Executive Summary

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

Japan 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 smaller islands. Japan's land area equals 37.79 million hectares, or 0.3% of the total global land area, of which about 80% is accounted for by forests and agricultural land. Japan's climatic zone stretches over a great distance from north to south, with the subtropical zone in the south and the subarctic zone in north, creating four very distinct seasons.

Japan's population in 2005 totaled some 127 million, with a population density of 343 inhabitants per square kilometer. The ratio of the elderly amongst the population is rapidly increasing to a higher rate than ever, and the population segment aged 65 or older reached 20 percent as of 2005. Compared with 1980, Japan's real gross domestic product (GDP) increased 1.8 times to 585 trillion yen in 2007.

The growth rate of passenger traffic volume increased rapidly in the latter half of the 1980s along with the economic boom due to the bubble economy. From the 1990s onward, however, passenger traffic volume, along with the share of each transportation mode, has remained almost constant. Total motor vehicle ownership has increased consistently since the 1960s, but has decreased in comparison to the previous year since 2006, with mileage also turning down since 2004.

Final energy consumption in Japan almost leveled off since FY2000, coming to $15{,}794 \times 10^{15}$J in FY2007. Looking at trends since FY2001 by consumption sector, final energy consumption has followed the downward trend in the industrial and transportation sectors, but has been on the rise in the civilian sector. 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.

Different energy sources contribute different shares of the total primary energy supply. In FY2007, oil's share of total primary energy stood at 47%, followed by 21% for coal, 16% for natural gas and 10% for nuclear power, with natural gas and nuclear power expanding their shares rapidly. Japan's total primary energy supply per capita as of 2007 was 187×10^{9}J, and has been declining in recent years. Japan's total primary energy supply per unit of GDP has improved significantly after the oil shock, and has followed the general downward trend since 2001 in the wake of the change in the industrial structure.

Chapter 2 : Trends in GHGs Emissions and Removals

Total greenhouse gas emission in FY2007[1] (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)[2] 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, and N_2O; FY1995 for emissions of HFCs, PFCs, and SF_6).

Table 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

[1] "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")

[2] 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).

The above increase reflects that CO_2 emissions stemming from the burning of fuels in the energy conversion sector, which accounts for 30% of total CO_2 emissions, increased by 38.4% over FY1990 and by 13.4% over the previous year.

Chapter 3：Policies and Measures

Ⅰ Promoting Efforts for Achieving Kyoto Protocol Targets

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). Subsequently, 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.

The direction and basic philosophy of global warming countermeasures prescribed in the current Kyoto Protocol Target Achievement Plan are as follows:

1. Basic Direction of Promotion of Global Warming Countermeasures

1.1. Direction of Japan's Global Warming Countermeasures

- Steady Achievement of the 6% Reduction Commitment under the Kyoto Protocol
- Further Long-term and Continuous Reduction of Greenhouse Gas Emissions on a Global Scale

1.2. Basic Philosophy of Global Warming Countermeasures

○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.

○Innovative Technology Development and Creation of a Low-carbon Society

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.

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

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 also actively provide and share knowledge about the increasingly serious global warming issue and information about the specific actions demanding enormous efforts, and about what each individual must do; and will carry out public relations and dissemination activities on these topics.

○Utilization of Diverse Policy Instruments

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. The Government will also place importance on incentive policies utilizing economic instruments which induce technology development and countermeasures introduction overcoming cost constraints.

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

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. In FY2009, the Government will comprehensively evaluate the progress of measures and policies in the Plan, and the state of emissions, based on the projection of Japan's greenhouse gas emissions during the whole first commitment period (five years).

○Ensuring of International Cooperation on Global Warming Countermeasures

Japan will unceasingly continue to put in its utmost efforts in order to create an effective framework in which all major emitters will participate beyond 2013 after the end of the first commitment period under the Kyoto Protocol. Also, Japan will take a leading role in the world's efforts to combat global warming through international cooperation.

2. Measures and Policies to Achieve the Targets

2.1. Basic Roles of the National and Local Governments, Business Operators and Citizens

The national government will promote global warming countermeasures in a comprehensive manner and also has the role of taking the initiative in making efforts to combat global warming. Local governments, business operators and citizens are called upon to undertake roles commensurate with their positions.

2.2. Global Warming Measures and Policies

2.2.1. Measures and Policies for Greenhouse Gas Emissions Reduction

(1) Energy-originated Carbon Dioxide

Concerning energy-originated carbon dioxide that account for 90% of total greenhouse gas emissions, 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 in order to change the structure itself into a CO_2-saving one, and will strive 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.

(2) Non-energy-originated Carbon Dioxide

The Government will help the expansion of blended cement use, promote measures to reduce carbon dioxide emissions derived from waste incineration, and develop national campaigns.

(3) Methane and Nitrous Oxide

As for methane (CH_4), the Government will proceed with reductions in the amount of final waste disposal and the review of organic matter and water management in rice paddies. Concerning nitrous oxide (N_2O), the Government will promote the sophistication of combustion at sewage sludge incineration facilities, the sophistication of combustion at municipal waste incineration facilities, and the optimization and reduction of fertilizer application.

(4) Three Fluorinated Gases (HFCs, PFCs and SF_6)

The Government will promote planned efforts by industry, development of substitute materials and use of substitute products, and recovery of HFCs filled as refrigerant in equipment based on relevant acts.

Table 2 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

- ◆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.

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

2.2.2. Greenhouse Gas Sink Measures and Policies

The government, for forest sink measures, will promote the development of sound forests, implementation of appropriate management and conservation of protection forests, implementation of forest fostering with the participation of citizens, and the use of timber and woody biomass. The Government will also promote urban greening.

2.2.3. Cross-sectoral Policies

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.

Furthermore, 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.

Meanwhile, 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 take measures to encourage environment-conscious efforts in business activities such as urging business operators to voluntarily and actively engage in environment-conscious business activities.

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.

2.2.4. Basic Policies

The Government will develop a national system for calculating greenhouse gas emissions and removals based on the UNFCCC and the Kyoto Protocol, and promote the development of global warming countermeasure technology. The Government will also promote research on climate change and strengthen observation and monitoring systems. Furthermore, the Government will strive to ensure international partnership on measures against global warming and promote international cooperation.

2.3. 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.

2.4. 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.

2.5. Measures and Policies Related to the Kyoto Mechanisms

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 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".

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 Council proposal.

The Action Plan sets out concrete measures to be taken for each policy item shown below:

○Japan's targets

Regarding the post-2012 framework, Japan will aim to build international agreement on fair and equitable rules, and will announce its quantified national emissions reduction target at an appropriate time in 2009.

○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.

○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.

○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.

Subsequently, regarding Japan's quantified national emissions reduction target (mid-term target), 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, and at the same time expressed the resolve to exercise the political will required to deliver on this promise by mobilizing all available policy tools, including the introduction of a domestic emissions trading system, a feed in tariff for renewable energy, as well as the consideration of a global warming tax. Noting 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, Prime Minister Hatoyama also stated that Japan is prepared to provide more financial and technical assistance than in the past, in accordance with the progress of the international negotiations, thus presenting the "Hatoyama Initiative," which includes the principle that the developed countries must contribute through substantial, new and additional public and private financing. The Prime Minister further addressed that Japan will exert every effort for the success of the 15th Conference of the Parties to the U.N. Framework Convention on Climate Change (COP15), in the course of formulating this initiative.

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

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 3 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%	1,253 (-0.6%)

	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%
Total emissions		1,261	1,273	0.9%	1,287	2.1%

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

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.

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.

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).

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.

Chapter 7：Research and Systematic Observation

1. Research

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 Council for Science and Technology Policy (CSTP) in September 2001 provided that related research and development should be promoted under collaboration among industry, academia and government. 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.

2. Systematic Observations

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.

Chapter 8：Education, Training, and Public Awareness

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 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.