Chapter 3

Policies and Measures

In Japan, the Global Warming Prevention Headquarters was established in December 1997 by order of the Cabinet to implement specific and effective countermeasures against global warming in reaction to the Third Session of the Conference of the Parties to the UNFCCC (COP3, also known as the "Kyoto Conference on Global Warming Prevention"). The "Guideline for Measures to Prevent Global Warming" was drawn up in June 1998 by these headquarters.
Subsequently, new "Guideline for Measures to Prevent Global Warming" was concluded on 19th March 2002, as additional measures need to be promoted to achieve the commitment stipulated in the Kyoto Protocol as emissions continue to increase.
This chapter is based on Chapters 1 through 4 of this new Guideline.*

3.1 Background and Significance of Review of Guideline for Measures to Prevent Global Warming

3.1.1 Basic understanding of global warming

The global warming issue refers to the adverse effect on both human being and the natural ecosystem, from the increase in global surface and atmospheric temperature due to the increase of greenhouse gases concentrations by human activities. It is certainly the most important environmental issue for human life in terms of the scale and severity of its estimated impact. According to the Intergovernmental Panel on Climate Change (IPCC), global mean surface temperature has increased by 0.6 ±0.2 °C between 1861 and the present, and global mean sea level has risen by 10 to 20 centimeters within the 20th century. It also mentions that regional climate changes have impacted on a variety of physical and biological systems in many areas of the world, as evidenced by the recession of mountain glaciers and the melting of permafrost. Furthermore, it describes new and more reliable evidence that most of warming observed over the last 50 years has been caused mainly by the human activities. In terms of future projection, the global mean

* In the Greenhouse Gas Emission/Removal Inventory submitted in 2001 and Chapter 2, total greenhouse gas emissions in the base year (1990 levels for CO_2, CH_4 and N_2O; 1995 levels for HFC, PFC and SF_6) and total emissions in 1999 were 1,223.8 million tons and 1,300.7 million tons respectively, but revised statistics are used here as it was discovered in the latest emission studies that the amounts of waste incineration and cement production were under-calculated, thus leading to new Guideline.

surface temperature is projected to increase by 1.4 to 5.8°C over the period 1990-2100, with global mean sea level rising by between 9 and 88 centimeters due mainly to the thermal expansion of sea water. It is reckoned that the impact on human society will include increases in the number of flood victims and infectious diseases such as malaria, further damage to the ecosystem, as well as the increase of extreme weather events. It also mentions that while any increase in temperature will cause net economic losses in developing countries, temperature increases of more than a few degrees centigrade will incur net economic losses in developed countries, thus widening the gap between the north and south will be further exacerbated.

3.1.2 Measures for international society

(1) Adoption and implementation of the Framework Convention on Climate Change

The “United Nations Framework Convention on Climate Change” was adopted in May 1992 by international society to resolve global warming-related issues. Japan signed the “Framework Convention on Climate Change” at the UN Conference on Environment and Development in June 1992, and accepted it in May 1993. The “Framework Convention on Climate Change” came into effect in March 1994. The ultimate objective of the “Framework Convention on Climate Change” is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic system. The “Framework Convention on Climate Change” states that such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. The “Framework Convention on Climate Change” also stipulates that, based on a concept of “common but differentiated responsibilities” of the Parties, it is recognized that the return by the end of the decade 1990-1999 to earlier levels of emissions of greenhouse gases would contribute to the modification of long-term trends in emissions, and that the developed country Parties shall communicate detailed information on its policies and measures to limit its emissions of greenhouse gases and to protect and enhance its greenhouse gas sinks, and reservoirs as well as on its resulting projected greenhouse gas emissions and removals for the decade with the aim of returning these emissions to their 1990 level. The “Framework Convention on Climate Change” thus makes it clear that the developed country Parties should take the lead in combating climate change ahead of developing countries. On the other hand, it stipulates the basic responsibilities of developing country Parties, such as estimation of the emission amounts in each country and its reporting to the Convention secretariat, while also clarifying the obligation of developed country Parties to support their implementation.

(2) Measures for the implementation of the Kyoto Protocol in 2002

As a first step towards long-term and continued reductions in emissions, the Kyoto Protocol – which provide a legally binding commitment to reduce greenhouse gas emissions by developed countries – was adopted at the Third Conference of the Parties (COP3) for the "Framework Convention on Climate Change" held in Kyoto in December 1997.

Under the Kyoto Protocol, the greenhouse gases subject to the quantified emission limitation and reduction commitments are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). A legally binding quantified commitment has been established for each country with a view to reducing the developed countries' overall emissions of these greenhouse gases by at least 5 per cent below 1990 levels in the first commitment period from 2008 to 2012. The quantified commitment for Japan is a 6% reduction, while those for the USA and EU are 7% and 8% respectively. The Kyoto Protocol introduces the so-called 'Kyoto mechanisms' (a mechanism stipulated in Article 6 of the Kyoto Protocol (so-called, and hereafter, referred to as, 'Joint Implementation (JI)'), a clean development mechanism (CDM) under Article 12, and emission trading under Article 17) as an international system to promote cost-effective measures to achieve such commitments.

Since then, international negotiations have been pursued to decide the operational details for the implementation of the Kyoto Protocol, and the decisions elaborating these details (so-called "the Marrakesh Accords") were adopted at COP7 held in Marrakech in October and November 2001. While the USA, which is the largest greenhouse gas emittor of the world, has made clear its position not to become a party to the Kyoto Protocol, the EU and other developed countries have already begun preparations towards the conclusion of the Kyoto Protocol following the decision reached at COP7, so as to enable its entry into force in 2002.

Japan, which chaired COP3 (The Kyoto Conference) at which the Kyoto Protocol was adopted, convened a Global Warming Prevention Headquarters meeting on February 13th 2002, and decided to make every effort to obtain the Diet's approval for its conclusion of the Kyoto Protocol and to complete legislative process for the adoption of the necessary domestic laws, taking into account the holding of the World Summit on Sustainable Development (The Johannesburg Summit) from late August into September. It was also decided at the meeting to review the 'Guideline of Measures to Prevent Global Warming' (Global Warming Prevention Headquarters decision, June 1998: hereafter referred to as the 'old Guideline') and establish a new Guideline. At the same time, Japan continues to make every effort to establish common rules in which all countries participate.

3.1.3 Measures to date, and the challenge of achieving the 6% reduction commitment stipulated in the Kyoto Protocol

Japan established an "Action Program to Arrest Global Warming" at the "Council of Ministers for Global Environmental Conservation" in October 1990, and took various measures to reduce and stabilize CO_2 emissions at 1990 levels from 2000 onward. This target value was also mentioned in the Framework Convention on Climate Change as well, but it is thought that this target was not achieved in 2000.

Taking into account the adoption of the Kyoto Protocol in December 1997, the Global Warming Prevention Headquarters drew up its "Guideline of Measures to Prevent Global Warming" in June 1998, covering those measures against global warming needing to be urgently promoted with the target year 2010 in view.

Furthermore, Japan has fixed a basic framework to promote measures to prevent global warming in Japan by establishing the "Law Concerning the Promotion of the Measures to Cope with Global Warming" (1998 law No. 117; hereafter 'Law to Promote Global Warming Countermeasures'), and established basic policies based on it. Japan has also implemented various domestic measures, such as revision of the "Law Concerning the Rational Use of Energy" (1979 law No. 49; hereafter 'Law for Energy Conservation').

However, greenhouse gas emissions are still increasing. Emissions of greenhouse gases from Japan increased by around 6.9% in fiscal 1999 compared to the base year (1990 for CO_2, CH_4, and N_2O, while 1995 for HFCs, PFCs, and SF_6. Thereafter same). It has been estimated that greenhouse gas emissions will increase in 2010 by around 7% compared to the base year assuming existing measures and policies, so further measures are required to achieve the Kyoto Protocol commitment.

Japan plans to conclude the Kyoto Protocol as soon as the requisite approval is granted by the Diet. However, it will not be easy for Japan to achieve the 6% reduction commitment stipulated for it in the Kyoto Protocol (hereafter '6% reduction commitment') since its energy efficiency is already of the highest standard in the world, and accordingly close cooperation of the government, local authorities, businesses and citizens will be required to meet the challenge of achieving the commitment. On the basis of the above, the revised "Guideline of Measures to Prevent Global Warming" which the Government of Japan elaborated prior to its conclusion of the Kyoto Protocol provides an overview of the specific measures to achieve the 6% reduction commitment which strongly promote combined efforts of the government, local authorities, businesses and citizens. Additionally, targets and measures to address each of the greenhouse gases and other categories, as well as the schedule for implementation of such measures are described, indicating for each measure the target amount of its introduction in the whole country, its resulting emission reduction estimated and policies to promote it.

3.2 Basic Policies for Measures to Prevent Global Warming

3.2.1 Direction for global warming prevention to aim in

As a measure to prevent global warming from now on, firstly, we must try to reverse the trend for ever-increasing total amounts of greenhouse gas emissions to a reducing basis at an early stage, and link such reductions to the achievement of the 6% reduction commitment stipulated in the Kyoto Protocol, leading also to a longer term and continued emission reduction.

(1) Achievement of the 6% reduction commitment stipulated under the Kyoto Protocol

Japan positively promotes measures to prevent global warming as required to achieve the 6% reduction commitment stipulated in the Kyoto Protocol, namely the commitment to reduce its overall emissions of greenhouse gases by 6% below 1990 levels in the first commitment period from 2008 to 2012. If measures are introduced later, larger reductions will be required in a shorter period to achieve the 6% reduction commitment, so we are immediately implementing such measures as can be carried out now to prevent global warming, will reverse the rising trend to a falling trend at the earliest possible stage, and thus achieve the 6% reduction commitment.

(2) Long-term and continued reductions in greenhouse gas emissions

We plan to achieve the 6% reduction commitment stipulated in the Kyoto Protocol and head towards longer-term and continued emission reductions. In order to do so, we are implementing each measure very carefully, and at the same time, striving to build a society in which a system to reduce greenhouse gas emissions is incorporated while trying to maintain consistency between each area of the overall policy and with due consideration for Japanese socioeconomic trends in the 21st century.

3.2.2 Basic concept for establishment and implementation of measures to prevent global warming

(1) Preparation and establishment of a system for contribution to both the environment and economy

We are endeavoring to prepare and establish a mechanism to ensure contribution to both the environment and economy by make the best use of technological innovation and innovative ideas in economic circles to link the various measures aimed at achieving the 6% reduction commitment called for in the Kyoto Protocol and to create labor opportunities by stimulating the economy in Japan.

(2) Step-by-step approach

We have segmented the term from 2002 to the end of the first commitment period, and define the term from 2002 to 2004 as the '1st step', from 2005 to 2007 as the '2nd step', with the first commitment period (2008 ~ 2012) as the '3rd step'. We will steadily quantify how to achieve the 6% reduction commitment stipulated in the Kyoto Protocol in the first commitment period, evaluate the progress of such measures, policies and emission statuses before the 2nd and 3rd steps, and adopt a step-by-step approach by implementing any additional requisite measures and policies. In carrying out the above, we shall include in this guideline any targets for each of greenhouse gases and other segments, Japan's overall implementation target amount for each measure, the estimated emission reduction amount, and policies to promote such measures to evaluate and review based on objective factors.

(3) Promotion of measures through cooperation between government, local authorities, businesses, and citizens

In order to promote measures to prevent global warming, cooperation between all parties is indispensable, by having the government, local authorities, businesses, and citizens each playing their roles. Also, local authorities shall establish comprehensive and considered policies to control greenhouse gas emissions in accordance with the natural and social conditions in each area while bearing in mind the basic concept of the above (1) and (2).

(4) Ensuring international cooperation for measures to prevent global warming

As the causes and effects of global warming are worldwide, it is necessary for all countries to work hard to reduce greenhouse gases in order to ensure the effectiveness of action against global warming, while, in addition to the efforts of each country, further efforts under international cooperation is indispensable. Thus, Japan continues its maximum efforts for the establishment of a common rule in which all countries including the USA and developing countries participate.

It is estimated that CO_2 emissions will increase rapidly in line with an increased global population and economic growth, so Japan intends to play a leading role drawing up global measures through international cooperation using its preeminent technological strengths and accumulated environmental conservation experience.

3.3 Policies Aimed at Achieving the Commitment to a 6% Reduction

3.3.1 Current status and future prospects of greenhouse gas emissions

Japanese aggregate anthropogenic carbon dioxide equivalent emissions of greenhouse gases listed in Annex A of Kyoto Protocol (hereafter, 'total greenhouse gas emissions') is 1,314 million tons of CO_2 in 1999. When the old Guideline was established, it was estimated that greenhouse gas emissions would increase significantly if no special measures were taken. As a result of promoting various measures based on the old Guideline, total greenhouse gas emissions in 2010 (assuming existing measures) is estimated at about 1,320 million tons of CO_2, and it is expected to be reduced to about a 7% increase compared to the base year. On the other hand, our total greenhouse gas emissions in the base year is 1,229 million tons of CO_2. In order to achieve the 6% reduction commitment for Japan stipulated in the Kyoto Protocol, a reduction to 1,155 million tons of CO_2 (6% off the above value) is required. Thus, in order to achieve the 6% reduction commitment, we must also strive to reduce emissions by about 13% (approximately 165 million tons of CO_2) over and above existing measures.

3.3.2 Targets for each of greenhouse gases and other segments

We shall try to achieve the 6% reduction commitment stipulated in the Kyoto Protocol based on the following targets for the time being.
Even if adequate progress is expected for targets ①-⑤ within the first commitment period, further emission reductions shall be promoted as well as continuously and steadily promoting earlier measures without allowing any complacency.
Furthermore, Japan shall study the utilization of the Kyoto mechanisms while taking account of international situation and bearing in mind the commitment achievement responsibility and the general rule that Kyoto mechanisms stipulated in the Kyoto Protocol are supplementary to domestic measures.

① We shall try to reduce carbon dioxide emissions from energy sources to the same level as fiscal 1990 within the first commitment period.

② We shall try to reduce carbon dioxide emissions from non-energy sources, methane, and nitrous oxide by 0.5% compared to the total greenhouse gas emissions in the base year from the fiscal 1990 level within the first commitment period.

③ We shall try to achieve a 2% reduction compared to the total greenhouse gas emissions in the base year from the fiscal 1990 level within the first commitment period by innovative

technological development and promotion of further activities to prevent global warming involving various sectors and layers of the public.

④ In terms of emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6), we shall try to contain the impact to within about +2% compared to the total greenhouse gas emissions in the base year from 1995 within the first commitment period.

⑤ For general targeted forests stipulated in Article 3.3 and 3.4 of the Kyoto Protocol, we shall try to ensure removals of about 13 million tons of carbon (47.67 million tons of CO_2; about 3.9% compared to the total greenhouse gas emissions in the base year) as agreed at COP7 through sink activities in Japan.

3.3.3 Targets for each measure

In order to show an overview of the measures with specific evidence to achieve the 6% reduction commitment stipulated in the Kyoto Protocol, this Guideline stipulates implementation target amounts, and estimated emission reduction amounts for each measure in order to achieve the target for each of greenhouse gases and other segments, and policies to promote such measures. Details are shown in the tables per field (see Tables 3.1-3.11) in the following section 3.4. We shall also make the utmost effort for steady implementation towards further reduction of emissions for measures whose setup of target amounts and estimated emission reduction amounts is difficult. Implementation target amounts and estimated amounts for emission reduction for the whole of Japan shall be decided as an expected standard for introduction and practice from the technological and economic viewpoint in order to achieve the target for each of greenhouse gases and other segments.

3.4 Promotion of Measures to Prevent Global Warming for Achievement of 6% Reduction Commitment

3.4.1 Comprehensive and systematic promotion of measures to prevent global warming

We are making enormous effort to conclude a “Bill for revising a part of the Law Concerning the Promotion of Measures to Cope with Global Warming” stipulating the establishment of a Kyoto Protocol target achievement plan, legal stipulation of the Global Warming Prevention Headquarters, and strengthening measures carried out by citizens. At the same time, we shall quickly establish a Kyoto Protocol Target Achievement Plan in accordance with the law based on

this Guideline, and promote comprehensive and systematic measures to achieve the 6% reduction commitment stipulated in the Kyoto Protocol. We shall also consider the opinions of the members at the Joint Meeting of Councils Relating to Domestic Measures to Arrest Global Warming Issue (held on August 22nd 1997 in line with the Prime Minister's decision) for the establishment of the Kyoto Protocol Target Achievement Plan.

We have just established this Guideline bearing in mind public comments and the deliberation results of the Relevant Advisory Councils. In order to establish the Kyoto Protocol Target Achievement Plan based on this Guideline, we shall listen to the various opinions from various sectors and layers of the public.

3.4.2 Promotion of a reduction in Carbon Dioxide Emissions focused on measures related to energy supply and demand

Approximately 90% of greenhouse gas emissions in Japan are generated from energy sources, such as from using oil, coal, and natural gas. Following the experience of the last two oil crises, energy conservation has progressed on the demand side thanks to various energy policies and efforts made at every level by the general public. In terms of the supply side, the ratios of nuclear power and natural gas-derived energy have steadily been increasing as substitutes for oil. As a result, energy consumption in relation to GDP and carbon dioxide emissions are generally lower than both Europe and America, and Japan has been one of the most noteworthy countries in terms of measures to prevent global warming and energy conservation.

On the other hand, energy is indispensable for public life and economic activity. Despite the tough economic situation we faced in the nineties, energy consumption has continued to increase. As a result, carbon dioxide emissions from energy sources in fiscal 2000 increased by around 10% (preliminary values) compared to fiscal 1990. In order to achieve the 6% reduction commitment stipulated in the Kyoto Protocol, Japan is trying to reduce carbon dioxide emissions from energy sources to the fiscal 1990 level by fiscal 2010.

＜Reduction in Carbon Dioxide Emissions from Energy Sources＞

In the Guideline of Measures to Prevent Global Warming (the old Guideline) of 1998, it has been estimated that carbon dioxide emissions from energy sources in fiscal 2010 will represent a 20% increase on fiscal 1990 levels if the measures mentioned in the old Guideline were not implemented. Since 1998, we have been actively promoting measures related to energy supply and demand based on the old Guideline, but even though the framework of the existing policies will be maintained, it is estimated that carbon dioxide emissions from energy sources in fiscal 2010 will be approximately 1,126 million tons of CO_2, which is approximately 73 million tons more than fiscal 1990 (about 1,053 million tons of CO_2). The reason on the demand side is

that energy demand mainly in the residential/commercial and transportation (passenger vehicle) sectors have increased significantly compared to fiscal 1990. The reason on the supply side is that the introduction of non-fossil energy such as nuclear power has not progressed as much as anticipated when the old Guideline was established, and use of coal – which relatively cheap – is expected to increase significantly.

Thus, Japan implements further energy conservation measures, new energy-related measures and other new measures such as fuel switching , as well as continuing to implement the measures stated in the old Guideline to reduce carbon dioxide emissions from energy sources in fiscal 2010 to the fiscal 1990 level. Japan also continues to promote its nuclear policy with giving priority to safety. Through such additional measures, the emission reduction amount for fiscal 2010 will be approximately 22 million tons of CO_2 through emission control measures at the demand side (energy conservation measure), approximately 34 million tons of CO_2 through new energy measures, and approximately 18 million tons of CO_2 through fuel switching. Estimated emissions for fiscal 2010 per sector when these measures will be implemented will be 462 million tons of CO_2 (-7%) from the industrial sector, 260 million tons of CO_2 from the residential and commercial sector (-2%), and 250 million tons of CO_2 from the transportation sector (+17%). (Percentages in parentheses show the reduction ratios from fiscal 1990 emissions per sector.) The reduction amount through each additional measure and emission reduction per sector are defined as the target for achieving the commitment stipulated in the Kyoto Protocol in this Guideline. Emission reduction target amount per sector shall be set up as achievable standards when expected effects are made through measures implemented by the energy supply side, such as promotion of nuclear power with giving priority to safety is ensured, introduction of new energy, and fuel switching, and also through measures implemented by each sector on the energy demand side, while our economy grows at its potential growth ratio.

Global warming issues are closely related to energy issues, and accordingly, Japan is going to further strengthen various measures for both energy supply and demand sides to achieve the 6% reduction commitment stipulated in the Kyoto Protocol while striving for contribution to both the environment and economy, and construct an environment-conscious energy supply and demand structure. Utilization of the Kyoto mechanisms for businesses is an effective way of ensuring a reduction in carbon dioxide emissions from energy sources. In terms of reducing carbon dioxide emissions at the energy supply and demand side, values are estimated as the effects of the measures concerned resulting from the effects of all supply and demand side measures included in this Guideline, rather than achieving this emission reduction only by implementing the relevant measures. From this viewpoint, it is appropriate to evaluate measures with a certain degree of flexibility from an overall viewpoint for the energy supply and demand structure while adopting the reduction and implementation target amounts.

＜Promotion of energy demand side measures to reduce Carbon Dioxide Emissions (energy conservation measure)＞

Striving for maximum energy conservation with minimum detriment to the national economy is one of the most effective ways of preventing global warming. There are various parties who need energy, so effective handling to reduce carbon dioxide emissions cannot be achieved without their own action, such as generation of ideas by each energy consumer. Based on the above, Japan implements energy demand side measures focused on independent action carried out by the industrial sector, promotion of technological development and implementation of energy conservation type equipment and systems in the residential and commercial sector, as well as preparation of the environment required for them. Through such actions, new economic growth can be expected through the development of advanced energy-saving equipment and investment in energy-saving facilities, while maintaining the current economic welfare standards for the general public's lifestyle, and aiming for contribution to both the environment and economy is considered possible.

Especially in the residential/commercial and transportation (passenger vehicle) sectors whose energy consumption has significantly increased compared to fiscal 1990 despite the economic depression in the nineties, minimizing increase in carbon dioxide emissions from these sectors is an urgent task.

Energy demand for the residential and commercial sector has steadily increased even after the oil crisis. Within this sector, in the residential sub-sector, the reasons for the increase in demand are the increased amount of equipment retained and modification of use duration and conditions in accordance with the popularization of new equipment and the demands of citizens that requests an ever more comfortable lifestyle. In terms of the commercial sub-sector, the main reason of its increase is greater floor space in office buildings and commercial facilities in line with changes in the industrial structure. Thus, Japan shall strengthen measures by increasing equipment efficiency, carrying out thorough energy management, and improving the energy-saving performance of housing and buildings in the residential and commercial sector.

In terms of the transportation sector, from fiscal 1990 to 1995, carbon dioxide emission increased significantly in line with energy consumption to 17% more than that in fiscal 1990. Since 1995, carbon dioxide emissions have been stable except emissions from passenger vehicles, which were 11% more in fiscal 1999 than those in fiscal 1995. Total carbon dioxide emissions from the transport sector in fiscal 1999 were 5.6% more than those in fiscal 1995. However, carbon dioxide emissions from the transportation sector are still higher than those in fiscal 1990, so the government shall continue to implement various measures, such as traffic measures, improving logistical efficiency and modal shift, and promoting increased use of public transport.

Through implementation of such demand side measures, in terms of the expected effect for fiscal 2010, about 50 million kiloliters reduction is expected through existing measures, with a

further 7 million kiloliters reduction through additional measures in crude oil equivalent. In terms of the reduction in carbon dioxide emissions, about 22 million tons of CO_2 is expected to be cut through such additional measures.

(1) Steady implementation of voluntary action plans and follow-up

The Keidanren Voluntary Action Plan on the Environment developed by the Japan Federation of Economic Organizations (Keidanren) was established by industry as subjective measures for global warming issues, action has been taken on that basis, and significant results have been achieved so far. The voluntary action plan is one of the core components of this Guideline with the aim of achieving contribution to both the environment and economy whereby optimal methods can be selected through the subjective and wide ranging participation of individual entities and the use of their own ideas, while flexible and quick action is possible in response to any change in status. In particular, the expected amount of energy savings through such voluntary action plans and so on account for about a third of the energy conservation measures stated in this Guideline, and it is a core plan for future energy conservation measures as well. The further establishment of volunteer action plans and their steady implementation is expected in both the residential and commercial sector and the transportation sector, which expect to see a continued and significant increase in energy consumption in the future. Japan is also trying to enhance follow-up measures for them.

[Current measures]

The Keidanren Voluntary Action Plan on the Environment was established in June 1997, with the expressed intent of reducing carbon dioxide emissions for 2010 to no more than those of 1990. Voluntary action plans have also been established by various other industries as well as the Keidanren Voluntary Action Plan on the Environment. We are checking the progress of the action plans that have already been established by industry for energy conservation and reduction of carbon dioxide emissions, and ensure their effectiveness through the Relevant Advisory Councils. We also encourage industries that have not established such action plans to quickly do so with numeric targets.

[Additional measures]

Keidanren is currently studying how to implement a third-party authentication and registration system. The government will provide the required support and promote its smooth implementation to engender transparency and reliability of the voluntary action plan that has been established by Keidanren and so on.

Furthermore, we will follow up the progress of the energy conservation measures through voluntary action plans based on the mid- and long-term plans and periodical reports submitted annually to the government in accordance with the Law Concerning the Rational Use of

Energy. In terms of the implementation of comprehensive checks per business type that began this fiscal year, we shall continuously try to increase the effectiveness of such voluntary measures while utilizing their advantages by carrying out priority checks with industries that have not established voluntary action plans and industries whose progress in terms of energy conservation measures lags behind the targets set in the voluntary action plan in the event that such action plans are established.

At the same time, we shall provide priority support for measures in accordance with the voluntary action plans and so on per company and industry for assistance systems to implement corporate energy conservation facilities.

(2) Comprehensive energy management

Appropriate management is important to promote energy conservation wherever energy is consumed. Thus, we strive for on-site energy management by promoting appropriate energy management at private residences and office buildings through the utilization of IT, as well as establishing a system for energy management at factories and business sites by focusing on measures based on the Law Concerning the Rational Use of Energy.

[Current measures]

① Measures for factories and business sites based on the Law Concerning the Rational Use of Energy

In terms of energy conservation for factories and business sites, we are implementing measures to establish energy management systems assuming implementation of voluntary measures by companies, such as the establishment of energy manager systems / energy management staff systems and energy conservation plans in factories and business sites that consume large amounts of energy, in line with the Law Concerning the Rational Use of Energy.

[Additional measures]

① Implementation of comprehensive factory checkups

Since fiscal 2001, we have been implementing a new comprehensive checkup scheme concerning the compliance status using standards based on the Law Concerning the Rational Use of Energy for factories that consume large amounts of energy. As a result, we have actuated measures based on the Law Concerning the Rational Use of Energy such as instructing the creation of a rationalization plan for factories that have not implemented sufficient measures for rationalization of energy use, with the threat of publication if they do not adhere to such instructions.

In terms of comprehensive checkups, we will try to increase the effectiveness of the voluntary action plan by following up on the progress status of the energy conservation measures stated

in the voluntary action plan based on the mid- and long-term plans and periodical reports submitted annually to the government in accordance with the Law Concerning the Rational Use of Energy, and intensify our comprehensive factory checkups for any businesses whose progress in terms of energy conservation measures significantly lags behind the targets stated in the voluntary action plan, or for businesses that have not established such voluntary action plans.

② Promotion of energy demand side management for commercial sector

In order to strengthen energy demand side management measures at large business sites with large energy consumption, we propose a revision of the Law Concerning the Rational Use of Energy, and are trying to establish a system that conforms to those energy management measures that have already been implemented for large-scale factories while bearing in mind actual commercial demand.

We also promote energy management by establishing support measures such as assistance systems for Building Energy Management System (BEMS) to enable smooth and appropriate energy management at commercial buildings through the utilization of the latest IT.

Furthermore, we are trying to create an environment that promotes the active use of Energy Service Company (ESCO) businesses that comprehensively promotes energy conservation for businesses as an agent for parties who established the facility.

③ Development and distribution of the Home Energy Management System (HEMS)

In order to manage energy at home smoothly and appropriately, we are trying to develop and popularize the Home Energy Management System (HEMS) that can increase public awareness of the cost of energy and provide optimal control of the major domestic appliances by displaying energy usage in cost terms and displaying the data visually in real-time through the utilization of IT.

(3) Further improving appliance efficiency

Measures to improve appliance efficiency are reliable ways to promote energy conservation with minimal adverse effects for countless consumers.

Based on the above, we are utilizing a labeling system and so on for vehicles, household electrical products and office appliances, etc., for which an energy conservation standard has been specified based on the Top Runner Approach as introduced in the Revised Law Concerning the Rational Use of Energy in 1998. Also, we continue to extend the range of targets for energy conservation standards based on the Top Runner Approach concept as well as trying to promote the introduction of products that have achieved the relevant standard on the market.

Furthermore, we support the smooth introduction of efficient water supply systems to the water supply field where improvements in terms of energy efficiency have not progressed sufficiently.

In terms of transportation equipment, improvement of energy efficiency of railways, ships, and aircraft, as well as motor vehicles should be pursued.

[Current measures]

① Introduction of Top Runner Approach in line with the Law Concerning the Rational Use of Energy

We have just adopted the 'Top Runner Approach' concept with the aim of raising the standards for maximum energy conservation performance or higher concerning fuel efficiency standards of motor vehicles and energy conservation standards for household electrical products and office appliances, etc., from among applicable commercial products through revision of the Law Concerning the Rational Use of Energy in 1998. The smooth introduction of products to the market that have achieved the relevant standards by accelerating the development and dissemination of such products, including the government's procurement of low-emission vehicles as official cars.

② Promoting the use of hybrid and natural gas vehicles

The government should promote the smooth introduction of hybrid vehicles and natural gas trucks and buses, which have high energy conservation performance, in to the market with supportive measures including subsidies and tax concessions, bearing in mind their cost differences.

③ Improving the energy efficiency of railways, ships, and aircraft

The introduction of trains, ships and aircraft with better energy efficiency characteristics.

[Additional measures]

① Expansion of appliances targeted for Top Runner standard application

Gas and oil consuming appliances, vending machines, and transformers that have not been targeted under regulations in the Law Concerning the Rational Use of Energy are to be targeted for energy conservation standards based on the concept of the Top Runner Approach.

② Accelerated introduction of vehicles that meet Top Runner standards

Based on the Top Runner Approach concept stipulated under the Law Concerning the Rational Use of Energy, the Top Runner standards on vehicles should be achieved precedently through industry's voluntary measures by reducing Automobile Acquisition Tax and the green automobile taxation for vehicles whose fuel efficiency standards are provided to be achieved by fiscal 2010.

③ Development and distribution of revolutionary domestic vessels (Super Eco-Ships)

The development and distribution of Super Eco-Ships should be promoted that are expected to reduce the impact on the environment through increased transport efficiency with the high efficiency propulsion system and improved ship shape.

④ Promoting the spread of high efficacy water heater

In order to promote energy conservation in the water supply field, where the energy demand ratio is large, within the residential and commercial sector, we are establishing support measures such as assistance systems for equipment with superior energy conservation performance compared to the existing system, i.e., carbon dioxide refrigerant heat pump water heater, and high efficiency water heater with latent heat exchanger.

⑤ Reduction of standby power consumption

We are trying to reduce the amount of electricity consumed while domestic electrical appliances and suchlike are on standby, which wastes electricity as they are not actually being used. In order to do so, we have created an environment in which the industries concerned can strive for reductions with major domestic electrical appliances through voluntary measures to achieve a target of 1W or less for equipment requiring energy consumption when on standby, such as for timer functions, or to reduce it as close to zero as possible in all other cases.

⑥ Promotion of the number of vehicular models of hybrid vehicles

Supportive measures should be conducted such as subsidies to introduce and popularize low emission vehicles such as hybrid vehicles.

⑦ Promoting the introduction of high performance industrial furnaces

As a result of field tests that were carried out after completion of technological development, considerable energy saving results were seen. We implement support measures such as assistance systems to introduce energy saving facilities to companies to promote the introduction of high performance industrial furnaces from which greater energy saving is expected.

(4) Increased energy conservation performance in housing and buildings

The energy conservation performance of housing and building has long had a large effect on energy consumption within the residential and commercial sector, so the implementation of reliable measures is required.
Thus, we publicize judgment criteria for construction parties in line with the Law Concerning the Rational Use of Energy, and implement reliable energy conservation measures through assistance, construction instruction, and providing information to consumers.
We also try to take the lead in implementing energy conservation measures in public housing and buildings.

[Current measures]

① Promoting the spread of housing and buildings with superior energy conservation performance

We are trying to promote the spread of housing and buildings with superior energy conservation performance by providing incentives such as through the Housing Loan Corporation, instruction in line with the Law Concerning the Rational Use of Energy, adoption of energy conservation-related performance display system, development of engineers, and the promotion of voluntary measures carried out by the industries concerned.

② Measures for public housing and buildings

We implement energy conservation measures for public housing and promote the establishment of environment-friendly government building facilities (Green Government Buildings).

[Additional measures]

① Strengthening incentives for housing

We try to provide incentives for environment-friendly housing by strengthening standards concerning energy conservation performance for the Housing Loan Corporation.

② Strengthening energy conservation measures for buildings

We propose a revision to the Law Concerning the Rational Use of Energy, and obligate the notification of energy conservation measures at the time of construction or expansion of office buildings and commercial facilities. We also try to promote green assessment and renovation of existing government building facilities.

(5) Vehicle traffic measure

Regarding measures on the road transportation, which are the mainstay in the transportation sector, it is important to give further environmental consideration on business vehicles, as well as developing and distributing low emission vehicles and highly fuel-efficient vehicles including clean energy vehicles aiming at improved efficiency as mentioned above.
Furthermore, measures to control traffic flow and manage traffic demand should be continued.
In order to facilitate smooth traffic flow, the trunk route network should be extended by developing circular roads and preparing crossings and flyovers.

[Current measures]

Measures should be implemented to promote alternatives to transportation by utilizing information communications techniques such as tele-working while existing measures such as management of vehicular traffic demand, promotion of the Intelligent Transport Systems (ITS), implementation of measures to prevent illegal parking, reduction of engineering work on roads, and the establishment of traffic safety facilities are to be implemented.

[Additional measures]

Great emphasis should be put on business vehicles' driving style with regard to the environment by promoting eco-driving through distribution of idling prevention systems on buses and trucks, and controlling the maximum speed of large trucks by obliging the installation of speed limiting device.

Measures for environment-friendly traffic management should be conducted such as utilization of results of Traffic Demand Management (TDM) proof tests, and developing a comprehensive urban traffic management project that controls traffic signals and provides information based on environmental data, In addition, further studies on traffic regulations and around crossings.

(6) Construction of a traffic system with minimal environmental impact

In the transportation sector, it is necessary to implement measures to ensure a transportation system with little carbon dioxide emissions and low environmental impact for passenger and freight transportation, in addition to measures on road transportation.
To this end, it is important to implement deliberate and steady measures to shift transportation modes towards alternative ones with better energy consumption and improved efficiency of freight transportation.
A shift from private passenger vehicles to public transportation or passenger transportation should be continued through development of public transportation and improvements in their services and convenience.

[Current measures]

Measures to promote domestic sea freight transportation by ship and rail and to improve efficiency of freight transportation should be conducted to curb emissions of carbon dioxide.

Promotion of the use of public transportation should be carried out by constructing new railways and modified personal rapid transit system in urban areas, and improving existing services and convenience.

[Additional measures]

Transportation modes should be shifted towards marine transport and the competitiveness of domestic sea transport should be strengthened by introducing new technologies, such as the development of Super Eco-Ships that increased energy consumption efficiency, reviewing regulations, and developing a marine highway network. At the same time, a modal shift to rail transport should be promoted by improving the convenience of railways such as by increasing their capacity. Furthermore, measures to further improve logistical efficiency should be strengthened by reviewing regulations, improving convenience, and developing transportation structure such as a multipurpose international.

Measures to promote the use of public transportation services should be strengthened as well.

(7) Development and diffusion of new energy-saving technologies

It is important to continuously promote the development and distribution of new energy-saving technologies, as significant improvements in energy efficiency are highly likely through such breakthroughs. Thus, we promote the introduction of highly efficient boilers and lasers whose effects are expected by 2010, and highly efficient lighting using light emitting diodes at this stage. In the transportation sector, the development and distribution of next generation low-emission vehicles including clean energy vehicles as well as next-generation energy-saving transportation.

Table 3.1 Demand Side Measures for the Industrial Sector

Current measures and their reduction amounts	Additional measures and their reduction amounts	Measures of the government and so on; (Current○, Additional◎)
○Steady implementation and follow-up of the voluntary action plan (Target of the Keidanren Voluntary Action Plan on the Environment is to reduce CO_2 emissions for 2010 to no more than 1990 levels.) ○Factory measures based on the Law Concerning the Rational Use of Energy <Target amount> Energy conservation effects: Approx. 20.1 million kl Approx. 60.5 million t-CO_2		○ Since fiscal 2001, a new comprehensive check scheme has been implemented to assess standard compliance based on the Law Concerning the Rational Use of Energy. Legal action will be initiated based on the Law Concerning the Rational Use of Energy as required. The government also follows up the progress of the energy conservation measures through the voluntary action plan based on reports submitted to the government in accordance with the Law Concerning the Rational Use of Energy, and implements priority checks based on the same law for industries that have not established voluntary action plans or whose progress towards such energy conservation measures lags far behind the target.
	○Promoting the introduction of high performance industrial furnaces <Target amount> Energy conservation effects: Approx. 400,000 kl Approx. 1.1 million t-CO_2	◎Extensive support is provided for such measures in line with the voluntary action plans and so on of companies and industries with regard to assistance systems for companies to introduce energy saving facilities.
	○ Technological development and diffusion of its results ・Highly efficient boilers ・Highly efficient lasers <Target amount> Energy conservation effects: Approx. 500,000 kl Approx. 1.5 million t-CO_2	◎ Until fiscal 2001, support has been provided for the technological development of highly efficient lasers and so on.

・Additional measures refer to extra measures established as of this Guideline review, or measures whose details have been completely reviewed and strengthened, while current measures cover all other existing measures.

・Reduction amount indicates approximate estimated amount contributing to CO_2 emissions as of 2010 when the relevant measures are implemented.

・The unit of Energy conservation effects, "kl" means kiloliter of crude oil equivalent.

・The same definitions apply for descriptions in all tables below.

Table 3.2 Demand Side Measures for the Residential and Commercial Sector

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; (Current○, Additional◎)
●Measures to improve efficiency of equipment		
○Strengthening to improve efficiency of equipment ＜Target amount＞ Energy conservation effects: Approx. 5.4 million kl (Assumed to achieve standard value of all targeted manufacturers as of the target year per equipment) ■Air conditioners ・Target year 2007 refrigeration year (partially 2004 refrigeration year) ・Energy conservation effects*: Approx. 63% (for both coolers and heaters) ・Energy conservation effects*: Approx. 14% (only coolers) ■TVs ・Target year: Fiscal 2003 ・Energy conservation effects: Approx. 16% ■VTRs ・Target year: Fiscal 2003 ・Energy conservation effect*s: Approx. 59% ■Fluorescent lights ・Target year: Fiscal 2005 ・Energy conservation effects*: Approx. 17% ■Copiers ・Target year: Fiscal 2006 ・Energy conservation effects*: Approx. 30% ■Computers ・Target year: Fiscal 2005 ・Energy conservation effects*: Approx. 83% ■Hard disc drive ・Target year: Fiscal 2005 ・Energy conservation effects*: Approx. 78% ■Refrigerators/freezers ・Target year: Fiscal 2004 ・Energy conservation effects*: Approx. 30% (* About 20% more energy conservation effects overall are anticipated by adopting	○Expansion of equipment to which Top Runner Approach applies <Target amount> Energy conservation effects: Approx. 1.2 million kl Approx. 2.9 million t-CO_2 ○Promotion of distribution of high efficiency water heater <Target amount> Energy conservation effects: Approx. 500,000 kl (Expected to distribute about 4 million units by fiscal 2010) Approx. 1.1 million t-CO_2 ○Reduction of standby power consumption <Target amount> Energy conservation effects: Approx. 400,000 kl Approx. 1.1 million t-CO_2	○Through revision of the Law Concerning the Rational Use of Energy in 1998, the Top Runner Approach has been adopted for domestic electric appliances and OA equipment (i.e. air conditioners, TVs, VTRs, fluorescent lights, copiers, computers, hard disc drive, refrigerators, freezers). ◎ Gas/oil equipment, and commercial equipment, etc. that were not previously targeted are added based on the Top Runner Approach. ◎Assistance system to promote its spread has been established. ◎A system enabling consumers to identify products with minimal electricity consumption during standby will be established in the near future.

the top-runner approach compared to the original estimates set up under the old Guideline) Approx. 30.4 million t-CO_2	○ Technological development and result distribution • High efficiency lighting <Target amount> Energy conservation effects: Approx. 500,000 kl Approx. 1.8 million t-CO_2	◎ Support is provided for technological development of highly efficient lighting, etc.
●Increasing energy conservation efficiency for housing and buildings		
○Increasing energy conservation efficiency for housing and buildings <Target amount> Energy conservation effects: Approx. 8.6 million kl ■New housing ・Target year: Fiscal 2008 : 50% achieve current standards ■New buildings (non- residence, 2,000m^2 or more) ・Target year: Fiscal 2006 : 80% achieve current standards Approx. 35.6 million t-CO_2		[Increasing energy conservation efficiency for housing] ○ Under the Law Concerning the Rational Use of Energy, responsibility for such efforts lies with the parties requesting construction. "Design and Construction Guidelines on the Rationalization of Energy Use for Houses" have been drawn up and published as detailed specifications and standards to assist parties requesting construction to make decisions (revised and strengthened in March 1999). ◎ Strengthening standards for energy saving housing by providing incentives through financing by the Housing Loan Corporation ○Implementing energy conservation measures in public housing and assistance for housing in towns that comply with energy conservation standards ○ Promoting the distribution of systems showing clear housing efficiencies including energy conservation efficiency (Housing Performance Indication System) [Increasing energy conservation efficiency for buildings (non-residential)] ○ Responsibility for efforts on parties requesting construction based on the Law Concerning the Rational Use of Energy. Decision standards for parties requesting construction are drawn up and published. (Revised and strengthened in March 1999) ◎ Responsibility for notifying energy conservation measures when

		building special new buildings and their refurbishment or addition (Revision of the Law Concerning the Rational Use of Energy) ○ Providing incentives through financing and tax system of the Development Bank of Japan ○ Promoting the establishment of environment-friendly government building facilities (Green Government Buildings) ◎ Endeavors to promote green assessment and renovation of existing government building facilities [Improving energy conservation efficiency for both housing and buildings] ○ Development of engineers to handle design and construction through training courses ○Promotion of voluntary measures for the relevant industries involved in housing and buildings
●Strengthening energy demand side management		
	○Promoting distribution of the Home Energy Management System (HEMS) <Target amount> Energy conservation effects: Approx. 900,000kl (Expected distribution to about 30% of total households by fiscal 2010) Approx. 2.9 million t-CO_2 ○Promotion of energy demand side management for commercial sector <Target amount> [BEMS] Energy conservation effects: Approx. 1.6 million kl (Expected distribution to about 30% of total commercial floor space by fiscal 2010) Approx. 7.7 million t-CO_2	◎ Implementation of support for field tests ◎Energy management system that applies to large-scale factories is adopted for large-scale office buildings through revision of the Law Concerning the Rational Use of Energy. ◎Assistance system for promoting distribution of the Building Energy Management System (BEMS) is established. ◎ Support measures such as assistance systems and low interest loan systems will be established for further utilization of Energy Service Company (ESCO).

Table3.3 Demand-side Measures in the Transportation Sector

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; (Current○, Additional◎)
■Measures on road transportation		
●Development/ dissemination of low emission vehicles including clean energy vehicles and highly fuel efficient vehicles, and environmental considerations of the driving style of business vehicles		
・Development and distribution of low emission vehicles including clean energy vehicles and highly fuel efficient vehicles		
○Strengthening measures to improve motor vehicle fuel efficiency (Estimated emission reduction) Approx. 13.9 million t-CO_2 <Target amount> Energy conservation effects: Approx. 5.4 million kl (Expect to achieve standard values for all targeted manufacturers by the target year per gasoline vehicle and diesel vehicle)) ■Passenger vehicle (gasoline) ・Target year: Fiscal 2010 ・Energy conservation effects*: Approx. 23% ■Passenger vehicle (diesel) ・Target year: Fiscal 2005 ・Energy conservation effects*: Approx. 15% ■Freight vehicle (gasoline) ・Target year: Fiscal 2010 ・Energy conservation effects*: Approx. 13% ■Freight vehicle (diesel) ・Target year: Fiscal 2005 ・Energy conservation effects*: Approx. 7% (* Overall energy conservation of about 20% is anticipated by adopting the Top Runner Approach compared to the original estimates set up in the old Guideline) ○ Promoting dissemination of clean energy vehicles (Estimated emission reduction) Approx. 2.2 million t-CO_2 <Target amount> Energy conservation effects: Approx. 800,000 kl	○Rapid introduction of vehicles that meet Top Runner Approach, the green automobile taxation and automobile acquisition tax reduction, and accelerating the development and distribution of low emission vehicles through the procurement of low emission official vehicles by the government. (Estimated emission reduction) Approx. 2.6 million t-CO_2 <Target amount> Energy conservation effects: Approx. 1.0 million kl (Note) In the case that the Guideline is, the measures shall be revised so that the latest progress, such as the green automobile taxation established in April 2001 and reducing automobile acquisition tax, and the procurement of low emission official vehicles by the government is well reflected.	○Following revision of the Law Concerning the Rational Use of Energy in 1998, the Top Runner Approach has been applied to motor vehicles. ◎Introduction of green automobile taxation ◎ Extension of reduction of automobile acquisition tax ◎Establishment of fuel measuring methods to consider fuel efficiency standards of freight vehicles 2.5t or more of GVW ◎Promotion of measures to replace general low emission official vehicles within about three years following fiscal 2002 ◎ Promotion of technological development and practical proof testing for the earliest possible use of fuel-cell vehicles ◎Promoting development of next generation low emission vehicles (including clean energy vehicles) ◎Development of an IT network to promote widespread the distribution of low emission vehicles, including clean energy vehicles ◎Provision of assistance for low emission vehicles, including clean energy vehicles ○ Support for practical use of electric vehicle joint-use system ◎ Promotion of assistance to establish an enhanced fuel supply infrastructure (eco stations) ◎Measures on motor vehicle fuel quality to ensure sufficient functioning of the emission post-processing system (Reduction of sulfur content from 500 ppm to 50 ppm by the end of 2004 for diesel fuel. Further improvements such as reducing sulfur from gasoline should be pursued.)

・Environmental consideration of the driving style of business vehicles		
	○ Review and promotion of existing measures to promote eco drive of buses and trucks, etc. ○ Promotion of measures to reduce impact on the environment through consideration of driving style of business vehicles, etc. ・ Distribution of vehicles featuring idling prevention systems (Estimated emission reduction) Approx. 1.1 million t-CO_2 <Target amount> Energy conservation effects: Approx. 400,000 kl (Expected installation on about 30% of replaced buses and trucks) ・Installation of speed limiting device on large trucks (Estimated emission reduction) Approx. 800,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 300,000 kl	◎Promotion of green management by motor vehicle transportation companies from fiscal 2002 ◎ Mandatory installation of speed limiting device on large trucks (Production vehicles: September 2003 onward; Vehicles in use: Step by step from September 2003 onward)
●Measures on the traffic flow		
○ Car traffic demand management (Estimated emission reduction) Approx. 700,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 200,000 kl ○ Promotion of Intelligent Transport Systems (ITS) (Estimated emission reduction) Approx. 3.7 million t-CO_2 <Target amount> Energy conservation effects: Approx. 1.4 million kl	○Review and steady promotion of existing measures	○ Promotion of Traffic Demand Management (TDM) ◎ Utilization of Traffic Demand Management (TDM) proof tests established in fiscal 2001 to establish comprehensive plans for smooth urban transportation ○Promoting the preparation of a bicycle-friendly environment by improving cycle routes and parking areas. ○Implementation of social tests to contribute to promoting the use of bicycles ○ Preparing the Electric Toll Collection (ETC) System, and improving services by increasing the number of toll gates to 900 nationwide by the end of fiscal 2002. ○ Improving traffic information collection services through preparation of infrared beacons, etc. ○ Promotion of VICS (Vehicle Information and Communications

		System) (Service to be launched nationwide within fiscal 2002) ○Improving the central processing system and traffic control center system by introducing a new signal controlling system (MODERATO) ○ Promotion of the Environment Protection Management Systems (EPMS), and suchlike ○ Preparation of the Mobile Operation Control System (MOCS) for business vehicles ◎ Promotion of environment-friendly traffic management project ◎Development and standardization of Internet ITS and probe information system ○Development of a safety support system and comfortable driving by providing information and warnings to drivers ○ Positively promoting the introduction and distribution of ETC-enabled vehicles and triple-media VICS-enabled vehicles based on the Green Purchasing Law by the government, etc. ○Centralized signal control <Preparation of about 40,000 signals is expected between 1995 and 2010>
	○ Promotion of road traffic information provision business	◎ Promoting the provision of accurate and appropriate road traffic information by road traffic data providers through revision of the Road traffic law in 2001 ◎ Appropriate operation of the traffic information verification system ◎Promoting the preparation of a database on traffic regulation information
○Measures to prevent illegal parking and stopping on roads		○ Implementation of appropriate car parking regulations ○ Establishment of a system to minimize illegal car parking and a car parking indication system, etc. ○ Promoting patrols to counter illegal car park

○ Reduction in amount of engineering work on roads (Estimated emission reduction) Approx. 400,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 100,000 kl ○ Preparation of traffic safety facilities (Estimated emission reduction) Approx. 700,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 200,000 kl ○ Promotion of commuting alternatives using data communications such as tele-working (Estimated emission reduction) Approx. 3.4 million t-CO2 <Target amount> Energy conservation effects: Approx. 1.3 million kl (assuming that the number of tele-workers in 2010 represent about a quarter of all workers (16.3 million people))		○ Improvement of public drains, promotion of intensive engineering work and joint implementation, appropriate operation of road use permission ○Establishment, systemization, and improvement in signal induction <Increasing efficiency of about 20,000 signals is expected between 1995 and 2010> ○ Increasing efficiency of traffic control ○ Promoting measures to counter bottlenecks by preparing traffic indications and rail crossing signals ○Promoting the change of signal lights to LEDs ○ Improving data communication environment in companies, tax-related measures and financial support to contribute to introducing teleworking and support for SOHO. ◎ Providing information and diffusion promotion to promote teleworking and SOHO.
■Establishment of a transportation system with minimum impact on the environment		
●Modal shift and improving freight efficiency		
○Promotion of domestic sea freight and rail freight (Estimated emission reduction) Approx. 1.5 million t-CO_2 <Target amount> Energy conservation effects: Approx. 500,000 kl	○Review and steady promotion of current measures. ○ Studying institutional arrangements to promote a distribution system with reduced impacts on the environment	◎ Studying institutional arrangements including legislation to support improved efficiency of trunk line distribution ◎Promotion of Traffic Demand Management (TDM) proof tests contributing to improved efficiency of urban freight services ◎Conducting proof tests to reduce environmental impact of trunk line from fiscal 2002

		◎ Submission of proposal to the ordinary session of the Diet in 2002 to revise the law on freight transportation business to relax regulations on participation and pricing
	○Promotion of modal shift to shipping by reviewing regulations, strengthening competitiveness through introduction of new technologies, and improving transport efficiency (Estimated emission reduction) Approx. 2.6 million t-CO_2 <Target amount> Energy conservation effects: Approx. 1.0 million kl (assuming an increase in the share of domestic shipping to 44%)	◎Increasing the share of domestic shipping to 44% or more by strengthening its competitiveness by: ・Developing a plan for next-generation domestic shipping by the end of fiscal 2001 ・Reviewing regulations, such as relaxing regulations on participation ・Reviewing social regulations such as those on crew rotation ・Completing proof testing of Super Eco-Ships by fiscal 2005, aiming at practical use from fiscal 2006 ◎ Development of a marine highway network by establishing domestic trade terminals required for consistent integrated transport, non-stop coastal shipping service to reduce coastal shipping operations ・Completion of the Tokyo Bay passage preparation project by 2007 ・Strengthening shipping control and support functions based on the Vessel Traffic Advisory Service Center utilizing Automatic Identification System (AIS) in the Tokyo Bay by fiscal 2006
	○Increased rail convenience by strengthening transport capacity (Estimated emission reduction) Approx. 300,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 100,000 kl (assuming an increase in rail container traffic of 3.6%)	○ Increasing rail freight transportation capacity ◎ Submitting a proposal to the ordinary session of the Diet in 2002 to revise the Law for Railway Business Enterprise to relax fare and participation regulations ◎ Preparation of a cold chain system of foods by rail

○ Improving efficiency of freight services (Estimated emission reduction) Approx. 4.7 million t-CO_2 <Target amount> Energy conservation effects: Approx. 1.8 million kl	○ Reviewingcurrent measures and effects and promoting measures as follows. ・ Improving efficiency of transportation by truck (Estimated emission reduction) Approx. 2.9 million t-CO_2 <Target amount> Energy conservation effects: Approx. 1.1 million kl (assuming an increase in the ownership of trailers by about 15,000, and the ownership of 25-ton category vehicles by about 70,000 from fiscal 1996 and 2010) ・ Reduction in overland transportation of international freight (Estimated emission reduction) Approx. 1.8 million t-CO_2 <Target amount> Energy conservation effects: Approx. 700,000 kl (assuming a reduction in overland transportation by about 9,300 million ton-km	◎ Submitting proposal to the ordinary session of the Diet in 2002 to revise the law for freight vehicle transportation business to activate freight services through deregulation ○ Promoting the use of large vehicles and trailers ○Strengthening bridges in line with the increase in the vehicle size ○ Development of international marine container terminals in main and core international harbors ◎ Development of multipurpose international terminals ◎ Preparation of joint delivery facilities of fresh foods, etc. ○ Establishing, upgrading, and central control of signals
●Promoting use of public transportation		
○ Promoting use of public transportation (Estimated emission reduction amount) Approx. 5.2 million t-CO_2 <Target amount> Energy conservation effects: Approx. 2 million kl (assuming a reduction in passenger vehicle about 80 million vehicles-km)	○Review and steady promotion of current measures ○ Steady promotion of new railways and modified personal rapid transit system preparation in urban areas ○Promoting the use of public transport by further improving services and convenience	○Promoting the establishment of new railways in urban areas (new services of about 310km are planned to start between 1995 and 2010) ○Promoting the preparation of the modified personal rapid transit system such as new traffic system in urban area (new services of about 100km planned to start between 1995 and 2010) ○ Construction of Authorized Shinkansen lines ○ Promoting the use of public transport by improving services and convenience such as introduction of IC cards and improvements in connections ◎ Utilization of Traffic Demand Management (TDM) proof text established in fiscal 2001 to develop comprehensive plans for smooth urban transportation ◎ Promoting the use of public transportation through national campaigns ○Development of traffic junctions such as squares in front of stations

		○ Implementation of social experiments that contribute to the promotion of public transportation ○ Promoting the preparation of Public Transportation Priority Systems (PTPS) by establishing dedicated/priority bus lanes, and priority bus signal controls
●Increasing energy consumption efficiency for other transport ＊Except effects through “improvements in shipping energy consumption efficiency”		
○ Increasing energy consumption efficiency of railway transportation (Estimated emission reduction) Approx. 400,000 t-CO_2 <Target amount> Energy conservation effects: Approx. 100,000 kl (assuming improved energy consumption of around 7%) ○ Increasing aeronautical energy consumption efficiency (Estimated emission reduction) Approx. 1.1 million t-CO_2 <Target amount> Energy conservation effects: Approx. 400,000 kl (assuming improved energy consumption of around 7%)	○Promoting the development of new technologies	○ Promoting the introduction of new rail carriages and aircraft materials ・ Measures carried out by companies to introduce energy-saving carriages and aircraft materials ・Updating carriages and aircraft materials through supportive measures to introduce new carriages and aircraft materials ◎ Supporting the development of new technologies such as Super Eco-Ships ◎ Research and development of new-generation energy-saving transportation

〈Promotion of energy supply side Carbon Dioxide Emission reduction〉

Our energy supply has been diversified by increasing the ratio derived from nuclear power and natural gas under the oil alternative energy policy following the experience of the last two oil crises. On the other hand, dependence on cheap coal fuel has increased following recent deregulation in the energy sector and the request for further efficiency increases, and it cannot be denied that this has been one of the causes behind the increased carbon dioxide emissions.
Under the circumstances in which carbon dioxide emissions from energy sources account for about 90% of total emissions, promoting the further introduction of non-fossil energy such as nuclear power and new energies will be required to ensure a steady supply and harmony with global warming countermeasures. We continue to promote a shift in fuels between fossil energies that represent the core of our energy supply, and will strive to establish an energy supply structure in harmony with the environment while still satisfying demand for improved efficiency.

(1) New energy measures

The adoption of new energy sources is one way to maintain steady supplies, and also enables rationalization of fossil energy use while reducing the environmental impact and minimizing additional carbon dioxide emissions from energy generating process. As a result, it contributes to ways to prevent global warming by reducing carbon dioxide emissions, so it needs to be introduced positively.
Currently, the ratio of new energy on the supply side out of the total primary energy supply is less than 2%. If we consider the possibility of future technological progress and expectations of an improved economical efficiency, we must adopt new energy enthusiastically to play a major role as energy sources in Japan for the long term. New energy sources will also contribute significantly to creating labor opportunities and stimulating the economy through creation of new markets and development of new technologies.
We will actively promote the following policies concerning new energy measures.

1) Support at the introduction stage
2) Support at the stages of technological development and demonstration
3) Preparation of environment and awareness campaign, etc.
4) Introduction of measures to expand new markets for the electricity sector (proposing the establishment of the Bill Concerning the Use of New Energy by Electric Utilities)

As the usage formats for new energy are dispersed-types, measures must be implemented while considering important actions carried out by local authorities and businesses such as introducing wind power generation, waste power generation, and biomass energy, etc. while actions in terms of housing carried out by individuals are important in such as introducing photovoltaic power generation and solar thermal utilization.

As waste power generation effectively uses surplus energy from the waste that must be burned, it shall be promoted while keeping consistency with the philosophy of the "The Basic Law for Establishing a Recycling-Based Society" and the "National targets in waste management policy" stated in the "Waste Management and Public Cleansing Law".
By actively implementing these measures, we shall try to produce 19.1 million kl worth of new energy by fiscal 2010 as a new energy on the supply side measure. Through this, we expect a reduction of approximately 34 million tons of CO_2 through additional measures. In terms of new energy on the demand side measures, by fiscal 2010, the introduction of new energy with 3.48 million clean-energy vehicles, 4.64 million kW natural gas co-generation systems, and 2.2 million kW fuel cells* is expected.

*) These energy conservation effects are handled on the energy demand side.

(Current measures)

① Support at the introduction stage
- Promotion of introduction support for local authorities and businesses, etc.
- Promotion of introduction support for photovoltaic power generation, etc.
- Support with regard to taxation or financing

② Support at the stages of technological development and demonstration
- Promotion of technological developments and demonstration tests for fuel cells and photovoltaic power generation

③ Preparation of environment and awareness campaign, etc.
- Preparation of regulations and systems
- Promotion of awareness campaign, etc.

(Additional measures)

① Support at the introduction stage
- Placement biomass energy and snow ice cryogenic energy in the Law Concerning Promotion of the Use of New Energy
- Promotion of introduction support for local authorities and companies, etc.
- Promotion of introduction support for photovoltaic power generation, and solar thermal utilization, etc.
- Promotion of green purchases and procurement

② Support at the stages of technological development and demonstration
- Strengthening the support for technological developments and demonstration tests, etc. concerning fuel cells, photovoltaic power generation, and biomass energy, etc.

③ Preparation of environment and awareness campaign, etc.
- Studying grid-connection system measures
- Strengthening awareness campaign, etc.

④ Measure to expand new markets in the electricity sector

・Proposal to establish the Bill Concerning the Use of New Energy by Electric Utilities

Table 3.4 New Energy Measures

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; (Current○, Additional◎)
○ Current new energy measures New energy measure completed in 1998 aimed at introducing 19.1 million kl worth of new energy by fiscal 2010 <estimated introduction amount in fiscal 2010: 8.78 million kl>		【Support at introduction stage】 ○ Promotion of introduction support for local authorities and businesses, etc. ○ Promotion of introduction support for photovoltaic power generation, etc. ○Support with regard to taxation or financing 【 Support at the stages of technological development and demonstration】 ○ Promotion of technological developments and demonstration tests for fuel cells and photovoltaic power generation 【Preparation of environment and awareness campaign, etc.】 ○ Preparation of regulations and systems ○ Promotion of awareness campaign, etc.
	○ Additional new energy measures Additional new energy measure completed in 2001 aimed at introducing 19.1 million kl worth of new energy by fiscal 2010 (Estimated emission reduction) Approx. 34 million t-CO_2 [targeted introduction amount in fiscal 2010: 19.1 million kl] (Breakdown is as follows.) Photovoltaic power generation: 4.82 million kW (including photovoltaic power generation for housing: estimated approx. 1 million units) Wind power generation: 3 million kW Waste power generation: 4.17 million kW Biomass power generation: 330,000 kW Solar thermal utilization:	【Support at the introduction stage】 ◎ Placement biomass energy and snow ice cryogenic energy in the Law Concerning Promotion of the Use of New Energy ◎ Promotion of introduction support for local authorities and companies, etc. ◎ Promotion of introduction support for photovoltaic power generation, and solar thermal utilization, etc. ◎Promotion of green purchases and procurement 【 Support at the stages of technological development and demonstration】 ◎ Strengthening the support for technological developments and demonstration tests, etc. concerning fuel cells, photovoltaic power generation, and biomass energy, etc. ◎ Promotion of technological development and so on bearing in mind regional characteristics

	4.39 million kl (including solar thermal utilization for housing: Estimated approx. 9 million units) Unutilized energy: 580,000 kl Thermal utilization of waste: 140,000 kl Thermal utilization of biomass: 670,000 kl Black liquor, refused wood, etc.: 4.94 million kl	【Preparation of environment and awareness campaign, etc.】 ◎ Studying grid-connection system measures ◎Promoting the establishment of a software infrastructure for practical use of fuel cells ◎ Strengthening awareness campaign, etc. 【Measures to expand new markets in the electricity sector】 ◎ Proposal to establish the Bill Concerning the Use of New Energy by Electric Utilities

(2) Fuel switching, etc.

Currently, it is estimated that fossil fuels which account for about 83% of the total primary energy supply will continue to be the main energy supply in 2010 and later. Thus, converting the fossil fuel supply structure to a more environmentally friendly type with minimum carbon dioxide emissions while maintaining a steady supply is a very important issue from the viewpoint of handling global warming issues over the long term as well. Even with the implementation of the above energy conservation and new energy measures through fiscal 2010, a further reduction of approximately 18 million tons of carbon dioxide emissions from energy sources is required to bring back to the same level as fiscal 1990.

Thus, the implementation of fuel switching is required with a focus on the power generation field, in which increased use of such fuel as coal is expected. Specifically, we are promoting the conversion of industrial coal-fired boilers to natural gas as well as promoting the conversion of the now old coal-fired power generations that have long been used to highly efficient natural gas combined cycle power generation. We also promote improvements in the pipeline infrastructure through a low-interest financing system, and seek to expand the introduction of natural gas. Through the comprehensive implementation of the above measures, a reduction of approximately 18 million tons of CO_2 emissions is expected.

We continue to promote measures of load-leveling in power demand to reduce carbon dioxide emissions by promoting the distribution of heat storage systems.

(Additional measures)

① Support of promoting Fuel switching

・Subsidies to offset the costs of converting old coal-fired thermal power generations to natural gas, and for converting facilities that consume large amounts of energy to natural gas

② Environment preparation

・Preparation of safety standards for natural gas pipelines

・Low interest financing for domestic natural gas development projects (developing wells and linked pipelines, etc.)

Table 3.5 Fuel switching, etc.

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; (Current○, Additional◎)
	○ Additional measures for fuel switching, etc. such as electricity (Estimated emission reduction) Approx. 18 million t-CO_2	◎ Subsidization towards part of the cost of converting old coal fired power generations to natural gas power generations ◎ Subsidization towards part of the cost of fuel switching such as industrial boilers expected to downsize or cut CO_2 emissions ◎ Preparation of safety standards for natural gas pipelines ○ Low interest financing for domestic natural gas development projects (developing wells and linked pipelines, etc.)

(3) Promotion of nuclear power

Nuclear power generation which was introduced with the intention of assuring a steady energy supply in Japan does not emit carbon dioxide during the power generation process, so can be considered an important source of electricity in view of measures against global warming perspective as well. The effective reduction in carbon dioxide emissions per 1.35 million kW class nuclear power plant as an alternative to coal-derived power is significant and equivalent to about 0.7% of the total carbon dioxide emissions from energy sources in fiscal 1990. In order to achieve our reduction target while satisfying the ever-increasing demand for energy, the establishment of new nuclear power plants is indispensable. Thus, promoting nuclear power generation with giving priority to safety has been defined as an important issue from a standpoint for measures against global warming as well as from the energy policy perspective, and thus the construction of new nuclear power plants is required with the aim of increasing nuclear-generated electricity by around 30% by fiscal 2010 compared to fiscal 2000.

In order to promote nuclear use, measures must be taken to secure nationwide agreement, including in places where electricity is consumed as well as in the vicinity of nuclear facilities with giving priority to safety. Also, an environment needs to be prepared to promote the

provision of education to enable each citizen to deepen their understanding, consider by themselves, and can decide of energy issues, including the use of nuclear power. Various regional promotion activities concerning the siting of nuclear power plants and the like have been e taken in accordance with the “Three Electric Power-Source Siting Laws” and “Law on Special Measures concerning Promotion of the Development of Nuclear Power Site Regions” with full consideration for disaster prevention factors. We continue to push for steady and further promotion of these activities, and implement cooperative measures by the central government with cooperation from the various government offices concerned in order to promote the siting of nuclear facilities.

We also steadily promote nuclear fuel cycle, including research and development in Japan to ensure the continued long-term operational reliability of nuclear power plants, as well as to make effective use of our limited uranium resources. Furthermore, we continue to work for the siting of final disposal facilities for high-level radioactive waste, which is an important issue in terms of nuclear power generation.

(Current measures)

① Implementing measures to gain nationwide agreement including in electricity consumption areas as well as in the vicinity of nuclear facilities with giving priority to safety

② Steady promotion of measures in accordance with the “Three Electric Power-Source Siting Laws” and “Law on Special Measures concerning Promotion of the Development of Nuclear PowerSite Regions”

③ Measures to establish nuclear fuel cycle in Japan such as research and development of nuclear fuel cycles, appropriate technological transfer of their results, and steady promotion of the MOX utilization in LWRs.

(Additional measures)

① Promotion of the Power Sited Regions Promotion Measures related to location of nuclear fuel cycle facilities (addition of MOX fuel fabrication facilities and final disposal facilities for high-level radioactive waste and the like as facilities subject to grant initial measure subsidies such as locating power plants)

② Drastic strengthening of “public hearings and PR activities” to acquire nationwide agreement concerning the nuclear power policy

③ Creation of environment to promote education related to energy and nuclear power

Matrix Table (Refer to the attachment)

3.4.3 Promoting measures for reducing emissions of Carbon Dioxide from non-energy sources , Methane, and Nitrous Oxide

As measures for limitation of carbon dioxide emission from non-energy sources, reduction of waste incineration volume by promoting reducing, reusing and recycling waste, and effective use of recyclable wood that can limit the amount of fossil fuels used as raw materials or as a biomass energy source. As a means of reducing methane (CH_4) emissions, we have been conducting technological studies concerning reduction in direct landfill disposal of waste, improvement of farmland management, and livestock management. We have also been promoting the reduction of nitrous oxide (N_2O) emissions during the industrial process, and increasing incineration temperatures at incineration plants for municipal solid waste and wastewater sludge.

Carbon dioxide emitted in industrial processes through the processing of limestone, production of ammonia, and so on for fiscal 1999 (54 million tons of CO_2) was reduced by 12.8% compared to the emissions in fiscal 1990. The primary reason is a 12.4% reduction in cement production for fiscal 1999 compared to fiscal 1990. Carbon dioxide emissions through incineration of waste originating from fossil fuels (waste oil and waste plastics, etc.) only accounts for about 2% of total carbon dioxide emissions, but a comparison of fiscal 1999 emissions (23 million tons of CO_2) against the emissions for fiscal 1990 shows an increase of about 1.5 times.

On the other hand, both methane and nitrous oxide emissions in fiscal 1999 (25 million tons of CO_2 and 18 million tons of CO_2 respectively) fell by 12.4% and 21.1% respectively compared to fiscal 1990. The primary reason for the cut in methane is the reduction in the agricultural sector resulting from the decrease in paddy field area, while the main reason for the reduction in nitrous oxide is the introduction of a decomposition equipment during the manufacture of synthetic fiber materials.

It is expected that emissions of carbon dioxide from non-energy sources, methane, and nitrous oxide emissions in these fields will be reduced by 2.8% in 2010 compared to 1990 (0.29% compared to total greenhouse gas emissions in the base year) through current actions and measures, and will be reduced by 4.8% compared to 1990 (0.5% compared to total greenhouse gas emissions in the base year) with the implementation of additional measures.

Table 3.6 Promotion of Measures to Reduce Emissions of Carbon Dioxide from Non-Energy Sources, Methane, and Nitrous Oxide

	Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on;（Current○,Additional◎）
CO_2 emissions	○ Measures to reduce CO_2 emissions from industrial processes ・ Increased use of mixed cement with less CO_2 emissions during the production process		○ Promotion of Law for Promotion of Procurement of Recycled Products by the National Organizations and Local Authorities on its own Initiative
	○ Promotion of measures to reduce CO_2 emissions caused by waste incineration (approx. 3 million t-CO_2) ・ Reducing waste generation and restricting waste generation, and increasing recycling ratio through appropriate sorting of waste, implementation of separated collection and reusing, and establishment of relevant facilities [municipal solid waste: approx. 24%, industrial waste: approx. 47%] ・ Promoting the use of recycled resources and products by promoting green purchasing	○ A reduction of approximately 3 million tons of CO_2 is steadily being implemented by setting up reduction targets based on the Basic Guideline for the Promotion of Measures against Dioxins (September 1999), constitution of The Basic Law for Establishing a Recycling-Based Society, revision of the Waste Management and Public Cleansing Law, establishment of related individual recycling regulations (June 2000), and the setting up National targets in waste management policy (May 2001) in line with the Waste Management and Public Cleansing Law.	○ Setting up National targets in waste management policy based on the Waste Management and Public Cleansing Law, and implementation of measures based on related individual recycling laws for containers and packaging, and construction and demolition waste, etc.
		○ Substitution of fossil fuel origin products ・ Promoting the development and introduction of biomass technology	○ Development of biomass technology such as biodegradable materials, and supporting their introduction to business
	○ Promoting the effective use of timber resources ・Current status of supply and utilization of forest products through the Basic Plan on Forest and Forestry [Wood supply and use] 20 million m^3	○ Expansion of the utilization of timber and wood materials ・Target for pertaining to the supply and utilization of forest products stated in the Basic Plan on Forest and Forestry [Wood supply and use] 25 million m^3	○ Improvement of technologies of timber and wood materials processing, expansion of wood demand, and awareness campaigns for its long-term use, etc. ○ Expansion of demand for wood in housing, for which the ratio of wood demand is large, and promotion of its long-term use

			○ Expanding wood demand through public awareness campaigns, and extending its use such as in public facilities, and promotion of its long-term and multi-stage use.
		○ Promoting a reduction in emissions of CO_2 from farmland (including pastures) soil ・Reduction of CO_2 emissions from farmland soil by appropriately supplying organic substances through compost deoxidization and green manure cultivation in farmland [140,000 ha (estimated area for farmland where organic substances will newly be supplied appropriately)] (approx. 420,000 t-CO_2)	◎ Promotion of compost deoxidization and green manure cultivation in farmland ○ Promoting the preparation and preservation management of grassland
CH_4	(Measures to reduce CH_4 emissions) ○ Promoting a reduction in waste generation and recycling waste, and trying to halve the volume of waste disposed of in landfills by only incinerating waste that cannot be reduced through other measures [Municipal solid waste: 6.4 million tons, industrial waste: 30 million tons] (Approx. 1.2 million t-CO_2)		○ Widespread use of suitable strategies in the production and cooking processes based on Food Recycling Law, and promoting a reduction in the generation of food waste by improving distributional efficiency ○ Establishment of recycling facilities to prepare compost and feed
	○ Improvement of farmland management	○ Development of technologies to reduce emission of greenhouse gases from agricultural sector	○ Improvements in farmland management ○ Development of technologies to reduce greenhouse gas emissions from the agricultural sector
	○ Establishment of emission reduction technologies such as livestock feeding management skills		

N_2O	(Measures to reduce N_2O emission) ○ Establishment of N_2O emission suppressing equipment in adipic acid production process (Approx. 8.74 million t-CO_2)		○ It has been already implemented voluntarily in the plant
	○ Sophistication of combustion in incineration facilities for wastewater sludge (Approx. 1.4 million t-CO_2) ○ Sophistication of combustion in incineration facilities for municipal solid waste (Approx. 50,000 t-CO_2)		○ Thorough awareness of the "Guideline to establish global warming prevention plans for sewerage" ◎ Introduction of high-temperature combustion in all Fluidized bed incinerators of the sludge with polyelectrolyte flocculant, by clarifying the appropriate incineration temperature management stated in the "sewerage facility plan and design guideline" ○ Setting up maintenance management standards and structure standards for waste incineration facilities
	○ Improving drainage treatment in line with wider use of sewage and combined household treatment systems (johkasou), etc. (approx. 700,000 t-CO_2)		○ Promoting the preparation of sewage and combined household treatment systems (johkasou)
		○ Development of technologies to reduce greenhouse gas emissions from the agricultural sector	○ Promoting the provision of appropriate manuring ○ Development of technologies to reduce greenhouse gas emissions from the agricultural sector
	Emission reduction through current measures: total approx. 15.09 million t-CO_2 (about ▲1.23% compared to total greenhouse gas emissions in the base year)	Emission reduction through additional measures: approx. 3.02 million t-CO_2 (about ▲0.25% compared to total greenhouse gas emissions in the base year)	

Note 1) A total reduction of about 2.6 million tons of carbon dioxide or more shall be achieved through measures not showing reduced amounts such as the increased use of mixed cement.

Note 2) Emission of carbon dioxide from farmland will be included in the inventory of emissions and removals in line with the Marrakesh Accords, and efforts to reduce emissions will be made.

Emission outlook for 2010 Approx. 122 million t-CO_2 (about ▲0.5% compared to total greenhouse gas emissions in the base year)

3.4.4 Promoting measures to Containment of emissions of Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6)

(1) Existing measures

The ratio of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) emissions out of total greenhouse gas emissions is only about 3% (fiscal 1999 carbon dioxide equivalent basis), but how to limit their increase is the issue as they are main alternatives to ozone depleting substances, whose production and consumption are being phased out in accordance with the Montreal Protocol. Thus, the following have been implemented as current measures to reduce approximately 34 million tons of CO_2 from a business as usual basis.

① Promotion of implementation of voluntary action plans of industries

The industrial sectors established voluntary action plans in April 1998 based on the "Guidelines for measures to limit emissions of HFCs, PFCs, and SF6 by industry" (issued by the Ministry of the Economy, Trade and Industry) in February 1998. Since then, the Industrial Structure Council has annually followed up progress of the industry action plans. (Currently, 19 business organizations in 10 sectors have adopted the action plan.) Measures to support those organizations' emission limitation actions have also been implemented.

② Development of alternative substances

Research and development of new alternative substances, and development of technologies to recover and destroy HFCs have been implemented.

As a result of these measures, actual emissions in 2000 has been reduced by 26.2% compared to 1995, and satisfactory results are seen.

(2) Future measures and policies

It is estimated that such emissions will increase in line with a full-scale conversion from ozone depleting substances. We are trying to ensure a reduction of about 34 million tons of CO_2 by implementing additional measures in conjunction with effective and specific measures, as well as continuing to promote the current measures.

① Promotion of implementation of voluntary action plans of industries

The Industrial Structure Council continuously follows up on the progress of the industry action plans, and also tries to improve the transparency and accountability of the action plans, as well as to improve the effectiveness to achieve the target. Furthermore, industrial

associations those which have not yet established voluntary action plans will continue to be encouraged to establish ones, and support measures for emission limitation actions of companies shall be implemented.

② Research and Development of alternative substances, alternative technologies, and recovery and destruction technologies

Research and development of new alternatives to hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6), their alternative technologies, and recovery/destruction technologies should be carried out. More specifically, new substitutes for refrigerants, cleaners, and foaming agents should be developed; substitute gases and systems and substitute processes for etching gas (PFCs) used in the production process for electronic devices should continue to be developed; and research should continue into cleaning process systems for electronic device production using substitutes for PFCs and sulfur hexafluoride (SF_6). In addition, energy-saving synthetic technologies for new fluorocarbon substitutes should be developed; inexpensive and compact fluorocarbon recycling and destruction technologies should be developed; and technologies for highly efficient insulating construction materials should be developed without using fluorocarbons.

③ Promoting the use of products using substitute substances

With all due consideration for safety, economy, and energy efficiency, information provision and awareness campaigns for products using substitute substances or products using hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) with less impact on global warming should be promoted.

④ Recovery of HFCs refrigerants from equipment as required by law

In order to recover and destroy HFCs , a recovery and destruction system has been prepared through voluntary measures by industries as well as local communities . Since April 2001, the “Law for Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law)” has been enforced. In 2002, the “Law for ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Specified Products (the Fluorocarbon Recovery and Destruction Law) is enforced from April for commercial air-conditioners, refrigerators and chillers, and later, other provision of this law for mobile air conditioners will come into effect. Recovery and destruction of HFCs used as refrigerants shall be ensured through the appropriate enforcement of these laws.

Table 3.7 Implementation of Measures to Limit Emissions of Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6)

Current measures and their reduction amounts	Additional measures and their reduction amounts	Measures of the government and so on; (Current○, Additional◎)
○ Promotion of implementation of voluntary action plans of industries 19 business organizations in 10 sectors have established action plans to limit emissions, and have steadily been implementing them. The Industrial Structure Council has been following up on the action plans annually.		○ The Industrial Structure Council continuously follows up progress of the action plans of the industries. ◎ Efforts to improve transparency and accountability of the action plans, and to increase effectiveness to achieve the target. Furthermore, those business associations that have not yet established their own, shall be encouraged to do so.
○Research and development of substitutes, etc. Research and development of new alternative substances, alternative technologies, and recovery/destruction technologies ・ Development of new alternative substances ・ Development of substitute gases systems, and substitute processes for etching gas (PFC) used in production of electronic devices ・ Research into production and cleaning process system for electronic device production using substitutes for SF_6 and PFCs ・ Development of technologies to destroy HFC 23 generated as a by-product of the industrial process	○ Research and development of substitutes, etc.	○Current research and development of alternative substances, alternative technologies, and so on should continue. ◎ New technological development should be carried out as follows. ・ Development of energy-saving synthetic technologies for fluorocarbon substitutes ・ Development of inexpensive and compact fluorocarbon recycling and destruction technologies ・ Development of technologies for highly efficient insulating construction materials without using fluorocarbons
	○ Promoting use of products using alternative substances	◎ With all due consideration for safety, economy, and energy efficiency, information provision and awareness campaigns for products using substitute substances or products using HFCs, PFCs, SF_6 with less impact on global warming should be promoted
	○ Recovery of HFC refrigerants from equipment as required by law	◎Appropriate enforcement of Home Appliance Recycling Law and Fluorocarbon Recovery and Destruction Law

Reduction of approx. 34 million t-CO_2	Increasing prospects for reduction of approx. 34 million t-CO_2	

Emission outlook for 2010

Approx. 73 million t-CO2 (*)

(About +2% compared to total greenhouse gas emissions in the base year)

※ Increase amount will be controlled to +2% of total GHG emissions in the base year, from +5% of total GHG emissions in the base year on business as usual case

(Total amounts of emissions on business as usual case: approx. 107 million tons of CO_2)

3.4.5 Strengthening research and development of advanced and innovative energy- and environment-related technologies

Global warming is an issue that must be addressed throughout the 21st century. In order to tackle this issue, breakthroughs are required by promoting technological innovations that reach beyond existing assumptions as well as implementing measures by applying actions that can be undertaken at this stage.

In terms of innovative technological development, we aim for a 2% emission reduction compared to total greenhouse gas emissions in the base year, as well as further promoting activities to prevent global warming through efforts made by various sectors and layers of the public within the first commitment period. Thus far, we have been strongly promoting innovative technological development beyond the current technological standards such as ultra-efficient photovoltaic power generation, energy conservation-related technology in the energy use sector such as technologies using supercritical fluids as innovative environmental energy technology for 2010. We have also been deliberately implementing research and development of ultra-steels and super heat-resistant materials to improve energy use efficiency, development of technologies for carbon dioxide storage and fixation, and innovative hydrogen production techniques that are expected to prevent global warming, all of which are to strongly promote measures for an ultimate solution to global warming issues.

An effective reduction in greenhouse gases is expected in the future through innovative environmental and energy technology, but it is still only at the research and development stage, so such technology must be established at the earliest point.

Thus, in order to ensure maximum effectiveness as we head towards 2010, we are strongly promoting the establishment of technologies with good prospects at the earliest stage. More specifically, we are trying to strengthen technological developments further concerning technology aimed at innovative energy conversion, basic technology significantly increasing energy efficiency during product use, and innovative processes and system technology aimed at significant energy savings in the production process, etc. In addition, we are comprehensively

implementing measures to introduce and distribute active publication of the technological development results as well.

On the other hand, measures to prevent global warming must be implemented by strategically combining short- and long-term technological development with a long-term view. Therefore, we are working hard on technologies even if their technological development results will be long in coming if they appear to have good prospects.

In order to promote development of these innovative energy- and environment-related technologies, we are conducting research and development concerning technologies for global warming prevention measures in accordance with the "Science and Technology Basic Plan" (decided by the Government of Japan in March 2001), and are also seeking comprehensive promotion under the global warming research initiative of the Council for Science and Technology Policy.

Table 3.8 Strengthening Research and Development of Advanced and Innovative Energy- and Environment-Related Technologies

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; (Current○, Additional◎)
○ Promoting development of innovative technologies beyond current technological standards ・ Development of energy conservation-related technology such as technology using supercritical fluids ・ Development of technology for ultra high efficient photovoltaic power generation ・ Development of innovative hydrogen production technology ・ Development of technology for CO_2 storage and fixation ・ Development of technologies for ultra-steel and super heat-resistant materials, etc. to improve energy use efficiency ○ Promotion of study to create strategy for global warming countermeasures and basic studies aimed at construction of mechanism to promote study into resource cycling,	○ Strengthening promotion of innovative technological development beyond current technological standards (approx. 7.44 million t-CO_2) ・ Innovative energy conversion technology for storing energy and reducing losses during electricity distribution ・ Fundamental technology that significantly improves energy efficiency of products, such as electronic equipment and transport equipment ・ Innovative process system technology aimed at significant energy savings for industries that consume large amounts of energy	◎ Strengthening measures as the priority field under the Science and Technology Basic Plan ◎ Comprehensive promotion under the global warming research initiative of the Council for Science and Technology Policy ◎ Implementation of support for new technological development ○ Support measures for development of prospective technologies whose results will take a long time to see ○ Further studying of research and development themes

and consumption limitation, and the efficient use of energy ○ Promotion of basic studies aimed at construction of mechanism to promote study into creation of strategy for global warming countermeasures, resource cycling, and consumption limitation, and the efficient use of energy		
	Emission reduction through measures: total about 7.44 million t-CO_2 (approx. ▲0.6% compared to total greenhouse gas emissions in the base year)	

3.4.6 Further Activities to prevent Global Warming carried out by various sectors and layers of the public

The current socioeconomic system and living/working styles, as well as people's sense of values, are closely tied in to the emission of greenhouse gases. The implementation of global warming prevention measures is also changing the current socioeconomic system. Thus, an awareness campaign and provision of information to seek the better understanding, action and cooperation of various sectors and layers of the public must be promoted strongly in cooperation between them while fully utilizing the existing mechanisms, such as the various media channels.

In this Guideline, these measures, which can be realized by special efforts made by various sectors and layers of the public, are to be promoted through an awareness campaign by providing information, education and PR activities mainly by the government, and are defined as "Further Activities to prevent Global Warming carried out by various sectors and layers of the public", with the aim of a 2% emission reduction compared to the total greenhouse gas emissions in the base year as well as innovative technological development within the first commitment term by implementing those measures. For example, if various sectors and layers of the public implement the measures stipulated in the attached table as further global warming prevention activities, an emission reduction of up to about 1.8% is possible compared to total greenhouse gas emissions in the base year.

However, according to the "public opinion survey concerning global warming prevention and lifestyles" carried out by the Cabinet Office in July 2001, insufficient measures have been implemented so far despite the public's positive intentions towards such measures.

The reasons are thought to be as follows.

1) The awareness campaign and information provision concerning global warming prevention activities to various sectors and layers of the public have not been sufficient.

2) Most measures are temporary, and a system to continuously provide an awareness campaign and information has not been sufficiently established. In particular, the basis for promoting partnership measures involving the government, various businesses, and the public has not been sufficiently prepared at the regional level.
3) The requisite information and advice for implementing specific measures to prevent global warming when purchasing and using products have not adequately been provided to each family.

Various awareness campaign activities have been carried out by the Japan Center for Climate Change Actions, Prefectural Centers for Climate Change Actions, global warming prevention activities advisors, and through implementation of national resource and energy conservation campaign in accordance with the Law for the Promotion of Measures to Cope with Global Warming. In addition to those measures, "global warming prevention measures diagnosis" that provides instruction and advice by inspecting measures implemented by each family shall be carried out for the following purposes.

1) Nationwide implementation of a campaign to create a lifestyle suited to the global environment era by holding the Conference on "Wa-no-kuni-Kurashi", which means the lifestyles emphasizing simplicity, quality and sustainability, and so on.
2) Establishment of the basis for implementing regional measures
3) Implementation of measures for creating economic benefit

Furthermore, an awareness campaign for global warming prevention activities should be promoted while utilizing the promotion and support system for measures implemented by each family, preparing the basis for promoting regional measures, and developing a national campaign.

(1) Establishment of the basis for promoting global warming prevention activities

① Implementation of a national campaign to create a lifestyle suited to the global environment era

As part of the measures reviewing individual lifestyles, the Conference on "Wa-no-kuni-Kurashi" is to be held to encourage everyone to voluntarily undertake measures and to submit messages of encouragement. At the same time, studies into effective methods to be promoted in the future should be carried out for lifestyle innovation (lifestyle action) through cooperation between the government and each sector and layer of the public.

② Strengthening the basis for promoting regional measures

In order to establish the system and basis for regional measures, conditions specified for Prefectural Centers for Climate Change Action (hereafter, Prefectural Centers) should be expanded to specified non-profit corporations as well as for public service corporations, and promote the nationwide development of Prefectural Centers. At the same time, regional partnership measures through the establishment of a Global Warming Prevention Regional

Council comprising of local authorities, Prefectural Centers, global warming prevention activities advisors, businesses, and the public should be promoted.

③ Promotion of measures implemented by individual families

A global warming prevention measures diagnosis that provides instruction and advice on cost-effective ways with minimum greenhouse gas emissions should be promoted by inspecting the efficiency of houses and buildings, such as their thermal insulation, lighting, kitchens, air conditioners, and water heaters, as well as economic evaluations by global warming prevention activities advisors.

Furthermore, the Japan Center for Climate Change Action should be actively utilized as well as encouraging the development and selection of products with minimal greenhouse gas emissions to businesses and the public through labeling, and suchlike, and information concerning each product's greenhouse gas emissions should be recovered and provided. In addition, we promote studies of the evaluation methods into the effects of global warming measures, such as lifecycle assessments.

(2) Promotion of awareness campaigns for global warming prevention activities

① National debate on the introduction of a daylight saving time system is being attempted while taking into account the "Citizen's Conference report to think about the Global Environment and Daylight Saving Time" (May 1999) in order to gain a consensus.

② Awareness campaign to promote teleworking, etc.

③ Awareness campaign to promote bicycle use.

④ General subjects and "general studies" measures at school should be supported to further environmental and energy-related education and study, with efforts made to achieve substantiality. Furthermore, preparation of regional environmental study programs and information provision should be promoted to support various measures implemented by each organization, with efforts made to achieve substantiality. In addition, "environment-friendly school facilities (eco schools)" should be established.

⑤ Public involvement awareness campaigns should be implemented as well as continuously carrying out PR using the full media range.

⑥ In order to carry out extensive awareness campaigns to introduce the importance of greenery as a means of removing carbon dioxide, a greening campaign should be implemented with public involvement, by implementing national greening campaigns such as developing a Greenery Week, and City Greening Month, and the promotion of greening activities and afforestation carried out by the public using green feather fund movement and urban green space development fund.

⑦ Awareness campaign to promote comprehensive measures to prevent heat islands.

⑧ Environmental information concerning housing/buildings, residential and commercial equipment, and vehicles including greenhouse gas emissions should be provided continuously.

⑨ The government should take the lead in implementing global warming prevention measures such as promoting the purchase of recycled goods in line with the Law for Promotion of Procurement of Recycled Products by the National Organizations and Local Authorities on its own Initiative, and also will continuously implement model projects geared towards social system innovation.

Table 3.9 Promotion of further global warming prevention activities by various sectors and layers of the public

	Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on;（Current○, Additional◎）
Ⅰ. Measures implemented by the general public			
Residential and commercial sector	○ Raising air conditioners temperatures to 28°C, and lowering heater temperatures to 20°C or lower [30%] (approx. 440,000 ~ 850,000 t-CO_2)	○ Positive purchase and use of products with smaller energy consumption for equipment other than those specified by the Law Concerning the Rational Use of Energy (3.54 ~ 4.12 million t-CO_2) ・ Changing incandescent lamps to fluorescent lighting [60%] (740,000 ~ 1.41 million t-CO_2) ・ Purchase of microwaves with lower electrical consumption [30%] (350,000 ~ 680,000 t-CO_2) ・ Introduction of dish washers (reduction in hot water consumption) [40%] (1.6 ~ 1.18 million t-CO_2) ・ Introduction of water-saving shower head [30%] (850,000 t-CO_2)	◎ Information provision taking into account proposals at the Conference on "Wa-no-kuni-Kurashi", and promotion of model projects, etc. ◎ Implementation of “global warming prevention measures diagnosis” ◎ Information provision by the Japan Center for Climate Change Actions and Prefectural Centers for Climate Change Actions ◎ Promotion of regional measures through the “Global Warming Measures Regional Council” ◎ Carrying out PR and information provision, etc. through various regional organizations ○Establishment of a system for education, awareness campaign and information provision ○Distribution of environment and energy conservation household account books ○Strengthening PR ○ Provision of information concerning residential and commercial equipment ○ Preparation, analysis, and provision of environmental information for products

		○ Implementation of global warming prevention lifestyle [30%] (approx. 6.76 ~ 9.37 million t-CO_2) ・20% reduction in use of heaters and lighting by family members spending more time in the same room (3.41 ~ 4.67 million t-CO_2) ・More selective TV viewing and reducing time spent watching TV by one hour a day (190,000 ~ 350,000 t-CO_2) ・Reducing shower use by one minute a day with all of family (930,000 t-CO_2) ・Efficient use of refrigerator (150,000 ~ 280,000 t-CO_2) ・Using bathwater to wash clothes (240,000 ~ 460,000 t-CO_2) ・Eliminating the use of electric thermostat in pots and rice cookers (440,000 ~ 850,000 t-CO_2) ・Using one's own shopping bags, and selecting vegetables with minimum packaging, etc. (830,000 t-CO_2) ・Distribution of eco cooking (100,000 t-CO_2) ・Water-saving measures while washing (stop water running while cleaning teeth and washing face) (90,000 ~ 170,000 t-CO_2) ,etc.	
	○ Restraint in vehicle use ○ Promoting 'No idling' while cars are stopped or parked: 20 ~ 40% (140,000 ~ 280,000 t-CO_2)	○ Implementation of eco drive [20 ~ 40%] (approx. 810,000 ~ 1.62 million t-CO_2) ・Raising vehicle cooler temperatures by 1 degree ・Part-filling gasoline tanks ・Smooth (non-aggressive) acceleration ・Elimination of unnecessary loads on vehicles ・Thoughtful driving ・Appropriate control of tire pressure ,etc.	◎ Information provision taking into account proposals at the Conference on "Wa-no-kuni-Kurashi", and promotion of model projects, etc. ◎ Implementation of "global warming prevention measures diagnosis" ◎ Information provision by the Japan Center for Climate Change Actions and Prefectural Centers for Climate Change Actions ◎ Promotion of regional measures through the "Global Warming Measures Regional Council"

Transportation sector		○ Introduction of goods contributing to reduced environmental impact (approx. 20,000 ~ 30,000 t-CO_2) ・Installation of solar-proofing film on vehicles without reducing driver's view [20 ~ 40%] ・Installing/featuring other parts and goods that contribute to reduced CO_2 emissions while driving ,etc.	◎ Carrying out PR and information provision, etc. through various regional organizations ○ Establishment of a system for education, awareness campaigns, lectures and information provision ○ Strengthening PR ◎ Efficiency evaluation of environmentally friendly goods and distribution of information provision are implemented from fiscal 2002. ○Awareness campaign for bicycle use
Ⅱ. Measures implemented by companies			
Commercial sector	○ Raising air conditioners temperatures to 28°C, and lowering heater temperatures to 20°C or lower [40%] (Estimated emission reduction is included in the same type of measures implemented by the general public as shown before)	○ Positive purchase and use of products with smaller energy consumption for equipment other than those specified by the Law Concerning the Rational Use of Energy (Estimated reduction is the figure included in the same type of measures implemented by the general public as shown before + approx. 830,000 ~ 1.56 million t-CO_2) ・ Changing incandescent lamps to fluorescent lighting [60%] (640,000 ~ 1.22 million t-CO_2) ・50% reduction in upwards luminous lux of outdoor lighting in the evening as a measure to prevent light pollution [50%] (170,000 ~ 320,000 t-CO_2) ・ Use of energy-efficient cookers [20%] (20,000 t-CO_2) ○ Establishment of global warming preventing work style [30%] (approx. 230,000 ~ 410,000 t-CO_2)	◎ Information provision taking into account proposals at the Conference on "Wa-no-kuni-Kurashi", and promotion of model projects, etc. ◎ Information provision by the Japan Center for Climate Change Actions and Prefectural Centers for Climate Change Actions ◎ Promotion of regional measures through the "Global Warming Measures Regional Council" ◎ Carrying out PR and information provision, etc. through various regional organizations ○Establishment of a system for education, awareness campaign, lectures and information provision ○Strengthening PR ○Promotion of information provision ○Wider use of environment management systems, etc.

		・ Temporarily turning off lights in offices (at lunchtime, etc.) (180,000 ~ 310,000 t-CO_2) ・ Reduction in wasteful copies (10,000 ~ 30,000 t-CO_2) ・ Switching off PCs at lunchtime (40,000 ~ 70,000 t-CO_2) ,etc.	
Transportation sector		○ Promotion of eco drive for company cars, etc. [20 ~ 40%] (Estimated reduction is included in implementation of eco drive as shown before)	
Ⅲ. Measures implemented by the government and local authorities			
Commercial sector and Transportation sector	○ Implementation of measures to reduce greenhouse gas emissions with regard to clerical work and projects of government (approx. 150,000 t-CO_2) ○ Implementation of measures to reduce greenhouse gas emissions with regard to clerical work and projects of prefectures (approx. 600,000 t-CO_2) ○ Implementation of measures to reduce greenhouse gas emission with regard to clerical work and projects of city, town, and village (approx. 2 million t-CO_2)	○ Introduction of energy-saving facilities (figures included in the current measures implemented by the government, prefectures, cities/towns/villages) ・ For example, inverter-control motors for water supply facilities	○ Obligating the establishment of execution plan for clerical works and projects of government and local authorities based on the Law Concerning the Promotion of the Measures to Cope with Global Warming ○ Promotion of green purchasing such as environmentally friendly goods with minimum greenhouse gas emissions based on the Law for Promotion of Procurement of Recycled Products by the National Organizations and Local Authorities on its own Initiative ○ Promoting establishment of environmentally friendly school facilities (eco school)
Cross-sector		Introduction of daylight saving time system (approx. 250,000 ~ 1.23 million t-CO_2)	○Establishing national debate on the introduction of a daylight saving time system, and gaining consensus.
	Emission reduction through current measures: total about 3.18 ~ 3.88 million t-CO_2 (0.3%)	Emission reduction through additional measures: total about 12.44 ~ 18.34 million t-CO_2 (1.0 ~ 1.5%)	

3.4.7 Promotion of Measures Involving sinks of greenhouse gas

(1) Promotion of forests and forestry measures

The Basic Plan on Forest and Forestry was set as a Cabinet decision, in October 2001, based on the Basic Law on Forest and Forestry. It is approximately estimated that if the targets set forth in this plan to fulfil the multiple functions forests have and the targets pertaining to the supply and utilization of forestry products are achieved as per the plan, it is possible to ensure removals around the upper limit (3.9 percent of total greenhouse gas emissions in the base year, 47.67 million tons of CO2) of the obtainable removals through forest management across the forests under Article 3, 3 and 4 of the Kyoto Protocol.

Since the above is an estimate based on accomplishment of the Basic Plan on Forest and Forestry, further scrutiny and examination of the calculation method is required. Also, there is a concern that if forest management, timber supply and utilization continues at current levels, the removals will fall below 3.9 percent of total greenhouse gas emissions in the base year.

Ensuring the removals is a matter in the public's interest and utmost efforts need to be made by all of those involved including the government, forest owners, operators of forestry and timber products businesses, as well as local authorities and organizations involved in forests and forestry. Moreover, it is essential to steadily and comprehensively implement the forest management, timber supply and efficient utilization of timber, etc. required to achieve the targets of the Basic Plan on Forest and Forestry.

In order to ensure the necessary removals, Japan must strongly promote the measures described below as well as try to enhance the removals reporting and verification systems for the removals.

① Sound forest management

a) Rolling out of a variety of forest management measures including establishment of multi-storeyed forest, introduction of broad-leaved tree species and so on according to the functional classification of the forest
b) Promotion of the necessary human intervention in forests where it is necessary to implement tending practices such as urgent thinning
c) Promotion of re-establishment (re-planting) and weeding after felling
d) Promotion of afforestation and tending in non-forested areas, waste land, forests that have been hit by natural disaster, and abandoned agricultural land

② Appropriate management of protected forests

a) Promotion of forest management through systematic designation of forests as protected forests and ensuring forest permanency through regulations on the alternate use of forests and felling regulations under the protected forests system

b) Appropriate implementation of erosion control in protected forests with declining functionality
c) Prevention of damage caused by diseases and pests
d) The use of systems, based on the Nature Parks Law and the Nature Conservation Law, for forests where management of the forest and natural environment that makes up an impressive natural landscape is particularly necessary

③ Promotion of forest related activities with citizen participation

a) Promotion of forest management activities through direct participation from a broad group of the community
b) Promotion of education about forest environments

④ Promotion of utilization of timber and wood biomass

a) Proactive utilization of timber in order to reduce the usage of fossil fuels and to contribute to reducing carbon dioxide emissions. Measures include the promotion of education of the citizens to popularize the efficient use of timbers as renewable resource, promotion of the use of timbers in wooden housing and public facilities, and improvement of timber and wooden material utilization and processing technology
b) Use of woody biomass, such as logging residues and saw mill residues, as energy source

Table 3.10　Promotion of Measures for Forests and Forestry

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on;（Current○, Additional◎）
	Setting forth targets for demonstrating the multiple functions forests have including preventing global warming and for the supply and utilization of forestry products as well as establishing a plan (the Basic Plan on Forest and Forestry) promoting comprehensive and systematic measures pertaining to forests and forestry.	○Roll out of measures based on the Basic Law on Forest and Forestry and the Basic Plan on Forest and Forestry
・ Current state of demonstration of the multiple functions forests have (as at 2000) ＜Forest area＞ Managed single- storied forest 10.3 million ha Managed multi-storied forest 0.9 million ha Natural forest 13.9 million ha Total 25.1 million hectares ＜ Total growing stock＞ 3,930 million m^3 ・Current state of the supply and utilization of forestry products ＜Timber supply and utilized volume＞ 20 million m^3	・Targets pertaining to fulfiling the multiple functions forests have (by 2010) ＜Forest area＞ Managed single-storied forest 10.2 million ha Managed multi-storied forest 1.4 million ha Natural regeneration forest 13.5 million ha Total 25.1 million hectares （ Total growing stock） 4,410 million m^3 ・Targets pertaining to the supply and utilization of forestry products ＜ Timber supply and utilized volume＞ 25 million m^3	◎Strong and systematic promotion of forest management based on the Basic Plan, over the decade from 2003 through to the final year of the first commitment period, which is up to 2012. Further enhancement of the reporting and verification systems on the removals (Roll out of the 10-year Forest Sink Measures to Prevent Global Warming)
○Sound forest management Implementation of afforestation, and the necessary tending and thinning (track record for the 3 years from 1998 to 2000) ・Planting 40,000 ha per year ・Weeding 300,000 ha per year ・Thinning 315,000 ha per year ・Guided felling into multiple-layered forest -- ・Improvement of natural forest 25,000 ha per year ・ Road network operations 2,500 km per year	○Sound forest management Implementation of the forest management required to achieve the targets of the Basic Plan on Forest and Forestry	◎Promotion of forest management in accordance with the important functional classification (water and land conservation forests, symbiosis of forest and people, forests for the cyclical use of resources) ○Implementation of 5-year urgent thinning measures ○ Implementation of long-term cyclical forest management ◎ Upgrading and expanding of public management of forests ○Promotion of thinning measures ◎ Acceleration of guided felling into multi-storied forests ◎Implementation of special “Re-greening” measures

	○ Promotion of appropriate management of protected forests	○ Promotion of systematic designation of forests as protected forests ○ Promotion of conservation measures in protected forests ○Prevention of damage caused by diseases and pests ◎Promotion of urgent upgrading measures for protected forests with declining functionality ◎ Management of disaster prevention information in mountain villages and enhancement of disaster prevention systems
○ Promotion of forest related activities with citizen participation	○ Promotion of forest related activities with citizen participation	○Promotion of forest management and conservation activities with participation by citizens ◎ Enhanced participation and coordination between diverse groups such as community residents, NPOs, etc. ○Promotion of forest environment education
○Promotion of the efficient use of timber resources ・Current state of supply and utilization of forest products ＜Timber supply and utilized volume＞ 20 million m^3	○ Promotion of utilization of timber and wood biomass ・Targets pertaining to the supply and utilization of forestry products ＜ Timber supply and usage volume＞ 25 million m^3 ・Promotion of the utilization of unutilized timber resources	○ Developing new demand for forestry products ○Promotion of the use of timber in construction and facilities ○ Promotion of comprehensive measures to promote the utilization of timber ◎Putting in place model facilities using local timbers, such as school interiors and school-related facilities ○Use of wood biomass energy ◎Putting in place model facilities using wood biomass energy
If forest management, timber supply, utilization, etc. continued at the same level as it is currently (average of the actual figures for 1998 to 2000) the forest removal amount would be approx. 35.5 million t-CO_2	If the targets set out in the Basic Plan on Forest and Forestry, of demonstrating the multiple functions forests have and for the supply and utilization of forestry products, were achieved as set out in the plan, the removal amount in forests would be approx. 47.7 million t-CO_2	

(2) Promotion of Urban Greening

Urban greening is to be promoted continuously based on comprehensive action plans, pertaining to the creation and conservation of green areas by the government and local authorities, such as the “Green Policy Guidelines” and “Basic Plan of Green” set by cities, towns, and villages. Under these plans, urban greening, such as upgrading urban parks, the greening along roadways, rivers, and erosion prevention areas etc., the conservation of existing privately-owned green spaces, the creation of new green areas on building rooftops and sides of walls etc., and so on will be pro-actively promoted. In addition, the greening etc. of ports and harbors etc. will continue to be promoted through the “Eco Port Policy.”

If these measures are implemented as planned, it is estimated that removals equivalent to around 0.02 percent of the total greenhouse gas emissions in the base year (280,000 tons of CO_2) will be secured on an annual average in the first commitment period.

These are estimates based on the plans for planting of arboreal vegetation in urban greening and future scrutiny and examination of the target activities that are counted in the removals and the calculation method etc. is required.

Table 3.11 Promotion Urban Greening

Current measures and their reduction amount	Additional measures and their reduction amount	Measures of the government and so on; （Current○, Additional◎）
○Greening of public facilities Planting of arboreal vegetation along public facilities such as urban parks, roadways, and rivers <Target amount: The increase in the number of trees planted from 1990 to 2010 is estimated at 75 million trees and the estimated absorption volume calculated based on this.> (Forecast reduction in emissions (removals)) 280,000 t-CO_2 (Ratio of the total greenhouse gas emissions in the base year around 0.02%)		○Promotion of greening based on the “Green Policy Guidelines” etc. ○Promotion of the greening of ports and harbors based on the “Eco Port Policy” ○Drafting of “Basic Plan of Green” drafted by cities, towns, and villages and the promotion of greening based on these plans. ○Promotion of education in order to popularize the creation of greenery and promotion of greening by a broad range of groups such as residents, companies, NPOs, etc.

3.4.8 Making use of the Kyoto mechanisms

(1) Basic philosophy

The Kyoto Protocol permits the use of the Kyoto mechanisms (Joint Implementation (JI), clean development mechanism (CDM), and emissions trading), which enable Parties to the Protocol to use a part of the emissions reductions in other Parties or a part of the other Parties' assigned amount (the assigned amount is an emission "quota" allocated to each Party), as flexibility measures, to achieve their commitments. In light of such functions of the Kyoto mechanisms, it is necessary to use them appropriately in order to achieve the commitment of the Kyoto Protocol in a cost-effective manner, while keeping in mind that the use of the Kyoto mechanisms shall be supplemental to domestic actions.

(2) Measures necessary to make use of the Kyoto mechanisms

① Implementation of immediately necessary measures

Joint Implementation (JI) is one of the Kyoto mechanisms based on the Article 6 of the Kyoto Protocol. It allows an Annex I Party to acquire from another Annex I Party, as "emission reduction unit", the emissions reduction or the removals resulting from emissions reduction projects or sink projects. The clean development mechanism (CDM) is provided in the Article 12 of the Protocol. It allows an Annex I Party to acquire from an non-Annex I Party, as "certified reduction emissions", the emissions reduction or the removals resulting from an emissions reduction project or an afforestation or reforestation project in the non-Annex I Party. Furthermore, emissions trading is a mechanism, based on the provisions of Article 17 of the Protocol, which allows trading of a part of the assigned amounts between Annex B Parties.

The Kyoto mechanisms also allow the participation of private sectors. Therefore, it is expected that these mechanisms will be used by them to achieve their own emission reduction target more cost-effectively. However, when private sectors carry out JI or CDM and obtain "emission reduction units" or "certified emission reductions" (credits), it is necessary to be approved by the Parties involved, based on the provisions of Article 6.1 and Article 12.5 (a) of the Protocol. Moreover, these credits need to be verified after the project has commenced by an internationally accredited organization which has no conflict of interest with its other functions in proceeding to the verification. (For JI projects, verification by the host country is also possible.)

Projects starting as of the year 2000 are eligible as the JI or CDM projects. In addition, with regard to the CDM, "certified emission reductions" pertaining to the reduction of emission realized since the year 2000 can be obtained.

Therefore, the systems to enable the utilization of these two mechanisms should be promptly put into place.

Also, in order to meet the eligibility requirements to use the Kyoto mechanisms from the beginning of the first commitment period, Japan will put in place national systems to calculate Japan's greenhouse gas emissions and removals, and will establish the national registry to track and record its assigned amount, "emission reduction units" and "certified emission reductions" (credits) that arise from JI and CDM projects respectively, and will report to the secretariat by the summer of 2006, at the latest, giving an overview of these systems.

To this end, following measures will be taken shortly.

a) Putting in place a project approval system for approving the JI and CDM projects

When project participants conduct a JI or CDM project, and wish to obtain "emission reduction units" or "certified emission reductions", it is necessary to obtain approval on these projects from the Parties involved based on the provisions of Article 6.1 (a) and Article 12.5 (a) of the Protocol.

Therefore, the government organizations concerned will jointly and promptly establish the systems for accepting and checking the applications for the approval of projects pertaining to the JI or CDM.

b) Setting up the national registry etc.

Japan will promptly set up the national registry to track and record its assigned amount, the "emission reduction units" and "certified emission reductions" that arise from JI and CDM projects in accordance with the results of the COP8. In addition, Japan will also put in place national systems to calculate greenhouse gas emissions and removals.

c) Other measures

Japan will implement following measures with a view to achieve the smooth operation of the Kyoto mechanisms.

1) Assistance for the use of Kyoto mechanisms by private sector etc.

- Strengthening of project finding, feasibility study and other related project preparation functions for JI or CDM projects, and provision of relevant information to private sector etc;
- Assistance on negotiations with the other governments involved in the project and their human resources development in order to promote initiatives by private sector in JI and CDM;
- Assistance with the training in the private sectors so that Japanese private sector companies be designated as operational entities under the CDM or independent entity under the JI;
- Establishment of advisory offices for private sector' queries and requests relating to the Kyoto mechanisms;

・Elaboration and dissemination of the guides on how to use the Kyoto mechanisms in order to ensure the smooth use of the Kyoto mechanisms by private sectors, which will be regularly updated in accordance with the development of relevant domestic and/or international rules;

2) Initiatives to promote the understanding of governments of the countries involved in projects

・Improvement of the understanding about the Kyoto mechanisms of the governments of the key partner countries where JI and CDM projects will be conducted, through intergovernmental consultations and the implementation of projects, as well as encouragement for such key partner countries to establish transparent systems to domestic project approval procedures etc.;

・Capacity building assistance for the potential key partner countries in JI and emissions trading so that they satisfy the participation requirements of the Kyoto mechanisms;

3) Contributing to the elaboration of international rules

Given that a member from Japan has been appointed to the CDM Executive Board, Japan will pro-actively contribute to the elaboration of international rules so that they will be economically rational and ensure environmental integrity.

② Examination of the systems in view of the full operation of the mechanisms after 2008

In principle, the full operation of the Kyoto mechanisms such as transfer of credits under the emissions trading will commence from 2008. Some of the technical rules are referred to future international negotiation, and real knowledge and experience obtained with regard to the mechanisms are not sufficient.

Therefore, in the meantime the measures described in ① above will be implemented, and we will work to accumulate knowledge and experience about the actual conditions of relevant policies and initiatives in other countries and international negotiation on the rules of the Kyoto mechanisms with a view to preparing for the full use of the mechanisms from 2008 onwards.

Also, given this situation, we will continue examination of how the systems necessary for the utilization of the Kyoto mechanisms should be, and consider the necessary measures based on the results of such examination.

3.4.9 Others

(1) Promotion of understanding and publicly announcing the volume and per unit production of greenhouse gas emissions involved in project activities

Businesses conduct a variety of business activities from the manufacture, through the use, to the disposal of products, and each and every one of those activities is an emission source of greenhouse gases. In order to ensure that all businesses devise the most technologically and economically effective measures for each of these various emission sources, it is important to that the operators grasp an understanding of the current state of emissions (emission volume and per unit production) related to their business activities. Furthermore, businesses are a social presence and will be encouraged to voluntarily make public information pertaining to the current state of their emissions (emission volume and per unit production).

(2) Promotion of understanding the volume of greenhouse gas emissions involved in household energy consumption

In order for households to grasp an understanding of their own emission volumes and promote people taking concrete actions relating to these, we will promote activities such as environment and energy conservation household account books as well as examine a broad range of various types of methods to gain an understanding of what levels of greenhouse gases emissions are involved in their energy consumption, and stimulate further initiatives in households.

(3) Use of policy mix

A policy mix is one approach in order to effectively and efficiently reduce greenhouse gas emissions, by organically combining and making use of the characteristics of all of the policy measures, such as voluntary methods, regulatory methods, and economic methods.
So-called economic methods used to achieve highly cost effective reductions include guiding actions along the lines of economic rationalism by various groups through the granting of economic incentives based on market mechanism premises. However, economic methods, such as taxes and levies, should be compared to other methods and afforded continued comprehensive examination in a variety of forums while continuing to consider international cooperation to ensure that global environmental conservation results are secured appropriately from the focal points of their effectiveness in terms of environmental conservation, and of the effects on the domestic economy, such as macro economics and industrial competitiveness, and the current state of initiatives in other foreign countries.