheries

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Japan Processed Foods Wholesalers Association	energy consumption	FY2000	-10%

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
	Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry					
	Business (Plan Formulator)		Performance Indicator	Base Year	Target Level	
	○ Japanese Chain Stores Association		energy consumption intensity	FY1996	-4%	
	○ Japan Franchise Association		energy consumption intensity	FY1990	-23%	
	○ Japan Department Stores Association		energy consumption intensity	FY1990	-7%	
	○ Meeting of Large Household Appliance Retailers		energy consumption intensity	FY2006	-4%	
	○ Japan DIY Industry Association		energy consumption intensity	FY2004	±0%	
	○ Japan Information Technology Services Industry Association		energy consumption intensity	FY2006	-1%	
	○ Japan Association of Chain Drug Stores		energy consumption intensity	FY2004	-15%	
	○ Japan Foreign Trade Council, Inc.		CO_2 emissions	FY1998	-40%	
	○ Japan LP Gas Association		energy consumption intensity	FY1990	-7%	
	○ Japan Leasing Association		energy consumption intensity	FY2002	-3%	
	Businesses Within the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism					
	Business (Plan Formulator)		Performance Indicator	Base Year	Target Level	
	○ Japan Warehousing Association Inc.		energy consumption intensity	FY1990	-8%	
	○ Japan Association of Refrigerated Warehouses		energy consumption intensity	FY1990	-8%	
	○ Japan Hotel Association		energy consumption intensity	FY1995	-6%	
	○ Japan Ryokan Association		CO_2 emissions intensity	FY1997	-6%	
	○ Japan Ryokan & Hotel Association		energy consumption intensity	FY1999	-4%	
	○ Japan Automobile Service Promotion Association		CFCs destroyed	FY2004	-10%	
	○ Real Estate Companies Association of Japan		energy consumption intensity	FY1990	±0%	
	Businesses Within the Jurisdiction of the Ministry of the Environment					
	Business (Plan Formulator)		Performance Indicator	Base Year	Target Level	
	○ National Federation of Industrial Waste Management Associations		greenhouse gas emissions	FY2000	±0%	
	○ Japan Newspaper Publishers & Editors Association		CO_2 emissions	FY2005	-5%	
	○ Zenkoku Pet Kourigyou Kyoukai (National Retail Pet Association)		CO_2 emissions	FY2006	-6%	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (Industrial, Consumer, Transport, etc.) B. Efforts in the Commercial and Other Sector (b) Initiatives by Public Organizations								
○ Initiatives by the National Government								
Emissions reductions by public organizations (all government ministries)	Reduction rate compared to FY2001 levels (%)		National government: -Implementing necessary measures toward the target achievement based on the National Government Action Plan and each ministry's implementation plan under this Plan	-Implementing and inspecting the National Government Action Plan -Implementing and inspecting each ministry's implementation plan (Major specific efforts) -Promoting intensively *greening* of national government buildings across the country by means of photovoltaic power generation, building planting, etc. -Promoting the pioneering introduction based on the Green Purchasing Act (including disseminating highly-efficient lighting)	－	(10,000t-CO_2)		This estimated volume of emissions reductions has been caluculated by summing up the volumes of emissions reductions by all ministry's reduction plans in their implementaion plans
	2008	－				2008	－	
	2009	－				2009	－	
	2010	8				2010	16	
	2011	8				2011	16	
	2012	8				2012	16	
○ Initiatives by Local Governments								
○ Promotion of the Initiatives by Other Public Organizations								
(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport,* etc.) B. Efforts in the *Commercial and Other* Sector (c) CO_2 saving of Buildings, Equipment and Devices								

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
						Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Improvement of the Energy Efficiency Performance of Buildings							
Improvement of the energy efficiency performance of buildings	Relevance ratio of FY1999 energy-saving criteria for new buildings (%)		Client: -Constructing buildings with high energy efficiency performance in new construction, expansion or renovation -Using the CASBEE Owner: -Improving energy efficiency performance through repair, maintenance, etc. -Using the CASBEE Architect: -Implementing and using the CASBEE -Providing information to clients or other stakeholders Builder: -Supplying buildings with high energy efficiency performance -Developing and using energy-saving technology -Using the CASBEE -Providing information to clients or other stakeholders Manufacturer of building material and equipment: -Promoting technology development -Providing information to clients or other stakeholders	-Improving energy efficiency performance of buildings by the amendment of the Energy Conservation Act: ...Expanding the coverage of buildings subject to notification obligation concerning energy-saving measures to include certain small- to medium-sized buildings; and ...Reinforcing regulations regarding energy-saving measures for large-scale buildings -Providing support through the Tax System for Promoting Investment in Energy Supply-and-demand Structure Reform -Developing and disseminating the CASBEE -Promoting the introduction of construction technologies related to energy-saving measures for small and medium sized enterprises -Providing assistance for leading technology developments by private business operators and model projects introducing CO_2-saving technologies -Fostering technical experts on architecture and construction -Subsidizing energy saving of commercial buildings -Implementing school eco-renovations -Promoting voluntary efforts by related industries	-Appropriately enforcing the notification system concerning energy-saving measures under the amended Energy Conservation Act -Using the CASBEE -Implementing energy-saving measures for local government buildings -Providing information to clients, architects or other stakeholders.	($10,000t-CO_2$)	The effects by the bill to amend the Energy Conservation Act, submitted to the 2008 ordinary Diet session, have been estimated, assuming that the energy efficiency performance of new and existing buildings will be improved further -Relevance ratio of FY1999 energy-saving criteria for new buildings: 85% (FY2010) -Amount of energy saved: approx. 8.6 million kL (crude oil equivalent)
	2008					2008	
	2009					2009	
	2010	85				2010	approx. 2,870
	2011					2011	
	2012					2012	
○ Decarbonization of Urban Areas Through Improving the Thermal Environment by Urban Greening and Other Heat Island Countermeasures							

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Dissemination of Energy Management Systems								
Energy management systems	Energy-saving effect (10,000kl; crude oil equivalent)		Business operator: -Introducing an energy management system	-Providing support measures for the introduction and tachnology development of energy management systems by business operators	-Taking the initiative in introducing energy management systems	($10,000t-CO_2$)		−Energy saving effects by energy management systems in grant-aided projects
	2008					2008	−	
	2009					2009	−	
	2010	158-220				2010	520-730	
	2011					2011		
	2012					2012		
○ Improvement of the Efficiency of Devices Based on the Top-runner Standards								
Improvement of the efficiency of devices based on the Top-runner standards	Crude oil equivalent (10,000kl)		Manufacturer: -Developing and supplying highly energy-efficient devices Dealer: -Selling highly energy-efficient devices -Providing information to consumers Consumer: -Choosing a highly energy-efficient device at the time of replacement	-Expanding the range of products subject to the Top-runner standards and toughening up the standards for the products already designated -Promoting the reduction of standby power	-Familiarization -Promoting pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$)		Improvement of the efficiency of devices based on the Top-runner standards -Energy efficiency of devices -No. of households (*residential* sector), floor area (*commercial* sector) -Device ownership ratio -Average tenure of device use Reduction in standby power consumption -Dissemination rate per household
	2008	-				2008	−	
	2009	-				2009	−	
	2010	740				2010	2,600	
	2011	-				2011	−	
	2012	-				2012	−	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Support for the Development and Dissemination of High-efficient Energy-saving Devices								
Dissemination of high-efficient energy-saving devices	Countermeasure evaluation index		(High-efficient water heater) Manufacturer: -Developing, producing and selling high-efficient water heaters Business operator, consumer: -Actively introducing high-efficient water heaters (High-efficient air conditioner) Manufacturer: -Developing, producing and selling high-efficient air conditioners Commercial facility client: -Actively introducing high-efficient commercial-use air conditioners (High-efficient lighting) Manufacturer, dealer: -Developing, producing and selling high-efficient lighting Business operator, consumers: -Actively introducing high-efficient lighting	(High-efficient water heater) -Implementing support measures for the introduction of high-efficient water heaters -Subsidizing the introduction to the houses with greatly reduced CO_2 emissions compared to ordinary houses -Promoting the pioneering introduction based on the Green Purchasing Act (High-efficient air conditioner) Manufacturer: -Developing, producing and selling high-efficient air conditioners Commercial facility client: -Actively introducing high-efficient commercial-use air conditioners, etc. (High-efficient lighting) -Supporting technology development toward further efficiency improvements and cost reductions of high-efficient lighting -Supporting the introduction in Regional Councils on Global Warming Countermeasures and the pioneering introduction by local governments	-Familiarization -Promoting their pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$)		(High-efficient water heater) -Cumulative no. of CO_2 refrigerant heat pump water heaters disseminated -Cumulative no. of latent heat recovery type water heaters disseminated -Coefficients of performance(COP) of heat pump water heaters, latent heat recovery type water heaters and traditional water heaters *Note: Gas engine water heaters are regarded as a type of high-efficient water heaters as well as CO_2 refrigerant heat pump water heaters and latent heat recovery type water heaters. however, the estimates for the introduction of gas engine water heaters are calculated as part of those for cogeneration. (High-efficient air conditioner) -Energy consumption efficiency of traditional combustion-type air conditioners -Energy consumption efficiency of traditional electrical-type air conditioners -Annual operating time of air conditioners (High-efficient lighting) -Amount of energy saved by LED lighting
	2008					2008	–	
	2009					2009	–	
	2010	Cumulative no. of heat pump water heaters introduced to the market: 4.46-5.20 million Cumulative no. of latent heat recovery type water heaters introduced to the market: 2.91-3.26 million Vol. of high-efficient air conditioners introduced (10,000 refrigeration tons): 92.5-141 Dissemination rate of high-efficient lighting (%):				2010	640-720	
	2011					2011		
	2012					2012		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Dissemination of commercial-use energy-saving refrigerator-freezer	No. of facilities with energy-saving refrigerator-freezers introduced		Manufacturer: -Introducing natural refrigerant freezer units to low-temperature refrigeration equipment -Actively introducing energy-saving refrigerator-freezers	-Implementing the project for promoting the introduction of energy-saving natural refrigerant freezer units -Subsidizing energy saving for small- and medium-scale commercial facilities		($10,000t-CO_2$)		-No. of disseminated energy-saving integrated systems of refrigerator, freezer and air conditioner: approx. 10,000-16,000 facilities (FY2010) Amount of reduced electricity consumption per unit: approx. 43,000-62,000kwh -No. of energy-saving natural refrigerant freezer units introduced to low-temperature refrigeration equipment: approx. 260 facilities (FY2010), Amount of reduced electricity consumption per unit: approx. 140,000kwh
	2008	6000-8000				2008	20-30	
	2009	8000-12000				2009	20-50	
	2010	10000-16000				2010	30-60	
	2011	12000-20000				2011	30-80	
	2012	14000-24000				2012	40-90	
(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport,* etc.) B. Efforts in the *Commercial and Other* Sector (d) Thorough Energy Management, etc.								
○ Thorough Energy Management in Factories and Workplaces								
○ Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises								
○ Initiatives in Water Supply and Sewerage Systems and Waste Management								
Implementation of energy-saving and renewable energy measures in waterworks	Vol. of emissions reductions ($10,000t-CO_2$)		Water supplier: -Implementing energy-saving and renewable energy measures	-Implementing energy-saving and renewable energy measures in waterworks -Monitoring the implementation of energy-saving and renewable energy measures in waterworks -Providing information on energy-saving and renewable energy measures		($10,000t-CO_2$)		-Surveys have been carried out for water suppliers nationwide concering the implementation of energy-saving and renewable energy measures. -The total volume has been calculated by adding up the amounts of energy saved and the amounts of renewable energy in each water supplier. -It is assumed that CO_2 emissions will be reduced by the amount of energy rationalized for energy saving and by the amount of electricity or other energy used at renewable energy facilities.
	2008	35				2008	35	
	2009	36				2009	36	
	2010	37				2010	37	
	2011	37				2011	37	
	2012	37				2012	37	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Implementation of energy-saving and renewable energy measures in sewerage systems	Rate of energy use of sewage sludge (%)		Local government: -Implementing energy-saving and renewable energy measures through the usage of sewage sludge/heat as the operator of sewage business	-Supporting local governments' efforts through government subsidies for the establishment of sewage facilities -Supporting the joint efforts by sewage managers and private enterprises on the utilization of sewage sludge as resource or energy source -Providing technology information on energy-saving measures	-Implementing energy-saving and renewable energy measures through the usage of sewage sludge/heat	($10,000t-CO_2$)		Energy consumption at sewage plants: 0.91 million kl (FY2010, without any countermeasures) Amount of sewage sludge produced: 2.41 million t-DS (FY2010) Percentage of organic matter in sewage sludge: 80% Digestive efficiency of sewage sludge: 50%
	2008	15				2008	56	
	2009	19				2009	73	
	2010	22				2010	90	
	2011	25				2011	108	
	2012	29				2012	126	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
					Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Implementation of measures in waste management	-	Industrial waste management business operator: -Promoting facility improvement for waste power generation (included in the National Federation of Industrial Waste Management Associations' voluntary action plan on the environment) Consumer: -Contributing to BDF usage such as cooperating to collect waste cooking oil -Contributing to separated collection of plastic containers and packaging Business operator: -Recycling containers and packaging wastes	'-Providing the Subsidies to Promote the Establishment of a Sound Material-Cycle Society -Supporting industrial waste management business operators through global warming countermeasure projects in waste management facilities -Providing information on the promotion of the National Federation of Industrial Waste Management Associations' voluntary action plan on the environment -Creating and distributing a "manual on vehicle measures" -Enforcing the Containers and Packaging Recycling Act	-Introducing power generation facilities by subsidies when renewing or augmenting waste management facilities -Improving the system for BDF manufacturing, introducing BDF to packing trucks or other vehicles, and practicing eco-driving -Collecting container and packaging wastes separately -Promoting residents' voluntary activities and implementing familiarization and environmental education for the 3Rs -Promoting the pioneering introduction based on the Green Purchasing Act	(10,000t-CO_2)		-Emission coefficient 0.425kg-CO_2/kWh -Oil substitution 2.62kg-CO_2/L
	Increase in electricity from waste power generation: 1,125GWh Volume of BDF used for waste collection and transport by local governments: 1,117kL Estimated volume of separately collected plastic container and packaging (through designated corporations): approx. 869,000 tons				2008		(Recycling of container and packaging waste*) *Out of the effects by recycling plastic containers and packaging based on the Containers and Packaging Recycling Act, those by its material or fuel use not included in "Promotion of Measures to Reduce CO_2 Emissions Derived from Waste Incineration"have been calculated here. -Estimated volume of plastic containers and packaging collected separately (estimated volume of those delivered to designated corporations in the fifth period municipal separated collection plan): 869,000 tons (FY2010) -Percentage of material or fuel use (FY2007 bid results) (note) The actual volume of separated collection by municipalities might be smaller than the estimates due to emission control based on the Containers and Packaging Recycling Act
					2009		
					2010	70	
					2011		
					2012		

<table>
<tr><th rowspan="2">Specific Countermeasure</th><th rowspan="2">Countermeasure Evaluation Index (Estimates of FY2008-FY2012)</th><th rowspan="2">Measure by Each Actor</th><th rowspan="2">National Policy</th><th rowspan="2">Example of Policies Expected to be Implemented by Local Governments</th><th colspan="3">Countermeasure Effect</th></tr>
<tr><th colspan="2">Estimated Volume of Emissions Reductions</th><th>Assumption Made in Calculating the Estimated Volume of Emissions Reductions*</th></tr>
<tr><td colspan="8">(ii) Measures and Policies by Sector (Industrial,Consumer,Transport,etc.)
B. Efforts in the Commercial and Other Sector
(e) Development of National Campaigns</td></tr>
<tr><td colspan="8">○ Information Provision/Familiarization</td></tr>
<tr><td rowspan="6">Implementation of national campaigns</td><td colspan="2">Executing rate of Cool Biz and Warm Biz (commercial sector)
Upper: Executing rate of Cool Biz
Lower: Executing rate of Warm Biz</td><td rowspan="6">-Implementing the measures to reduce CO_2 emissions by Cool Biz (with air conditioning set at 28°C) and Warm Biz (with air conditioning set at 20°C) in the commercial and other sector</td><td rowspan="6">-Project to promote and strengthen local activities to stop global warming
-Project to promote the "National Campaign" to stop global warming
-Project to promote the national movement to reduce CO_2 by 1kg 1 day 1 person</td><td rowspan="6">-Implementing the measures described in the "Measure by Each Actor" section</td><td colspan="2" rowspan="2">(10,000t-CO_2)</td><td rowspan="6">(The estimated volume of CO_2 emissions reductions has been calculated from *1 below)
*1 Executing rate of Cool Biz and Warm Biz estimated from yearly surveys

*2 This estimated volume of emissions reductions is an approximate target figure calculated after organizing the overlapping effects of other countermeasures. It partially includes the effects of measures to reduce CO_2 emissions practiced at home, as typified by the six actions</td></tr>
<tr><td>2008</td><td>61-63%
64-66%</td><td>2008</td><td rowspan="5">approx. 100</td></tr>
<tr><td>2009</td><td>64-68%
67-71%</td><td>2009</td></tr>
<tr><td>2010</td><td>66-73%
69-76%</td><td>2010</td></tr>
<tr><td>2011</td><td>67-78%
70-81%</td><td>2011</td></tr>
<tr><td>2012</td><td>69-83%
72-86%</td><td>2012</td></tr>
</table>

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Implementation of national campaigns	*six actions* at home		-Each household will implement CO_2 emissions reduction measures possible at home, as typified by the *six actions* : setting air conditioning at 28°C in summer and at 20°C in winter; turning on the shower only when needed; practicing eco-driving; replacing products with more energy-saving ones; carrying a shopping bag/using simple packaging; and reducing standby power consumption -Selling energy-saving products and services -Choosing and purchasing energy-saving products and services (Household appliance manufacturer) -Providing information on energy saving, developing and advertising highly energy-efficient devices (Small and medium sized retailer) -Explaining about energy-saving effects and highly energy-saving devices and selling those devices by visiting consumers' homes (Mass retailer) -Explaining about and selling highly energy-saving devices	-Making efforts to disseminate nationally the measures which provide people or environmental preservation groups with positive incentives, especially economic incentives, accoding to the amount of their environmentally considerate behavior, such as "Eco action point," to prompt environmental action by citizens -Supporting the regional sales system model project to introduce domestic versions of ESCO by fostering experts or creating a diagnostic tool -Assiting the promotion of dissemination of energy-efficient household appliances by supporting the establishment of the Energy-efficient Household Appliances Promotion Forum by mass retailers and household appliance organizations, and cooperating with the events held by the Forum	-Implementing the measures described in the "Measure by Each Actor" section	($10,000t-CO_2$)		*3: The executing rates for the *six actions* at home will be monitored through monthly surveys in the project to promote the "National Campaign" to stop global warming. Note: Implementation of national campaigns supports other countermeasures. With the effects of such other countermeasures included, the effects of implementation of national campaigns are estimated to reach 6.78 million to 10.5 million t-CO_2 (based solely on quantifiable actions).
	2008	*3				2008	-	
	2009					2009	-	
	2010					2010	-	
	2011					2011	-	
	2012					2012	-	
	Information provision by energy suppliers and others (10,000kl; crudel oil equivalent)		Energy supplier, energy-efficient appliance retailer: -Providing general consumers with information contributing to rationalization in energy use	-Institutionalizing energy suppliers' information provision to general consumers by the Energy Conservation Act -Promoting the dissemination of energy-efficient household appliances through the Energy-efficient Household Appliances Promotion Forum -Actively providing information on energy saving to consumers through the Energy Saving Labeling Program, the Energy Efficient Product Retailer Assessment System, etc.		($10,000t-CO_2$)		
	2008	−				2008	−	
	2009	−				2009	−	
	2010	50-100				2010	150-300	
	2011	−				2011	−	
	2012	−				2012	−	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Encouragement of replacing appliances with less energy-consuming ones	No. of energy-saving devices introduced (10,000 units) a) energy-saving electric pot, b) dishwasher, c) compact fluorescent lamp, d) water-saving showerhead, e) energy-saving control device for air conditioning	Household appliance manufacturer, mass retailer: -Providing information on energy saving -Explaining about energy-saving effects (especially on electric pots and dishwashers) Consumer: -Actively choosing an energy-saving device at the time of replacement	-Encouraging familiarization by "seminars for disseminating energy-saving household appliances," etc. -Providing information about "stores cooperating with the dissemination of energy-saving household appliances"	-Familiarization	($10,000t-CO_2$)	-Cumulative no. of appliances introduced in FY2010: Electric pot (approx. 11.8 million), dishwasher (approx. 9.2 million), compact fluorescent lamp (approx. 191.4 million), water-saving showerhead (approx. 18.4 million), energy-saving control device for air conditioning compressor (approx. 0.11 million) -Energy-saving effects through replacing these appliances: Electric pot (approx. 54%), dishwasher (approx. 56%), compact fluorescent lamp (approx. 80%), water-saving showerhead (approx. 20%), energy-saving control device for air conditioning compressor (approx. 13%)
	2008 a) 990 b) 740 c) 14,430 d) 1,580 e) 8				2008 a) 219 b) 51 c) 310 d) 59 e) 10	
	2009 a) 1,080 b) 830 c) 16,540 d) 1,710 e) 10				2009 a) 238 b) 57 c) 356 d) 64 e) 12	
	2010 a) 1,180 b) 920 c) 19,140 d) 1,840 e) 11				2010 a) 259 b) 63 c) 412 d) 68 e) 14	
	2011 a) 1,290 b) 1,020 c) 22,220 d) 1,970 e) 13				2011 a) 284 b) 71 c) 478 d) 73 e) 16	
	2012 a) 1,390 b) 1,140 c) 25,750 d) 2,100 e) 15				2012 a) 307 b) 79 c) 554 d) 78 e) 18	
○ Environmental Education, etc.						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) C. Efforts in the *Residential* Sector (a) Development of National Campaigns						
○ Information Provision/Familiarization						
○ Environmental Education, etc.						
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) C. Efforts in the *Residential* Sector (b) CO_2 Saving of Houses, Equipment and Devices						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Improvement of the Energy Efficiency Performance of Houses								
Improvement of the energy efficiency performance of houses	Revelance ratio of FY1999 energy-saving criteria for new houses (%)		Client: -Constructing houses with high energy efficiency performance in new construction, expansion or renovation -Using the CASBEE Owner: -Improving energy efficiency performance through repair, maintenance, etc. -Using the CASBEE Architect: -Implementing and using the CASBEE -Providing information to clients or other stakeholders Builder, housing supplier: -Supplying houses with high energy efficiency performance -Developing and using energy-saving technology -Using the CASBEE -Providing information to clients or other stakeholders Manufacturer of building material and equipment: -Promoting technology development -Providing information to clients or other stakeholders	Improving energy efficiency performance of houses by the amendment of the Energy Conservation Act: ...Expanding the coverage of houses subject to notification obligation concerning energy-saving measures to include certain small- to medium-sized houses; ...Reinforcing regulations regarding energy-saving measures for large-scale houses ...Introducing measures to urge business operators who construct or sell houses to improve their energy efficiency performance. -Encouraging energy-efficient houses by loans through securitization framework -Promoting the dissemination of energy-efficient houses by creative and original local efforts through the Regional Housing Grant -Improving energy efficiency through tax relief for renovations to improve energy efficiency -Promoting the introduction of construction technologies related to energy-saving measures for small and medium sized enterprises -Providing assistance for leading technology developments by private business operators and model projects introducing CO2-saving technologies -Developing and disseminating the CASBEE and the Housing Performance Indication System -Promoting the development of comprehensive energy efficiency evaluation methods including ones for housing equipment -Fostering technical experts on architecture and construction -Promoting voluntary efforts by related industries -Subsidizng energy saving of houses -Familiarizing the public with eco-reforming of houses	-Appropriately enforcing the notification system concerning energy-saving measures under the amended Energy Conservation Act -Promoting the dissemination of the Housing Performance Indication System -Using the CASBEE -Promoting the dissemination of energy-efficient houses by creative and original local efforts through the Regional Housing Grant -Providing information to clients, architects or other stakeholders	(10,000t-CO_2)		The effects by the bill to amend the Energy Conservation Act, submitted to the 2008 ordinary Diet session, have been estimated, assuming that the relevance ratio of FY1999 energy-saving criteria for new houses will increase and that the energy efficiency performance of existing houses will be improved further. -Relevance ratio of FY1999 energy-saving criteria for new houses: 66% (FY2010) -Amount of energy saved: approximately 3.3 million kL (crude oil equivalent)
	2008					2008		
	2009					2009		
	2010	66				2010	approx. 930	
	2011					2011		
	2012					2012		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Leading measures for CO_2 saving of houses through partnership between house manufacturers, consumers, etc.	Included in "Improvement of the energy efficiency of houses" and "Improvement of the efficiency of devices based on the Top-runner standards"	House manufacturer, builder, model house exhibitor: -Providing information on energy saving concerning houses Consumer: -Actively taking energy-saving measures in building a new house	-Promoting the dissemination of energy efficient houses, energy-saving materials and equipment, etc.	-Providing information on energy saving through prefectural and major municipal Promotion Centers	($10,000t\text{-}CO_2$)	-Included in "Improvement of the energy efficiency of houses" and "Improvement of the efficiency of devices based on the Top-runner standards"
	2008				2008	
	2009				2009	
	2010				2010	
	2011				2011	
	2012				2012	
○ Dissemination of Energy Management Systems						
○ Improvement of the Efficiency of Devices Based on the Top-runner Standards						
○ Support for the Development and Dissemination of High-efficient Energy-saving Devices						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) D. Efforts in the *Transport* Sector (a) Automobile/Road Traffic Measures								
○ Improvements in the Fuel Efficiency of Automobile, etc.								
Improvements in the fuel efficiency of automobile, etc.	(a) Energy-saving effect by the Top-runner standards (10,000kL) (b) No. of CEVs disseminated (10,000 vehicles) (c) Ownership ratio of sulphur-free fuel diesel vehicles in all diesel vehicles (%)		Manufacturer, importer: -Developing, manufacturing, selling or importing vehicles with excellent fuel efficiency Dealer: -Actively selling vehicles with excellent fuel efficiency Consumer: -Introducing vehicles with excellent fuel efficiency	-Subsidizing the introduction of clean energy or idling stop vehicles -Favorable tax treatments -Accelerating the development and dissemination of low-emission vehicles with the opportunity of replacing general official government vehicles with low-emission ones -Providing information to consumers concerning fuel efficiency through assessment and publication systems on vehicle fuel efficiency performance and display on vehicle body -Promoting the pioneering introduction based on the Green Purchasing Act -Promoting introduction of fuel-efficient vehicles through low-interest loan systems -Encouraging vehicle transport business operators to introduce fuel-efficient vehicles by the Energy Conservation Act -Promoting development and practical application of low-emission vehicles with an eye to the next generation -Considering measures to encourage the introduction and disseminatation of clean diesel passenger vehicles in the "Advisory Panel on Clean Diesel"	-Familiarization -Promoting the pioneering introduction based on the Green Purchasing Act -Supporting for the introduction	(10,000t-CO_2)		-Avg. theoretical fuel effciency for new vehicles in 2010 -Avg. theoretical fuel efficiency in the case of taking the measures for vehicles with fuel efficiency standards -Avg. theoretical fuel efficiency in the case of not taking the measures above -Total travel distance (passenger-kilometer or ton-kilometer) -Cumulative no. of introduced hybrid, hydrogen/fuel cell, diesel-substituting LP gas, natural gas and electric vehicles -Energy saving rates for each type of vehicles above -Ownership ratio of sulphur-free fuel diesel vehicles in all diesel vehicles
	2008					2008		
	2009					2009		
	2010	(a) approx. 940 (b) 69-233 (c) 0-10				2010	2470-2550	
	2011					2011		
	2012					2012		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Promotion of Traffic Flow Management						
Diverse and flexible expressway toll policies	Volume of traffic paying discounted tolls (travel distance (vehicle-kilometer)) (hundred million km/year) 2008 approx. 200+β (annual average of five years between FY2008 and FY2012) 2009 2010 2011 2012	Citizen, business operator: -Using toll discounts Expressway company: -Implementing its own toll discount	-Implementing toll discounts		(10,000t-CO_2) 2008 approx. 20+α (annual average of five years between FY2008 and FY2012) 2009 2010 2011 2012	-Conversion ratio of vehicles shifting from an ordinary road to its parallel expressway -CO_2 emission coefficient for each speed (About "approx. 20+α": Since the privatization of highway-related public corporations in FY2005, expressway tolls have been discounted by an avarage of 10%, thus reducing approximately 0.2 million t-CO_2; Further reduction in tolls will start from FY2008, which is estimated to lead to the reduction of CO_2 emissions by approximately α ten thousand tons-CO_2)

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Traffic demand management for automobiles	Length of improved bicycle paths (10,000km)		Traffic business operator: -Promoting measures for traffic demand management (TDM) Citizen: -Using a bicycle	-Promoting measures for traffic demand management (TDM) -Improving and supporting the environment for cycling -Implementing and supporting pilot programs contributing to the promotion of cycling	-Promoting measues for traffic demand management (TDM) -Improving the environment for cycling -Implementing pilot programs contributing to the promotion of cycling	($10,000t-CO_2$)		-Passenger cars' travel distances shorter than 5km -Conversion ratio to cycling -CO_2 emission coefficients for each speed
	2008	approx. 2.6				2008	approx. 26	
	2009	approx. 2.8				2009	approx. 28	
	2010	approx. 3.0				2010	approx. 30	
	2011	approx. 3.2				2011	approx. 32	
	2012	approx. 3.4				2012	approx. 34	
Implementation of Intelligent Transport Systems (ITS): Electronic Toll Collection systems (ETC)	Utilization rate of ETC (%)		Citizen, business operator: -Using ETC Expressway company: -Implementing measures to promote the dissemination of ETC	-Implementing measures to promote the dissemination of ETC	−Promoting the pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$)		-Vol. of traffic jams for each toll booth -No. of vehicles passing through each toll booth -CO_2 emission coefficients for each speed
	2008	approx. 77				2008	approx. 19	
	2009	approx. 79				2009	approx. 19	
	2010	approx. 81				2010	approx. 20	
	2011	approx. 83				2011	approx. 20	
	2012	approx. 85				2012	approx. 21	
Implementation of ITS: Vehicle Information and Communication Systems (VICS)	Dissemination rate of VICS (%)		Citizen, business operator: -Using VICS	-Promoting the dissemination of VICS	-Promoting the collection and provision of traffic information -Promote the pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$)		'-Improved speed through dissemination of VICS -CO_2 emission coefficients for each speed
	2008	approx. 19.0				2008	approx. 225	
	2009	approx. 19.5				2009	approx. 230	
	2010	approx. 20.0				2010	approx. 240	
	2011	approx. 20.5				2011	approx. 245	
	2012	approx. 21.0				2012	approx. 250	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		Countermeasure Effect
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Implementaion of ITS: central control of traffic signals	Central control of traffic signals (no. of controlled signals)		-	-Promoting central control of traffic signals -Upgrading the central processing system and sophisticating traffic control centers by introducing a new traffic signal controlling system (MODERATO) -Implementing model projects concerning the sophistication of traffic signal controlling through traffic signal profile control methods -Promoting the Environment Protection Management Systems (EPMS) -Developing the Mobile Operation Control Systems (MOCS) for commercial vehicles -Prompting traffic information suppliers to provide accurate, appropriate traffic information -Operating traffic information examination systems adequately -Operating traffic control information management systems adequately	-Central control of traffic signals	($10,000t-CO_2$)		-Volume of CO_2 saved per traffic signal controlled centrally (FY2005 criteria)
	2008	approx. 38,000				2008	approx. 100	
	2009	approx. 40,000				2009	approx. 110	
	2010	approx. 42,000				2010	approx. 110	
	2011	approx. 44,000				2011	approx. 120	
	2012	approx. 47,000				2012	approx. 130	
Roadworks reduction	Annual roadwork hours per kilometer (hour/km/year)		Implementing concentrated roadworks and joint construction	-Coordinating for concentrated roadworks and joint construction at meetings for roadworks coordination (consisting of road administrators, enterprises occupying roads, etc.) -Developing joint ditches -Refraining from roadworks at the end of December and March	-Developing joint ditches -Implementing concentrated roadworks and joint construction -Coordinating for concentrated roadworks and joint construction at meetings for roadworks coordination	($10,000t-CO_2$)		-Difference in speeds between in traffic jams and in free flowing traffic -Length of traffic tie-ups caused by roadworks -CO_2 emission coefficients for each speed
	2008	approx. 116				2008	approx. 64	
	2009	approx. 112				2009	approx. 66	
	2010	approx. 108				2010	approx. 68	
	2011	approx. 105				2011	approx. 69	
	2012	approx. 101				2012	approx. 71	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Countermeasures against bottleneck railroad crossings	Reduction in time loss caused by traffic jams (person-hour/year)		National and local governments, railroad company: -Accelerating countermeasures against railroad crossings	-Overhauing the traffic at railroad crossings (selecting railroad crossings needing an emergency countermeasure), -Accelerating countermeasures against railroad crossings	-Accelerating countermeasures against railroad crossings	($10,000t-CO_2$)		-Duration for which railroad crossings are closed -Traffic volume at railroad crossings -No. of retired railroad crossings -CO_2 emission coefficients for each speed
	2008	approx. 8 million				2008	approx. 12	
	2009	approx. 10 million				2009	approx. 13	
	2010	approx. 14 million				2010	approx. 18	
	2011	approx. 21 million				2011	approx. 25	
	2012	approx. 31 million				2012	approx. 40	
Development of traffic safety facilities (sophistication of traffic signals)	No. of sophisticated traffic signals		-	-Promoting cordinated and actuated traffic signals -Sophisticating traffic control -Developing illegal parking prevention system -Developing parking guidance system -Promoting countermeasures against bottlenecks by guiding traffic with traffic information boards and developing traffic signals at railroad crossings	-Sophisticating traffic signals	($10,000t-CO_2$)		-Volume of CO_2 saved per sophisticated traffic signal (FY2005 criteria)
	2008	approx. 33,000				2008	approx. 30	
	2009	approx. 35,000				2009	approx. 40	
	2010	approx. 38,000				2010	approx. 40	
	2011	approx. 40,000				2011	approx. 40	
	2012	approx. 42,000				2012	approx. 50	
Development of traffic safety facilities (promotion of the use of LEDs for signal lights)	No. of LED signal lights		-	-Promoting the use of LEDs for signal lights	−Improving signal lights (using LEDs)	($10,000t-CO_2$)		-Volume of CO_2 saved per LED signal light
	2008	approx. 14,600				2008	approx. 0.1	
	2009	approx. 29,200				2009	approx. 0.4	
	2010	approx. 43,800				2010	approx. 0.7	
	2011	approx. 58,400				2011	approx. 1	
	2012	approx. 73,000				2012	approx. 1.3	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Promotion of the Environmentally-friendly Usage of Vehicles						
Promotion of the environmentally-friendly usage of vehicles (greening of vehicle transport business through such measures as dissemination and promotion of eco-driving)	No. of eco-driving devices disseminated (10,000 units) 2008: 28 2009: 31 2010: 34 2011: 37 2012: 40 Dissemination rate of vehicles with advanced GPS-AVM system (%) 2008: 20% 2009: 24% 2010: 28% 2011: 32% 2012: 36%	Manufacturer: -Developing and selling eco-driving devices Carrier: -Introducing eco-driving devices -Practicing eco-driving -Improving taxi pools -Implementing effective dispatch of vehicles with advanced GPS-AVM system -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act Consumer: -Introducing eco-driving devices -Practicing eco-driving	-Promoting the dissemination of eco-driving by implementing EMS dissemination projects -Conducting idling stop demonstration experiments by improving taxi pools -Supporting the development of advanced GPS-AVM system -Familiarizing the public with eco-driving including idling stop (promoting the dissemination of eco-driving based on the initiatives by the Eco-driving Dissemination Liaison Meeting) -Applying the Energy Conservation Act to motor carriers -Promoting the efforts through the Green Logistics Partnership Conference	-Familiarization -Promoting idling stop compliance measures	($10,000t-CO_2$) 2008: 110 2009: 122 2010: 134 2011: 145 2012: 157 ($10,000t-CO_2$) 2008: 4 2009: 4 2010: 5 2011: 6 2012: 6	-Volume of CO_2 saved per vehicle with an eco-driving device introduced: approx. 10% -Travel distance for dispatch saved with advanced GPS-AVM system: approx. 1km
Limit on the maximum speed of large trucks on expressways	No. of vehicles with a speed control device (10,000 vehicles) 2008: 61.4 2009: 66.6 2010: 71.8 2011: 77 2012: 80	Business operator: -Installing a speed control device to its large truck	-Requiring a speed control device to be installed to large trucks based on the Road Trucking Vehicle Act	–	($10,000t-CO_2$) 2008: 42.2-87.4 2009: 44.6-92.1 2010: 47.1-101 2011: 49.1-101 2012: 50.9-104	-Changes in the speed distribution through limit on maximum speed on expressways along with installation of speed control devices based on the Road Trucking Vehicle Act (traveling at the speed of less than 90km/h)
○ Development of National Campaigns (concerning eco-driving, promotion of public transport utilization, etc.)						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) D. Efforts in the *Transport* Sector (b) Promotion of Public Transport Utilization, etc.								
○ Promotion of Public Transport Utilization								
Promotion of public transport utilization	(million people)		Traffic business operator: -Developing public transport systems -Improving service and convenience Business operator: -Encouraging its employees and customers to utilize public transport systems Citizen: -Utilizing public transport systems	-Implementing development of new railway lines -Implementing development of LRT -Promoting the introduction of BRT -Promoting public transport utilization through improving service and convenience by promoting IC card introduction or other computerization, facilitating connections, realizing seamless public transport, etc. -Implementing projects for revitalization and revival of local public transport -Implementing and supporting pilot programs contributing to further public transport utilization -Promoting public transport utilization based on the Energy Conservation Act -Familiarization -Promoting development of Public Transport Priority Systems (PTPS) by controlling the priority signals for the bus	'-Developing public transport systems -Promoting public transport utilization through improving service and convenience -Familiarization	(10,000t-CO_2)		-It is assumed that a certain percentage of passengers carried by public transport systems, on which development of new railway lines or other measures are estimated to have improvement effects, will have switched from personal passenger vehicle users. Based on the assumption, the volume of emissions reductions has been calculated by summing up all the volumes calculated for each area. -It is assumed that around 10% of automobile commuters in the business places with 100 or more employees will switch to public transport commuters.
	2008	2,020				2008	213	
	2009	2,198				2009	255	
	2010	2,528				2010	375	
	2011	2,638				2011	397	
	2012	2,889				2012	452	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
					Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Dissemination and development of Environmentally Sustainable Transport (EST)	-	Traffic business operator: -Developing public transport systems -Improving service and convenience -Reducing environmental burdens of transport vehicles Business operator: -Encouraging its employees and customers to utilize public transport systems Local government: -Promoting public transport utilization -Developing transport infrastructure -Controlling illegal parking -Establishing bus-only lanes, etc. User: -Refraining from automobile use -Utilizing a bicycle and public transport systems -Walking	-Supporting areas promoting EST -Providing information concerning the measures and evaluation methods for promoting EST -PR activities	-Promoting public transport utilization in local areas -Developing transport infrastructure contributing to the reduction of environmental burdens -Creating the environment -Familiarization	($10,000t\text{-}CO_2$)		Included in "Promoting the dissemination of clean energy vehicles," "Traffic demand management for automobiles," "Promotion of public transport utilization," etc.
					2008	-	
					2009	-	
					2010	-	
					2011	-	
					2012	-	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Promotion of the Development and Introduction of Energy-efficient Railways, Ships and Aircrafts								
Improvement of energy consumption efficiency of railways	Energy consumption intensity		Railway operator: -Voluntary action plan -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act	-Supporting introduction of new vehicles -Applying the Energy Conservation Act to railway operators	-	($10,000t-CO_2$)		-Introduction of energy-saving vehicles: approximately 75%
	2008	2.44				2008	37	
	2009	2.43				2009	41	
	2010	2.42				2010	44	
	2011	2.41				2011	48	
	2012	2.4				2012	51	
Improvement of energy consumption efficiency of aircrafts	Energy consumption intensity (L/passenger-km)		Airline: -Voluntary action plan -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act	-Supporting introduction of new machinery -Upgrading air traffic control and landing gear -Promoting eco-airports -Applying the Energy Conservation Act to airlines	-	($10,000t-CO_2$)		−Amount of domestic air transport in FY2010: 101.9 billion passenger-km
	2008	0.052				2008	187	
	2009	0.052				2009	189	
	2010	0.0519				2010	191	
	2011	0.0518				2011	194	
	2012	0.0517				2012	196	
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) D. Efforts in the *Transport* Sector (c) Promotion of Telework and Other Transport Substitution by Information and Communications Technology								
Promotion of telework and other transport substitution by information and communications technology	Teleworking population (10,000 persons)			-Steadily implementing the 36 items listed in the Action Plan to Double the Number of Teleworking Population (established by the Ministries Concerned Liaison Conference on Teleworking Promotion and approved by the IT Strategy Headquarters on May 29, 2007; Cabinet Secretariat, Ministry of Internal Affairs and Communications, Ministry of Health, Labour and Welfare, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, and the other ministries and agencies)		($10,000t-CO_2$)		−Teleworking population (20% of employees: approx. 13 million in 2010)
	2008	approx. 970				2008	approx. 37.8	
	2009	approx. 1140				2009	approx. 43.9	
	2010	approx. 1300				2010	approx. 50.4	
	2011	approx. 1460				2011	approx. 56.5	
	2012	approx. 1630				2012	approx. 63	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*

(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.)

D. Efforts in the *Transport* Sector

(d) Promotion and Reinforcement of Voluntary Action Plans of Industry

○ Promotion and Reinforcement of Voluntary Action Plans of Industry (Businesses in the *Transport* Sector)

(10,000t-CO_2)	
2008	
2009	
2010	1310*
2011	
2012	

-It is assumed that the targets in the voluntary action plans by all businesses will be achieved.
-The calculations of reduction effects have been conducted for the 14 businesses marked with a circle (○)
*These effects are duplicative with those of other energy-saving countermeasures.

BusinessesWithin the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
◯ Japanese Shipowners' Association	CO_2 emissions intensity	FY1990	-15%
○ Japan Trucking Association	CO_2 emissions intensity	FY1996	-30%
◯ Scheduled Airlines Association of Japan	CO_2 emissions intensity	FY1990	-12%
○ Japan Federation of Coastal Shipping Associations	CO_2 emissions intensity	FY1990	-3%
○ Japan Passenger Boats Association	energy consumption intensity	FY1990	-3%
○ Japan Federation of Taxicab Associations	CO_2 emissions	FY1990	-11%
○ Nihon Bus Association	CO_2 emissions intensity	FY1997	-12%
○ Association of Japanese Private Railways	energy consumption intensity	FY1990	-15%
○ East Japan Railway Company	CO_2 emissions	FY1990	-22%
	energy consumption intensity	FY1990	-19%
○ West Japan Railway Company	energy consumption intensity	FY1995	-6.2%
○ Central Japan Railway Company	energy consumption intensity	FY1995	-15%
◯ Japan Harbor Transportation Association	CO_2 emissions intensity	FY2005	-6%
○ Japan Freight Railway Company	energy consumption intensity	FY1995	-2%
○ Kyushu Railway Company	energy consumption intensity	FY1990	-10%
○ Hokkaido Railway Company	energy consumption intensity	FY1995	-6.9%
○ All Japan Freight Forwarders Association	CO_2 emissions	FY1998	-11%
○ Shikoku Railway Company	energy consumption intensity	FY1990	-18.5%

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial*,*Consumer*,*Transport*, etc.) D. Efforts in the *Transport* Sector (e) Improvement of the Efficiency of Logistics Systems, etc.								
○ Implementation of CO_2 Saving by Cooperation Between Shippers and Logistics Operators								
○ Promotion of Modal Shifts, Increase of Truck Transport Efficiency, etc								
Comprehensive measures for environmentally friendly marine transport	Volume of marine transport (volume of cargo (general merchandise) easily transportable by automobile) (hundred million ton-kilometer)		Marine transport operator: -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act Shipper: -Actively utilizing domestic shipping in partnership with marine transport operator	-Implementing policies to promote the dissemination of new technologies such as Super Eco-Ships -Revitalizing marine transport through review of the regulations -Applying the Energy Conservation Act to shippers and marine transport operators -Supporting introduction of new vessels and equipment -Promoting efforts through the Green Logistics Partnership Conference -Promoting modal shifts through the Act on Promotion of Comprehensive and Efficient Logistics Operations -Promoting the dissemination of fuel-efficient vessels by utilizing indicators to evaluate the fuel efficiency performance of vessels	-	($10,000t\text{-}CO_2$)		-Intensity improvement of shipping compared to trucking: approximately 14%
	2008	303				2008	102	
	2009	307				2009	114	
	2010	312				2010	126	
	2011	316				2011	136	
	2012	320				2012	148	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Modal shift to railway freight	Ton-kilometer of railway container transport increased by switching from trucking to railway container transport (hundred million ton-kilometer)		Railway operator: -Effectively utilizing transport capacity with IT -Promoting the utilization through improving large container transport system -Improving transport efficiency by developing E&S(Effective & Speedy Container Handling System) stations -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act -Improving transport quality Railway-using carrier: -Promoting the utilization through enhancement of transport equipment and materials such as large containers Shipper: -Actively utilizing environmentally friendly railway cargo transport	-Implementing projects to strengthen railway cargo transport capacity -Promoting efforts through the Green Logistics Partnership Conference -Supporting introduction of new high-performance rail cars contributing to the reinforcement of transport capacity -Supporting the efforts by railway operators to improve transport quality -Applying the Energy Conservation Act to shippers and railway operators -Promoting modal shifts through the Act on Promotion of Comprehensive and Efficient Logistics Operations -Improving the level of awareness of environmentally friendly railway cargo transport(including dissemination and promotion of the Eco Rail Mark)	-Familiarization	(10,000t-CO_2)		-Intensity improvement of railway freight transport compared to trucking: approximately 8%
	2008	28				2008	70	
	2009	31				2009	78	
	2010	32				2010	80	
	2011	35				2011	88	
	2012	36				2012	90	
Promotion of dissemination of energy-saving vessels	Cumulative no. of vessels introduced		Domestic shipping operator: -Choosing Super Eco-Ships (SES), vessels contributing to energy saving in constructing a new vessel	-Implementing policies to support dissemination of environmentally friendly, economical next-generation domestic vessels (SES)	-	(10,000t-CO_2)		-Volume of CO_2 emissions reductions per Super Eco-Ship: approximately 285t-CO_2 (An average per Super Ecco-Ship has been calculated from its FY2005 records)
	2008	19				2008	0.54	
	2009	26				2009	0.74	
	2010	33				2010	0.94	
	2011	40				2011	1.14	
	2012	47				2012	1.34	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Improvement of truck transport efficiency	(1) No. of vehicles owned with gross weight over 24t but not exceeding 25t (2) No. of trailers owned (3) Ratio of commercial trucks (%) (4) Load efficiency (%)		Carrier: -Promoting the use of heavy or trailer trucks and the improvement of truck transport efficiency -Creating and implementing a mid- to long-term plan based on the Energy Conservation Act	-Promoting the use of heavy or trailer trucks -Constructing roads fit for heavy trucks -Applying the Energy Conservation Act to shippers and truck operators -Promoting efforts through the Green Logistics Partnership Conference -Implementing the support project for business operators rationalizing their energy use	-Promoting the dissemination -Constructing roads fit for heavy trucks	(10,000t-CO_2)		-Fuel reduction by introducing a 25t truck: approx. 9,000L/truck -Fuel reduction by introducing a trailer truck: approx. 24,000L/trailer -Intensity improvement of a commercial truck compared to a private truck: approx. 15%
	2008	(1) 120800 (2) 71100 (3) 87 (4) 44.6				2008	1,389	
	2009	(1) 120800 (2) 71100 (3) 87 (4) 44.6				2009	1,389	
	2010	(1) 120800 (2) 71100 (3) 87 (4) 44.6				2010	1,389	
	2011	(1) 120800 (2) 71100 (3) 87 (4) 44.6				2011	1,389	
	2012	(1) 120800 (2) 71100 (3) 87 (4) 44.6				2012	1,389	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Reduction of overland transport distances of international freight	Volume of overland transport of international freight (hundred million ton-km)		Shipper, logistics operator: -Using the most suitable ports close to producing and consuming areas	-Developing international marine container terminals in core and hub international ports -Developing multi-purpose international terminals as logistics centers -Promoting efforts through the Green Logistics Partnership Conference	-	($10,000t\text{-}CO_2$)		-Reduction of overland transport distances of international freight
	2008	82.6				2008	236	
	2009	87.4				2009	249	
	2010	92.3				2010	262	
	2011	92.3				2011	262	
	2012	92.3				2012	262	
the Certification Program for Green Management								

Specific countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions	Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (Industrial, Consumer, Transport, etc.) D. Efforts in the Energy Conversion Sector (a) Promotion and Reinforcement of Voluntary Action Plans of Industry						
○ Promotion and Reinforcement of Voluntary Action Plans of Industry (oil, gas, power producers and suppliers)					($10,000t-CO_2$) 2008 2009 2010 230 2011 2012	-It is assumed that the targets in the voluntary action plans by all businesses will be achieved. -The calculations of reduction effects have been conducted for the three businesses marked with a circle (○)

Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry

Business (Plan Formulator)	Performance Indicator	Base Year	Target Level
○ Petroleum Association of Japan	energy consumption intensity	FY1990	-13%
○ Japan Gas Association	CO_2 emissions	FY1990	-59%
	CO_2 emissions intensity	FY1990	-86%
○ Power Producers and Suppliers	CO_2 emissions intensity	FY2001	-3%

Specific countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Reduction of Carbon Dioxide Emissions Intensity in the Electric Power Sector						
Reduction of carbon dioxide emissions intensity in the electric power sector through promotion of nuclear energy, etc.	Improvement rate of CO2 emissions intensity of electric utilities: (The Federation of Electric Power Companies of Japan: Environmental Action Plan targets) Reducing CO2 emissions intensity in final use in FY2008-FY2012 by an average of approximately 20% from FY1990 level (reducing the intensity to about 0.34kg-CO2/kWh)	(The Federation of Electric Power Companies of Japan) -Working toward achieving the targets in its voluntary action plan through the following efforts: (1) Improvement of the nuclear power plant's capacity factor through realization of scientific and rational operation management; (2) Further improvement of the thermal efficiency of thermal power generation, environment-conscious adjustment of the operational methods of thermal power sources; and (3) Acquisition of credits (volume of emissions reductions) under the Kyoto Protocol through utilization of the Kyoto Mechanisms.	Implementing the following measures toward the reduction of carbon dioxide emissions intensity in the electric power sector -Assessing and verifying the achievement of targets in the "Environmental Action Plan by the Japanese Electric Utility Industry" (The Federation of Electric Power Companies of Japan) -Promoting nuclear energy with the understanding of citizens under public private partnership, based on the most fundamental premise of ensuring safety -Supporting the improvement of generating efficiency of thermal power by subsidizing the costs for converting obsolete coal thermal power plants into natural gas power plants -Supporting the utilization of the Kyoto Mechanisms -Reflecting the Kyoto Mechanism credits acquired by an electric utility to the utility's CO2 emission coefficient under the Calculating, Reporting and Announcing System -Implementing measures for electrical load leveling by promoting the dissemination of thermal storage systems or the like		(10,000t-CO_2)	CO2 emissions intensity will be reduced by apporoximately 20% from FY 1990 level by combining the following measures. The effect here includes the effects of energy-saving measures on the demand side. -Further improvement of the nuclear power plant's capacity factor -Improvement of CO2 emissions intensity through adjustment of the operational methods of thermal power source -Improvement of CO2 emissions intensity through utilization of the Kyoto Mechanisms
	2008	About 0.34 (average of five years from FY2008 to FY2012)				2008	
	2009					2009	
	2010					2010	approx. 1,400-1,500
	2011					2011	
	2012					2012	

Specific countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport,* etc.) D. Efforts in the *Energy Conversion* Sector (b) Efforts by Energy Type						
○ Steady Implementation of Nuclear Power Generation						
○ Introductioin and Utilization Expansion of Natural Gas						
○ Promotion of the Efficient Use of Petroleum						
○ Promotion of the Efficient Use of Liquefied Petroleum Gas						
○ Realization of a Hydrogen Society						
(ii) Measures and Policies by Sector (*Industrial, Consumer, Transport,* etc.) D. Efforts in the *Energy Conversion* Sector (c) Measures for Renewable Energy						
○ Promotion of the Introduction of Renewable Energy, etc.						

Specific countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Promotion of measures for renewable energy (utilisation expansion of biomass heat, photovoltaic generation, etc.)	Volume of renewable energy introduced (million kl)		Private business operator: -Actively using renewable energy -Developing technology for improving the efficiency of renewable energy equipment Electric utility: -Achieving the target volume under the RPS Act Consumer: -Actively using renewable energy	-Further Strengthening and efficiently operating projects supporting the demonstration and introduction of renewable energy and its technology development -Supporting the introduction of renewable energy by steadily enforcing the RPS Act -Promoting private-sector voluntary efforts such as green power certificates -Smoothly coordinating with all types of regulations (land use regulations including natural park regulations) -Evaluating the local efforts to introduce renewable energy by local production for local consumption and sharing best practices by introducing such leading efforts -Building a network of dispersed renewable energy -Effectively using untapped energy (in the renewable energy field) -Subsidizing the introduction and demonstration of bioethanol fuel-utilizing equipment -Subsidizing the pioneering introduction of renewable energy-utilizing equipment by local governments -Establishing a biofuel associated tax system -Supporting the cooperative efforts between people engaged in agriculture, forestry or fisheries, who produce raw material for biofuels, and biofuel manufacturers -Developing a system to ensure the quality of biofuels	-Creating, implementing and evaluating a comprehensive plan to introduce renewable energy -Promoting the introduction of renewable energy in public facilities -Supporting the introduction of renewable energy -Promoting the pioneering introduction based on the Green Purchasing Act	(10,000t-CO_2)		Introduction of 15.6 million kl of renewable energy -Utilization of photovoltaic generation: 0.73 million kl -Utilization of wind power generation: 1.01 million kl -Utilization of waste and biomass power generation: 4.49 million kl -Utilization of biomass heat: 2.82 million kl -Other: 6.55 million kl Introduction of 19.1 million kl of renewable energy -Utilization of photovoltaic generation: 1.18 million kl -Utilization of wind power generation: 1.34 million kl -Utilization of waste and biomass power generation: 5.68 million kl -Utilization of biomass heat: 3.08 million kl (including biofuel for transport use: 0.5 million kl) -Other: 7.64 million kl * This breakdown shows rough indications for each source of renewable energy.
	2008					2008		
	2009					2009		
	2010	15.6-19.1				2010	3800 -4730	
	2011					2011		
	2012					2012		

<table>
<tr><th>Specific countermeasure</th><th>Countermeasure Evaluation Index (Estimates of FY2008-FY2012)</th><th>Measure by Each Actor</th><th>National Policy</th><th>Example of Policies Expected to be Implemented by Local Governments</th><th colspan="3">Countermeasure Effect</th></tr>
<tr><th colspan="3"></th><th colspan="3"></th><th>Estimated Volume of Emissions Reductions</th><th>Assumption Made in Calculating the Estimated Volume of Emissions Reductions*</th></tr>
<tr><td rowspan="7">Promotion of introduction of cogeneration and fuel cells</td><td colspan="3">Cumulative volume of cogeneration and fuel cells introduced (10,000kW)</td><td rowspan="7">Manufacturer:
-Developing technology of natural gas cogeneration and fuel cells

Dealer:
-Selling natural gas cogeneration and fuel cells
-Providing information to consumers

Consumer:
-Actively introducing natural gas cogeneration and fuel cells</td><td rowspan="7">-Implementing research and development of natural gas cogeneration and fuel cells
-Subsidizing the introduction of natural gas cogeneration and fuel cells
-Subsidizing the introduction of fuel cells (local goverments, Regional Councils)
-Promoting the pioneering introduction based on the Green Purchasing Act</td><td rowspan="7">-Taking the lead in introducing natural gas cogeneration and fuel cells
-Supporting the introduction
-Promoting the pioneering introduction based on the Green Purchasing Act</td><td colspan="2">(10,000t-CO_2)</td><td rowspan="7">-Cumulative volume of cogeneration introduced
-Cumulative volume of fuel cells introduced</td></tr>
<tr><td></td><td>cogene-ration</td><td>fuel cells</td><td></td><td>cogenerati-on /fuel cells</td></tr>
<tr><td>2008</td><td></td><td></td><td>2008</td><td></td></tr>
<tr><td>2009</td><td></td><td></td><td>2009</td><td></td></tr>
<tr><td>2010</td><td>498 -503</td><td>1.97 -10</td><td>2010</td><td>1400 -1430</td></tr>
<tr><td>2011</td><td></td><td></td><td>2011</td><td></td></tr>
<tr><td>2012</td><td></td><td></td><td>2012</td><td></td></tr>
<tr><td colspan="8">○ Promotion of Biomass Utilization</td></tr>
<tr><td rowspan="7">Promotion of biomass utilization (building of biomass towns)</td><td colspan="2">No. of biomass towns</td><td rowspan="7">Farmer, forester, fisher, business operator:
-Actively utilizing biomass resources

Local resident:
-Actively cooperating in collection and use of biomass resources</td><td rowspan="7">-Promoting biomass town initiatives
-Supporting planning, building facilities, developing technology and providing information for local efforts for biomass utilization</td><td rowspan="7">-Formulating and implementing a biomass town initiative
-Establishing systems for production, collection, transport, conversion and utilization of local biomass</td><td colspan="2">(10,000t-CO_2)</td><td rowspan="7">-Around 300 municipalities nationwide will utilize 90% of waste biomass and 40% of unused biomass.
-About 0.1 million ton of biomass plastic will be utilized.</td></tr>
<tr><td>2008</td><td></td><td>2008</td><td></td></tr>
<tr><td>2009</td><td></td><td>2009</td><td></td></tr>
<tr><td>2010</td><td>300</td><td>2010</td><td>approx. 100 (paritally including the effects of measures for renewable</td></tr>
<tr><td>2011</td><td></td><td>2011</td><td></td></tr>
<tr><td>2012</td><td></td><td>2012</td><td></td></tr>
<tr><td colspan="8">○ Initiatives in Water Supply and Sewerage Systems and Waste Management</td></tr>
</table>

(Appendix 1) Table-2 List of Measures and Policies on Non-energy-originated Carbon Dioxide

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
							Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Expansion of Blended Cement Use								
Expansion of blended cement use	Percentage of blended cement used		Manufacturer: -Supplying blended cement -Providing information to consumers	Promoting the pioneering introduction based on the Green Purchasing Act	Promoting the pioneering introduction based on the Green Purchasing Act		(10,000t-CO_2)	Projected cement production in FY2010: 68,660t -Regular cement: 51,633t -Blended cement: 17,027t -Volume of CO_2 emissions per ton of limestone: 415kg-CO_2/t-limestone
	2008	21.9				2008	76	
	2009	23.4				2009	95	
	2010	24.8				2010	112	
	2011	24.8				2011	112	
	2012	24.8				2012	112	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		Countermeasure Effect
					Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Promotion of Measures to Reduce Carbon Dioxide Emissions Derived From Waste Incineration							
Promotion of Measures to Reduce Carbon Dioxide Emissions Derived From Waste Incineration	—	Business operator: -Improving the durability of the products it manufactures or sells and enhancing repair service for those -Promoting voluntary collection, handover and recycling of its products that have ended up in the waste -Implementing recycling based on the Containers and Packaging Recycling Act -Further promoting the 3Rs based on the Keidanren Voluntary Action Plan on the Environment (Section on Establishing a Sound Material-Cycle Society) which was reviewed in March 2007 Industrial waste management business operator: -Implementing measures based on the National Federation of Industrial Waste Management Associations' Voluntary Action Plan on the Environment (including reducing the amount of incineration of industrial wastes originating from petroleum) Consumer: -Giving consideration in buying and using products (e.g. using recycled goods, using for the long term) -Giving consideration in disposing of products (e.g. handing over to business operator products that have ended up in the waste, cooperating in separated garbage collection by municipalities) -Reducing garbage generation through charge for its collection -Separating garbage emissions thoroughly	-Promoting the measures towards the achievement of the targets (from March 2003 onward) determined in the Sound Material-Cycle Plan under the Sound Material-Cycle Act -Promoting the measures towards the achievement of the waste volume reduction targets (from May 2001 onward) based on the Waste Management Act -Providing information on promoting the National Federation of Industrial Waste Management Associations' Voluntary Action Plan on the Environment -Providing support to municipal -Implementing, evaluating and studying measures based on the individual recycling acts (e.g. Containers and Packaging Recycling Act) -Promoting the pioneering introduction based on the Green Purchasing Act -Disseminating guidelines for municipal separated collection and charge for collection, and promoting familiarization regarding the 3Rs	-Promoting residents' voluntary activities, familiarization and environmental education toward waste reduction and reuse and recycling of recyclable resources of manufactured goods and the like -Promoting the pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$)		Volume of CO_2 emissions per ton of waste incinerated ($kg-CO_2/t$) -Municipal waste (plastics): 2,670 -Industrial waste (waste plastics): 2,600 -Industrial waste (waste oil): 2,900
	Amount of municipal waste (plastics) incinerated: approx. 4.4 million t Amount of industrial waste (waste plastics) incinerated: approx. 2 million t Amount of industrial waste (waste oil) incinerated: approx. 2.3 million t				2008		
					2009		
					2010	580	
					2011		
					2012		
○ Development of National Campaigns (on promotion of the 3Rs)							

(Appendix 1) Table-3 List of Measures and Policies on Methane and Nitrous Oxide

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
1. Methane						
○ Reduction in the Amount of Final Waste Disposal, etc.						
Reduction in the amount of final waste disposal, etc.	–	Business operator: -Improving the durability of the products it manufactures or sells and enhancing repair service for those -Promoting voluntary collection, handover and recycling of its products that have ended up in the waste -Controlling direct landfill disposal of organic waste based on the Keidanren Voluntary Action Plan on the Environment (Section on Establishing a Sound Material-Cycle Society) which was reviewed in March 2007 Industrial Waste Management Business Operator: -Implementing measures based on the National Federation of Industrial Waste Management Associations' Voluntary Action Plan on the Environment (e.g. reducing the amount of final disposal of biodegradable industrial wastes)	-Promoting the measures towards the achievement of the targets (from March 2003 onward) determined in the Sound Material-Cycle Plan under the Sound Material-Cycle Act -Providing information on promoting the National Federation of Industrial Waste Management Associations' Voluntary Action Plan for the Environment -Promoting the measures towards the achievement of the waste volume reduction targets (from May 2001 onward) based on the Waste Management Act -Providing support to municipal projects such as ones for developing waste recycling facilities	-Promoting residents' voluntary activities, familiarization and environmental education toward waste reduction and reuse and recycling of recyclable resources of manufactured goods and the like -Promoting the pioneering introduction based on the Green Purchasing Act -Strengthening litter control in immediate areas and ensuring adequate disposal of waste -Fostering excellent waste management business operators	(10,000t-CO_2) 2008 2009 2010 50	Volume of CH_4 emissions per ton of landfilled waste (kg-CH_4/t) -Food waste: 143 -Paper, textiles: 140 -Wood waste: 136 Amount of municipal waste incinerated: approx. 33.3 million t Volume of CH_4 emissions per ton of waste incinerated (g-CH_4/t) -Continuous furnace: 7.3 -Semi-continuous furnace: 68 -Batch furnace: 73
	Amount of final municipal waste disposal (food, paper, textile, wood): approx. 0.31 million t Amount of final industrial waste disposal (livestock carcass, animal and plant residue, paper, textile, wood): approx. 0.12 million t Percentages of each incinerator type: continuous furnace (85%), semi-continuous (11%), batch furnace (4%) Measures against illegal dumping of industrial wastes: Eradicating large-scale illegal dumping of industrial wastes (over 5000 tons) by early detection					

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
					Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Reduction in the amount of final waste disposal, etc.		Consumer: -Giving consideration in buying and using products (e.g. using recycled goods, using for the long term) -Giving consideration in disposing of products (e.g. handing over to business operator products that have ended up in the waste, cooperating in separated garbage collection by municipalities) -Implementing comprehensive measures including above at each stage of waste flow (Action Plan for Eradication of Illegal Dumping)	-Implementing, evaluating and studying measures based on the individual recycling acts (e.g. Containers and Packaging Recycling Act) -Disseminating guidelines for municipal separated collection and charge for collection, and promoting familiarization regarding the 3Rs -Promoting the pioneering introduction based on the Green Purchasing Act -Implementing the Action Plan for Eradication of Illegal Dumping -Promoting the removal of obstacles to maintaining a good living environment such as illegal dumping, by providing support based on the Act on Special Measures Concerning Removal of Environmental Problems Caused by Specified Industrial Wastes		2011		
					2012		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Review of Organic Matter and Water Management in Rice Paddies ○ Optimization and Reduction of Fertilizer Application								
Optimization and reduction of fertilizer application through the promotion of environmentally-sound agriculture	(1) Organic matter management ratio ([Current ratio] rice straw:compost:no application =60:20:20) (2)Amount of chemical fertilizer demanded (FY2005 records: 471,000 tN)		Testing laboratory: -Establishing and demonstrating new methane generation control technology Producer: (Methane) Shifting from "rice straw plowing" to "compost application" (Nitrous oxide) Reducing fertilizer applied, splitting application and utilizing slow release fertilizers	(Measures to reduce methane emissions resulting from rice production (rice paddies) (1) Project for building a system to control the generation of greenhouse gas originating from soil -Providing support to promote the shift from "rice straw plowing" to "compost application" -Supporting the establishment and demonstration of newly developed methane generation control technology and its familiarization -Supporting basic data collection for greenhouse gas calculations based on the IPCC guidelines (2) Review of the methods for calculating greenhouse gas emissions from rice production	Prefecture: -Implementing policies such as dissemination and promotion of environmental rules in agriculture in collaboration with fertilizer standards review	($10,000t-CO_2$)		It is assumed that the management method of organic matter for intermittent irrigation rice paddies will be shifted from rice straw plowing to compost application because the former has a high methane emission coefficient, while the later can control methane generation with high productivity. Because the reduction in fertilizer application lessens the amount of N_2O originating from agricultural land, the policies to reduce fertilizer application will be further implemented through prefectural review of fertilizer standards. Therefore, it is assumed that the amount of chemical fertilizer demanded after 2006 onward will continue to decrease on a trend similar to between 2000 and 2005 after the introduction of the Sustainable Agriculture Act.
	2008	(1) 56:24:20 (2) 469,000 tN				2008	6,3	
	2009	(1) 52:28:20 (2) 467,000 tN				2009	12,1	
	2010	(1) 48:32:20 (2) 465,000 tN				2010	18.1	
	2011	(1) 44:36:20 (2) 463,000 tN				2011	24.1	
	2012	(1) 40:40:20 (2) 461,000 tN				2012	30	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
						Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(ii) Nitrous Oxide							
○ Installation of Nitrous Oxide Decomposer in the Production Process of Adipic Acid							
Installation of nitrous oxide decomposer in the production process of adipic acid	Number of plant		Manufacture: -Introducing nitrous oxide decomposer (completed)	-	-	($10,000t-CO_2$)	-Amount of adipic acid produced: 120,000 t -Rate of N_2O generation: 282kg-N_2O/t -Rate of N_2O decomposition: 99.9%
	2008	1				2008 approx. 985	
	2009	1				2009 approx. 985	
	2010	1				2010 approx. 985	
	2011	1				2011 approx. 985	
	2012	1				2012 approx. 985	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Sophistication of Combustion at Sewage Sludge Incineration Facilities								
Sophistication of combustion at sewage sludge incineration facilities	(%) (Upper: Ratio of sewage sludge incinerated at high temperature, Lower: Industrial waste)		Local government: -Implementing sophistication of sewage sludge combustion as the operating body of sewerage business Industrial waste management business operator: -Implementing measures based on the National Federation of Industrial Waste Management Associations' Voluntary Action Plan on the Environment	-Establishing standards concerning the sophistication of sewage sludge combustion -Providing information on promoting the National Federation of Industrial Waste Management Associations' Voluntary Action Plan on the Environment	-Implementing sophistication of sewage sludge combustion	($10,000t-CO_2$) (Upper: Sewerage business operator, Lower: Industrial waste management business operator - National Federation of Industrial Waste Management Associations)		Volume of N_2O emissions per ton of sewage sludge incinerated in a polymer fluidized-bed furnace (g-N_2O/t) -Regular combustion: 1,508 -High-temperature combustion: 645
	2008	75 -				2008	91 -	
	2009	87 -				2009	108 -	
	2010	100 -				2010	126 Included in 64.8	
	2011	100 -				2011	127 -	
	2012	100 -				2012	129 -	

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
○ Sophistication of Combustion at Municipal Waste Incineration Facilities, etc.						
Sophistication of combustion at municipal waste incineration facilities	Percentages of each incinerator type Continuous furnace: 85%, semi-continuous furnace: 11%, batch furnace: 4%	Business operator: -Improving the durability of the products it manufactures or sells and enhancing repair service for those -Promoting voluntary collection, handover and recycling of its products that have ended up in the waste Consumer: -Giving consideration in buying and using products (e.g. using recycled goods, using for the long term) -Giving consideration in disposing of products (e.g. handing over to business operator products that have ended up in the waste, cooperating in separated garbage cllection by municipalities)	-Providing support to municipal projects such as ones for developing waste recycling facilities -Promoting the installation of incineration facilities with continuous furnaces along with widening the areas of waste management -Strengthening and enforcing the standards for structure and for operation and maintenance of waste incineration facilities (from March 2001 onward) -Promoting the measures towards the achievement of the targets (from March 2003 onward) determined in the Sound Material-Cycle Plan under the Sound Material-Cycle Act -Promoting the measures towards the achievement of the waste volume reduction targets (from May 2001 onward) based on the Waste Management Act -Implementing, evaluating and studying measures based on the individual recycling acts (e.g. Containers and Packaging Recycling Act) -Promoting the pioneering introduction based on the Green Purchasing Act -Disseminating guidelines for municipal separated collection and charge for collection, and promoting familiarization regarding the 3Rs	-Promoting residents' voluntary activities, familiarization and environmental education toward waste reduction and reuse and recycling of recyclable resources of manufactured goods and the like -Promoting the pioneering introduction based on the Green Purchasing Act	($10,000t-CO_2$) 2008 2009 2010 20 2011 2012	Amount of municipal waste incinerated: approx. 33.3 million t Volume of N_2O emissions per ton of waste incinerated ($g-N_2O/t$) -Continuous furnace: 52 -Semi-continuous furnace: 53 -Batch furnace: 64
○ Review of Organic Matter and Water Management in Rice Paddies ○ Optimization and Reduction of Fertilizer Application						

(Appendix 1) Table-4 List of Measures and Policies on Three Fluorinated Gases

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

<table>
<tr><th rowspan="2">Specific Countermeasure</th><th rowspan="2">Countermeasure Evaluation Index (Estimates of FY2008-FY2012)</th><th rowspan="2">Measure by Each Actor</th><th rowspan="2">National Policy</th><th rowspan="2">Example of Policies Expected to be Implemented by Local Governments</th><th colspan="3">Countermeasure Effect</th></tr>
<tr><th>Estimated Volume of Emissions Reductions</th><th colspan="2">Assumption Made in Calculating the Estimated Volume of Emissions Reductions*</th></tr>
<tr><td colspan="8">○ Promotion of Planned Efforts by Industry</td></tr>
<tr><td colspan="8">○ Promotion of Development of Substitute Materials and Use of Substitute Products</td></tr>
<tr><td>Promotion of planned efforts by industry</td><td colspan="2">Achievement of the targets and projections set in each industry organization's voluntary action plan</td><td>Organization with a voluntary action plan (22 organizations in eight sectors):
-Complying with its voluntary action plan</td><td>-Implementing assessments and verifications of the action plans in the Global Warming Prevention Measures Subcommittee of the Chemicals and Bio-industry Committee of the Industrial Structure Council
-Subsidizing the introduction of equipment controlling the three fluorinated gas emissions</td><td>-Supporting the efforts by business operators</td><td rowspan="2">(10,000t-CO_2)</td><td rowspan="2"></td></tr>
<tr><td>Realization of compact urban structures</td><td>Elimination of fluorocarbons in aerosol, etc.</td><td>Shipping volume of HFCs in aerosol products (t)
2008 1,857
2009 1,900
2010 1,948
2011 1,998
2012 2,050
Estimated volume of HFCs used in MDI (t)
2008 142
2009 160
2010 180
2011 180
2012 180</td><td></td><td></td><td></td><td>2008 Approx. 6,410
2009 Approx. 6,400</td><td></td></tr>
</table>

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Promotion of Development of Substitute Materials and Use of Substitute Products	Elimination of fluorocarbons in blowing agents and insulation materials	Estimated volume of HFC-134a used in urethane foam (t) 2008: 239 2009: 229 2010: 220 2011: 220 2012: 220	Manufacturer of the three fluorinated gases: -Developing substitute materials, etc.	-Supporting technology development of substitute materials -Promoting the pioneering introduction based on the Green Purchasing Act -Familiarizing the public with substitute products (In the case of blowing agents and insulation materials) -Appending fluorocarbon-free insulation materials standards to Japanese Industrial Standards (FY2006) -Stipulating the use of fluorocarbon-free insulation materials in standard public works specifications, etc. (FY2006) -Promoting the use of fluorocarbon-free insulation materials through the project to promote dissemination of "eco-house" and tax relief for renovations to improve energy efficiency	-Promoting procurement of substitute products -Familiarizing the public with substitute products -Promoting the pioneering introduction based on the Green Purchasing Act	2010	Approx. 6,440	It is assumed that additional recovery and disposal (destruction of PFCs and SF_6 through introduction of destructive furnaces) by subsidies will reduce PFCs and SF_6 emissions by approximately 1.2 million t-CO_2 (on an average of the period between 2008 and 2012).
		Estimated volume of HFCs used in extruded foamed polystyrene (t) 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0	Manufacturer of products containing the three fluorinated gases: -Developing and selling substitute products -Providing information to consumers			2011	Approx. 6,410	
		Estimated volume of HFCs used in highly foamed polyethylene (t) 2008: 104 2009: 97 2010: 90 2011: 90 2012: 90	Business operator or consumer using products containing the three fluorinated gases: -Choosing substitute products					

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)			Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
							Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
		Estimated volume of HFCs used in phenol foam (t)		Manufacturer of magnesium alloy: -Developing and disseminating SF_6-free magnesium alloy technology Business operator using magnesium (manufacturers of auto parts, electronics and electrical equipment, etc.): -Using magnesium alloy manufactured with SF_6-free					
		2008	0						
		2009	0						
		2010	0						
		2011	0						
		2012	0						
	Development and dissemination of SF_6-free magnesium alloy	Estimated volume of SF_6 gas used (t)			-Supporting development of magnesium alloy technology without using SF_6 as protective gas				
		2008	39						
		2009	40						
		2010	9						
		2011	9						
		2012	9						

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect: Estimated Volume of Emissions Reductions		Countermeasure Effect: Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
	Substitution and appropriate disposal of liquid PFCs, etc.		Owner of machinery using liquid PFCs: -Using substitute products -Ensuring appropriate disposal of machinery using liquid PFCs	-Investigating the actual conditions on the use and emissions of liquid PFCs, etc. -Supporting the establishment of disposal technology for proper destruction	-Supporting the efforts by business operators	($10,000t-CO_2$)		-Amount of liquid PFCs disposed of appropriately: approx. 3.7t (2010) -Global warming potential of liquid PFCs: 7,400 (PFC-51-14)
		2008				2008	0	
		2009				2009	3	
		2010				2010	3	
		2011				2011	3	
		2012				2012	3	
○ Recovery of HFCs Filled as Refrigerant in Equipment Based on Relevant Acts, etc.								
Recovery of HFCs filled as refrigerant in equipment based on relevant acts, etc.	(Estimated volume of HFCs recovered from air-conditioners of scrapped automobiles) 1.17 million t-CO_2 in FY2010 (Recovery rate of refrigerant in commercial refrigeration and air conditioning equipment) 60% in FY2010 (Estimated volume of HFCs recovered from household appliances) 87,000 t-CO_2 in FY2010		Citizen: -Cooperating in steady recovery and destruction of fluorocarbons	-Implementing and operating relevant acts appropriately -Familiarization	-Implementing and operating relevant acts appropriately -Familiarization	($10,000t-CO_2$)		
		2008				2008	approx. 363	
		2009				2009	approx. 444	
		2010				2010	approx. 526	
		2011				2011	approx. 604	
		2012				2012	approx. 681	

(Appendix 1) Table-5 List of Measures and Policies on Greenhouse Gas Sinks

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(1) Forest Sink Measures						
Implementation of measures for greenhouse gas sinks by promoting forest and forestry measures	Area of forest maintained (10,000 ha/year)	-Undertaking 0.2 million ha per annum of additional forest management for a six year period between FY2007 and FY2012 -Promoting support measures to accelerate forest management such as tree thinning -Taking into account the progress of consideration of cross-sectoral policies, making united efforts with the private sector to steadily and comprehensively promote forest management, timber supply, effective use of timber or other measures, which are necessary for achieving the targets of the Basic Plan for Forest and Forestry (specific policies include the formulation of a new Act on Special Measures Concerning the Promotion of the Implementation of Thinning, etc. of Forests and the development of the “National Movement for Fostering Beautiful Forests in Japan” that has the target of undertaking 3.3 million ha of thinning in a six-year period starting from FY2007, with the understanding and cooperation of a wide range of citizens)			(10,000t-CO_2/year)	Assumptions made in calculation (1) Forests subject to the calculation of sink removals under the Kyoto Protocol -*Managed forest* : forest for which forestry operations (renewal including site preparation, surface tilling and planting; nurturing including sanitary or improvement cutting); thinning; and final cutting) have been conducted since 1990 in order to keep forests in appropriate conditions -*Naturally regenerated forest* : forest for which protection and conservation measures, such as regulations for land use conversion and logging, have been taken based on laws and regulations (2) Area of forests subject to the calculation of sink removals -Managed forest estimated to be subject to forest management if the past level of forest management continues: 6.75 million ha

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
	2008	78				2008	4,767	-Naturally regenerated forest estimated to be subject to forest management if utmost efforts are given to expanding area of protection forests: 6.6 million ha (3) Average volume of removals by forests (estimated from the growth increment data of major tree species) -Average volume of removals by managed forest: 1.35t-C/ha -Average volume of removals by naturally regenerated forest: 0.42t-C/ha (4) Area needing additional forest management -Undertaking 0.2 million ha per annum of additional forest management for a six year period between FY2007 and FY2012
	2009					2009		
	2010					2010		
	2011					2011		
	2012					2012		

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Development of sound forests		National and local governments: -Promoting forest management necessary for achieving the targets of the Basic Plan for Forest and Forestry Local government, forestry-related actor, NPO, etc.: -Implementing steady, efficient maintenance of insufficiently-managed forests	-Forest management measures including additional thinning through new legal regimes or the like -Implementing appropriate forest maintenance including tree thinning, multistoried forest management and long cutting-cycle management -Eliminating the land left denuded by investigating the renewal status of such land or other measures -Promoting proper maintenance of broadleaf forests and shift to mixed forests of broadleaf and coniferous trees -Eliminating treeless land in water source forests in the hinterland or other areas and reviving devastated *satoyama* forests -Reducing costs by effectively combining road networks and developing road networks with consideration for the conservation of natural environment -Commissioning operations and management to motivated personnel and promoting maintenance by public bodies -Promoting the efforts to secure and foster essential personnel responsible for forest development	−Promoting forest and forestry policies in accordance with the natural, economic and social conditions of the local areas, taking into account the appropriate division of roles with the national government, based on the basic philosophy of the Forest and Forestry Basic Act (the Basic Plan on Forest and Forestry) and the Act on Promotion of Global Warming Countermeasures		Assumptions made in calculation (1) Forests subject to the calculation of sink removals under the Kyoto Protocol -Managed forest: forest for which forestry operations (renewal including site preparation, surface tilling and planting; nurturing including sanitary or improvement cutting); thinning; and final cutting) have been conducted since 1990 in order to keep forests in appropriate conditions -Naturally regenerated forest: forest for which protection and conservation measures, such as regulations for land use conversion and logging, have been taken based on laws and regulations (2) Area of forests subject to the calculation of sink removals -Managed forest estimated to be subject to forest management if the past level of forest management continues: 6.75 million ha

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Appropriate management and conservation of protection forests, etc.		National and local governments, etc.: -Developing soil conservation facilities -Appropriately implementing measures to conserve protection forests	-Promoting appropriate conservation and management through appropriate operation of the regulations under the protection forests system, systematic designation of protection forests, the protected forest system, and measures for natural vegetation protection and recovery in partnership with NPOs, etc. -Promoting development of soil conservation facilities in accordance with the characteristics of watershed -Promoting measures to prevent damage caused by forest pests or forest fires -Expanding and enhancing natural parks and nature conservation areas and strengthening conservation management within these areas			-Naturally regenerated forest estimated to be subject to forest management if utmost efforts are given to expanding area of protection forests: 6.6 million ha (3) Average volume of removals by forests (estimated from the growth increment data of major tree species) -Average volume of removals by managed forest: 1.35t-C/ha -Average volume of removals by naturally regenerated forest: 0.42t-C/ha (4) Area of additional forest management -Undertaking 0.2 million ha per annum of additional forest management for a six year period between FY2007 and FY2012

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Implementaion of forest fostering with the participation of citizens, etc.		National and local governments, business operator, NPO: -Promoting familiarization, forest volunteer activity, forest environmental education, and diverse forest use	-Promoting familiarization through events such as a tree-planting ceremony -Implementing forest fostering activities by a wider range of actors, including promotion of the participation of enterprises or others in forest fostering through the development of the “National Movement for Fostering Beautiful Forests in Japan" -Improving the skills of people such as forest volunteers and upgrading safety systems -Implementing forest environmental education -Implementing the Green Worker Program to protect flora and fauna including forests in national parks or other areas			

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect	
					Estimated Volume of Emissions Reductions	Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
Use of timber and woody biomass		National and local governments, business operator, NPO: -Promoting expanded use of timber in houses or public facilities and diversification of the use of wood resources by familiarization with timber use and structural reform of the lumber industry	-Promoting utilization of locally supplied timber in houses or public facilities by developing model facilities using local timber -Implementating consumer-focused programs to expand the actual demand for locally supplied timber, such as enhancing environmental education on the use of timber -Developing production, distribution and processing systems through computerization to meet consumer needs in close coordination among all concerned from forest workers to retailers -Establishing an efficient and low-cost collection and transport system for remnant wood in forest areas and promoting the utilization of such wood for making energy and products -Developing and making practicable new technology for using forest products or new woody materials -Promoting public awareness and utilization of charcoal for new uses including water purification and humidity control			

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)		Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		
						Estimated Volume of Emissions Reductions		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
(2) Promotion of Urban Greening								
Promotion of urban greening	Area of urban parks, green space in roads, riversides, harbors, sewage treatment plants and the premises of public housing and government facilities, and green space authorized by greening facilities plans developed in the first commitment period (1,000 ha)		National and local governments: -Promoting greening in public facilities or the like -Familiarizing the public with greenery creation -Promoting greening by a wide-ranging actors Citizen, enterprise, NPO: -Proactively participating in greening activities in various lands, facilities, etc.	-Promoting the following: creation of urban parks; greening of public facilities such as roads, rivers, *sabo* (erosion and sediment control facilities), harbors, sewage treatment plants, public housing and government facilities; and creation of new green space on building rooftops or other places -Examining the calculation methods for the volume of removals by urban greening and developing a system for reporting and verifying the volume of removals -Familiarizing the public with greenery creation and promoting greening by a wide-ranging actors such as citizens, enterprises and NPOs	-Promoting the following: creation of urban parks; greening of public facilities such as roads, rivers, sabo (erosion and sediment control facilities), harbors, sewage treatment plants, public housing and government facilities; and creation of new green space on building rooftops or other places -Providing information for calculating, reporting and verifying the volume of removals by urban greening -Familiarizing the public with greenery creation and promoting greening by a wide-ranging actors such as citizens, enterprises and NPOs	(10,000t-CO_2/year)		
	2008	approx. 71				2008	approx. 70	
	2009	approx. 74				2009	approx. 72	
	2010	approx. 76				2010	approx. 74	
	2011	approx. 78				2011	approx. 77	
	2012	approx. 81				2012	approx. 79	

(Appendix 1) Table-6 Cross-sectoral Policies

*This indicates an assumption other than countermeasure evaluation index and its estimate made in calculating the estimated volume of emissions reductions for each countermeasure at the time of drafting this Plan

Specific Countermeasure	Countermeasure Evaluation Index (Estimates of FY2008-FY2012)	Measure by Each Actor	National Policy	Example of Policies Expected to be Implemented by Local Governments	Countermeasure Effect		Assumption Made in Calculating the Estimated Volume of Emissions Reductions*
						Estimated Volume of Emissions Reductions	
○ Promotion of Global Warming Countermeasures Through the Revisions to the Act on Promotion of Global Warming Countermeasures							
Promotion of global warming countermeasures through the revisions to the Act on Promotion of Global Warming Countermeasures	Percentage of formulation of local government action plans (*1)	National and local governments, business operator, citizen: -Implementing measures prescribed by the Act	-Introducing the following measures through the revisions to the Act: (a) Strengthening local government action plans (b) Formulating Guidelines for Controlling Greenhouse Gas Emissions (c) Enhancing the calcuating, reporting and announcing system of greenhouse gas emissions -Operating the revised Act appropriately	Prefecture, government-designated city, core city and special case city: -Stipulating, in its local government action plan, programs for controlling greenhouse gas emissions in accordance with the natural and social conditions of its local area		($10,000t-CO_2$) (*2)	*1: Prefecture, government-designated city, core city and special case city *2: This countermeasure supports other countermeasures listed in Appendix 1-5.
	2008					2008 –	
	2009					2009 –	
	2010	100				2010 –	
	2011					2011 –	
	2012					2012 –	

Appendix II

"Progress in the Kyoto Protocol Target Achievement Plan", Global Warming Prevention Headquarters, July 2009, appendix2

Progress Report on the Countermeasures/Measures For Greenhouse Gas Emission Reduction, Absorption, Etc.

- The table of inspection results -

Progress Report on the Countermeasures/Measures For Greenhouse Gas Emission Reduction, Absorption, Etc.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
[Energy-originated CO2] ○Formation of Low-Carbon Urban/Regional Structures and Socioeconomic Systems																	
Realization of compact urban structures	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Realization of cities with minimal environmental loads (Compact City)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Utilization of the Special Zones for Structural Reform System for global warming countermeasures	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	5.3	5.3	5.3	5.3	5.3	5.3	5.3	Performance trends are generally in line with expectations.	Continue to solicit proposals for the Special Zones, and add those that are accepted by the relevant ministries as special case measures.
	cases	—	—	—	—	—	—	—	2	2	2	2	2	2	2		
Establishment of the "Global Warming Countermeasures Promotion Program for Regions"	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Measures at the Block and District Levels	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Promotion of area-wide energy usage	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Promotion of global warming countermeasures for tenant buildings or the like at local levels	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Decarbonization of Urban Areas Through Improving the Thermal Environment by Urban Greening and Other Heat Island Countermeasures	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	0.1-0.5	0.2-1.1	—	0.3-1.4	0.4-1.8	0.5-2.3	0.6-2.8	0.7-3.2	Performance trends are generally in line with expectations.	・Implemented an extension to the special exemption for fixed assets tax relating to authorized green facilities in the FY2009 tax reforms. ・Expanded the support activities (Green Environment Maintenance General Support Operation) for FY2009.
	ha	—	—	—	—	—	—	29	58	—	73	98	123	149	174		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Measures for Extending the Useful Life of Housing	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
○Efforts in the Industrial Sector (Manufacturers, etc.)																	
	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	6,530						
	Businesses Within the Jurisdiction of the Ministry of Finance										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Brewers Association of Japan Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	107.9 (96)	104.5 (93)	99.8 (89)	94.5 (84)	89.4 (79)	87.1 (77)	85.1 (76)	78.6 (70)	— ( )	101.2 (90)	101.2 (90)	101.2 (90)	101.2 (90)	101.2 (90)	Performance trends are exceeding expectations.	Continue to implement regular follow-ups with regards to the objective levels.
	Japan Tobacco Inc. Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1995=100	44 (98)	43 (96)	42 (93)	38 (84)	37 (82)	32 (71)	30 (67)	29 (64)	— ( )	31 (68)	— ( )	— ( )	— ( )	— ( )	Performance trends are exceeding expectations.	Continue to implement regular follow-ups with regards to the objective levels.
	Businesses Within the Jurisdiction of the Ministry of Health, Labor and Welfare										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Federation of Pharmaceutical Manufacturers' Associations of Japan / Japan Pharmaceutical Manufacturers Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	218.7 (125.0)	215.0 (122.9)	221.4 (126.5)	237.7 (135.8)	241.1 (137.8)	239.0 (136.6)	231.9 (132.5)	236.0 (134.9)	— ( )	229.0 (130.9)	218.0 (124.6)	223.0 (127.4)	229.0 (130.9)	231.0 (132.0)	Performance trends are not reaching expectations.	Considering reinforcement of countermeasures going forward.
	Businesses Within the Jurisdiction of the Ministry of Agriculture, Forestry and Fisheries										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japan Starch and Saccharification Industry Association CO2 Emission Basic Unit (tCO2/volume of used raw material (t)) Inside (): Year 2005=100	— ( )	— ( )	— ( )	— ( )	— ( )	0.330 (100)	0.323 (98)	0.329 (100)	— ( )			0.319 (97)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	Japan Dairy Industry Association Energy Consumption Basic Unit (kl/production volume (1,000t)) Inside (): Year 2000=100	100.612 (100)	104.321 (104)	106.535 (106)	102.031 (101)	101.224 (101)	102.327 (102)	101.594 (101)	102.223 (102)	— ( )			95.693 (95)			Performance trends are not reaching expectations.	Intensification of initiative encouraged.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Soft Drink Association CO2 Emission Basic Unit (t-CO2/production volume (kl)) Inside (): Year 1990=100	— ( )	0.093 (103)	0.098 (109)	0.098 (109)	0.097 (108)	0.106 (118)	0.103 (114)	0.100 (111)	— ( )	0.084 (94)					Performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Japan Baking Industry Association CO2 Emission Basic Unit (tCO2/production output (billion Yen)) Inside (): Year 2004=100	— ( )	— ( )	— ( )	— ( )	869.665 (100)	887.809 (102)	856.094 (98)	857.179 (99)	— ( )			818.772 (94)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	Japan Canners Association Energy Consumption Basic Unit (kl/production volume (t)) Inside (): Year 1990=100	— ( )	— ( )	0.074 (107)	0.078 (113)	0.074 (107)	0.076 (110)	0.073 (106)	0.074 (107)	— ( )			0.069 (100)			Performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Japan Beet Sugar Association CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 2000=100	1.110 (100)	0.982 (88)	0.970 (87)	0.960 (86)	1.079 (97)	1.082 (97)	1.073 (97)	1.082 (97)	— ( )			1.076 (97)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	Japan Oilseed Processors Association CO2 Emission volume (tCO2) Inside (): Year 1990=100	— ( )	— ( )	686,934 (102)	663,926 (98)	639,014 (95)	645,609 (96)	630,150 (93)	631,112 (94)	— ( )	620,610 (92)					Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 1990=100	— ( )	— ( )	0.302 (87)	0.312 (90)	0.304 (88)	0.306 (88)	0.292 (84)	0.299 (86)	— ( )	0.291 (84)						
	All Nippon Kashi Association CO2 Emission volume (tCO2) Inside (): Year 1990=100	— ( )	481,681 (99)	490,441 (101)	490,463 (101)	489,444 (101)	486,209 (100)	467,742 (96)	472,735 (97)	— ( )			457,638 (94)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Sugar Refiners' Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	— ( )	48.6 (84)	45.8 (79)	47.8 (82)	44.0 (76)	43.3 (75)	43.1 (74)	44.7 (77)	— ( )	45.2 (78)					Objective already accomplished.	Raising of objective levels encouraged.
	Japan Frozen Food Association CO2 Emission Basic Unit (tCO2/frozen foods production volume (t)) Inside (): Year 1990=100	— ( )	0.452 (97)	 ( )	 ( )	0.459 (99)	 ( )	0.439 (94)	0.453 (97)	— ( )			0.418 (90)			Due to the worsening of the carbon emission factor of electricity, performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Japan Ham and Sausage Cooperative Association CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 2003=100	— ( )	— ( )	— ( )	0.779 (100)	0.787 (101)	0.803 (103)	0.706 (91)	0.759 (97)	— ( )			0.740 (95)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	Flour Millers Association CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 1990=100	— ( )	0.034 (94)	0.037 (103)	0.040 (111)	0.039 (108)	0.039 (108)	0.039 (108)	0.042 (117)	— ( )			0.034 (94)			Due to the worsening of the carbon emission factor of electricity, performance trends are not reaching expectations.	Intensification of initiative encouraged.
	All Japan Coffee Association CO2 Emission Basic Unit (tCO2/volume of used raw material (t)) Inside (): Year 2005=100	— ( )	— ( )	— ( )	— ( )	— ( )	1.099 (100)	1.056 (96)	1.081 (98)	— ( )			1.065 (97)			Performance trends are generally in line with expectations.	Intensification of initiative encouraged.
	Japan Soy Sauce Association CO2 Emission volume (tCO2) Inside (): Year 1990=100	— ( )	204,862 (99)	201,803 (97)	211,041 (102)	201,457 (97)	207,877 (100)	192,605 (93)	193,519 (93)	— ( )			194,659 (94)			Objective already accomplished.	Raising of objective levels encouraged.
	Japan Convenience Foods Industry Association CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 1990=100	— ( )	0.490 (86)	0.503 (88)	0.487 (85)	0.464 (81)	0.432 (76)	0.429 (75)	0.397 (70)	— ( )	0.433 (76)					Objective already accomplished.	Raising of objective levels encouraged.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Nihhon Hamburg & Hamburger Association CO2 Emission Basic Unit (-CO2/production volume (t))	—	—	—	—	0.752	0.739	0.738	0.806	—			0.714			Due to the worsening of the carbon emission factor of electricity, performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Inside (): Year 2004=100	( )	( )	( )	( )	(100)	(98)	(98)	(107)	( )			(95)				
	Japan Mayonnaise and Dressing Association CO2 Emission Basic Unit (tCO2/production volume (t))	—	—	—	0.122	0.120	0.121	0.124	0.131	—			0.087			Performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Inside (): Year 1990=100	( )	( )	( )	(98)	(96)	(97)	(99)	(105)	( )			(70)				
	Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japan Iron and Steel Federation Amount of energy consumption (PJ)	2,323	2,253	2,304	2,326	2,351	2,336	2,389	2,458	—	2,274					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Inside (): Year 1990=100	(92.0)	(89.2)	(91.2)	(92.1)	(93.1)	(92.5)	(94.6)	(97.3)	( )	(90.0)						
	Japan Chemical Industry Association Energy Consumption Basic Unit (index)	89	90	88	86	85	84	82	83	—	80					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Inside (): Year 1990=100	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )						

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Paper Association Energy Consumption Basic Unit (Amount of fossil energy consumption (MJ)/production volume (t)) Inside (): Year 1990=100	13,396 (93.2)	13,608 (94.7)	13,272 (92.4)	13,204 (91.9)	12,832 (89.3)	12,196 (84.9)	11,632 (81.0)	11,407 (79.4)	— ( )	— (80.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	CO2 Emission Basic Unit (tCO2/production volume (t)) Inside (): Year 1990=100	0.961 (96.3)	0.985 (98.8)	0.963 (96.6)	0.967 (97.0)	0.941 (94.3)	0.888 (89.0)	0.837 (83.9)	0.823 (82.5)	— ( )	— (84.0)						
	Japan Cement Association Energy Consumption Basic Unit (MJ/t-cement) Inside (): Year 1990=100	3,504 (97.7)	3,499 (97.6)	3,463 (96.6)	3,438 (95.9)	3,407 (95.0)	3,413 (95.2)	3,478 (97.0)	3,458 (96.4)	— ( )	3,451 (96.2)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	4 electrical/electronics-related groups CO2 Emission Basic Unit (tCO2/real output (million yen)) Inside (): Year 1990=100	0.230 (71.1)	0.227 (70.1)	0.231 (71.4)	0.245 (75.7)	0.230 (70.9)	0.224 (69.3)	0.214 (66.0)	0.218 (67.3)	— ( )	0.210 (65.0)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Steady implementation and assessment and verification of voluntary action plans	Japan Auto Parts Industries Association Volume of CO2 Emissions (10 Thousand Tonnes -CO2) Inside (): Year 1990=100	637.3 (89.0)	578.3 (81.0)	625.9 (87.0)	644.4 (90.0)	654.6 (92.0)	696.8 (97.0)	683.9 (95.7)	735.1 (102.9)	— ( )	664.7 (93.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	CO2 Emission Basic Unit (tCO2/billion yen) Inside (): Year 1990=100	509.1 (86.4)	479.8 (81.5)	482.9 (82.0)	483.7 (82.1)	470.4 (79.9)	463.5 (78.7)	418.5 (71.1)	422.9 (71.8)	— ( )	472.2 (80.0)						
	Japan Automobile Manufacturers Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	680	643	673	679	673	685	663	661	—	651					Voluntary action plans being integrated, objectives being set at values higher than recorded performance levels.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan Auto-Body Industries Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	(80.5)	(76.1)	(79.6)	(80.4)	(79.6)	(81.1)	(78.5)	(78.2)	( )	(77.0)						
	Japan Mining Industry Association Energy Consumption Basic Unit (kl/production volume (t)) Inside (): Year 1990=100	0.802 (90.9)	0.803 (90.9)	0.806 (91.3)	0.796 (90.2)	0.811 (91.9)	0.777 (88.0)	0.746 (84.5)	0.738 (83.6)	— ( )	0.777 (88.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Lime Manufacture Association Volume of CO2 Emissions (10 Thousand Tonnes -CO2) Inside (): Year 1990=100	301.4 (85.1)	274.6 (77.6)	291.7 (82.4)	298.7 (84.4)	299.8 (84.7)	304.9 (86.1)	311.6 (88.0)	326.5 (92.2)	— ( )	325.7 (92.0)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Amount of energy consumption (10,000 kl) Inside (): Year 1990=100	104.7 (86.0)	95.4 (78.3)	99.9 (82.0)	100.8 (82.8)	101.3 (83.2)	104.5 (85.8)	107.0 (87.8)	112.0 (92.0)	— ( )	112.1 (92.0)						
	Japan Rubber Manufacturers Association Volume of CO2 Emissions (10 Thousand Tonnes -CO2) Inside (): Year 1990=100	178.1 (93.1)	171.1 (89.4)	182.8 (95.5)	197.0 (102.9)	197.8 (103.3)	195.8 (102.3)	179.5 (93.8)	186.2 (97.3)	— ( )	179.9 (94.0)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Energy Consumption Basic Unit（kl/new rubber consumption amount (1,000t)) Inside (): Year 1990=100	708.4 (93.0)	714.5 (93.8)	693.3 (91.0)	688.1 (90.3)	694.4 (91.2)	688.0 (90.3)	670.8 (88.1)	671.3 (88.1)	— ( )	700.8 (92.0)						
	Japan Textile Finishers' Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	— ( )	262.2 (70.7)	239.2 (64.5)	234.8 (63.3)	234.9 (63.3)	191.6 (51.6)	175.5 (47.3)	169.2 (45.6)	— ( )	205.9 (55.5)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Amount of energy consumption (1,000kl) Inside (): Year 1990=100	— ( )	1,193 (74.9)	1,094 (68.7)	1,057 (66.4)	1,066 (67.0)	882 (55.4)	813 (51.1)	797 (50.1)	— ( )	954 (60.0)						

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Aluminium Association Energy Consumption Basic Unit (GJ/rolled amount(*2) (t)) Inside (): Year 1995=100	19.2 (89.0)	19.8 (92.0)	19.3 (90.0)	18.6 (86.0)	18.7 (87.0)	19.3 (90.0)	18.8 (87.0)	19.0 (88.0)	— ( )	19.2 (89.0)					With objective already accomplished, objective levels being raised (within actual achievement levels).	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Flat Glass Manufacturers Association of Japan Volume of fuel originating CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	134.5 (76.0)	137.2 (77.0)	131.8 (74.0)	133.8 (75.0)	133.6 (75.0)	132.8 (75.0)	135.8 (76.0)	129.8 (73.0)	— ( )	138.8 (78.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Amount of energy consumption (10,000 kl) Inside (): Year 1990=100	53.8 (75.0)	55.1 (77.0)	52.3 (73.0)	52.2 (73.0)	52.2 (73.0)	51.7 (72.0)	53.5 (75.0)	50.5 (71.0)	— ( )	56.1 (79.0)						
	Japan Glass Bottle Association Volume of CO2 Emissions (10 Thousand Tonnes -CO2) Inside (): Year 1990=100	125.5 (70.2)	121.2 (67.8)	117.9 (65.9)	111.5 (62.4)	106.8 (59.7)	107.0 (59.8)	103.6 (57.9)	98.8 (55.3)	— ( )	107.3 (60.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Amount of energy consumption (10,000 kl) Inside (): Year 1990=100	47.6 (75.9)	46.2 (73.7)	44.4 (70.9)	42.1 (67.2)	41.0 (65.4)	41.7 (66.5)	41.7 (66.6)	41.6 (66.3)	— ( )	43.8 (70.0)						
	Japan Electric Wire & Cable Makers' Association ＜copper/aluminum＞ Amount of energy consumption (1,000 kl) Inside (): Year 1990=100	489 (85.0)	437 (76.0)	430 (75.0)	428 (74.0)	419 (73.0)	422 (73.0)	418 (73.0)	416 (72.0)	— ( )	417 (73.0)					With objective already accomplished, objective levels being raised above actual achievement levels.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	＜fiber optic＞ Energy Consumption Basic Unit (Amount of energy consumption(*3) (kl) / unit production length (1,000kmc)) Inside (): Year 1990=100	3.8 (46.0)	3.4 (41.0)	3.5 (42.0)	3.6 (43.0)	3.2 (39.0)	2.0 (24.0)	2.0 (24.0)	1.8 (22.0)	— ( )	1.8 (22.0)						

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Bearing Industrial Association CO2 Emission Basic Unit (tCO2/added value output (100 million yen)) Inside (): Year 1997=100	160.5 (96.7)	167.4 (100.9)	172.8 (104.2)	172.3 (103.9)	165.5 (99.8)	166.2 (100.2)	155.5 (93.7)	162.7 (98.1)	— ( )	144.3 (87.0)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan Society of Industrial Machinery Manufacturers Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1997=100	52.5 (92.0)	51.4 (90.0)	52.6 (92.0)	54.2 (95.0)	54.1 (95.0)	56.3 (99.0)	54.4 (95.0)	58.5 (102.0)	— ( )	50.1 (88.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan Copper and Brass Association Energy Consumption Basic Unit (crude oil equivalent kl/production volume t) Inside (): Year 1995=100	0.412 (93.2)	0.453 (102.5)	0.416 (94.1)	0.432 (97.7)	0.400 (90.5)	0.407 (92.1)	0.404 (91.4)	0.420 (95.0)	— ( )	0.412 (93.2)	0.412 (93.2)	0.411 (93.0)	0.411 (93.0)	0.411 (93.0)	Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan Construction Equipment Manufacturers Association Energy Consumption Basic Unit (consumed energy for manufacturing (kl) / pretextual sales (100 million yen)) Inside (): Year 1990=100	14.65 (110.0)	14.82 (111.0)	14.68 (110.0)	13.22 (99.0)	12.77 (96.0)	11.63 (87.0)	10.42 (78.0)	10.21 (77.0)	— ( )	11.34 (85.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Lime Association of Japan Energy Consumption Basic Unit (l/production volume (t)) Inside (): Year 1990=100	1.13 (99.1)	1.13 (99.1)	1.05 (92.1)	1.06 (93.0)	1.06 (93.0)	1.03 (90.6)	1.02 (89.6)	1.03 (90.7)	— ( )	1.02 (89.7)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan Sanitary Equipment Industry Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	36.4 (76.2)	37.2 (77.9)	35.4 (74.0)	36.4 (76.1)	36.2 (75.7)	35.2 (73.7)	33.4 (70.0)	30.0 (62.8)	— ( )	35.9 (75.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Japan Machine Tool Builders' Association Energy Consumption Basic Unit (l/real output (million yen)) Inside (): Year 1997=100	139.3 (99.0)	138.9 (99.0)	166.3 (119.0)	142.6 (102.0)	129.4 (93.0)	112.4 (80.0)	106.8 (76.0)	103.4 (74.0)	— ( )	131.4 (94.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Amount of energy consumption (10,000 kl) Inside (): Year 1997=100	14.1 (97.0)	13.3 (92.0)	11.9 (82.0)	12.5 (86.0)	14.2 (98.0)	15.5 (107.0)	16.6 (114.0)	17.3 (119.0)	— ( )	13.6 (94.0)						
	Japan Petroleum Development Association CO2 Emissions Basic Unit (kg-CO2/production activity level (GJ)) Inside (): Year 1990=100	1.69 (84.9)	1.72 (86.4)	2.04 (102.7)	2.12 (106.7)	1.49 (74.9)	1.58 (79.3)	1.69 (85.0)	1.77 (89.0)	— ( )	1.59 (80.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Industrial Vehicles Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	5.99 (97.0)	5.36 (87.0)	5.75 (93.0)	6.03 (98.0)	6.11 (99.0)	6.61 (107.0)	6.55 (106.0)	7.36 (119.0)	— ( )	5.56 (90.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Businesses Within the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Shipbuilders' Association of Japan / Cooperative Association of Japan Shipbuilders Energy Basic Unit (kWh/steel processing weight ton) Rate against benchmark year (%) Inside (): Year 1990=100	▲ 13 (87)	▲ 11 (89)	▲ 6 (94)	▲ 4 (96)	▲ 11 (89)	▲ 8 (92)	▲ 6 (94)	▲ 5 (95)	— ( )	▲ 10 (90)					Progress only at levels where objective accomplishment seems unlikely.	Reinforcement of measures to be instructed.
	Japan Marine Equipment Association Energy Basic Unit (MJ/produced horse power) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	— ( )	▲ 12 (88)	▲ 13 (87)	▲ 12 (88)	▲ 16 (84)	▲ 20 (80)	▲ 26 (74)	— ( )	▲ 30 (70)					Objective already accomplished, and objective has been raised during FY2008 evaluation and verification.	—
	Japan Boating Industry Association Energy Basic Unit (MJ/produced horse power) Rate against benchmark year (%) Inside (): Year 2002=100	— ( )	— ( )	0 (100)	▲ 7 (93)	▲ 15 (85)	▲ 16 (84)	▲ 20 (80)	▲ 17 (83)	— ( )	▲ 18 (82)					Progress steady, objective accomplishment deemed possible.	—

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Association of Rolling Stock Industries Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	3.2 (74)	3.2 (74)	3 (70)	3 (70)	3.1 (72)	3.4 (79)	3.5 (81)	4 (93)	— ( )	3.95 (92)					Method of objective definition changed after FY2008 evaluation and validation.	Change from "CO2 Emissions Basic Unit" to "CO2 Emission Volume".
	Japan Federation of Construction Contractors / Japan Civil Engineering Contractors' Association, Inc. / Building Contractors Society CO2 Emissions Basic Unit (10,000 tCO2/construction amount) Rate against benchmark year (%) Inside (): Year 1990=100	31,540 (90)	32,353 (92)	34,029 (97)	31,747 (90)	30,323 (86)	30,604 (87)	28,539 (81)	30,534 (87)	— ( )	31,014 (88)	31,014 (88)	31,014 (88)	31,014 (88)	31,014 (88)	Objective achieved, but new objective levels not yet set.	Accuracy to be improved by increasing number of samples.
	Japan Federation of Housing Organizations Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	506 (97)	494 (95)	472 (91)	442 (85)	427 (82)	409 (79)	416 (80)	375 (72)	— ( )	415 (80)	415 (80)	415 (80)	— ( )	— ( )	Objective achieved, but new objective levels not yet set.	Objectives raised last year. Inspecting current progress.
Dissemination of Energy-efficient Devices in the Manufacturing Field	Vol. of emissions reductions (10,000 tCO2)	—	—	—	126	167	214	272	332				340-490			Performance trends are generally in line with expectations.	Ongoing implementation support.
	(1)Highly efficient industrial furnace (unit) (2)Highly efficient boiler (unit) (3)Next-generation coke oven (unit)	(1)— (2)— (3)—	(1)— (2)— (3)—	(1)— (2)1,352 (3)—	(1)550 (2)2,761 (3)—	(1)663 (2)4,450 (3)—	(1)761 (2)6,729 (3)—	(1)915 (2)9,113 (3)—	(1)1,057 (2) 11,130 (3)—	(1)— (2) 13,246 (3)1			(1) 1,000-1,500 (2) 11,000-15,000 (3)1				
Dissemination of Fuel-efficient Machinery in the Construction Field	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	12	—	14	17	20	23	27	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Dissemination rate of fuel-efficient construction machinery (%)	—	—	—	—	—	—	—	18	—	21	25	30	35	41		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Thorough Energy Management in Factories and Workplaces	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	150	350	450	—			820-980			Performance trends are generally in line with expectations.	Maintain implementation support and appropriate law enforcement.
	(a) Effect of the Energy Conservation Act (10,000kl) (b) Cooperation among multiple business operators (10,000kl)	(a)— (b)—	(a)— (b)—	(a)— (b)—	(a)— (b)—	(a)— (b)2	(a)40 (b)5	(a)86 (b)17	(a)115 (b)18	(a)— (b)18			(a)210 (b)45-100				
Implementation of Emissions Reduction Measures for Small and Medium Sized Enterprises	Vol. of emissions reductions (10,000 tCO2)	0	0	0	0	0	0	0	0	15.0	30	91	182	—	—	Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Reinforcement of efforts to unearth further cases by operations such as popularization/PR activity and soft support.
	Number of domestic credit certifications	—	—	—	—	—	—	—	—	12	485	1,455	2,910	—	—		
Measures to reduce greenhouse gas emissions in greenhouse horticulture /agricultural machinery	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	3.9	8.3	15.8	10.0	13.7	17.4	20.6	23.8	(Evaluation Markers) (1)-(4)Performance trends exceeded expectations. (5)Performance trends did not reach expectations. (Volume of emissions reductions) The overall trend in volume of emissions reduction has exceeded expectations.	(3)Expanded the districts covered by support activities and added support in the supplementary budget for FY2009. (4)Starting FY2009 commenced support activities for energy efficiency display screens in agricultural machines.
	(1) No. of energy-saving devices introduced (devices) (2) No. of energy-saving equipment introduced (locations) (3) No. of energy-saving model facilities introduced (areas) (4) No. of energy-saving agricultural machinery introduced (devices) (5) No. of model areas utilizing biodiesel fuel (areas)	(1)— (2)— (3)— (4)— (5)—	(1)— (2)— (3)— (4)— (5)—	(1)— (2)— (3)— (4)— (5)—	(1)— (2)— (3)— (4)— (5)—	(1)— (2)— (3)— (4)— (5)—	(1)— (2)— (3)— (4)— (5)—	(1) 8,740 (2) 9,482 (3)— (4) 20,098 (5)—	(1) 16,921 (2) 20,139 (3)— (4) 43,377 (5)—	(1) 27,851 (2) 31,571 (3) 19 (4) 65,455 (5) 4	(1) 22,400 (2) 21,344 (3) 18 (4) 52,418 (5) 5	(1) 30,420 (2) 28,514 (3) 33 (4) 71,718 (5) 5	(1) 38,440 (2) 35,684 (3) 48 (4) 90,418 (5) 5	(1) 45,790 (2) 42,854 (3) 48 (4) 110,818 (5) 5	(1) 53,140 (2) 50,024 (3) 48 (4) 131,718 (5) 5		
Energy-saving measures for fishing vessels	Vol. of emissions reductions (10,000t -CO2)	—	—	—	—	—	—	0.62	1.25	—	2.8	3.8	4.7	5.7	6.6	Performance trends are slightly lower than expectations. *(based on performance of FY2007)	While continuing current activities, put effort into widening operational success and attempt to encourage utilization of energy-efficient devices.
	Percentage of energy efficient fishing vessels (%)	—	—	—	—	—	—	0.92	1.84	—	4.2	5.6	7.0	8.4	9.8		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
○Efforts in the Commercial and Other Sector																	
	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	130						
	Businesses Within the Jurisdiction of the Financial Services Agency										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japanese Bankers Association Amount of energy consumption (10,000kWh) Inside (): Year 2000=100	162,737 (100.0)	163,794 (100.6)	156,990 (96.5)	151,791 (93.3)	150,195 (92.3)	146,114 (89.8)	146,106 (89.8)	148,324 (91.1)	— ( )	143,209 (88.0)					Reductions have been going steadily, but reduction rate has decreased in the latest fiscal year.	Heighten awareness toward electricity use reduction by encouraging initiatives by the individual association member.
	Life Insurance Association of Japan Amount of energy consumption (10,000kWh) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	15,573 (100.0)	15,712 (100.9)	— ( )	15,262 (98.0)					Head office electricity consumption increased due to increase in member companies and increased floor space and employees at the head office.	While maintaining current initiatives, attempt reinforcement through best practices exchange among member companies.
	General Insurance Association of Japan Amount of energy consumption (10,000kWh) Inside (): Year 2000=100	8921 (100.0)	8,395 (94.1)	8,152 (91.4)	7,627 (85.5)	7,806 (87.5)	7,604 (85.2)	7,637 (85.6)	7,688 (86.2)	— ( )	7,315 (82)					Though reduction rates have not been as acute in the past year or two due to the bad economy, achieving the 2010 objectives seems feasible.	Currently implemented measures to be continued.
	The National Association of Shinkin Banks Amount of energy consumption (kWh) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	23,764 (100.0)	23,973 (100.9)	— ( )	23,646 (99.5)	23,319 (98.1)	22,992 (96.8)	22,665 (95.4)	22,338 (94.0)	FY2007 saw a 0.9% increase compared to the benchmark year (FY2006).	Gain understanding of the fiscal 2008 situation at an early stage in fiscal 2009 and implement necessary measures.
	Community Bank Shinyo Kumiai Amount of energy consumption (10,000kWh) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	3,120 (102.6)	3,042 (100)	3,103 (102.0)	— ( )	3,005 (98.8)	2,969 (97.6)	2,932 (96.4)	2,896 (95.2)	2,859 (94.0)	FY2007 saw a 0.20% increase compared to the benchmark year (FY2006).	Currently implemented measures to be continued.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Securities Dealers Association Amount of energy consumption (10,000kWh) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	26,888 (100)	28,515 (106.1)	— ( )	26,565 (98.8)	26,242 (97.6)	25,920 (96.4)	25,597 (95.2)	25,275 (94.0)	FY2007 saw an increase in electricity consumption compared to the previous fiscal year. Factors for increase are as follows: (1) Members who did not answer the survey in FY2006 answered in FY2007. (2) Increase in floor space due to increased business. Note however that electricity usage per square meter has decreased from FY2006.	Currently implemented measures to be continued.
	Businesses Within the Jurisdiction of the Ministry of Internal Affairs and Communications										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Telecommunications Carriers Association Energy Basic Unit (kWh/number of contracts (contracts)) Inside (): Year 1990=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	38.2 (61.4)	— ( )	43.5 (69.9)					Performance is exceeding expectations.	An increase in the base unit is expected from service provision trends up to FY2012. Further verification and continued operations are necessary.
	Telecom Service Association of Japan Energy Basic Unit (kWh/sales (10,000 yen) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	4.06 (100.0)	4.04 (99.5)	— ( )	4.02 (99.0)					Performance trends are generally proceeding according to expectations.	It is necessary to steadily maintain and promote current initiatives.
	National Association of Commercial Broadcasters in Japan CO2 Emission Basic Unit (tCO2/value of tangible fixed assets relating to broadcasting (100 million yen)) Inside (): Year 2004=100	— ( )	— ( )	— ( )	— ( )	134.52 (100.0)	— ( )	75.87 (56.4)	86.08 (63.9)	— ( )	121.3 (90.2)					Performance is exceeding expectations.	An increase in the base unit is expected from service provision trends up to FY2012. Further verification and continued operations are necessary.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	NHK (Japan Broadcasting Corporation) CO2 Emission Basic Unit (tCO2/overall value of tangible fixed assets (million yen)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	0.261 (100.0)	0.263 (100.8)	— ( )	0.251 (96.2)	0.245 (93.9)	0.240 (92.0)	0.235 (90.0)	0.229 (87.7)	Due to temporary special circumstances, performance has been slightly under the benchmark year.	An increase in the base unit is expected from service provision trends up to FY2012 and energy saving technology, alternative energy introduction and energy saving activities must be stepped up.
	Japan Cable and Telecommunications Association Energy Basic Unit (kWh/connected households (households)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	6.33 (100.0)	5.94 (93.8)	— ( )	6.14 (97.0)	6.05 (95.5)	5.95 (94.0)	5.86 (92.5)	5.76 (91.0)	Performance trends are generally proceeding according to expectations.	It is necessary to steadily maintain and promote current initiatives.
	Japan Satellite Broadcasting Association Energy Basic Unit (kWh/floor space by office (㎡)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	292 (100.0)	290 (99.3)	— ( )	275 (94.2)	269 (92.1)	263 (90.1)	257 (88.0)	251 (86.0)	Performance trends are generally proceeding according to expectations.	It is necessary to steadily maintain and promote current initiatives.
	Businesses Within the Jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Federation of All Japan Private Schools Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 2007=100	( )	( )	( )	( )	( )	( )	( )	324.6 (100)	— ( )	321.4 (99)	318.2 (98)	315.1 (97)	312 (96)	308.9 (95)	Because FY2007 is the benchmark year, trends to be discovered going forward.	Will consider after understanding performance trends.
	Businesses Within the Jurisdiction of the Ministry of Health, Labor and Welfare										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japan Medical Association/4 Hospital Associations Council CO2 Emissions Basic Unit (Kg-CO2/floor space (㎡)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	130.6 (102.8)	127.1 (100.0)	121.9 (95.9)	— ( )	124.5 (97.9)	123.3 (97.0)	122.1 (96.0)	120.9 (95.1)	119.7 (94.1)	Performance trends are generally in line with expectations.	Continue to implement current countermeasures.
	Japanese Consumers' Co-operative Union CO2 Emission Basic Unit (tCO2/product supply (100 million yen)) Inside (): Year 2002=100	— ( )	— ( )	31.9 (100.0)	32.5 (101.9)	33.7 (105.6)	33.3 (104.6)	32.8 (102.8)	31.7 (99.6)	— ( )	31.0 (97.3)	30.1 (94.5)	29.6 (92.8)	— ( )	— ( )	Performance trends are generally in line with expectations.	Continue to implement current countermeasures.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Businesses Within the Jurisdiction of the Ministry of Agriculture, Forestry and Fisheries										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Nihhon Hamburg & Hamburger Association CO2 Emission Basic Unit (tCO2/amount of production and sales(t)) Inside (): Year 2004=100	— ( )	— ( )	— ( )	— ( )	1.603 (100)	1.568 (98)	1.492 (93)	1.623 (101)	— ( )			1.426 (89)			Due to the worsening of the carbon emission factor of electricity, performance trends are not reaching expectations.	Intensification of initiative encouraged.
	Japan Processed Foods Wholesalers Association Amount of energy consumption (kl) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	130,200 (100)	142,576 (110)	— ( )				123,690 (95)		Performance for FY2007 is as yet uncertain.	—
	Energy Consumption Basic Unit (kl/unloaded sales (100 million yen)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	2.344 (100)	2.182 (93)	— ( )				2.226 (95)			
	Japan Food Service Association Energy Consumption Basic Unit (MJ/sales (1,000 yen)) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	19.212 (100)	— ( )	— ( )			18.923 (98.5)			Out of evaluation scope.	—
	Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japanese Chain Stores Association Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡・h)) Inside (): Year 1996=100	0.120 (102.0)	0.119 (101.0)	0.109 (92.0)	0.112 (95.0)	0.116 (98.0)	0.114 (97.0)	0.113 (96.0)	0.109 (92.0)	— ( )	0.113 (96.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Japan Franchise Association Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡・h)) Inside (): Year 1990=100	0.128 (79.5)	0.144 (89.4)	0.127 (78.9)	0.127 (78.9)	0.127 (78.9)	0.125 (77.6)	0.127 (78.9)	0.131 (81.4)	— ( )	0.124 (77.0)					Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Promotion and Reinforcement of Voluntary Action Plans of Industry (Businesses in the Commercial Sector)	Japan Council Of Shopping Centers Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡･h)) Inside (): Year 2005=100	— ( )	— ( )	— ( )	— ( )	0.184 (101.0)	0.182 (100.0)	0.175 (96.0)	0.168 (92.0)	— ( )	0.173 (95.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Japan Department Stores Association Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡･h)) Inside (): Year 1990=100	0.135 (94.0)	0.134 (93.0)	0.132 (92.0)	0.140 (97.0)	0.139 (97.0)	0.134 (93.0)	0.130 (90.0)	0.125 (87.0)	— ( )	0.134 (93.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Meeting of Large Household Appliance Retailers Energy Consumption Basic Unit (MJ/(sales floor space)㎡) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	3,611 (100.0)	3,660 (101.0)	— ( )	3,466 (96.0)					Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Japan DIY Industry Association Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡･h)) Inside (): Year 2004=100	— ( )	— ( )	— ( )	— ( )	0.05086 (100.0)	0.04408 (86.7)	0.04842 (95.2)	0.04818 (94.7)	— ( )	0.05086 (100.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Information Technology Services Industry Association Energy Consumption Basic Unit (kWh/floor space (㎡))	—	—	—	—	—	—	620.7	650.4	—			614.5			Accomplishing the objective is possible if future countermeasures are sufficiently implemented.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Inside (): Year 2006=100	( )	( )	( )	( )	( )	( )	(100.0)	(104.8)	( )			(99.0)				
	Japan Association of Chain Drug Stores Energy Consumption Basic Unit (floor space by shop/Amount of energy consumption during sales hours (kWh/㎡・h))	—	—	—	—	0.1032	0.0910	0.0762	0.0876	—			0.0877			Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Inside (): Year 2004=100	( )	( )	( )	( )	(100.0)	(88.2)	(73.8)	(84.9)	( )			(85.0)				
	Japan Foreign Trade Council, Inc. Volume of CO2 Emissions (10 Thousand Tons -CO2)	5.6	5.5	5.6	6.3	5.5	4.6	4.3	4.6	—			3.5			Accomplishing the objective is readily possible.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	Inside (): Year 1998=100	(96.6)	(94.8)	(96.6)	(108.6)	(94.8)	(79.3)	(74.1)	(79.3)	( )			(60.0)				
	Japan LP Gas Association Energy Consumption Basic Unit (electricity crude oil equivalent kl/LP gas storage stations' capacity (t))	—	2.003	1.969	1.909	1.975	1.955	1.980	1.960	—			1.995			Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Inside (): Year 1990=100	( )	(93.4)	(91.8)	(89.0)	(92.1)	(91.1)	(92.3)	(91.4)	( )			(93.0)				

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Leasing Association Energy Consumption Basic Unit (10,000kWh/HQ floor space (㎡)) Inside (): Year 2002=100	— ( )	— ( )	14.16 (100.0)	13.65 (96.4)	13.75 (97.1)	13.77 (97.2)	13.63 (96.3)	13.60 (96.0)	— ( )	13.74 (97.0)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Businesses Within the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japan Warehousing Association Inc. Energy Basic Unit (l/㎡) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	— ( )	1 (101)	▲ 2 (98)	▲ 4 (96)	▲ 4 (96)	▲ 3 (97)	▲ 5 (95)	— ( )	▲ 8 (92)					Progress steady, objective accomplishment deemed possible.	—
	Japan Association of Refrigerated Warehouses electricity usage base unit (kwh/equipment ton) Rate against benchmark year (%) Inside (): Year 1990=100	▲ 12 (88)	▲ 10 (90)	▲ 7 (93)	▲ 8 (92)	▲ 5 (95)	▲ 2 (98)	▲ 2 (98)	▲ 6 (94)	— ( )	▲ 8 (92)					Progress steady, objective accomplishment deemed possible.	—
	Japan Hotel Association Energy Basic Unit (electricity usage per employee) Rate against benchmark year (%) Inside (): Year 1995=100	— ( )	— ( )	— ( )	— ( )	— ( )	▲ 6 (94)	▲ 4 (96)	▲ 4 (96)	— ( )	▲ 6 (94)					Progress steady, objective accomplishment deemed possible.	—
	Japan Ryokan Association CO2 Emissions Basic Unit (CO2 Emission volume per establishment)/Rate against benchmark year (%) Inside (): Year 1997=100	— ( )	▲ 3 (97.2)	— ( )	▲ 4 (96.4)	— ( )	▲ 6 (94.2)	▲ 4 (96.3)	▲ 8 (92.4)	— ( )	▲ 6 (94.0)					A new objective is being considered.	With regards to the Japan Ryokan Association and Japan Ryokan & Hotel Association, a joint objective definition is being considered.
	Japan Ryokan & Hotel Association Energy Basic Unit (electricity usage per member)/Rate against benchmark year (%) Inside (): Year 1999=100	▲ 2 (98)	▲ 1 (99)	▲ 3 (97)	▲ 4 (96)	▲ 2 (98)	0 (100)	0 (100)	1 (101)	— ( )	▲ 4 (96)						

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Automobile Service Promotion Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 2007=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	163.9 (100)	— ( )	— ( )	— ( )	— ( )	— ( )	155.7 (95)	Method of objective definition changed after FY2008 evaluation and validation.	Changed from destroyed fluorinated gas to CO2 emission volume and CO2 overall emission volume per delivered car.
	CO2 Emissions Basic Unit (10,000 tCO2/number of cars) Rate against benchmark year (%) Inside (): Year 2007=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	11.25 (100)	— ( )	— ( )	— ( )	— ( )	— ( )	10.69 (95)		
	Real Estate Companies Association of Japan Energy Basic Unit (Amount of energy consumption per floor space)/Rate against benchmark year (%) Inside (): Year 1990=100	1,070 (107)	900 (90)	950 (95)	940 (94)	970 (97)	1,030 (103)	950 (95)	980 (98)	— ( )						Progress steady, objective accomplishment deemed possible.	Created the "Environment Voluntary Action Plan for Newly Built Condominiums" in February 2009.
	Businesses Within the Jurisdiction of the Ministry of the Environment																
	National Federation of Industrial Waste Management Associations amount of green house gas emission (10,000 tCO2) Inside (): Year 2000=100	1,009 (100)	954 (95)	943 (93)	1,038 (103)	911 (90)	916 (91)	— ( )	— ( )	— ( )	1,009 (100)					Performance trends are generally in line with expectations.	Will continue to implement activities based on voluntary action plans.
	Japan Newspaper Publishers & Editors Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 2005=100	— ( )	— ( )	— ( )	— ( )	— ( )	53.6 (100.0)	52.9 (98.7)	53.2 (99.3)	— ( )	50.9 (95.0)					Performance trends are generally in line with expectations. (Countermeasures which have been planned for implementation included in evaluation.)	Will continue to implement activities based on voluntary action plans.
	Zenkoku Pet Kourigyou Kyoukai (National Retail Pet Association) CO2 Emission volume (1,000 tCO2) Inside (): Year 2006=100	— ( )	— ( )	— ( )	— ( )	— ( )	— ( )	6.58 (100)	6.42 (98)	— ( )	6.41 (97)	6.38 (97)	6.31 (96)	6.25 (95)	6.19 (94)	Performance trends are exceeding expectations.	Will continue to implement activities based on voluntary action plans.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Emissions reductions by public organizations (all government ministries)	Vol. of emissions reductions (10,000 tCO2)	—	—	7	7	2	2	29	41	—			16	16	16	Performance trends are exceeding expectations.	Currently implemented measures to be continued.
	reduction rate against fiscal 2001(%)	—	—	3	3	1	1	15	21	—			8	8	8		
Improvement of the energy efficiency performance of buildings	Vol. of emissions reductions (10,000 tCO2)	—	—	520	630	800	1,020	1,330	—	—			2,870			Performance trends are generally in line with expectations.	Continue current measures and reinforce measures that improve energy efficiency in buildings by efforts such as amending the Energy Saving Act.
	%	—	—	50	70	74	85	87	—	—	85	85	85	85	85		
Dissemination of energy management systems	Vol. of emissions reductions (10,000 tCO2)	—	—	150	180	220	250	290	370	420			520-730			Performance trends are generally in line with expectations.	Ongoing implementation support.
	10,000 kl	—	—	45	55	66	75	89	111	128			158-220				
Improvement of the efficiency of devices based on the Top-runner standards	Vol. of emissions reductions (10,000 tCO2)	—	—	281	433	630	836	1,108	1,435	—			2,600			Performance trends are generally in line with expectations.	Continue to review standards.
	10,000 kl	—	—	69	107	158	212	296	394	—			740				
Dissemination of high-efficiency energy saving devices	Vol. of emissions reductions (10,000 tCO2)	—	—	3	14	27	49	84	144	231			640-720			Performance trends are generally in line with expectations.	Maintain implementation support and appropriate law enforcement.
	(1)Cumulative no. of CO2 Coolant heat pump water heaters introduced to the market (10,000 devices) (2)umulative no. of latent heat recovery type water heaters introduced to the market (10,000 devices) (3)Vol. of high-efficiency air conditioners introduced (10,000 refrigeration ton) (4)Dissemination rate of high-efficient lighting (%)	(1)— (2)— (3)— (4)—	(1)— (2)— (3)— (4)—	(1)4 (2)1 (3)1.6 (4)0.06	(1)12 (2)3 (3)4.9 (4)0.09	(1)25 (2)9 (3)11.0 (4)0.14	(1)48 (2)24 (3)18.8 (4)0.18	(1)83 (2)48 (3)33.6 (4)0.23	(1)124 (2)79 (3)53.0 (4)0.29	(1)174 (2)116 (3)74.0 (4)0.38			(1)446-520 (2)291-326 (3)92.5-141 (4)0.41-0.76				
Dissemination of commercial-use energy saving refrigerator-freezer	Vol. of emissions reductions (10,000 tCO2)	0	0	0.1	2.1	5.0	10.6	16.9	22.0	26.7	20-30	20-50	30-60	30-80	40-90	Performance trends are generally in line with expectations.	Ongoing implementation support.
	Facilities	—	—	23	613	1,466	2,891	4,521	5,811	7,112	6,000 -8,000	8,000 -12,000	10,000 -16,000	12,000 -20,000	14,000 -24,000		
Implementation of energy saving and renewable energy measures in waterworks	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	32	33	35	—	35	36	37	37	37	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	10,000t-CO2	—	—	—	—	—	32	33	35	—	35	36	37	37	37		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Implementation of energy saving and new energy measures in waterworks	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	34	38	—	—	56	73	90	108	126	Performance trends are generally in line with expectations.	・Increased supplementary operations from 2008. ・Present guidelines for planning and otherwise technically supporting sewer managers.
	Rate of energy use of sewage sludge (%)	—	—	—	—	—	12	13	—	—	15	19	22	25	29		
Implementation of measures in waste management	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	0	10	—	—	15.8	39.0	65.9	89.1	110.8	Electricity generated from non-industrial waste is steadily increasing. Though facilities maintenance has been going on for industrial waste power generation, further initiatives are required as global warming counter measures. With regards to separately collected plastic containers and packaging, due to the increase in local governments implementing this policy, the rate of separated collection and re-use is increasing.	Currently implemented measures to be continued.
	(1)Increase in electricity from waste (non-industrial waste) power generation (GWh) (2)Increase in electricity from waste (industrial waste) power generation (GWh) (3)Estimated volume of separately collected plastic container and packaging (through designated corporations) (1,000 tonnes)	(1)— (2)— (3)67	(1)— (2)— (3)169	(1)— (2)— (3)260	(1)— (2)— (3)368	(1)— (2)— (3)447	(1)0 (2)— (3)529	(1)140 (2)— (3)549	(1)— (2)0 (3)581	(1)— (2)— (3)—	(1)— (2)245 (3)731	(1)— (2)490 (3)780	(1)390 (2)735 (3)869	(1)— (2)980 (3)900	(1)— (2)1,225 (3)921		
Implementation of national campaigns	Vol. of emissions reductions (10,000 tCO2)	0	0	0	0	0	—	—	—	—	90	95	100	105	110	Performance trends are exceeding expectations.	Currently implemented measures to be continued.
	(1)-1）Cool Biz (Execution rate (%)) (1)-2）Cool Biz (Accomplished reduction amount (10,000 tCO2)) (2)-1）Warm Biz (Execution rate (%)) (2)-2）Warm Biz (Accomplished reduction amount (10,000 tCO2))	(1)-1）— (1)-2）— (2)-1）— (2)-2）—	(1)-1）— (1)-2）— (2)-1）— (2)-2）—	(1)-1）— (1)-2）— (2)-1）— (2)-2）—	(1)-1）— (1)-2）— (2)-1）— (2)-2）—	(1)-1）— (1)-2）— (2)-1）— (2)-2）—	(1)-1） 42.5 (1)-2） 92 (2)-1） 44.9 (2)-2） 106	(1)-1） 53 (1)-2） 126 (2)-1） 55.8 (2)-2） 143	(1)-1） 57.9 (1)-2） 140 (2)-1） 66.7 (2)-2） 163	(1)-1） 61.8 (1)-2） 172 (2)-1） — (2)-2） —	(1)-1） 61-63 (1)-2） 136 (2)-1） 64-66 (2)-2） 169	(1)-1） 64-68 (1)-2） 139 (2)-1） 67-71 (2)-2） 176	(1)-1） 66-73 (1)-2） 140 (2)-1） 69-76 (2)-2） 181	(1)-1） 67-78 (1)-2） 141 (2)-1） 70-81 (2)-2） 184	(1)-1） 69-83 (1)-2） 140 (2)-1） 72-86 (2)-2） 187		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Implementation of national campaigns (Information provision by energy suppliers and others)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	150-300	—	—	—	—
	10,000 kl	—	—	—	—	—	—	—	—	—	—	—	50-100	—	—		
Encouragement of replacing appliances with less energy-consuming ones	Vol. of emissions reductions (10,000 tCO2)	208	247	299	355	415	472	526	583	643	649	726	816	921	1,035	Performance trends are generally in line with expectations.	Continue the edification effort.
	No. of energy-saving devices introduced (10,000 units) a) energy-saving electric pot, b) dishwasher, c) compact fluorescent lamp, d) water-saving showerhead, e) energy-saving control device for air conditioning compressor	a) 119 b) 231 c) 7,247 d) 254 e) 0.2	a) 219 b) 275 c) 7,540 d) 452 e) 0.9	a) 351 b) 330 c) 8,027 d) 653 e) 1.7	a) 484 b) 399 c) 8,664 d) 859 e) 2.5	a) 615 b) 471 c) 9,458 d) 1,069 e) 3.6	a) 725 b) 542 c)10,487 d) 1,194 e) 4.3	a) 816 b) 598 c)11,594 d) 1,322 e) 5.5	a) 891 b) 630 c)13,090 d) 1,426 e) 6.8	a) 944 b) 648 c)15,494 d) 1,530 e) -	a) 990 b) 740 c)14,430 d) 1,580 e) 8	a) 1,080 b) 830 c)16,540 d) 1,710 e) 10	a) 1,180 b) 920 c)19,140 d) 1,840 e) 11	a) 1,290 b) 1,020 c)22,220 d) 1,970 e) 13	a) 1,390 b) 1,140 c)25,750 d) 2,100 e) 15		
○Efforts in the Residential Sector																	
Improvement of the energy efficiency performance of houses	Vol. of emissions reductions (10,000 tCO2)	—	—	390	430	480	520	590	660	—			930			Performance trends are generally in line with expectations.	Continue current measures and reinforce measures that improve energy efficiency in housing by efforts such as amending the Energy Saving Act.
	%	13	17	21	23	32	30	36	36	—	51	59	66	69	72		
Leading measures for CO2 saving of houses through partnership between house manufacturers, consumers, etc.	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
○Efforts in the Transport Sector																	
Improvements in the fuel efficiency of automobiles, etc.	Vol. of emissions reductions (10,000 tCO2)	238	403	604	782	955	1,113	1,299	1,528	—		2,470-2,550				Performance trends are generally in line with expectations.	Introduced a new fuel consumption standard to be achieved by FY2015. Currently implemented measures to be continued.
	(1)Energy-saving effect by the Top-runner standards (crude oil equivalent 10,000kl) (2)No. of CEVs disseminated (10,000 cars) (3)Ownership ratio of sulfur-free fuel diesel vehicles in all diesel	(1)92 (2)8 (3)—	(1)155 (2)12 (3)—	(1)233 (2)14 (3)—	(1)301 (2)19 (3)—	(1)368 (2)26 (3)—	(1)429 (2)33 (3)—	(1)500 (2)42 (3)—	(1)588 (2)51 (3)—	(1)— (2)62 (3)—			(a) 940 (b) 69-233 (c) 0-10				
Diverse and flexible expressway toll policies	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	20	24	—	The average over the 5 years of 2008-2012 is about 20+α					Performance trends are generally in line with expectations.	Implemented further discounts and other efforts starting FY2008.
	Volume of traffic paying discounted tolls (travel distance (vehicle-kilometer)) (hundred million km/year)	—	—	—	—	—	—	200	220	—	The average over the 5 years of 2008-2012 is about 200+β						
Adjustment of automobile traffic demand	Vol. of emissions reductions (10,000 tCO2)	—	16.0	16.6	18.3	20.0	20.8	21.4	22.6	—	26	28	30	32	34	Performance trends are generally in line with expectations.	From FY2007, model sectors for maintaining a bicycle commuting environment have been designated and bicycle roads and other efforts have been implemented.
	Maintenance and extension of car roads (10,000km)	—	1.60	1.66	1.83	2.00	2.08	2.14	2.26	—	2.6	2.8	3.0	3.2	3.4		
Promotion of Intelligent Transportation Systems (ITS) (ETC)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	14	16	19	19	19	19	20	20	21	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	ETC utilization rate (%)	—	—	5	16	47	60	68	76	79	77	79	81	83	85		
Promotion of Intelligent Transportation Systems (ITS) (VICS)	Vol. of emissions reductions (10,000 tCO2)	—	—	114	151	168	194	214	225	—	225	230	240	245	250	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	VICS dissemination rate (%)	—	—	8	11	13	16	18	19	—	19.0	19.5	20.0	20.5	21.0		
Promotion of Intelligent Transportation Systems (ITS) (Centralization of traffic lights regulation)	Vol. of emissions reductions (10,000 tCO2)	30	40	50	60	60	70	80	90	100	100	110	110	120	130	A planned maintenance schedule is being implemented to reach the objective.	Going forward, a scheduled maintenance is planned.
	lights	15,000	17,000	20,000	22,000	25,000	28,000	32,000	36,000	38,000	38,000	40,000	42,000	44,000	47,000		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Reduction of road construction	Vol. of emissions reductions (10,000 tCO2)	—	—	51	53	58	60	60	63	64	64	66	68	69	71	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Annual road construction hours per 1km (hour/km over year)	—	—	201	186	143	126	123	114	107	116	112	108	105	101		
Countermeasures for bottleneck railroad crossings and the sort	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	5	7	10	12	13	18	25	40	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Reduction of time loss due to traffic congestion (10,000 people over hour/year)	—	—	—	—	—	—	400	700	800	800	1,000	1,400	2,100	3,100		
Development of traffic safety facilities (Upgrading traffic lights)	Vol. of emissions reductions (10,000 tCO2)	10	10	10	20	20	20	30	30	30	30	40	40	40	50	A planned maintenance schedule is being implemented to reach the objective.	Going forward, a scheduled maintenance is planned.
	lights	12,000	14,000	16,000	18,000	21,000	24,000	27,000	30,000	33,000	33,000	35,000	38,000	40,000	42,000		
Development of traffic safety facilities (Utilizing LEDs for traffic lights)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	0.1	0.4	0.7	1.0	1.3	—	—
	bulb	—	—	—	—	—	—	—	—	—	14,600	29,200	43,800	58,400	73,000		
Advancement of environmentally friendly car use (Greening of the automobile, transport industry through popularization of eco driving)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	29	57	89	—	114	126	139	151	163	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Dissemination of eco-driving related equipment (10,000 devices)	—	—	—	—	—	7	14	22	—	28	31	34	37	40		
	Adoption rate cars with advanced GPS-AVM systems (%)	—	—	—	0.9	3.4	7.4	12.3	17.2	—	20	24	28	32	36		
Suppressing maximum speeds for large trucks on highways	Vol. of emissions reductions (10,000 tCO2)	0	0	0.8	11.7	25.3	40.4	78.5	80.5	79.3	42.2-87.4	44.6-92.1	47.1-96.8	49.1-101	50.9-104	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	thousand cars	0	0	8	117	253	404	515	549	557	614	666	718	770	800		
Encouraging use of public transportation	Vol. of emissions reductions (10,000 tCO2)	103	103	119	128	141	163	190	—	—	213	255	375	397	452	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	million people	472	621	624	958	1,240	1,643	1,824	—	—	2,020	2,198	2,528	2,638	2,889		
Dissemination of environmentally sustainable transport (EST)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Improvement of energy consumption efficiency of railways	Vol. of emissions reductions (10,000 tCO2)	22	35	35	49	44	51	65	65	—	37	41	44	48	51	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Energy Consumption Basic Unit (kWh/km)	2.51	2.46	2.46	2.41	2.43	2.41	2.36	2.36	—	2.44-2.6	2.43-2.6	2.42-2.6	2.41-2.6	2.4-2.6		
Improvement of energy consumption efficiency of aircrafts	Vol. of emissions reductions (10,000 tCO2)	140	160	177	156	176	181	174	185	—	187	189	191	194	196	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	L/passenger-km	0.0539	0.0530	0.0525	0.0535	0.0525	0.0523	0.0526	0.0521	—	0.0520	0.0520	0.0519	0.0518	0.0517		
Promotion of telework and other transport substitution by information and communications technology	Vol. of emissions reductions (10,000 tCO2)	—	—	15.8	—	—	25.9	—	—	42.5	—	43.9	50.4	56.5	63.0	Performance for 2008 on emissions reductions has exceed expectations.	In 2009 as well, the plan is to attempt increase the rate of emission volume reduction by encouraging tele-work.
	10,000 people	—	—	408	—	—	674	—	—	1,000	—	1,137	1,300	1,463	1,625		
	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—		1,310						
	Businesses Within the Jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Japanese Shipowners' Association CO2 Emissions Basic Unit (10,000t-CO2/freight ton) Rate against benchmark year (%) Inside (): Year 1990=100	▲ 16 (84)	▲ 15 (85)	▲ 13 (87)	▲ 15 (85)	▲ 12 (88)	▲ 12 (88)	▲ 14 (86)	▲ 16 (84)	— ( )	▲ 15 (85)					Progress steady, objective accomplishment deemed possible.	—
	Japan Trucking Association CO2 Emissions Basic Unit (kg-CO2/tkm) Rate against benchmark year (%) Inside (): Year 1996=100	0.187 (95)	0.182 (92)	0.182 (92)	0.172 (87)	0.158 (80)	0.148 (75)	0.145 (74)	0.142 (72)	— ( )	0.137 (70)					Progress steady, objective accomplishment deemed possible.	—
	Scheduled Airlines Association of Japan CO2 Emissions Basic Unit (10,000 tCO2/seat kg) Rate against benchmark year (%) Inside (): Year 1990=100	▲ 10 (90)	▲ 11 (89)	▲ 13 (87)	▲ 11 (89)	▲ 12 (88)	▲ 12 (88)	▲ 12 (88)	▲ 13 (87)	— ( )	▲ 12 (88)					Objective achieved, but new objective levels not yet set.	Objectives raised last year. Inspecting current progress.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Federation of Coastal Shipping Associations CO2 Emissions Basic Unit(10,000 tCO2/freight tkm) Rate against benchmark year (%) Inside (): Year 1990=100	1.073 (107)	1.075 (108)	1.068 (107)	1.096 (110)	1.006 (101)	1.044 (104)	1.068 (107)	1.061 (106)	— ( )	0.97 (97)					Progress only at levels where objective accomplishment seems unlikely.	Reinforcement of measures to be instructed.
	Japan Passenger Boats Association Energy Consumption Basic Unit (MJ/overall t) Rate against benchmark year (%) Inside (): Year 1990=100	1.13 (113)	1.02 (102)	1.04 (104)	1.19 (119)	0.99 (99)	1.07 (107)	0.99 (99)	0.99 (99)	— ( )	0.97 (97)					Progress steady, objective accomplishment deemed possible.	—
	Japan Federation of Taxicab Associations Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1990=100	494 (97)	488 (96)	495 (98)	487 (96)	458 (90)	451 (89)	447 (88)	435 (86)	— ( )	446 (88)					Progress steady, objective accomplishment deemed possible.	—
	Nihon Bus Association CO2 Emissions Basic Unit (10,000 tCO2/real car kg) Rate against benchmark year (%) Inside (): Year 1997=100	0.978 (98)	0.966 (97)	0.956 (96)	0.954 (95)	0.925 (93)	0.896 (90)	0.898 (90)	0.904 (90)	— ( )	0.882 (88)					Progress steady, objective accomplishment deemed possible.	—
	Association of Japanese Private Railways Energy Basic Unit (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	▲ 8 (92)	▲ 8 (92)	▲ 10 (90)	▲ 9 (91)	▲ 11 (89)	▲ 13 (87)	▲ 13 (87)	— ( )	▲ 15 (85)					Progress steady, objective accomplishment deemed possible.	—

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Promotion and Reinforcement of Voluntary Action Plans of Industry (Businesses in the Transport Sector)	East Japan Railway Company CO2 Emission volume (10,000 tCO2) Inside (): Year 1990=100	— ( )	229 (83)	232 (84)	220 (80)	239 (87)	258 (93)	199 (72)	209 (76)	— ( )	215 (78)					Objective already accomplished, and objective has been raised during the FY2008 evaluation and verification.	The FY2010 objectives moved up to FY2008. Where objectives have been already reached, a review is being planned before the next follow-up.
	Energy Basic Unit (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	▲ 9 (91)	▲ 10 (90)	▲ 11 (89)	▲ 13 (87)	▲ 15 (85)	▲ 17 (83)	▲ 17 (83)	— ( )	▲ 19 (81)						
	Energy Efficient Carriage Installation Rate (%)	—	63	68	72	76	81	83	85	—	82						
	West Japan Railway Company Energy Basic Unit (kWh/car kg) Rate against benchmark year (%) Inside (): Year 1995=100	▲ 4 (96)	▲ 5 (95)	▲ 4 (96)	▲ 7 (93)	▲ 6 (94)	▲ 5 (95)	▲ 7 (93)	▲ 7 (93)	— ( )					▲ 12 (88)	Objective already accomplished, and objective has been raised during the FY2008 evaluation and verification.	—
	Energy efficient carriage (Shinkansen) installation rate (%)	77.5	81.3	87.7	90.2	92.4	94.1	95.5	96.7	—					100		
	Energy efficient carriage (overall) installation rate (%)	46.3	48.3	50.3	54.1	57.6	59.9	62.2	64.7	66.7					75		
	Central Japan Railway Company Energy Basic Unit (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1995=100	— ( )	▲ 11 (89)	▲ 13 (87)	▲ 15 (85)	▲ 12 (88)	▲ 12 (88)	▲ 15 (86)	▲ 15 (85)	— ( )	▲ 15 (85)					Progress steady, objective accomplishment deemed possible.	—
	Energy efficient carriage (Shinkansen) installation rate (%)	69.1	79.1	89.4	100	100	100	100	100	—	100						
	Energy efficient carriage (local line) installation rate (%)	58.7	61.0	61.3	61.3	61.3	62.3	76.5	85.3	—	85						
	Energy efficient carriage (motor car) installation rate (%)	94.5	96.5	97.4	97.4	97.4	97.4	97.4	98.8	—	100						

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Japan Harbor Transportation Association CO2 Emissions Basic Unit (CO2 Emissions Basic Unit per handled freight amount) Rate against benchmark year (%)	— ( )	— ( )	— ( )	— ( )	— ( )	0 (100)	▲ 4 (96)	▲ 5 (95)	— ( )	▲ 6 (94)					Progress steady, objective accomplishment deemed possible.	—
	Japan Freight Railway Company Energy Basic Unit (Wh/tkm) Rate against benchmark year (%) Inside (): Year 1995=100	1 (100.6)	2 (102.2)	3 (103.2)	▲ 2 (97.6)	▲ 1 (99.0)	▲ 1 (98.7)	▲ 5 (94.7)	▲ 8 (92.0)	— ( )	▲ 2.0 (98.0)					Objective already accomplished, and objective has been raised during the FY2008 evaluation and verification.	Objectives to be partially moved up. Where objectives have already been reached, a review for a new objective is being planned for FY2009.
	Energy Efficient Carriage Installation Rate (%)	9.5	11.2	13.1	15.7	18.3	21.6	25.9	31.3	—	35.0						
	Kyushu Railway Company Energy Basic Unit (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	▲ 12 (89)	▲ 10 (90)	▲ 10 (90)	▲ 8 (92)	▲ 9 (91)	▲ 9 (91)	▲ 10 (90)	▲ 12 (89)	▲ 10 (90)					Progress steady, objective accomplishment deemed possible.	—
	Energy Efficient Carriage Installation Rate (%)	—	51.6	51.9	55.1	56.8	57.9	61.7	62.3	62.4	65						
	Hokkaido Railway Company Energy Basic Unit (kWh/car kg) Rate against benchmark year (%) Inside (): Year 1995=100	▲ 6 (94)	▲ 7 (93)	▲ 5 (95)	▲ 9 (92)	▲ 8 (92)	▲ 7 (93)	▲ 12 (88)	▲ 14 (86)	— ( )	▲ 7 (93)					Objective achieved, but new objective levels not yet set.	Partial move up of objectives planned for FY2009.
	Energy efficient carriage (trains) installation rate (%)	62.6	62.6	65.8	70.6	71.2	73.1	75.4	86.4	—	75						
	Energy efficient carriage (motor car) installation rate (%)	23.2	27.4	27.4	27.4	27.4	27.8	28.6	30.6	—	30						
	All Japan Freight Forwarders Association Volume of CO2 Emissions (10 Thousand Tonnes CO2) Inside (): Year 1998=100	— ( )	14.6 (96)	14.6 (96)	14.6 (96)	14.5 (95)	14.3 (94)	13.9 (91)	13.6 (89)	— ( )	13.0 (86)					Objective already accomplished, and objective has been raised during the FY2008 evaluation and verification.	—

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
	Shikoku Railway Company Energy Basic Unit (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	▲ 16 (83.8)	▲ 17 (82.9)	▲ 18 (82.3)	▲ 16 (84.1)	▲ 17 (83.3)	▲ 18 (81.9)	▲ 18 (81.8)	— ( )	▲ 19 (81.5)					Progress steady, objective accomplishment deemed possible.	—
	Consumption Energy Basic Unit with train kg as the denominator (MJ/car kg) Rate against benchmark year (%) Inside (): Year 1990=100	— ( )	▲ 11 (89.0)	▲ 13 (87.5)	▲ 14 (85.7)	▲ 14 (86.4)	▲ 15 (85.0)	▲ 17 (83.0)	▲ 16 (84.1)	— ( )	▲ 18 (82.5)						
	Energy Efficient Carriage Installation Rate (%)	—	63.5	63.0	65.0	65.0	65.0	66.0	68.0	70.6	72						
Implementation of CO2 Saving by Cooperation Between Shippers and Logistics Operators	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Comprehensive measures for environmentally friendly marine transport	Vol. of emissions reductions (10,000 tCO2)	0	0	34	127	58	87	96	96	—	102	114	126	136	148	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	100 million tonne km	—	—	276	312	284	298	301	301	—	303	307	312	316	320		
Modal shift to railway freight	Vol. of emissions reductions (10,000 tCO2)	0	8	8	30	25	35	53	58	40	70	78	80	88	90	Due to the global economic depression, commodity distribution in general is down, making performance trends somewhat lower than expectations.	Currently implemented measures to be continued.
	100 million tonne km	0	3	3	12	10	14	21	23	16	28	31	32	35	36		
Promotion of dissemination of energy-saving vessels	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	0.04	0.21	—	0.54	0.74	0.94	1.14	1.34	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	vessels	—	—	—	—	—	3	7	11	19	19	26	33	40	47		
Improvement of truck transport efficiency	Vol. of emissions reductions (10,000 tCO2)	—	—	0	300	662	993	1,212	1,309	—	1,389	1,389	1,389	1,389	1,389	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	(1)No. of vehicles owned with gross weight over 24t but not exceeding 25t (trucks) (2)No. of trailers owned (trailers) (3)Ratio of corporate automobiles(%) (4)Load efficiency(%)	(1)— (2)— (3)— (4)—	(1)— (2)— (3)— (4)—	(1)79,500 (2)66,000 (3)84.0 (4)42.8	(1)89,500 (2)67,700 (3)85.2 (4)42.4	(1)105,400 (2)66,200 (3)86.1 (4)43.6	(1)119,900 (2)71,100 (3)86.8 (4)44.6	(1)134,400 (2)76,900 (3)87.2 (4)44.2	(1)147,300 (2)81,600 (3)87.4 (4)44.0	(1)157,400 (2)85,800 (3)— (4)—	(1)120,800, (2)71,100, (3)87, (4)44.6	(1)120,800, (2)71,100, (3)87, (4)44.6	(1)120,800, (2)71,100, (3)87, (4)44.6	(1)120,800, (2)71,100, (3)87, (4)44.6	(1)120,800, (2)71,100, (3)87, (4)44.6		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Reduction of overland transport distances of international freight	Vol. of emissions reductions (10,000 tCO2)	—	—	155	167	185	200	217	221	—	238	249	262	262	262	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	100 million tonne km	—	—	53	58	64	69	75	77	—	83	87	92	92	92		
Promotion of Dissemination of the Certification Program for Green Management	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
○Efforts in the Energy Conversion Sector																	
Promotion and Reinforcement of Voluntary Action Plans of Industry (oil, gas, power producers and suppliers)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	230						
	Businesses Within the Jurisdiction of the Ministry of Economy, Trade and Industry										*After fiscal 2008 values are either estimates or expected average of the 5 years between 2008 and 2012						
	Petroleum Association of Japan Energy Consumption Basic Unit (crude oil equiv. kl/production activity level 1,000 kl) Inside (): Year 1990=100	8.89 (87)	8.89 (87)	8.90 (87)	8.82 (87)	8.77 (86)	8.59 (84)	8.62 (85)	8.64 (85)	— ( )	8.87 (87)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.
	Japan Gas Association Volume of CO2 Emissions (10 Thousand Tons CO2) Inside (): Year 1990=100	81.7 (62)	70.5 (53)	64.5 (49)	57.2 (43)	52.6 (40)	45.6 (34)	36.7 (28)	39.1 (29)	— ( )	45.0 (34)					With objective already accomplished, objective levels being raised above actual achievement levels.	Going forward, countermeasures (including use of the Kyoto Mechanism) to fill the gap to objective achievement should be proposed by the pertinent council with as much specific & quantitative detail as possible in order to achieve objectives.
	CO2 Emissions Basic Unit (g-CO2/urban gas production/gas in process of supplying (㎥)) Inside (): Year 1990=100	32.2 (39)	27.4 (33)	23.1 (28)	19.8 (24)	17.1 (20)	13.7 (16)	10.5 (13)	10.6 (13)	— ( )	10.0 (12)						
	Power Producers and Suppliers CO2 Emissions Basic Unit (kg-CO2/amount of sold electricity (kWh)) Inside (): Year 2001=100	— ( )	0.54 (100.0)	0.52 (96)	0.54 (100)	0.50 (92)	0.49 (91)	0.49 (90)	0.47 (86)	— ( )	0.52 (97)					Objective already accomplished.	Going forward, upon validation and verification of the current situation, emissions performance, and future expectations, an increase in objectives levels should be encouraged by the pertinent councils.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Reduction of CO2 emission intensity in the electric power sector through promotion of nuclear energy, etc.	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—			1,400-1,500			Objective accomplishment is expected by exerting the maximum effort in implementing countermeasures to ensure further increase in effectiveness.	Continue maximum efforts toward objective achievement in the following three areas. (1)Promotion of atomic power, assuming assurance of safety and recovery of trust. (2)Further enhancement of thermal efficiency in thermal power generation and a review of thermal power generation operation. (3)International initiatives. (Use of such things as the Kyoto Mechanism)
	kg-CO2/kWh	—	—	0.404	0.433	0.418	0.423	0.410	0.453	—	The average over the 5 years of 2008-2012 is roughly 0.34						
Introduction and Utilization Expansion of Natural Gas	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Promotion of the Efficient Use of Petroleum	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Promotion of the Efficient Use of Liquefied Petroleum Gas	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Realization of a Hydrogen Society	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Promotion of measures for renewable energy (increasing utilization of biomass heat, photovoltaic generation, etc.)	Vol. of emissions reductions (10,000 tCO2)	—	—	2,626	2,720	2,942	3,117	3,237	3,315	—		3,800-4,730				Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	2-1)Renewable energy overall (10,000 kl) 2-2)Solar power generation (10,000 kl) 2-3)Wind power generation (10,000 kl) 2-4)biomass/waste generation (10,000 kl) 2-5)biomass heat utilization (10,000 kl)	2-1)— 2-2)— 2-3)— 2-4)— 2-5)—	2-1)— 2-2)— 2-3)— 2-4)— 2-5)—	2-1) 991 2-2) 15.6 2-3) 18.9 2-4) 175 2-5) 68	2-1) 1,054 2-2) 21 2-3) 27.6 2-4) 214 2-5) 79	2-1) 1,119 2-2) 27.7 2-3) 37.8 2-4) 227 2-5) 122	2-1) 1,160 2-2) 34.7 2-3) 44.2 2-4) 252 2-5) 141.8	2-1) 1,262 2-2) 41.8 2-3) 60.7 2-4) 290.5 2-5) 156.3	2-1) 1,293 2-2) 46.9 2-3) 68.2 2-4) 269.1 2-5) 197.8	2-1)— 2-2)— 2-3)— 2-4)— 2-5)—			2-1) 1,560 -1,910 2-2) 73-118 2-3) 101-134 2-4) 449-586 2-5) 282-308				

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Promotion of introduction of cogeneration and fuel cells	Vol. of emissions reductions (10,000 tCO2)	—	—	534	601	706	777	1,124	1,246	—		1,400-1,430				Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	natural gas cogeneration (10,000kW)	—	—	233	262	308	339	397	440	—			498-503				
	fuel cells (10,000kW)	—	—	0.97	0.88	0.98	1.01	1.36	1.39	—			1.97-10				
Promotion of biomass utilization (building of biomass towns)	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	4	13	27	41	59			100			Performance trends are generally in line with expectations.	Formulated laws for FY2008, increased commissioned research/supplementary operations, and implemented initiatives for speeding new biomass towns.
	cases	—	—	—	—	13	44	90	136	197	191	242	300	300	300		
[Non-energy-originated CO2]																	
Expansion of blended cement use	Vol. of emissions reductions (10,000 tCO2)	89	101	91	81	64	70	55	51	55	76	95	112	112	112	Performance trends are lower than expectations, but rate of use is expected to increase with continuous edification.	Continue current measures as well as disseminating research results on blended cement promotion policy to regional public institutions in attempts to increase use.
	rate of use (%)	21.9	22.9	22.6	22.1	21.0	21.4	20.2	20.1	20.6	21.9	23.4	24.8	24.8	24.8		
Promotion of Measures to Reduce CO2 Emissions Derived From Waste Incineration	Vol. of emissions reductions (10,000 tCO2)	439	524	545	380	634	851	1,075	—	—			580			Non-industrial waste incineration is on a definite decrease. With regards to industrial waste incineration, the amount of incinerated industrial waste has been progressing at values slightly under the objective level for the FYs 2000-2006 and performance trends are exceeding expectations.	Currently implemented measures to be continued.
	(1)Amount of non-industrial waste (plastics) incinerated (1,000t) (2)Amount of industrial waste (waste plastics) incinerated (1,000t) (3)Amount of industrial waste (waste oil) incinerated (1,000t)	(1)4,919 (2)1,947 (3)2,309	(1)4,943 (2)1,835 (3)2,095	(1)4,914 (2)1,764 (3)2,112	(1)4,844 (2)1,964 (3)2,569	(1)4,462 (2)1,994 (3)2,017	(1)3,548 (2)1,977 (3)2,123	(1)2,606 (2)1,908 (3)2,046	(1)— (2)— (3)—	(1)— (2)— (3)—			(1)4,383 (2)2,000 (3)2,300				

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
[Methane]																	
Reduction in the amount of final waste disposal, etc.	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—			50			The final waste disposal amount for organics has been steadily decreasing for both non-industrial and industrial waste.	Currently implemented measures to be continued.
	(1)Amount of final municipal waste disposal (food, paper, textile, wood) (1,000t) (2)Amount of final industrial waste disposal (livestock carcass, animal and plant residue, paper, textile, wood) (1,000t) (3)Amount of final processed large-scale illegal dumping of industrial wastes (no. of newly discovered cases) *Percentages of each incinerator type will be omitted	(1)845.7 (2)336 (3)19	(1)763.3 (2)345 (3)5	(1)631.6 (2)335 (3)9	(1)627.5 (2)289 (3)4	(1)609 (2)272 (3)7	(1)368 (2)219 (3)7	(1)309 (2)200 (3)—	(1)— (2)— (3)—	(1)— (2)— (3)—			(1)310 (2)123 (3)0				
Optimization and reduction of fertilizer application through the promotion of environmentally-sound agriculture	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	6.3	12.1	18.1	24.1	30.0	(Evaluation Markers) (1)Performance lower than expectations (2)— (Amount of emissions reduction) The overall amount of emissions reductions cannot be evaluated at present as the values for "(2)Amount of chemical fertilizer demand" have not been reported.	(1)Instigated information dissemination toward farmers and edification of both crop and livestock producers through operations explanations at EcoFarmer National Conventions and other husbandry related conventions. (2)Implemented supplementary operations to reduce overfertilization and introduce fertilization reduction techniques starting FY2009.
	(1)Organic matter management ratio (rice straw:compost:no application) (2)Amount of chemical fertilizer demanded (1,000 tN)	(1)— (2)487.4	(1)— (2)473.0	(1)— (2)473.4	(1)— (2)493.8	(1)— (2)474.8	(1)— (2)471.2	(1)— (2)453.8	(1)— (2)—	(1) 65:18:17 (2)—	(1) 56:24:20 (2)468.8	(1) 52:28:20 (2)466.9	(1) 48:32:20 (2)465.1	(1) 44:36:20 (2)463.3	(1) 40:40:20 (2)461.5		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
[Nitrous Oxide]																	
Installation of N2O decomposer in the production process of adipic acid	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	985	985	985	985	985	Performance trends are generally in line with expectations.	Already completed due to voluntary initiatives by businesses.
	offices	1	1	1	1	1	1	1	1	—	1	1	1	1	1		
Sophistication of combustion at sewage sludge incineration facilities	Vol. of emissions reductions (10,000 tCO2)	29	39	39	39	44	43	53	—	—	91	108	126	127	129	Performance trends are generally lower than expectations.	・Encourage implementation of a concrete action plan toward sewer managers who have yet to implement advanced combustion and support through the national treasury. ・Publication of status of individual incineration facilities with regards to advanced combustion implementation.
	%	23	31	31	31	35	34	42	—	—	75	87	100	100	100		
Sophistication of combustion at municipal waste incineration facilities	Vol. of emissions reductions (10,000 tCO2)	6.6	6.6	7.1	7.4	9.1	10.3	10.8	—	—			20.0			Continuous furnaces which emit less N2O are steadily increasing while batch furnaces which emit more N2O are decreasing. Though the amount of incinerated non-industrial waste is decreasing, the rate of decrease does not match expectations and further activity, including encouraging waste suppression and recycling is necessary to promote the wider application of waste processing.	Currently implemented measures to be continued.
	Percentage of each incinerator type(%) (1)Continuous furnace (2)Semi-continuous furnace (3)batch furnace	(1)77.9 (2)14.1 (3)8.1	(1)78.6 (2)13.9 (3)7.6	(1)80.8 (2)12.7 (3)6.6	(1)82.3 (2)12.2 (3)5.5	(1)83.5 (2)11.2 (3)5.2	(1)84.5 (2)10.5 (3)4.9	(1)85.3 (2)9.9 (3)4.8	(1)— (2)— (3)—	(1)— (2)— (3)—			(1)84.7 (2)10.9 (3)4.3				

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
[Substitution of 3 fluorinated gases]																	
Promotion of planned efforts, development of substitute materials and use of substitute products by industry	amount of emissions reduction (million tCO2)	-0.2	7.9	13.6	17.4	25.0	32.0	37.2	45.6	—	64.1	64.0	64.4	64.1	63.8	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	amount of substituted 3 fluorine gases emission (million tCO2)	35.7	30.3	26.9	26.4	23.4	22.2	24.2	24.1	—	26.7	28.7	30.5	33.2	36.0		
	(1)Shipping volume of HFCs in aerosol products (t) (2)Amount of HFC used for MDI purposes (t) (3)Amount of HFC-134a used for urethane foam purposes (t) (4)Amount of HFC used for extruded polyethylene (t) (5)Amount of HFC used for highly foamed polystyrene (t) (6)Amount of HFC used for phenolic foam purposes (t) (7)Amount of used SF6 gas (t)	(1)2,078 (2)47 (3)167 (4)0 (5)322 (6)0 (7)43	(1)1,945 (2)58 (3)177 (4)10 (5)288 (6)0 (7)48	(1)2,192 (2)61 (3)201 (4)35 (5)299 (6)0 (7)47	(1)2,151 (2)77 (3)233 (4)638 (5)294 (6)0 (7)42	(1)2,239 (2)109 (3)190 (4)517 (5)254 (6)0 (7)40	(1)1,904 (2)115 (3)224 (4)26 (5)128 (6)0 (7)40	(1)1,799 (2)110 (3)259 (4)5 (5)120 (6)0 (7)39	(1)1,500 (2)97 (3)216 (4)0 (5)120 (6)0 (7)38	(1)— (2)— (3)— (4)— (5)— (6)— (7)—	(1)1,857 (2)142 (3)239 (4)0 (5)104 (6)0 (7)39	(1)1,900 (2)160 (3)229 (4)0 (5)97 (6)0 (7)40	(1)1,948 (2)180 (3)220 (4)0 (5)90 (6)0 (7)9	(1)1,998 (2)180 (3)220 (4)0 (5)90 (6)0 (7)9	(1)2,050 (2)180 (3)220 (4)0 (5)90 (6)0 (7)9	Performance trends are generally in line with expectations.	Currently implemented measures to be continued.
	Vol. of emissions reductions (10,000 tCO2) (Correct processing of liquid PFC, etc)	—	—	—	—	—	—	—	—	—	0.0	3.0	3.0	3.0	3.0	—	Encourage voluntary emission suppression of liquid PFC according to the "PFC Destruction Processing Guideline" drawn up in FY2008.

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
Recovery of HFCs filled as refrigerant in equipment based on relevant acts, etc.	Vol. of emissions reductions (10,000 tCO2) (1)Car air conditioners (Reduction values based on the automobile recycling law. Further, value in () are reduction values based on the fluorine reclamation/destruction law.) (2)Industrial refrigeration and air conditioning equipment (upper values are fluorine recovery values based on the fluorine reclamation/destruction law, lower values based on fluorine recovery values after maintenance due to the revised fluorine reclamation/destruction law) (implemented Oct 2007) (3)Household electronics	(1) - (-) (2) - (3) - Total	(1) - (-) (2) - (3) - Total	(1) - (13.9) (2) 13 (3) 1.4 Total 28	(1) - (29.0) (2) 19 (3) 2.8 Total 51	(1) 8.0 (33.7) (2) 28 (3) 5.4 Total 75	(1) 57.3 (2.1) (2) 37 (3) 8.5 Total 105	(1)70.2 (0.8) (2) 41 (3) 12.2 Total 124	(1) 84.2 (0.0) (2) 37 (47) (3)18.7 Total 187	(1) - (-) (2) - (3) 26.0 Total	(1) 97.8 (2) 256 (3) 8.7 Total 363	(1)107.5 (2) 328 (3) 8.7 Total 444	(1)117.3 (2) 400 (3) 8.7 Total 526	(1)120.7 (2) 474 (3) 8.7 Total 603	(1)120.7 (2) 551 (3) 8.7 Total 680	(1)Performance trends are generally in line with expectations. (2)The original estimation of the number of devices being disposed which use HFC as a refrigerant was too high and therefore performance trends are lower than expectations. The estimation is being considered for revision. ~~(3)~~Performance trends are exceeding expectations.	(1)Currently implemented measures based on the automobile recycle law to be continued. (2)Implemented labeling of fluorine gas coolant amount in CO2 equivalent as part of the "Visualization" initiative. Reinforcement of implementation at prefectural level. Notification of the fluorine reclamation/destruction law. Further based on a grasp of the actual leakage amount during usage, promotion of countermeasures to reinforce management structure. (3)Compulsary reclamation of coolant fluorine gases from electronic washing machines due to revisions in the household electronics recycle law.
	(1)Car air conditioners (10,000 tCO2) (Reduction values based on the automobile recycling law. Further, value in () are reduction values based on the fluorine reclamation/destruction law.) (2)Industrial refrigeration and air conditioning equipment (%)*reference value (includes gases outside of Kyoto Mechanisms scope (CFC, HCFC)) (3)Household electronics (10,000 tCO2)	(1) - (-) (2) - (3) -	(1) - (-) (2) - (3) -	(1) - (13.9) (2) 29* (3) 1.4	(1) - (29.0) (2) 28* (3) 2.8	(1) 8.0 (33.7) (2) 31* (3) 5.4	(1) 57.3 (2.1) (2) 32* (3) 8.5	(1) 70.2 (0.8) (2) 36* (3) 12.2	(1) 84.2 (0.0) (2) 49 (3) 18.7	(1) - (-) (2) - (3) 26.0	(1) 97.8 (2) — (3) 8.7	(1)107.5 (2) — (3) 8.7	(1)117.3 (2) 60 (3) 8.7	(1)120.7 (2) — (3) 8.7	(1)120.7 (2) — (3) 8.7		

Specific Countermeasure	Countermeasure Evaluation Index	2000	2001	2002	2003	2004	2005	2006	2007	2008	2008	2009	2010	2011	2012	Evaluation of performance trends compared to expectations(*1)	Addition, reinforcement, etc of countermeasure/measure
		Performance									forecast						
【Measures and Policies on Greenhouse Gas Sinks】																	
Implementation of measures for greenhouse gas sinks by promoting forest and forestry measures	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	3,542	3,721	3,997	—	The average over the 5 years of 2008-2012 is 4767					Performance trends are generally in line with expectations.	Implementation of special measures law and supplementary budgets just put in place to speed up the current countermeasures, which will be continued.
	10,000ha	—	—	—	—	Average of 58 over 3 years			75	—	The average over the 5 years of 2008-2012 is 78						
Promotion of urban greening	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	63	66	69	—	70	72	74	77	79	Performance trends are generally in line with expectations.	・Added "Park Greening as an Absorption Source Countermeasure" as a supplementary operation from FY2009. ・Implemented an extension to the special exemption for fixed assets tax relating to authorized green facilities in the FY2009 tax reforms.
	1,000ha	—	—	—	—	—	64	66	70	—	71	74	76	78	81		
[Cross-sectoral Policies]																	
Promotion of global warming countermeasures through the revisions to the Act on Promotion of Global Warming Countermeasures	Vol. of emissions reductions (10,000 tCO2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Percentage of formulation of local government action plans (%)	—	—	—	—	—	—	—	—	—			100				

*1 When using amount of emissions as a countermeasure evaluation index, if emissions trend is lower than expected, it is noted that "Performance trends are higher than expectations".
*2 Amount rolled calculated by production amount adjusted by degree of cold rolling due to plate thickness variation derived from production LCI data.
*3 Amount of energy consumed during the process of creating optic fiber cables at the manufacturing plant.