Tentative Translation

Interim Report by Global Environmental Subcommittee, Environmental Committee, Industrial Structure Council

ー Future Measures for Global Warming ー

August 2004

Contents

1． Introduction

(1) From the adoption of the Kyoto Protocol to today

○ Global warming, which adversely effects natural ecological systems and human beings, is a result of the emission of greenhouse gases from human activities that have led to rise in temperatures on a global scale. In order to cope with the global warming problem, scientific information has been accumulated and an international framework to reduce the emission of greenhouse gases has been established.

○ At the first conference of the parties to the United Nations Framework Convention on Climate Change held in 1995 (COP1), it was agreed that the protocol, which defines the qualitative goal of reducing emissions for each party, shall be negotiated (Berlin Mandate). In 1997, COP3 was held in Kyoto, Japan, and it was here that the Kyoto Protocol, which defines the numerical targets of each party, was adopted.

○ Since the time of adoption, negotiations on management rules have been ongoing. In 2001, the main issues were agreed upon at the reconvention of COP6 (Bonn Agreement), and at COP7, held last November, management rules were almost established (Marrakech Agreement).

○ An international framework has been established, and 123 countries have already ratified the Kyoto Protocol. (The share of CO_2 emissions from Annex I parties that have signed the Protocol is 44% as of July 2004) (note). Japan signed the Kyoto Protocol in June 2002. In contrast to this, the United States of America, which is the largest emitter of greenhouse gases in the world, stated in March 2001 that the United States had no intention of ratifying the Kyoto Protocol. The Kyoto Protocol will come into effect on only if Russia ratifies the Protocol. Therefore the behavior of Russia has been closely observed.

(Note) The Kyoto Protocol will come into effect 90 days after the following two conditions are satisfied: (1) 55 countries or more sign the Protocol, and (2) The amount of CO2 emissions in 1990 from the signed parties, included in Annex I, reaches 55% of the total emissions.

○ In addition, included in the text of the Kyoto Protocol, it is agreed that a discussion on the framework, regarding the post 2013 period, shall start by the end of 2005. Various researches and discussions have already started at various forums all over the world. An effective and sustainable framework, for which every country can participate, is required to be established.

(2) Viewpoints of discussions in this subcommittee and the process of discussions until today

○ In order to fulfill the commitments under the Kyoto Protocol and to control and continuously reduce the emission of greenhouse gases for in long-run, Japan has been working on countermeasures for global warming and has executed more than 200 programs such as promotion of energy efficiency and conservation and introduction of new energy in accordance with the new Climate Change Policy Program, which was defined in March 2002.

○ Under such conditions, beginning in January 2004, the deliberation on countermeasures for global warming started in the subcommittee for the global environment of the Industrial Structure Deliberation Council. The main issues of deliberation are as follows:

① Tasks on evaluation and review of the new Climate Change Policy Program in order to fulfill the responsibility of reduction defined in the Kyoto Protocol.

② Work toward establishing a future sustainable international framework.

③ Direction of countermeasures for global warming from the mid and long-term point of views such as technical development.

○ Concerning the evaluation and review of the new Climate Change Policy Programme on Promotion of Countermeasures for Global Warming, in total there have been seven deliberations on the following items since January of this year:

・ Follow up of The Keidanren Voluntary Action Plan on the Environment (joint subcommittee with Advisory Committee for Natural Resources and Energy).
・ Review of energy supply and demand, future countermeasures on energy efficiency and conservation, development of innovative technology for measures regarding global warming, countermeasures for the substitution of fluorocarbons.
・ Evaluation of countermeasures for control and reduction of greenhouse gas emissions, estimation of the amount of emissions in 2010.
・ Points of view on future control and reduction of greenhouse gas emissions.
・ Measures for applying Kyoto mechanisms.

○ As for the domestic countermeasures for control and reduction of greenhouse gas emissions, the work was summarized based on the following results and by cooperating with each work:

・ Discussion on the estimation of energy supply and demand, the program for energy efficiency and conservation in Energy Supply and Demand Subcommittee, and Energy Efficiency and Conservation Subcommittee, Advisory Committee for Natural Resources and Energy.
・ Follow up of the countermeasures for substitution of fluorocarbons in the chemistry and biology taskforce of the Industrial Structure Deliberation Council.
・ Follow up of the development of innovative technology for global warming in Industrial Science Technology Policy Committee of the Industrial Structure Council.

○ In July, the results of the deliberations were summarized and extracted, and along with the points of issue for the interim report, opinions were called for.

○ The new Climate Change Policy Program will be evaluated and reviewed by the government this year. This committee, therefore, will prepare an interim report so that the results of the examinations of the contents such as the evaluation of the present countermeasures, which have been executed up until today, and the direction of the countermeasures for future global warming will be applied to work on the evaluation and review of the new Climate Change Policy Program, and so that reasonable and effective countermeasures for global warming according to the principle of contribution to both the environment and economy will be executed.

(3) Estimate of energy supply and demand in 2030 estimated by Advisory Committee for Natural Resources and Energy

○ The problem of global warming is a task that should be solved from the standpoint of the mid and long-term outlook. In addition, global warming largely depends on the trends of energy supply and demand, as about 90% of green house gases originate from CO2 emissions from energy sources. Therefore, it is very useful to discuss the countermeasures for the problem of global warming by watching mid and long-term trends of energy supply and demand.

○ Since last December, Advisory Committee for Natural Resources and Energy has been discussing and developing prospects for energy supply and demand in 2030 from the point of view of forecasting the structure of future energy supply and demand quantitatively and discussing mid and long-term energy strategies. The draft of the interim report of this work was submitted in June. The suggestions from the standpoint of the problem of global warming included in the draft are as follows:

① If final energy consumption in the future changes naturally, following the trends under the assumptions of present technological systems and policies, the rate of increase will decrease due to the changes in population, economy, and social structure. The decrease will begin after 2021. The amount of CO_2 emissions is expected to decrease faster than that of the energy consumption due to the trend of decrease in energy demand and the change in the structure of energy supply, including the use of nuclear and new energies as the mainstay of power.

② If energy efficiency and conservation largely progresses due to energy efficiency and conservation technologies, fuel cells technology, which are expected to be realized, high efficiency heat-pump devices and latent heat recovering water heaters, which are expected to progress and become widely disseminated, final energy consumption will significantly decrease. It is possible that the amount of CO2 emissions in such cases will be lower than the level in 1990, and there is a potential for large reductions from the long-term viewpoint by 2030.

③ When addressing countermeasures for global warming in the future, it is important to realize the control and reduction of greenhouse gas emissions by realizing such reduction potential as soon as possible on the basis of the contribution to both the environment and economy.

(Reference) Outline of the prospects for energy supply and demand in 2030

1) <u>The prospects if economic society and population structure are changed by the trends (Reference case)</u>

The prospects if economic society, population structure, market and user preferences, and work by the private sector change according to the trends, as before, under the assumption of present technological systems and the programs, which are already being executed.

[Final energy consumption]

- The rate of the increase in energy demand will decrease structurally in the coming 30 years due to the changes in population, the economy and social structure, and demand will become saturated in 2021 and energy consumption will decrease afterward.

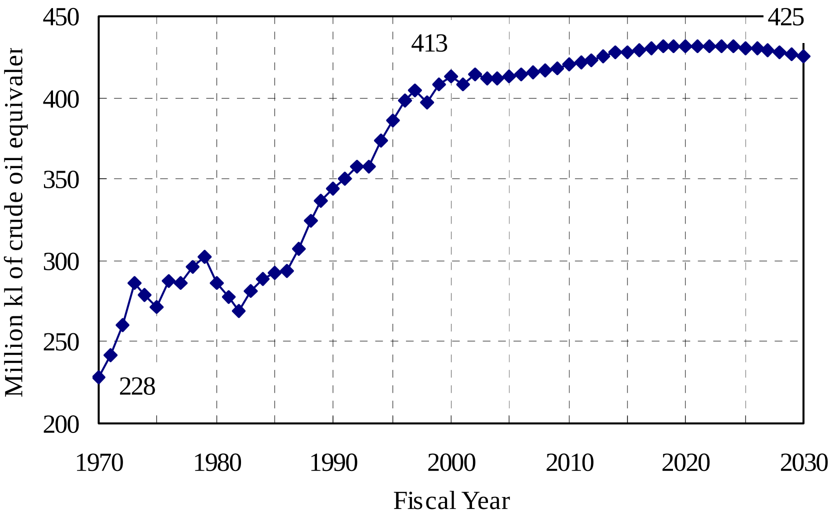


Fig.1-1. Forecast of final energy consumption in Japan in the coming 30 years

(Source: Outlook for Energy Supply and Demand in 2030 -interim Report(Draft)-, Energy Supply and Demand Subcomittee, Advisory Committee for Natural Resources and Energy, June 2004)

[Trends of energy supply and demand in each sector]

① Industrial sector

- Will decrease gradually due to the transformation of the industrial structure (high value added, services), and the rate of increase for manufacturing activity will also decrease.

② Domestic sector

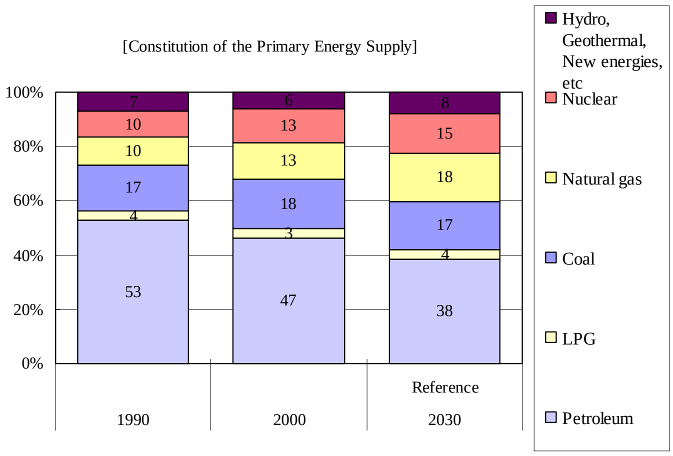
- Will slightly increase until 2020 due to the increase in the number of households and increase in floor space, but will subsequently decrease, after peaking at some time during the mid 2020s. This trend is also expected in the family sector and commercial sector due to (a) the decrease in the number of households and the decrease in floor space and (b) the dissemination and stimulation of energy efficiency and conservation devices and systems.

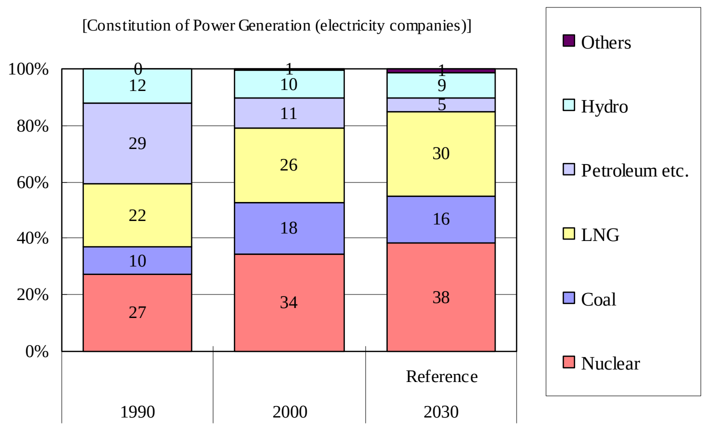
③ Transportation sector

- The passenger sector will decrease, after peaking at some time during the mid 2020s, due to the peak in the demand for traffic (the passenger sector will saturate and the freight sector will tend to decrease) and the progress of improvements in fuel consumption. The freight sector will continue to decrease gradually.

[Trend of energy supply]

- The share of petroleum in the constitution of the primary energy supply will decrease, although it will still occupy about 40% of total share.
- The share of nuclear and LNG will increase significantly in the constitution of power generation, whereas the share of petroleum and coal will decrease.





(Left) Fig.1-2. Constitution of the primary energy supply in Japan

(Source: Outlook for Energy Supply and Demand in 2030 -interim Report(Draft)-, Energy Supply and Demand Subcomittee, Advisory Committee for Natural Resources and Energy, June 2004)

(Right) Fig.1-3. Constitution of power generation in Japan (electricity enterprise)

(Source: Outlook for Energy Supply and Demand in 2030 -interim Report(Draft)-, Energy Supply and Demand Subcomittee, Advisory Committee for Natural Resources and Energy, June 2004)

[Amount of CO_2 emissions]

- The amount of CO_2 emissions will peak and then begin to decrease due to the decrease in energy demand and the change in the structure of energy supply such as use of new energies and nuclear.

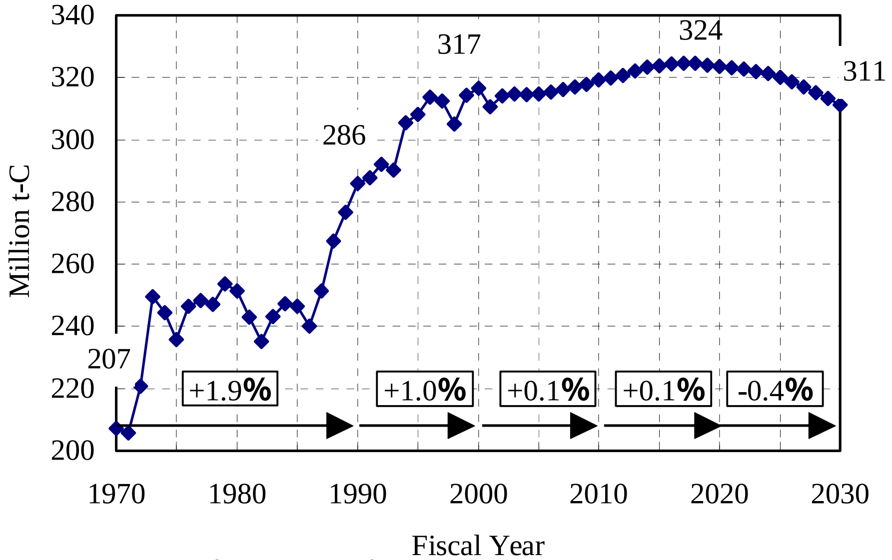


Fig.1-4. Estimation of the amount of CO2 emissions in the coming 30 years in Japan

(Source: Outlook for Energy Supply and Demand in 2030 -interim Report(Draft)-, Energy Supply and Demand Subcommittee, Advisory Committee for Natural Resources and Energy, June 2004)

2) The prospects if energy technology progresses (Energy conservation progress case)

- The case in which energy efficiency and conservation progresses significantly due to technology and business models such as energy efficiency and conservation techniques under development being realized and exploited and becoming smoothly integrated on a large scale.
- Specifically, the prospects if the followings are realized:
  (a) Diffusion and progress of the current work on energy efficiency and conservation.
  (b) Diffusion and progress of novel technologies dealing with energy efficiency and conservation.
  (c) Diffusion and progress of the technologies of energy efficiency and conservation using heat pumps.
  (d) Diffusion and progress of fuel cells and dispersion type energies.

[Final energy consumption]

- The potential of energy efficiency and conservation by realization and diffusion of energy efficiency and conservation technologies is quite significant. The effect of energy efficiency and conservation in 2030 will correspond to about fifty million kl.

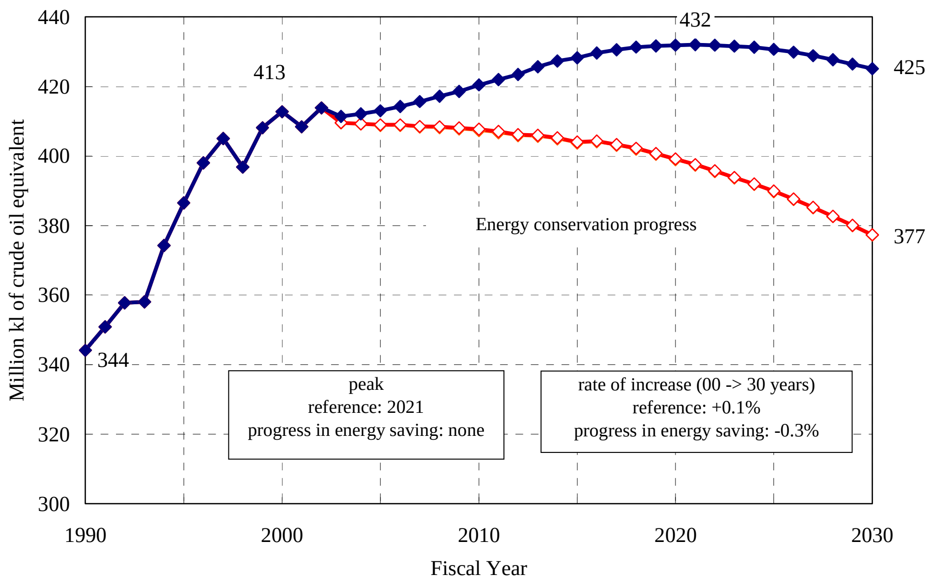


Fig.1-5. the estimation of final energy consumption in the coming 30 years in Japan for Energy conservation progress case.

(Source：Prospects for energy supply and demand in 2030 (draft of the interim report), Energy Supply and Demand Subcomittee, Advisory Committee for Natural Resources and Energy, June 2004)

【CO_2 emissions】

- Because of the progress in energy efficiency and conservation, CO2 emissions in 2030 could be reduced by about 50Mt-C. It is suggested that the coexistence of the economy and environment is possible if progress in energy technologies is realized.

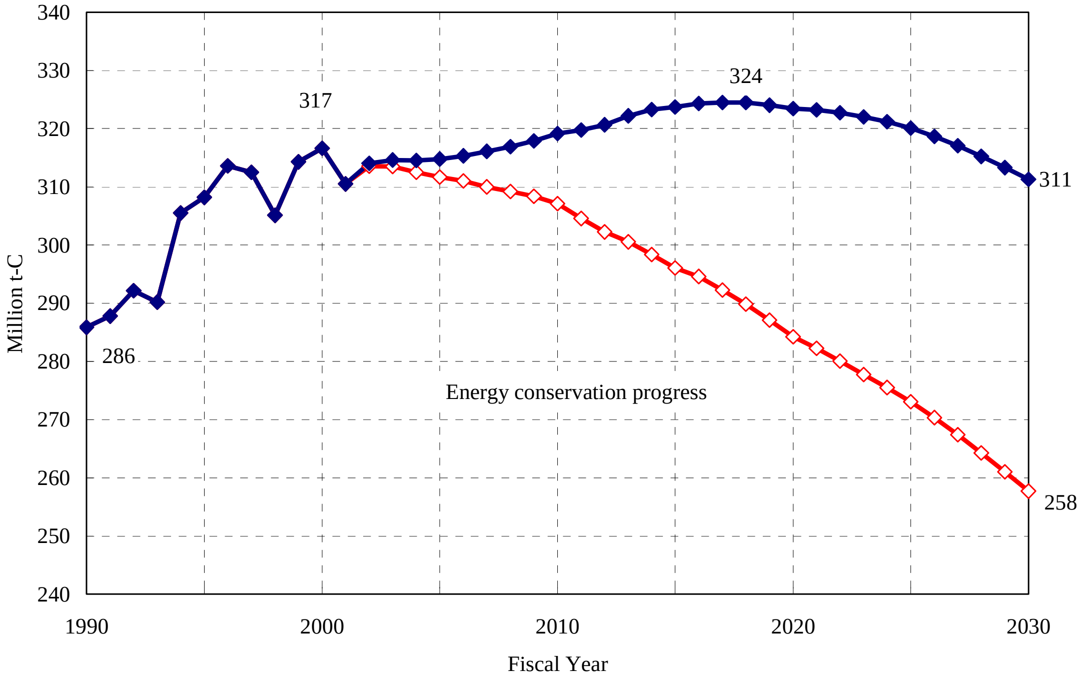


Fig.1-6. the estimation of the amount of carbon dioxide emissions in the coming 30 years in Japan in Energy conservation progress case.

（Source：Outlook for Energy Supply and Demand in 2030 -interim Report(Draft)-, Energy Supply and Demand Subcomittee, Advisory Committee for Natural Resources and Energy, June 2004）

2. International trend on countermeasures for global warming

It is necessary for every country to make efforts to reduce greenhouse gases in order to ensure the effectiveness of the countermeasures for global warming because the causes and effects of global warming are felt throughout the world. Foreign countries also have been working on this problem, although the conditions of emission of greenhouse gases and the situations for countermeasures of global warming are different. It is necessary for Japan to ensure international collaboration as well as to grasp the trends in other foreign countries in order to take countermeasures for global warming.

(1) Recent trends in countermeasures for global warming in the EU and the United States

1) Summary

・Regarding countermeasures in the industrial sector, there is a movement to introduce a scheme for domestic emissions trading in Europe and the United States, which allocates the upper limit of emissions to companies and facilities and allows trading of the excess and deficiency of the real emissions.

・The governments of EU countries are preparing to carry out a method that allocates the upper limit of emissions to the enterprises and trade the real emissions next January. As far as observing the state of allocation for the time being, the effectiveness of the scheme is unclear at this moment because a larger amount than most recent emissions has been allocated.

・In the United States, countermeasures by companies are mainly worked on voluntarily, however, the method that set the upper limit of emissions and trade voluntarily has been adopted by a part of private sector. It is necessary to watch the future trend of such movements including their effects.

・Also the movement toward obtaining credit (reduction units of greenhouse gas emissions) is active in each government of the EU countries, making use of Kyoto mechanisms that are defined in the Kyoto Protocol and taking it into account one of the correspondences to the uncertainty of accomplishment of the Kyoto Protocol.

2) Trend of emission in each country

(a) EU countries

・ The Kyoto Protocol imposes a duty of reducing greenhouse gases by 8% (compared with the base year) during the first commitment period (2008 - 2012) on EU countries.

- In EU countries as a whole, emissions continued to decrease in the early 1990s, but subsequently repeated an increase and decrease in the latter half of 1990s. Emissions increased for two successive years in 2000 and 2001.

Note) the difference from the commitment defined in the Kyoto Protocol: about 240 million t-CO2 in the 15 EU countries (2001) (compared with the base year +5.7%)

- In the report published by the EU committee in 2004, the accomplishment of the reduction commitment is expected to be achieved through existing programs in certain countries such as United Kingdom and Germany. Although, it is noted that it is necessary to work on additional programs in most of the other countries.

(b) the United States, Canada

- The Kyoto Protocol imposes a duty of reducing greenhouse gases by 7% during the first commitment period (2008 - 2012) on the United States and by 6% on Canada.
- Emissions are increasing in both the United States and Canada (the United States has not ratified yet).

Note) the difference from the commitment defined in the Kyoto Protocol:

the United States, about 1.18 billion t-CO2 (2001) (compared with the base year +19.6%)

in Canada, about 150 million t-CO2 (2001) (compared with the base year +24.5%)

(c) Russia, Central and Eastern European countries

- The Kyoto Protocol imposes a duty of keeping greenhouse gases by +-0% during the first commitment period (2008 - 2012) on Russia. (Russia has not ratified yet).
- As for the reduction target in Russia and the countries under economic transformation, a larger amount of emissions than that of the most recent emissions was set while taking into account economic growth along with the transformation to market economy. In reality, emissions continued decreasing and as a result, the surplus increased. In these past several years the decrease in emissions has seemed to stop.

Note）the difference from the commitment defined in the Kyoto Protocol: Russia, about -1.17 billion t-CO2 i(1999 (compared with the base year -38.4%)

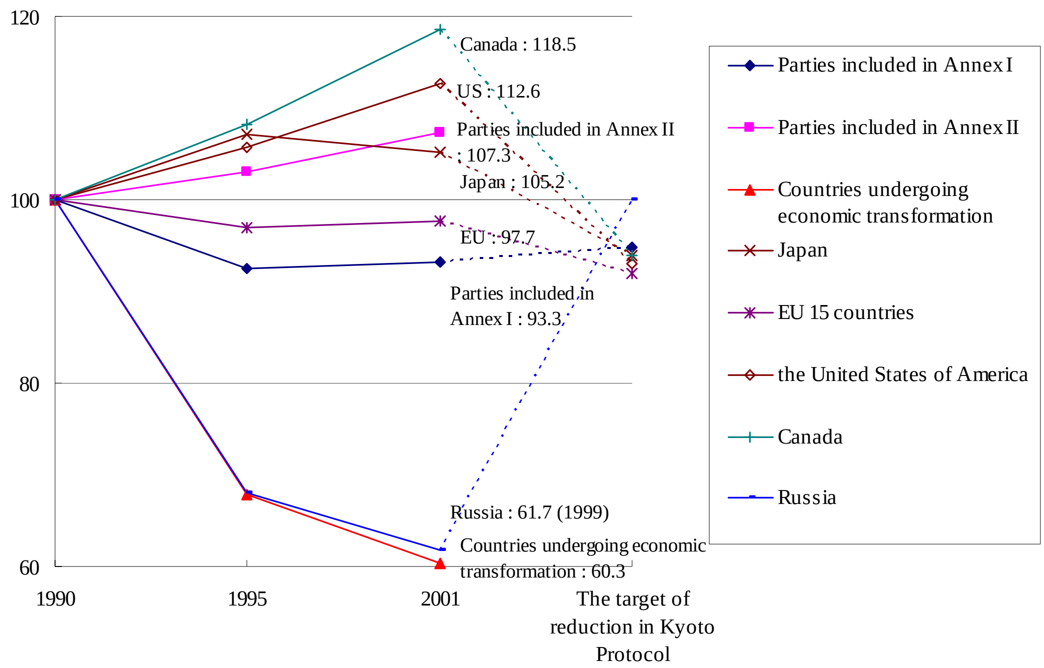


Fig.2-1. Trends of greenhouse gas emissions in each country (compared with base year)

3) <u>Trends of recent countermeasures for global warming in each country</u>

(a) EU countries

○ Energy consumption in EU countries has increased since the 1990s through the early 2000s..

○ By sector, the increase in the industrial sector is relatively small and consumption in the domestic and transportation sector increased.

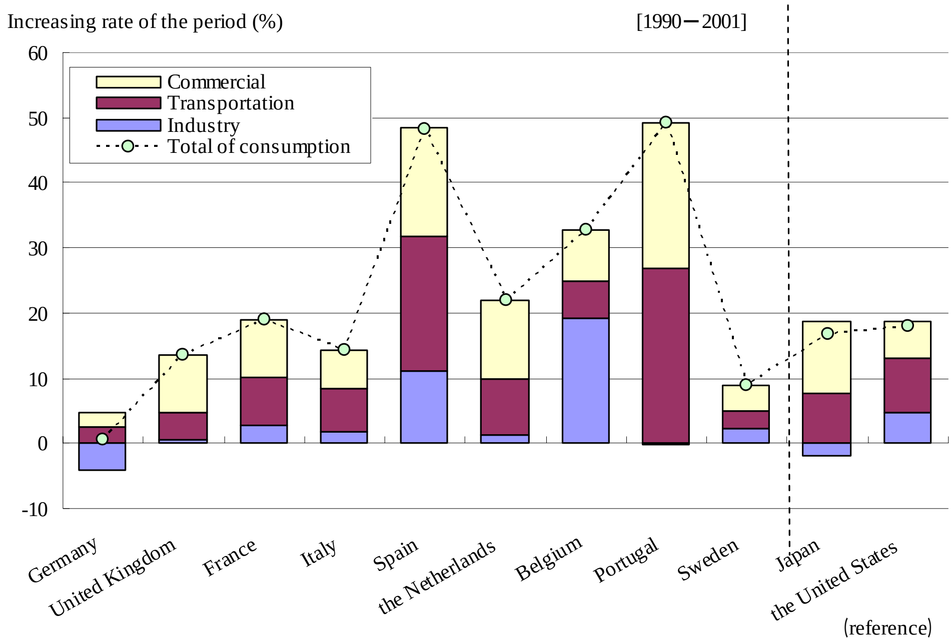


Fig.2-2. Increasing rate of final consumption of energy in EU countries

(Source: Energy Balances of OECD countries, IEA)

(1) <u>Movements to introduce emissions trading scheme</u>

(Positioning of the schemes)

The goal of reduction by each EU country is set at 8% compared with the base year in the Kyoto Protocol, however, it has been approved that the commitment is accomplished if the reduction by the EU, as a whole, reaches 8% compared with the base year (so called “EU bubble”). Hence it is possible to coordinate flexibly with one another by reallocating the goals according to EU directives while considering the situation of each country. The EU emission trading scheme, which is being prepared for introduction, is a mechanism that considers situations unique to the EU, with the purpose of achieving the goal more smoothly through emissions trading between each country and flexibly adopting the goals for each country.

(History)

- In July 2003, the EU council of ministers adopted directives concerning the foundation of an emissions trading scheme of the cap and trade type within EU countries, which was proclaimed in October 2003 and passed.
- Each country developed the National Allocation Plan (NAP) that allocates emissions to each domestic facility that will be allocated emissions, and then submitted the plan to the EU committee.
- Seeing total emissions allocated to each country, larger amounts of emissions than those of the most the recent emissions were allocated to eight countries out

of ten for which data were obtained. The four countries among the eight countries that were approved by the EU committee (Ireland, Austria, Denmark, and Sweden). (Table 2-1)

(Outline of EU emissions trading scheme)

- EU committee prepared the guidelines that should be referenced when each government allocates the upper limit of emissions, including consistency with the target defined in the Kyoto Protocol, consideration concerning competition with other countries and enterprises other than EU area.
- Each government allocates the upper limit of CO2 emissions to specified facilities (note 1) of domestic industrial and energy conversion sectors for the first commitment period (2005-2007) and the second commitment period (2008-2012) according to the guidelines. (development of NAP)
- Each government submits the NAP to the EU committee. The EU committee, when it recognizes the NAP as inappropriate, can reject or require amendments of the allocation plan.
- The facility that could suppress the emissions within the given upper limit of emissions can sell the surplus.
- The facility that exceeds the upper limit of emissions shall buy the equivalent amount to the excess in the trading market or shall pay a penalty (note 2). It can use credit obtained through Kyoto mechanisms.

Note 1) target facilities

Combustion facility, facilities for petroleum refining, metal, steel, cement, glass, ceramics, paper and pulp of which output is more than 20MW are targets (chemical and aluminum refining are out of the target for the first commitment period). They cover about 46% of the prospects for CO2 emissions within the EU area in 2010.

Note 2) penalty

In the first commitment period, the penalty is 40 Euros per 1 ton of CO_2 emissions. In the second commitment period, the name of the manager is published as well as the penalty of 100 Euros per 1 ton of CO_2 emissions.

Tab.2-1. State of developing NAP

	State of approval by the EU committee (as of July 13)	Actual results of emissions from the targeted facilities ($Mt\text{-}CO_2$)	Total allocation in NAP (Mt-CO2) (annual allocation during 2005～2007)
Spain	under review	166.5 (2002)	161.75
Portugal	under review	36.56 (2002)	38.9
Ireland	approved	20.9 (2002)	22.32 (originally submitted proposal: 22.5)
Austria	approved	31.74 (2001)	32.75 (originally submitted proposal: 33.19)
Italy	published but not submitted yet	256.6 (2000)	278.5 （2005）
Denmark	approved	30.9 (2002)	40.2 （2005）
Finland	under review	40.9 (2002)	44.4 （2005）
The Netherlands	approved	(unpublished)	95.3 (originally submitted proposal: 98.3)
France	under review	104 (1998～2001)	125.5
Sweden	approved	20.2 (1998～2001)	22.9
the United Kingdom	approved	(unpublished)	245.3
Germany	approved	505 (2002)	499

(2) Use of Kyoto mechanism in the EU

- Some EU governments are actively obtaining credits by using Kyoto mechanisms.
- In the EU, energy consumption and CO_2 emissions in domestic and transportation sectors have been increasing. It is considered that they assume to use Kyoto mechanisms to cover the increase and to raise the certainty of accomplishment of commitment to the Kyoto Protocol.

(i) Government of the Netherlands

- The government of the Netherlands plans to obtain credits for 100 million tons of CO2, which corresponds to about 50% of the required reduction of emissions by paying 736 million Euros (about 99.4 billion yen).
- Founded the CERUPT/ERUPT scheme by which credits can be bought by government funds by contracting with the CDM/JI project promoters through bidding.

※ CERUPT: Certified Emission Reduction Unit Procurement Tender

※ ERUPT: Emission Reduction Unit Procurement Tender

- Credits are bought by outsourcing as well as CERUPT/ERUPT.

(ii) Government of Spain

- The government of Spain positions the use of Kyoto mechanisms as a method to achieve the commitment to the Kyoto Protocol cost-effectively, contributing to the sustainable development in developing countries. It will be used to cover the emission excess, especially from the transportation and housing sectors.

- It plans to obtain credits that correspond to 100 million tons of CO_2 during the first commitment period.
- It is considering participation with a carbon fund that collaborates with the World Bank and European reconstruction development bank, and establishment of carbon fund that is unique to Spain.

(iii) Government of Italy

- The government of Italy considers additional countermeasures including the use of Kyoto mechanisms for the reduction of emissions that cannot be dealt with by the domestic countermeasures for emissions control (53 million tons CO_2).
- Specifically, the management of carbon funds that obtain credits from CDM/JI projects is entrusted to the World Bank. The government pays 15 million dollars at first, it is aimed to increase to 80 million dollars (about 8.8 billion yen) together with the investment from private companies.

(iv) Government of Denmark

- The government of Denmark will appropriate 126 million Euros (about 17 billion yen) in 2003-2007, and will obtain credits for 18.7 million tons CO2 during the first commitment period.

(v) Government of Belgium

- The government of Belgium announced the strategy for achievement of the goal of the Kyoto Protocol in March 2004. In addition to the domestic countermeasures, it will obtain credits for about 12 million tons -CO_2 through a CDM/JI project during the first commitment period, and Already started the first bid.

(3) Work on the technological development

- The EU committee research section and scientific research and development section promotes development of technology for environmental energy within the comprehensive framework plan of research and development.
- In the 6^{th} framework plan for 2003 -2006, development of renewable energy such as hydrogen and fuel cells is being promoted.

(b)The United States

(1) Movements to enhance rules for volunteer work

- The United States set the goal of reduction of greenhouse gas emissions per GDP at 18% compared to 2002 by 2012 in the “Climate Change Initiative,” which was announced in February 2002.
- In the Initiative, the research and technological development for countermeasures for global warming is promoted and volunteer work by industry on emissions reduction is promoted.
- As a part of the realization, the Department of Energy began to call for public comments for the revised draft of the scheme of reporting emissions reduction on the basis of energy policy law in December 2003. In this revised draft, the rules for voluntary efforts of emissions reduction by companies are enhanced by defining the procedure to improve the accuracy, reliability, and validability of the voluntarily reported emissions reduction.

(2) Work on the technological development

- The Department of Energy develops the energy security strategy, for 14 items such as hydrogen, coal, nuclear, power system, renewable energy, and enhances technological development.

(3) Others

○ Lieberman-McCain bill

- In October 2003, the Lieberman-McCain bill was submitted. It is a bill that imposes the requirement that emission of greenhouse gases in 2010 shall be decreased to the level of 2000 through emissions trading scheme on power, transportation, industry and business.
- The Senate rejected the bill by a vote of 55 against and 43 in favor.

○ Chicago Climate Exchange （CCX）

- It is managing the emissions trading scheme of cap and trade type on the basis of voluntary participation of companies. The base emissions by participating companies are about 230 million tons of CO_2. They commit to reduce the greenhouse gases by 1-4% during 2003-2006.
- Actual trading started December 2003.

(c)Canada

(1) Movement to introduce emissions trading scheme

- In November 2002, Federal government of Canada announced the “Climate Change plan for Canada” as a specific plan for prevention of global warming to accomplish the target defined in the Kyoto Protocol. In this plan, it suggested the policy of introducing a domestic emissions trading scheme.

- It announced in October 2003 that they have concluded successful negotiations with industry on the principles concerning the design and function of a greenhouse gas emissions trading scheme.

(2) Recent trend of Kyoto mechanism

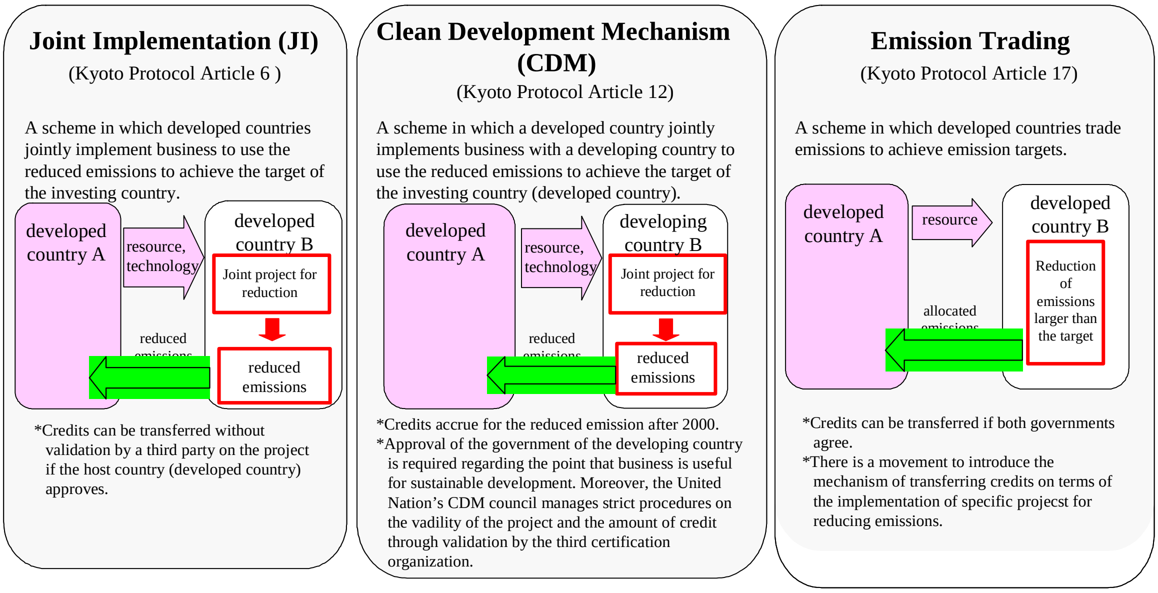


Fig.2-3. outline of Kyoto mechanism

1) Trends concerning the preparation of international rules such as CDM

○ At COP7 (2001), the CDM council was founded as a supervising organization for CDM. Up until this point, 14 meetings of the CDM council have been held and rules and procedures necessary for implementation of CDM such as approval of methodology concerning baseline monitoring, trust of managing organizations, development of simplified procedures for small scale CDM, were defined.

(a) State of approval methodology

- Up until this point in time, 47 cases have been reviewed, and of these 13 cases were approved by CDM council.

Tab.2-2. State of approval methodology for cases reviewed up until today

		Approved	Total reviewed
Energy efficiency and conservation		0	10
Recovery of flare gas		1	1
Conversion of fuel		1	2
Recovery and destruction of fluorocarbon		1	1
Renewable energy		10	30
	Wind power	0	2
	Hydro	1	4
	Biomass	4	17
	methane gas	5	7
Others		0	3
Total		13	47

(b) State of accredited operational entities

- Up until today 25 organizations (among them were 6 Japanese organizations) have applied and 4 were accredited. In Japan, the Japan Qualification Agency is accredited.

(c) State of registration to CDM projects

- Up until this point, there have not been any projects registered nor has there been any application for registration. However, the first case may apply for registration at the next CDM council (September of this year).

2) Movements in the future

○ The international rules on CDM are gradually prepared. However, the number of approved cases is only 13, in light of the methodology that defines the general method of calculating emissions according to the project type. In the future, it is extremely important that the methodology of a wide range of projects, including the energy efficiency and conservation projects, be recognized and various types of reduction projects be approved as CDM and facilities are prepared.

3) Possibility of CDM/JI projects and the trend in developing countries

○ The potential of CDM/JI widely exists in Asia, Central and South America, and Central and Eastern Europe.

○ On the other hand, it cannot be said that the meanings and mechanism of CDM/JI are fully recognized. There are differences in the state of preparation of executing schemes of CDM/JI in each country and the way of thinking related to the way in which it will be used. Therefore, it is important for the host country, such as developing counties, to understand the promotion of CDM/JI and to prepare the CDM/JI scheme of reception in the host country.

Tab.2-3. CDM/JI Scheme of reception in each country

Country	Scheme for Approving CDM/JI business	State of progress of works, method of thinking of CDM/JI
China	Enacted “preliminary law for managing and controlling green development mechanisms,” in which procedures for implementation of CDM businesses are defined. (in May 2004, enforced from June). Main contents are as follows:(1) specifies three fields, energy efficiency and conservation, new renewable energy, and recovery of methane as important fields; (2) sets the terms for approval;, (3) prepares the scheme and procedures for approval and implementation such as selection of DNA (national development and reform committee).	It is not active because recovery projects, including HFC and N_2O, are not included in the important fields compared to energy efficiency and conservation. Also it defines some terms for approval with the limitation of direct participation to Chinese companies, the ODA fund is not used, and the interest of ER shall be shared by the Chinese government and Chinese companies.
India	DNA is the national CDM committee. Standard for approval is established.	Active with CDM and has already approved many CDM projects.
Chile	DNA is the national environment committee that consists of several ministries. The guidelines for approval are prepared.	Active with CDM and has already approved many CDM projects.
Brazil	DNA is the global climate change committee that consists of several ministries. The guidelines for approval are prepared.	Many CDM programs are processed. Some terms are defined for approval so that the investing country has approved and a branch of DOE is in Brazil.
Bulgaria	Division that deals with JI is established in the Ministry of Environment. The guidelines for JI are defined.	Active for introducing foreign investment through JI. Three projects have been approved.
Hungary	The Ministry of Environment mainly deals with JI. Ministry of Economy and Transportation and Agency of Energy have active roles.	The draft of JI guideline was completed in 2001, but publication of the final version was suspended by the Ministry of Law.

(Source: prepared on the basis of Point Carbon)

〔Distribution of Word bank carbon fund adopted project by area〕

・The World bank established the carbon fund that rewards the reduced emission achieved by the CDM/JI project to the investors (2000). (The distribution of adopted project by the fund is shown as below by country)

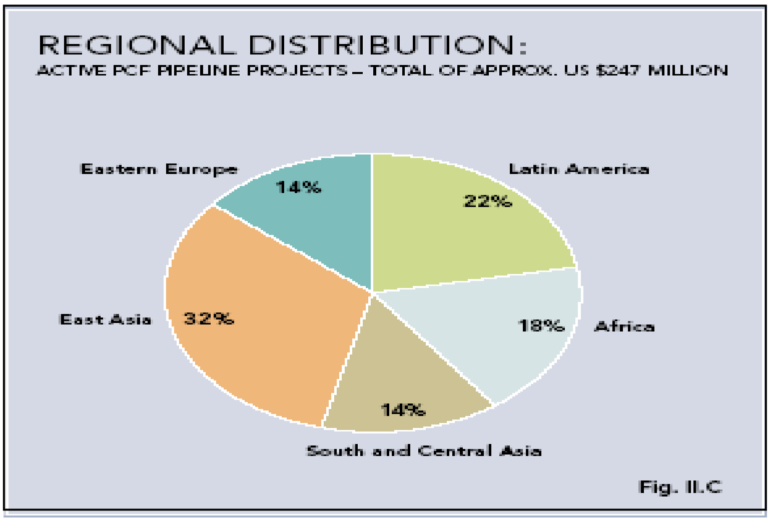


Fig.2-4. Projects by area that are adopted by the carbon fund of the World Bank.

(Source：PROTOTYPE CARBON FUND ANNUAL REPORT 2003)

3. Evaluation of the new Climate Change Policy Program

(1) Present state of greenhouse gas emissions

○ Total emissions of greenhouse gases in FY2002 were 1.31 billion tons. This was 7.6% larger than the 1.237 billion tons of total emissions in the base year of the Kyoto Protocol[1]. In addition, compared to the previous fiscal year, emissions increased 2.2% due to the increase in energy demand by the domestic sector and the closure of a nuclear plant.

○ CO2 emissions make up roughly 90% of total greenhouse gas emissions. A look at CO2 emissions by sector shows the industry sector decreased by 1.7% compared to 1990, while emissions in the transport sector, residential sector, business and other sectors increased significantly, by 20.4%, 28.8%, and 36.7% respectively compared to 1990. Recently, emissions have been on an increasing trend.

(2) Outline of the new Climate Change Policy Program

○ The government has been working on measures to combat global warming based on the new Climate Change Policy Program which was decided upon in March 2002 in order to achieve Japan's reduction commitment, 6% compared to the base year, under the Kyoto Protocol.

○ Under the new Climate Change Policy Program, four rudimentary ways of thinking are shown to develop and implement the countermeasures for global warming.

- Preparation and establishment of mechanisms that contribute to contribution to both the environment and economy.
- Step by step approach (evaluation and review of the new Climate Change Policy Program in 2004 and 2007)
- Promotion of work done together by the government, local governments, enterprises and nations.

1 the base year for the Kyoto Protocol is 1990, but as for three gases including fluorocarbon substitution, the base year is 1995

・ Ensure international cooperation on countermeasures for global warming (such as efforts toward establishing common rules that all countries participate, international environmental cooperation with developing countries, etc.)

○ In accordance with this type of methodology, the following items are set as goals in each field in order to achieve the reduction commitment of 6%:

・ Domestic measures for emissions control and reduction of greenhouse gases. (total emissions by following 1-3 compared to the base year is -0.5%).

(a) Promotion of CO_2 emissions reduction from energy sources

＞Measures for CO_2 emissions reduction mainly through measures for both energy supply and demand (±0%)

＞Innovative technological development

＞Promotion of activities for preventing global warming at various levels of the nation

(-2%)

(b) Promotion of measures for controlling emissions of three gases, including fluorocarbon substitutes (+2%)

(c) Promotion of measures for controlling emissions from non-energy origins CO_2, CH_4, and N_2O. (-0.5%)

・ Promotion of measures for greenhouse gases sinks (total emissions compared to the base year are -3.9%)

（Note）As for the use of Kyoto mechanisms, it is described in the new Climate Change Policy Program that it is important to use them appropriately on the basis that the principle obligation of the government is achievement of the commitment under the Kyoto Protocol and Kyoto mechanisms are supplementary to the domestic measures.

(3) Structure of greenhouse gas emissions

○ The increase and decrease of greenhouse gas emissions is composed of increases and decreases of each factor, including intensity of energy use and intensity in emissions of fluorocarbon substitutes, intensity of energy supply CO_2 and the amount of activity.

○ Intensity of energy use and intensity in emissions of fluorocarbon substitutes are defined as the energy consumption and emissions of fluorocarbon substitutes per unit of activity. If the energy conservation effort by each entity and the control of fluorocarbon substitutes' emissions during manufacturing processes such as the use of devices with high energy efficiency and introduction of energy efficiency and conservation facilities progress, the intensity of energy use and intensity of emissions of fluorocarbon substitutes will be improved and the reduction of greenhouse gas emissions will be realized.

○ Energy supply CO2 intensity is the amount of CO2 emissions from energy sources derived from the energy supplied per unit, and this varies according to the energy source used. The energy supply CO_2 intensity is improved and the reduction of greenhouse gas emissions is realized if the ratio of energy with less CO_2 emissions is increased by promoting the use of atomic power plant and new energies.

○ Activity is the amount of activity that accrues energy consumption or emissions of fluorocarbons (e.g., companies' production volume, amount of devices used, mileage of cars)

＊ See appendix 1 for the structure of greenhouse gas emissions.

(4) Measures in the new Climate Change Policy Program, evaluation method of greenhouse gas emissions

In the new Climate Change Policy Program, it is stated that the prospect of achieving the reduction target of greenhouse gas emissions by 2010 shall be evaluated on the basis of the new forecast for the future of each factor. This includes population, the number of households and economic growth rate, as well as the prospect of emissions reduction in 2010 through the measures assumed at the development of the new Climate Change Policy Program, which shall be evaluated on the basis of the situation of the progress since that time.

1) Evaluation method of each measure

○ The estimation of emissions reduction through each measure under the new Climate Change Policy Program is simply described as the "energy efficiency and conservation effect O kl, O t-CO_2." When evaluating it, it is necessary to distinguish the factors of improvement in intensity such as energy use efficiency and the factors that increase and decrease various activities, including production.

- For example, for each measure concerned with CO2 emissions from energy sources in the industry sector, the effect of the measures is to improve the energy consumption per production unit and intensity through energy efficiency and conservation investment by companies. The estimation of emissions reduction achieved by various measures is that obtained by multiplying the ratio of improvement of intensity by activities such as the amount of production.

- In the residential sector, for example, the improvement of energy consumption during the standard use of a device is the effect of the measures for improving efficiency of the device. In total, the effects of the measures are recognized in that they improve the intensity of energy consumption per household. The estimated emissions reduction achieved is obtained by multiplying the ratio of improvement of energy consumption per device by the indices concerned with the level of life such as real time usage of the device, the number of the devices possessed by a household, and the number of households. Aggregate residential sector is obtained by multiplying the ratio of improvement of energy consumption per household by the number of households.
- Similarly in the transport sector, the effect of the measures is improvement in fuel consumption performance of a car (fuel consumption by a car for standard traveling) in the passenger sector. In the freight sector, the effect of the measures can be recognized by the improvement in intensity of transport (energy consumption necessary for carrying unit weight for unit distance). The estimation of reduction can be obtained by multiplying the ratio of improvement of intensity to traveling distance, the number of cars possessed, and transport volume of freight.

○ Thus the effects of the measures and the efforts to reduce emissions by each entity under the measures should be evaluated using the improvement of intensity. The estimation of emissions reduction by measures should be obtained by multiplying the improved intensity by the increase and decrease of activity, while taking into account relevant factors associated with 2010 (population, the number of households, economic growth rate, etc).

2) <u>Method of evaluating greenhouse gas emissions</u>

○ The amount of greenhouse gas emissions is obtained by multiplying the improved intensity achieved by each measure by activities. Therefore, it should be calculated by accumulating the effects of the intensity improvements of each measure and by setting outlook with transparent and reasonable reasons for the factors relating to main activities such as economic growth rate, population, number of households and floor space, main business in industry sector and amount of products, variation of constitution ratio and transport volume.

(5) Evaluation of each measure

Note 1) See attachment 2 for the domestic structure of greenhouse gas emissions and the positioning of each measure under the current Program.

Note 2) Estimation of the effects of measures is derived by summarizing the results of estimations by the following councils:

(1)Promotion of reducing energy-derived CO_2 emissions

(a) Measure for reducing CO2 emissions mainly by measures for energy supply and demand.

・Estimate of energy supply in 2010 included in “Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)- edited by Advisory Committee for Natural Resources and Energy.

(b) Promotion of the development of innovative technology and further activities for preventing global warming by each sector and at each level. (only the development of innovative technology is evaluated)

・The follow-up working group on the development of innovative technology for global warming, the research and development subcommittee, Industrial Science Technology Policy Committee, the Industrial Structure Council.

(2) Promotion of measures for controlling emissions of three gases, including fluorocarbon substitutes

・Global warming prevention measures subcommittee, the chemistry and biology taskforce, the Industrial Structure Council

1) Evaluation of measures in the demand sectors

A. Industrial sector

A-1 Industrial Sector (energy derived CO_2)

- In order to reduce CO2 emissions from energy sources in the industry sector, work on efforts for energy conservation, high performance industry furnaces, high performance boilers, promotion of introducing energy efficiency and conservation facilities has been conducted under The Keidanren Voluntary Action Plan on the Environment.
- The effects of the measures can be evaluated as energy improvements per industrial activity (IIP) and in accordance, such work that improves the efficiency of energy use in production levels.
- The evaluation results of the state of progress of each measure shows that the estimated energy consumption per industrial activity in 2010 will improve by 9.7%, compared to 1990.

[Evaluation of individual measure]

○ The Keidanren Voluntary Action Plan on the Environment

- The industry sector has been working on the reduction of greenhouse gas emissions under The Keidanren Voluntary Action Plan on the Environment by improvement of the manufacturing process, advanced operation controls, efficient production facilities, and recovery of waste heat and introduction of new technologies.

- The progress of The Keidanren Voluntary Action Plan on the Environment was reviewed at the follow-up joint subcommittee for The Keidanren Voluntary Action Plan on the Environment, and the investigating committee for total resources and energy, Industrial Structure Council. As a result, the Voluntary Action Plan on the Environment has been progressing smoothly, on the whole, toward achieving the target, and it was evaluated that “the 2010 target is within the scope of achievement."
- As follows, the energy consumption per industrial activity (IIP) is estimated to improve by measures under The Keidanren Voluntary Action Plan on the Environment.

Note) In evaluating this sector, including the industry sector under The Keidanren Voluntary Action Plan on the Environment that covers the energy industry, the effects of intensity improvement, in the case targets of the plan are achieved, are analyzed.

The energy consumption per industrial activity (IIP) in 2010 will improve by 9.3% under The Keidanren Voluntary Action Plan on the Environment.

Note) The energy consumption per industrial activity (IIP) in 2010 will improve by 9.3% under The Keidanren Voluntary Action Plan on the Environment, compared to a case without measures.

Tab.3-1. the results of the follow up of The Keidanren Voluntary Action Plan on the Environment

1. Energy intensity

No.	Name of organization	unit	base year	2002 actual values	2010 estimation	2010 reduction target	target	possibility of achieving target	remark on target
1	Japan Mining Association (nonferrous)	kl/production (t)	0.70	0.58	0.59	0.62	12% reduction of energy intensity compared to FY1990	○	
2	Japan Mining Association (ferro-nickel)	kl/production (t)	2.02	2.20	2.21	1.92	5% reduction of energy intensity compared to FY1990	△	
3	Limestone Association of Japan	kl/production (t)	1.139	1.052	1.040	1.040	10% reduction of energy intensity compared to FY1990	○	
4	Petroleum Association of Japan	crude oil converted kl/crude oil (t)	10.19	8.90	8.90	9.17	10% reduction of energy intensity compared to FY1990	○	
5	Japan Chemical Industry Association	total index	100	91	87	90	10% reduction of energy intensity compared to FY1990	○	
6	The Japan Rubber Manufacturers Association	kl/production (t)	719.2	692.1	598.9	719.2	0% reduction of energy intensity compared to FY1990	○	
7	Japan Aluminum Association	GJ/rolling (t)	21.5	19.4	19.2	19.4	102% reduction of energy intensity compared to FY1995	○	base year is FY1995
8	The Japanese Electric Wire and Cable Makers' Association (optical fiber)	kl/production (thousand km c)	8.25	3.46	3.32	5.36	35% reduction of energy intensity compared to FY1990	○	
9	Japan Copper and Brass Association	kl/production (t)	0.413	0.382	0.376	0.382	7.5% reduction of energy intensity compared to FY1995	○	base year is FY1995
10	Japan Paper Association	MJ/production (t)	14389	13441	12951	12951	10% reduction of energy intensity compared to FY1990	○	
11	Japan Cement Association	MJ/t-cement	3586	3463	-	3451	3% reduction of energy intensity compared to FY1990	△	
12	Japan Machine Tool Builders' Association	L/million yen	139.5	179.3	-	131.1	8% reduction of energy intensity compared to FY1997	△	base year is FY1997
13	Japan Construction Equipment Manufacturers Association	total index	100	82	81	90	10% reduction of energy intensity compared to FY1990	○	
14	Japan Department Stores Association	Kwh/m2･h	0.144	0.132	-	0.144	0% reduction of energy intensity compared to FY1990	▲	
15	Japan Chain Stores Association	Kwh/m2･h	-	0.109	-	-	0% reduction of energy intensity compared to FY1990	▲	
16	Japan Franchise Association	Kwh/m2･h	0.161	0.126	-	0.161	0% reduction of energy intensity compared to FY1990	▲	

2. Energy consumption (converted to crude oil ten thousand kl)

No.	Name of organization	base year	2002 actual values	2010 estimation	2010 reduction target	target	possibility of achieving target	remark on target
17	Japan Coal Energy Center	13.2	1.3	1.2	6.0	58% reduction of electric power consumption compared to FY1995	○	base year is FY1995
18	The Japan Iron and Steel Federation	6396	5972	5756	5756	10% reduction of total energy consumption compared to FY1990	△	
19	Japan Lime Association	92.9	68.9	89.8	87.3	8% reduction of total energy consumption compared to FY1990	△	
20	The Japanese Electric Wire and Cable Makers' Association (copper, aluminum)	57.5	43.0	41.3	57.5	0% reduction of total energy consumption compared to FY1990	○	
21	Flat Glass Manufacturers Association	71.4	53.3	-	60.9	15% reduction of total energy consumption compared to FY1990	○	
22	Japan Textile Finishers Association	164.3	112.7	107.2	111.6	32% reduction of total energy consumption compared to FY1990	○	
23	Japan Glass Bottle Association	66.38	44.42	43.50	56.72	10% reduction of total energy consumption compared to FY1990	○	

3. CO2 intensity

No.	Name of organization	unit	base year	2002 actual values	2010 estimation	2010 reduction target	target	possibility of achieving target	remark on target
24	The Federation of Electric Power Companies of Japan	kg-CO2/kwh	0.421	0.407	-	0.340	20% reduction of CO2 intensity compared to FY1990	△	
25	Four organizations of electronics and electrics	t-CO2/million yen	0.307	0.361	0.256	0.230	25% reduction of CO2 intensity compared to FY1990	▲	
26	The Japan Society of Industrial Machinery Manufacturers	t-CO2/one hundred million	21.6	26.3	26.3	19.0	11.4% reduction of CO2 intensity compared to FY1997	△	base year is 1997
27	The Japan Bearing Industrial Association	t-CO2/one hundred million	86.6	97.6	76.1	75.3	13% reduction of CO2 intensity compared to FY1997	△	base year is 1997

4. CO2 emissions (ten thousand ton-CO2)

No.	Name of organization	base year	2002 actual values	2010 estimation	2010 reduction target	target	possibility of achieving target	remark on target
28	The Japan Gas Association	116.0	84.0	-	73.0	37% reduction of total emissions of CO2 compared to FY1990	○	
29	The Japan Rubber Manufacturers Association	184.4	189.4	161.8	184.4	0% reduction of total emissions of CO2 compared to FY1990	○	
30	Japan Textile Finishers Association	391.4	253.2	228.5	246.7	37% reduction of total emissions of CO2 compared to FY1990	○	
31	Japan Glass Bottle Association	179.2	111.7	106.3	140.6	10% reduction of total emissions of CO2 compared to FY1990	○	
32	Japan Auto Parts Industries Association	725.3	721.2	721.2	674.4	7% reduction of total emissions of CO2 compared to FY1990	△	
33	Japan Auto-Body Industries Association	92.6	95.1	70.1	83.3	10% reduction of total emissions of CO2 compared to FY1990	○	
34	Japan Automobile Manufacturers Association	759.0	595.0	727.0	683.0	10% reduction of total emissions of CO2 compared to FY1990	△	

○: industry, which stated that the achievement of the target is possible
△: industry, which stated that they will make efforts to achieve the target
▲: industry, which stated that the target will be difficult to achieve or unsure

(Note) In converting the voluntary action plan to energy consumption original units, note that it is not always strictly reflected because the target of the voluntary action plan is not always energy consumption original units and because the boundaries are different between the voluntary action plan and the prospects.

○ Promotion of the introduction of energy efficiency and conservation facilities, promotion of the diffusion of energy efficiency and conservation technologies

- Promotion of the introduction of energy efficiency and conservation facilities and the promotion of the diffusion of energy efficiency and conservation technologies are being worked on by supporting financial enterprises for the introduction of high performance industrial furnaces and through support for the diffusion of high performance boilers and high performance lasers.
- As for the promotion of the introduction of high performance furnaces, about 960 furnaces (for small and middle sized enterprises) in total will be introduced in 2010 on the basis of the effects of the previous supporting action.
- As for the diffusion of high performance boilers, under the assumption that the recent trend of accelerated introduction, due to the progress of measures that will continue, about 16,000 boilers (diffusion rate is about 30%) are estimated for introduction by 2010. Among them, estimates for introduction by small and medium sized enterprises are in the range of 11,000.
- As for the diffusion of high performance lasers, about 1,300 lasers are estimated for introduction to large enterprises.
- The energy consumption per industrial activity (IIP) is expected to improve through measures for the promotion of the introduction of energy efficiency and conservation facilities and for promotion of the diffusion of energy efficiency and conservation technologies.

The energy consumption per industrial activity (IIP) in 2010 will improve by 0.4% due to the promotion of the introduction of energy efficiency and conservation facilities and the promotion of the diffusion of energy efficiency

Note) The energy consumption per industrial activity (IIP) will increase by 0.4% in 2010 by promotion of the introduction of energy efficiency and conservation facilities compared to a case without measures.

A-2 Industry sector (three gases, including fluorocarbon substitutes (HFC, PFC,SF_6))

- In order to reduce three gases, including fluorocarbon substitutes (HFC, PFC, SF_6), in the industry sector, projects such as the development and diffusion of substitution materials, development of appliances of low leakage, and recovery and decomposition of HFCs have been pursued.
- The effects of the measures can be evaluated as a reduction of emissions per production of a product, reduction of emissions per lifecycle of a product, and reduction of emissions per disposal of product because these work to reduce the three gases, including fluorocarbon substitutes. Effects are realized during manufacturing appliances or products, during usage and at the disposal.
- As a result of evaluation of progress of the measures at the subcommittee for measures toward preventing global warming under the chemistry and biology taskforce of the Industrial Structure Council, it was concluded that "the probability of achievement of the defined targets in the new Climate Change Policy Program (suppress to +2% compared to total emissions in the base year) will increase in the field of the three gases, which include fluorocarbon substitutes, if the current measures are continuously executed. This is because the measures for suppressing emissions in industries that use the three gases, including fluorocarbon substitutes, have remarkably succeeded."

[Evaluation of individual measures]

○ Substantial effects, especially in the case current measures are executed, of the improvements since 1995 (the base year for three gases including fluorocarbon substitutes under the Kyoto Protocol) are expected by 2010, as a result of the measures for suppressing emissions in the industry sector.

Tab.3-2. The effects of intensity improvement of the reduction of emissions of three gases including fluorocarbon substitutes.

	intensity	evaluation	effects of intensity improvement
manufacturing HFC etc.	emissions of HFC (t) / production (t) of HFC	change of gas production process. Intensity increased remarkably because of installation and operation of HFC23 destruction furnaces	-64.7
foaming and insulation material	amount of fluorocarbon used for foam (mol converted ton) / production of insulation (t)	intensity tends to increase because of non-fluorocarbon insulation in market. Potential for further measures in the future	-28.3
aerosol etc.	amount of HFC used for spray (CO2 converted ton) / production of aerosol products (t)	intensity tends to increase because of the diffusion of low GWP products (HFC-152a)	-28.0
cooler air-conditioners	(emissions of refrigerant fluorocarbons (t) x reduction rate of sealed fluorocarbons (%) / use, stock, or disposal of refrigerant fluorocarbons (t)) x average of lifecycle	recovery of fluorocarbons started based on each law and actual recovery, which has increased substantially since the first fiscal year (FY2002) of the implementation of the law.	-21.9
cleaners and solvents	emissions of cleaners (CO2 converted thousand ton) / amount of production (thousand million yen)	reduction of emissions by non-cleaning processes and substitution to of low GWP substances	-18.2
semiconductor manufacturing	emissions of etching gas or CVD cleaning gas (CO2 converted thousand tons) / amount of production (thousand million	the emission intensity steadily improved on the base number of integrated circuits and area of liquid crystals	19.6
insulated gas devices	(emissions of SF6 (t) / recovering target amount of SF6) x weighted average of lifecycle	emission intensity remarkably improved because of installation of recovery instruments by heavy electric appliance companies and electric power companies.	-81.6
metal products	emissions of SF6 (t) / dissolved amount of magnesium (t)	intensity have improved to the half level of that in 2001. further measures for SF6 is expected in the future	-37.0

A-3 Industry Sector (non-energy derived CO_2, CH_4, N_2O))

- In order to reduce emissions of non-energy derived CO2, CH4, and N2O, measures to control CO2 emissions from industrial processes and decomposition of N2O are being worked on in the industry sector.
- The effects of measures can be evaluated as reduction of emissions per production unit because such work can reduce the emissions of CO2 and N2O from manufacturing processes.
- Evaluation of the measures' progress shows that it is expected that the emission intensity can be improved by each measure.

[Evaluation of individual measures]

○ Diffusion of the use of mixed cement from production processes with lower emissions of CO_2.

- CO_2 is emitted from the production process of cement due to the decomposition of the limestone used as raw material in cement manufacturing.
- In accordance with the measure, CO_2 emissions from the production process can be reduced by using mixed cement from a production process with lower CO_2 emissions.
- It is estimated that CO_2 emissions for cement production can be reduced by about 3%, considering the past increasing ratio of production of mixed cement.
- It is expected that the production ratio of mixed cement will increase further by being used with priority as one of the specified items for procurement defined by “the basic policy on promotion of procurement of environment friendly items.” It is necessary to note that there are uncertain factors such as the demand trend of export items abroad.

○ Installation of a N_2O decomposer in the adipic acid manufacturing process

- During the manufacturing process of adipic acid, N_2O is emitted.
- In accordance with measure, N2O emissions, which originate from the manufacturing process of adipic acid, shall be reduced by installing a N2O decomposer in the manufacturing process.
- A decomposer has already been installed and is operated by the voluntary work by enterprises, and a substantial amount of emissions reduction has been achieved compared to the base year. It is expected that more than 90% of N2O emissions, for production of adipic acid, can be reduced.

B. Domestic sector (residential sector/commercial sector)

B-1 Residential sector

- In order to reduce CO2 emissions from energy resorces in the residential sector, improvement of energy consumption efficiency of household electric appliances, improvement of the performance of thermal insulation of houses, and promotion of energy control by households are being conducted.
- The effect of the measures can be evaluated by the improvement of energy consumption per household, as such works can improve efficiency of energy use in each home.
- As a result of evaluating the progress of each measure, it is estimated that the energy consumption per household in 2010 will improve by 12.3% compared to a case without measures.

[Evaluation of individual measures]

○ Improvement of efficiency of devices by the top-runner standard

- The improvement of efficiency of energy consumption of residential electric appliances and OA devices, on a shipment base, are set by the top-runner standard.

Tab.3-3. The effect of improvement of energy consumption efficiency of main appliances (average of appliances shipped in the target fiscal year)

Appliance	Effect of improvement	Appliance	Effect of improvement
Air conditioner	about -63%	Refrigerator	about -30%
Television	about -16%	Personal computer	about -83%

(source：Report of the Energy Efficiency Standards Subcommittee, Advisory Committee for Natural Resources and Energy)

- The top-runner targeted appliances, which are newly manufactured or imported, have achieved the top-runner standard steadily and it is estimated that the standard will continue to be achieved through 2010.
- It is expected that the holding efficiency of main appliances (energy consumption per main appliance that is possessed by the residential sector) in FY 2010 will improve, as follows, through diffusion and being substituted by appliances that meet top-runner standards in households.

Tab.3-4. The effect of improvements of holding efficiency of main appliances (energy consumption per main appliance)

Appliance	Effect of improvement	Appliance	Effect of improvement
Air conditioner	-36%	Refrigerator	-72%
Television	-17%	Personal computer	-30%

(source: from each document estimation by the Agency of Natural Resources and Energy comparison with FY2000 and FY2010)

- As a result, it is expected that energy consumption per household in 2010 will be improved as follows:

Energy consumption per household in FY2010 will improve by 4.9% through the top-runner standard.

Note) Energy consumption per household in the FY2010 will improve by 4.9% through the top-runner standard compared to a case without measures.

○ Reduction of stand-by mode's power consumption

- It is set that the power consumption of stand-by mode shall be less than 1W for appliances that need power in stand-by mode such as timers, and shall be zero as much as possible for other appliances (voluntary work by the association of the industry).
- It is expected that the reduction target of power consumption of stand-by mode for audio devices and televisions will be achieved by the end of the FY2003. In addition, the target for air-conditioners is expected to be achieved.
- The power consumption of stand-by mode for main appliances in households is estimated to be reduced as follows by diffusion these appliances in households.

Tab.3-5. Reduction of power consumption of stand-by mode on the basis of holding main appliances in households in 2010

	Maintain current situation	Achievement of reduction target
Television	1.3W	0.4W (-70%)
Audio appliances	6.48W	0.58W (-91%)

(source：made on the basis of the investigations made by Japan Electronics and Information Technology Industries Association, The Japan Electrical Manufacturers' Association, The Japan Refrigeration and Air Conditioning Industry Association)

- As a result, energy consumption per household in 2010 is expected to be improved as follows:

Energy consumption per household in 2010 will be improved by 0.6% through the reduction of power consumption of stand-by mode.

Note） Energy consumption per household in 2010 will be improved by 0.6% through the reduction of power consumption of stand-by mode compared to a case without measures.

○ Improvement of the efficiency of thermal insulation of houses

・ Standards of the performances of energy efficiency and conservation for new construction are defined.

・ The ratio of the conformed houses for the energy efficiency and conservation standards of 1999 over total new construction in 2002 was 21.5%. It is expected that the energy efficiency and conservation performance of whole houses will be improved as follows, by the increase of such houses to the target of 50% by 2008.

【The effect of improvement of energy efficiency and conservation performance coefficient of houses with thermal insulation】

Energy efficiency and conservation performance coefficient FY2000 0.914 → FY2010 0.823（-10%）

※The energy efficiency and conservation performance coefficient is the index that indicates energy efficiency and conservation performance (thermal insulation efficiency) of houses on a stock base.

・ As a result, energy consumption per household in 2010 is estimated to be improved as follows:

Energy consumption per household in 2010 will be improved by 4.1% through improvement of thermal insulation efficiency of houses.

Note）Energy consumption per household in 2010 will be improved by 4.1% through improvement of thermal insulation efficiency of houses comparing with the case without measures.

○ Diffusion of high efficiency water heaters

・ Energy consumption of water heaters has improved by about 15 - 30% through water heaters with high energy efficiency such as heat pumps, latent heat recovering water heaters, and gas engine water heaters.

・ In order to promote the introduction of high efficiency water heaters supporting action has been implemented since 2002.

・ The introduction of water heaters has been accelerated since 2002 and about 150 thousand heaters have been used. It is estimated that the diffusion of water heaters will be accelerated and more than three million water heaters will be used in 2010.

・ As a result, energy consumption per household is expected to be improved as follows:

Energy consumption per household in 2010 will be improved by 1.6% due to the diffusion of high efficiency water heaters.

Note） Energy consumption per household in 2010 will be improved by 1.6% due to the diffusion of high efficiency water heaters, compared to a case without measures.

○ <u>Diffusion of high efficiency lights</u>

・ The power consumption of high efficiency lights (white LED) per unit brightness is reduced to about 50% of that of fluorescent lights.
・ In accordance with the measure, technological development is supported in order to promote high efficiency lights.
・ Up until this point, they have been promoted in traffic signals and indirect lights and the prices are decreasing. Substantial use in commercial lightening devices is expected during/after this year. According to estimations by the business associations, about 10% of shipped lights in 2010 will be high efficiency lights.
・ As a result, energy consumption per household in 2010 is estimated to improve by 0.3%.

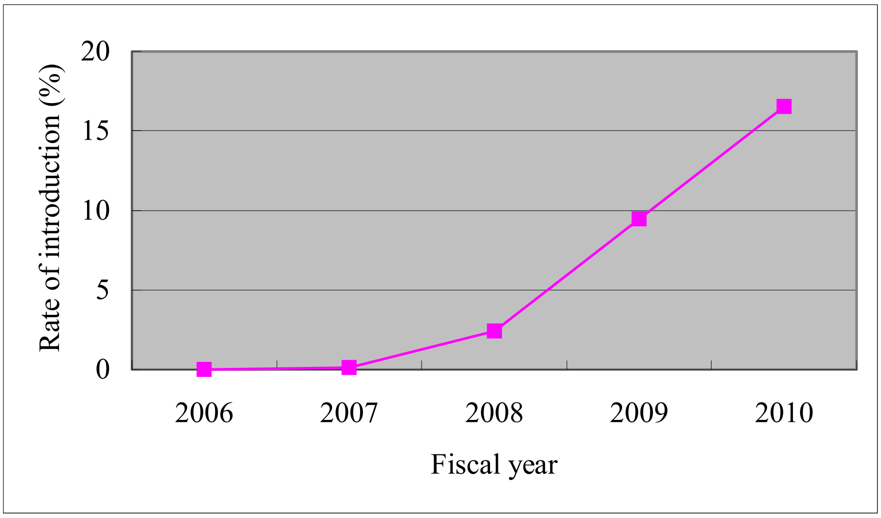
Energy consumption per household in 2010 will be improved by 0.3% due to the diffusion of high efficiency lights.

Note） Energy consumption per household in 2010 will be improved by 0.3% due to the diffusion of high efficiency lights compared to a case without measures.

<u>Diffusion of HEMS (Home Energy Management System)</u>

・ HEMS is a system that controls and optimizes energy consumption of main appliances in a household. The system encourages energy cost conscious nations by indicating the amount of energy used as a cost using IT technology. About 10% of energy efficiency and conservation effects are obtained by introducing HEMS.
・ In order to promote prevailing HEMS, validation tests have been done since 2001.
・ Although this is not substantially prevailing at this time, the introduction of

it will progress after 2006 and it is expected that penetration will reach about 17% by 2010.



(Source: Estimated by the Agency for Resource and Energy using various materials)

Fig.3-1. Prospects of introducing of HEMS if the current measures continues

- As a result, it is expected that energy consumption per household will be improved as follows.

Energy consumption per household in 2010 will be improved by 0.8% due to the diffusion of HEMS

Note) Energy consumption per household in 2010 will be improved by 0.8% due to the diffusion of HEMS compared to a case without measures.

B-2 Commercial sector

- In order to reduce energy derived CO2 emissions in the commercial sector, improvement of energy consumption efficiency of OA devices, improvement of the performance of thermal insulation of buildings, promotion of energy control are being worked on.
- The effect of the measures can be evaluated as the improvement of energy consumption per floor space, because such work can improve energy use efficiency in the commercial sector.
- As a result of evaluating the progress of each measure, it is estimated that the energy consumption per floor space in 2010 will improve by 12.7% compared to a case without measures.

[Evaluation of individual measures]

○ <u>Improvement of efficiency of devices by the top-runner standard</u>

- The improvement of the energy consumption efficiency of household electric appliances and OA devices, on a shipment base, are set by the top-runner standard.

Tab.3-6. The effect of the improvement of energy consumption efficiency of main appliances (average of appliances shipped in the target fiscal year)

Appliance	Effect of improvement	Appliance	Effect of improvement	Appliance	Effect of improvement
Refrigerator	about-30%	Television	about -16.4%	Photo-copying Machine	about -30%
Personal computer	about-83%	Vending machine	about -33.9%		

(source: Report of the Energy Efficiency Standards Subcommittee, Advisory Committee for Natural Resources and Energy)

- The top-runner targeted appliances that are newly manufactured or imported have steadily achieved the top-runner standard, and it is estimated that the standard will continuously be achieved through 2010.
- It is expected that holding efficiency of main appliances (energy consumption per main appliance that is possessed by the commercial sector) in FY2010 will improve, as follows, by diffusion and substitution by appliances that meet top-runner standards in the commercial sector.

Tab.3-7. The effects of the improvement of holding efficiency of main appliances (energy consumption per main appliance)

Appliance	Effect of improvement	Appliance	Effect of improvement	Appliance	Effect of improvement
Refrigerator	-25%	Television	-16%	Photo-copying machine	-22%
Personal computer	-30%	Vending machine	-30%		

(source: from each document、 estimation by the Agency of Natural Resources and Energy, comparison of FY2000 and FY2010)

・ As a result, it is expected that energy consumption per floor space in 2010 will be improved as follows:

Energy consumption per floor space of the commercial sector in FY2010 will improve by 3.3% through the top-runner standard.

Note） Energy consumption per floor space of the commercial sector in FY2010 will improve by 3.3% through the top-runner standard compared to a case without measures.

○ Improvement of energy efficiency and conservation performances of buildings

・ Standards of the performances of energy efficiency and conservation for new construction are defined.

・ The ratio of conformed buildings for the energy efficiency and conservation standards of 1999 over total new construction in 2003 was about 65% because the ratio began to increase since the start of managing the notification scheme of large buildings described in the amended energy efficiency and conservation law. It is expected that the energy efficiency and conservation performance of whole buildings will be improved as follows by increasing such houses to the target of 80% by 2008.

[The effects of the improvement of energy efficiency and conservation performance coefficient of houses with thermal insulation]

Energy efficiency and conservation performance coefficient FY2000 0.985 → FY2010 0.881 (-11%)

＊ The energy efficiency and conservation performance coefficient is the index that indicates energy efficiency and conservation performances (thermal insulation efficiency) of buildings on a stock base.

・ As a result, energy consumption per floor space in 2010 is estimated to be improved as follows:

Energy consumption per floor space in 2010 will improve by 6.6% through improvement of thermal insulation efficiency of buildings.

Note) Energy consumption per floor space in 2010 will be improved by 6.6% through improvement of thermal insulation efficiency of buildings compared to a case without current measures.

○ Diffusion of high efficiency water heaters

・ Energy consumption of water heaters has improved by about 15 - 30% through water heaters with high energy efficiency such as heat pumps, latent heat recovering water heaters and gas engine water heaters.

- In order to promote the introduction of high efficiency water heaters supporting action has been implemented since 2002.
- It is estimated that the diffusion of water heaters will be accelerated and more than three million water heaters will be used in 2010.
- As a result, energy consumption per floor space in the commercial sector is expected to be improved as follows.

Energy consumption per floor space in the commercial sector in 2010 will be improved by 0.01% due to the diffusion of high efficiency water heaters.

Note) The energy consumption per floor space in the commercial sector in 2010 will be improved by 0.01% due to the diffusion of high efficiency water heaters compared to a case without current measures.

○ Diffusion of high efficiency lights

- The power consumption of high efficiency lights (white LED) per unit brightness is reduced to about 50% of that of fluorescent lights.
- In accordance with the measure, technological development is supported in order to promote high efficiency lights.
- Up until this point, they have been promoted in traffic signals and indirect lights and the prices have been decreasing. Substantial use in commercial lightening devices is expected during/after this year. According to estimations by the business associations, about 10% of shipped lights in 2010 will be high efficiency lights.
- As a result, energy consumption per floor space in the commercial sector in 2010 is estimated to be improved by 0.3%.

Energy consumption per floor space in the commercial sector in 2010 will be improved by 0.5% due to the diffusion of high efficiency lights.

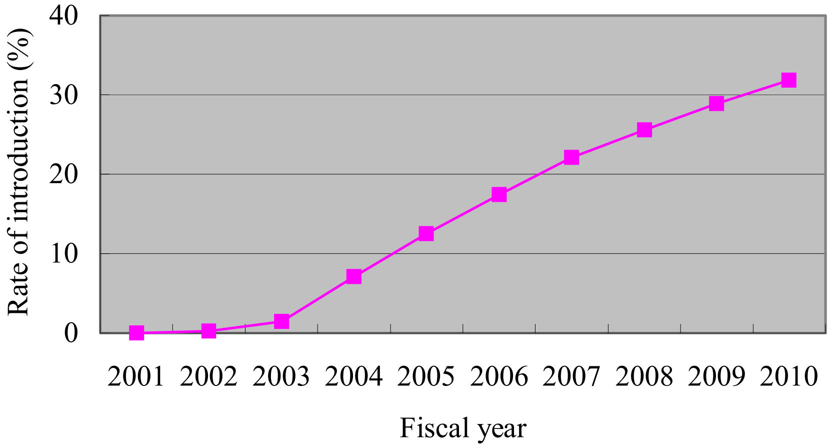
Note) Energy consumption per floor space in the commercial sector in 2010 will be improved by 0.5% due to the diffusion of high efficiency lights compared to a case without current measures

○ Diffusion of BEMS (Building Energy Management System)

- BEMS is a system that appropriately and smoothly controls energy consumption in business buildings by using IT technologies. About 10% of energy efficiency and conservation effects are obtained by introducing BEMS.

・ In order to promote prevailing BEMS, it was inserted in the measure as an action to be worked on with a plan that included the standards of judging plants and places of business under the energy efficiency and conservation law in April 2003. In addition, the measure has supported such introductions since FY2002.

・ Estimating the prevalence ratio of BEMS from the effects of reduction of energy cost by introduction of BEMS, it is expected that the introduction of BEMS will progress and that prevalence ratio will exceed 30% in 2010.



(Source: Estimated by the Agency for Natural Resources and Energy using various materials)

Fig.3-2. Prospect of introducing of BEMS per floor space if current measures continue

・ As a result, it is expected that energy consumption per floor space in the commercial sector will be improved as follows:

Energy consumption per floor space in the business sector in 2010 will be improved by 2.3% due to the diffusion of BEMS.

Note) Energy consumption per floor space in the commercial sector in 2010 will be improved by 2.3% due to the diffusion of BEMS compared to a case without current measures.

C. Transport sector

- In order to reduce energy derived CO2 emissions in the transport sector, improvement in fuel consumption of cars by the top-runner standard, promotion of prevailing clean energy cars, improvement of traffic systems are being worked on.
- The effect of the measures can be evaluated as an improvement in fuel consumption per transport volume, because such work improves energy use efficiency in the transport sector.
- As the result of a progress evaluation of each measure, it is expected that energy consumption per transport volume in FY2010 will be improved by 13.8% in the passenger sector and by 14.4% in the freight sector compared to a case without measures.

[Evaluation of individual measures]

○ Improvement in fuel consumption of a car by the top-runner standard

- The improvements in fuel consumption, on a shipment base, are set by the top-runner standard.

Tab. 3-8. The effects of the improvement in fuel consumption of cars (average of cars shipped in the target fiscal year)

	Effect of improvement		Effect of improvement
Passenger cars（gasoline）	about -23%	Passenger car（diesel）	about -15%
Freight car（gasoline）	about - 13%	Freight car（diesel）	about -7%

(sources: documents saved in the energy efficiency and conservation center, comparison of the base fiscal year of each category with the target fiscal year)

- Top-runner targeted cars, which are newly manufactured or imported, have achieved the top-runner standard, and it is estimated that the standard will continuously be achieved through 2010.
- It is expected that the average fuel consumption of all cars held in Japan in FY2010 will improve as follows by the diffusion and substitution of cars that meet the top-runner standards in households.

Tab3-9. Improvements in fuel consumption of holding cars

	Effects of improvements		Effects of improvements
Passenger cars（gasoline）	about -13.5%	Passenger car（diesel）	about-3.2%
Freight car（gasoline）	about -5.2%	Freight car（diesel）	about-3.9%

(source: from each document、 estimation by the Agency of Natural Resources and Energy。 comparison of FY2000 and FY2010)

- As a result, it is expected that energy consumption per transport volume in

2010 will be improved as follows:

Energy consumption per transport volume in FY2010 will improve by 9.6% (passenger sector) and 4.0% (freight sector) through the top-runner standard.

Note) Energy consumption per transport volume in FY2010 will improve by 9.6% (passenger sector) and 4.0% (freight sector) through the top-runner standard compared to a case without current measures.

○ Promotion of the diffusion of clean energy cars

- In accordance with the measure, in order to promote the diffusion of clean energy cars such as electric cars, hybrid cars, and natural gas cars, supporting actions such as financial supporting schemes and tax exemption are being pursued.
- At present, about 130 thousand cars are used, and it is expected that about 1.9 million cars will be used by steadily executing the measures.
- As a result, it is expected that energy consumption per transport volume in 2010 will be improved as follows:

Energy consumption per transport volume in the transport sector will be improved by 0.6% (passenger sector) and by 0.3% (freight sector) due to the prevalence of clean energy cars.

Note) Energy consumption per transport volume in the transport sector will be improved by 0.6% (passenger sector) and by 0.3% (freight sector) due to the prevalence of clean energy cars compared to a case without current measures.

○ Measures for energy efficiency and conservation related to traffic systems

- In the measure, energy efficiency and conservation is promoted by not only the energy efficiency and conservation of a car itself but also by the improvement of traffic systems such as smooth traffic and efficient logistics.
- As a result, it is expected that energy consumption per transport volume in 2010 will be improved as follows.

Energy consumption per transport volume in the transport sector will be improved by 3.6% (passenger sector) and by 010.1% (freight sector) by the improvement of traffic systems

Note 1) Energy consumption per transport volume in the transport sector will be improved by 3.6% (passenger sector) and by 010.1% (freight sector) by

the improvement of traffic systems compared to a case without current measures.

Note 2) The breakdown of passengers and freight in energy efficiency and conservation is estimated on a certain assumption on the basis of the contents of measures such as ITS, idling-stop, efficient transport by trucks that is positioned as a measure for energy efficiency and conservation relating to traffic systems.

D Innovative technology for measures regarding global warming

- As for innovative technology for the environment and energy (hereinafter referred to as innovative technology for measures regarding global warming), the technological developments of energy conversion technology, fundamental technology to improve energy efficiency of products and the process and system technology that improves energy efficiency of manufacturing processes are being enhanced and efforts toward the introduction and diffusion of the results of the technological development have been executed in order to ensure maximum results by 2010.
- The progress of the innovative technology for countermeasures for global warming was evaluated by Follow-Up Working Group for Innovative Technology for Measures Regarding Global Warming, Research and Development Subcommittee of Industrial Science Technology Policy Committee, Industrial Structure Council. It was shown that it is hard to expect the effects of CO2 emissions reduction in 2010 for some themes, but that each technological development will smoothly progress.
- As a result, the following effects of intensity improvement are expected in industry sector, domestic sector (household/business) and transport sector.
  ① In the industry sector, in addition to other measures, the energy consumption per industrial activity (IIP) in 2010 will be improved by 0.8% by the innovative technology for measures regarding global warming.
  ② In the residential sector, in addition to other measures, the energy consumption per household in 2010 will be improved by 1.1% by the innovative technology for measures regarding global warming.
  ③ In the domestic sector, in addition to other measures, the energy consumption per floor space in 2010 will be improved by 0.8% by the innovative technology for measures regarding global warming.
  ④ In the business sector, in addition to other measures, the energy consumption per transport volume in 2010 will be improved by 0.3% in the passenger sector and by 0.2% in the freight sector by the innovative technology for measures regarding global warming.
- Moreover, there are technologies for measures toward long-term warming trends that effect the reduction of CO_2 emissions, which can be expected by 2030. Most of them are in the basic stage of development and it is necessary to continue to consider them on the basis of the research of future technological seeds.

D-1 Innovative technologies for countermeasures for global warming- Industry sector

○ As for the effects in the industry sector, the following effects are expected by the contribution of 18 technologies such as the iron manufacturing process that reduces CO_2 emissions due to the improvement of the sintering process.

Tab.3-10. Innovative technological development and the effects of energy efficiency and conservation in the industry sector

Theme	reduction of CO2 emissions (ten thousand tons-CO2/year)	Saved energy (PJ)
Industry sector total	**470**	**62**
technology for power generation by small temperature differences using latent heat of thermoelectric conversion	7.0	2.0
development of natural gas adsorption material	0.2	0.0
technology for energy networking using low power loss	17.9	5.2
air-conditioning system using latent heat of novel medium	0.3	0.0
development of steel material that can control the performance of lubrication	1.5	0.4
technology for joining energy saving type steel structures	4.0	0.7
direct recovery system for zinc from electric furnaces for steel manufacture	12.9	1.9
iron manufacturing for CO2 reduction by improvement of sintering process	207.0	19.2
high quality refining and processing technology for recycled aluminum	1.7	0.2
chemical process related technologies	114.1	14.5
technology for electrolysis of salt using gas diffusion	19.3	5.7
internal thermal exchange type distillation technology	3.1	0.4
manufacturing process of resin a product that omits pellet	2.7	0.8
high temperature air combustion control technology	52.1	6.1
cleaning process of electronic device manufacturing using a SF6 substitute gas	1.7	0.5
technology for manufacturing activated carbon from combustible disposals	5.5	0.8
manufacturing of circuit boards by ink jet method	8.7	2.5
technology for advanced process of manufacturing magnesium alloy without SF6	10.0	1.5

(source: prepared from the report of the follow-up working group for innovative technologies for measures regarding global warming on May 19th of March, 2004)

Note 1) The amount of energy efficiency and conservation for each theme was estimated from the documents of the follow-up working group for innovative technology for measures regarding global warming. Here, if the effects of reduction by one theme are expected in more than one sector, the amount of energy efficiency and conservation was distributed to each sector.

Note 2) Here, other than the industry, domestic, and transport sectors, reduction of about 270 thousand tons-CO2 (7PJ) are expected in the energy conversion sector.

D-2 (1) Innovative technologies for measures regarding global warming - Domestic (household) sector

○ The effects in the residential sector, the following effects are expected by the contribution of four technologies such as display related technology.

Tab3-11. The innovative technological development and the effect of energy efficiency and conservation in the residential sector

theme	CO2 reductions (ten thousand t-CO2/year)	saved energy (PJ)
total of the commercial household sector	**93**	**27**
development of low power LSI for information terminals	0.1	0.0
energy saving technology for building and houses using high function materials for houses applying photocatalysts	15.2	4.4
display related technologies	51.9	15.1
development of organic materials for low power consumption type optical networks	25.7	7.5

(source: prepared from the interim report of the follow-up working group for innovative technologies for measures addressing global warming on the 19th of March, 2004)

Note) The amount of energy efficiency and conservation for each theme was estimated from the documents of the follow-up working group for innovative technology for measures regarding global warming. Here if the effect of reduction by one theme is expected in more than one sector, the amount of energy efficiency and conservation was distributed to each sector.

D-2 (2) Innovative technologies for measures regarding global warming - Domestic (business) sector

○ As for the effects in the commercial sector, the following effects are expected by the contribution of five technologies such as display related technology and energy networking technology.

Tab3-12. The innovative technological development and the effect of energy efficiency and conservation in the commercial sector

theme	CO2 reduction (ten thousand t-CO2/year)	saved energy (PJ)
total of the commercial business sector	**76**	**22**
technology for energy networking using low power loss	16.1	4.7
air-conditioning system using latent heat of novel medium	12.3	4.7
energy saving technology for building and houses using high function materials for houses applying photocatalysts	5.9	1.7
display related technologies	26.1	7.6
project of developing technology for laminated memory chips	15.9	4.6

(source: prepared from the interim report of the follow-up working group for innovative technologies for measures regarding global warming on the 19th of March, 2004)

Note) The amount of energy efficiency and conservation for each theme was estimated from the documents of the follow-up working group for innovative technology for measures regarding global warming. Here if the effect of reduction by one theme is expected in more than one sector, the amount of energy efficiency and conservation was distributed to each sector.

D-3 Innovative technologies for measures regarding global warming－Transport sector

○ As for the effects in the transport sector, the following effects are expected by the contribution of four technologies such as the technology for light weight cars.

Tab3-13. The innovative technological development and the effect of energy efficiency and conservation in the transport sector

theme	CO2 reduction (ten thousand t-CO2/year)	saved energy (PJ)
total of the commercial business sector	**83**	**12**
technology for energy networking using low power loss	0.7	0.2
technology for light weight cars	55.1	8.0
development of steel material that can control the performance of lubrication	26.0	3.8
technology for the advanced process of manufacturing magnesium alloy without SF6	1.4	0.4

(source: prepared from the interim report of the follow-up working group for innovative technologies for measures regarding global warming on the 19th of March, 2004)

Note) The amount of energy efficiency and conservation for each theme was estimated from the documents of the follow-up working group for innovative technology for measures addressing global warming. Here if the effect of reduction by one theme is expected in more than one sector, the amount of energy efficiency and conservation was distributed to each sector.

E. Activities for preventing global warming by nations for each field and level (national efforts) innovative technology for measure for global warming sector

○ In the new Climate Change Policy Program, the measures to be promoted by prevalence and enlightenment through information provided by the government, public information activities and education and future work, which is to be realized by special efforts of nations for each field and level, are positioned as “activities for preventing global warming by nations for each field and level” (hereinafter referred to as national efforts), and it aims at a 2% reduction of emissions compared with total emissions of the base year together with the innovative technological development.

[Examples of national efforts]

- Raising the cooling temperature to 28 degrees, lowering the heating temperature to 20 degrees
- All family relaxes in a same room to reduce the use of heaters and lights.
- Ecological driving

○ The environmental committee concluded that it was difficult to evaluate the effect of national efforts. In addition, the Industrial Structure Council has not yet evaluated it.

2) Evaluation of measures in the supplying sectors

(a) New energies

- In the current Program, the reduction goal of CO2 emissions through 2010 is about 34 million tons-CO2, through introducing new energies totaling 19.1 million kl.
- As for the power generation sector, it is expected that the soundness of the achievement of the target can be increased by smoothly implementing the RPS law, which came into effect in April 2003, accelerating technological development such as solar power generation, enhancement and supplement of the current measures such as measures for the systematic link of wind power generation and regulation and coordination of sites.
- As for the heat sector, introduction does not always progress smoothly in some fields. If additional measures are not adopted to accelerate introduction, the target, of roughly 3.5 million kl, probably will not be achieved.
- The estimation of the introduction of these new energies, power generation and heat is 15.38 million kl.
- Therefore the introduction target of 19.1 million kl cannot be achieved by 3.72 million kl, and additional measures are necessary to achieve the target.

(b) Nuclear, electric power

- In the case of nuclear, it is difficult to achieve the target of increasing power generation through increasing nuclear, by about 30% compared to FY2000, due the delay in construction of new nuclear plants must be taken into account.
- As for the CO_2 emission intensity in the electric power sector, the target described in the "Environmental action plan by electricity enterprises" (the Federation of Electric Power Companies of Japan) is to decrease end-user CO_2 emission intensity by about 20% in 2010 compared to FY1990 (decrease to the level of 0.34kg-CO_2/kwh)
- On the other hand, estimating the CO2 emission intensity in 2010, by taking into account the additional operation of four nuclear plants under construction and the installation of facilities and operation plan by the electric power companies. The amount of improvement compared with that of 1990 is 0.36 kg-ＣＯ2/kWh, which corresponds to 15%.

(6) The viewpoint on activities and the outlook

○ Considering that the emission of greenhouse gases is obtained by multiplying the intensity of emission of greenhouse gases by economic activities, when taking into account common indices, it is necessary to set reasonable and transparent outlook of economic activity in all sectors including industry, domestic (household, business and others), and transport for 2010.

[common indices]

・ Population and working population

—It is assumed that it will decrease after peaking in 2006 (working population peaked in FY1997), on the basis of "statistics of medium variant" summarized by the National Institute of Population and Social Security Research.

・ Energy prices

—It is assumed that it will change stably from FY2000 to FY2010 by referencing the estimates of the IEA, Department of Energy and the United States of America.

・ Economic growth rate

—It is assumed that the real GDP growth rate will fluctuate around 2% on the basis of the estimates provided in the "Mid-term prospect of structural reform, economy, and finance" (decided by cabinet meeting on the 19th of January, 2003) and its reference materials.

・ Items of final supply and demand

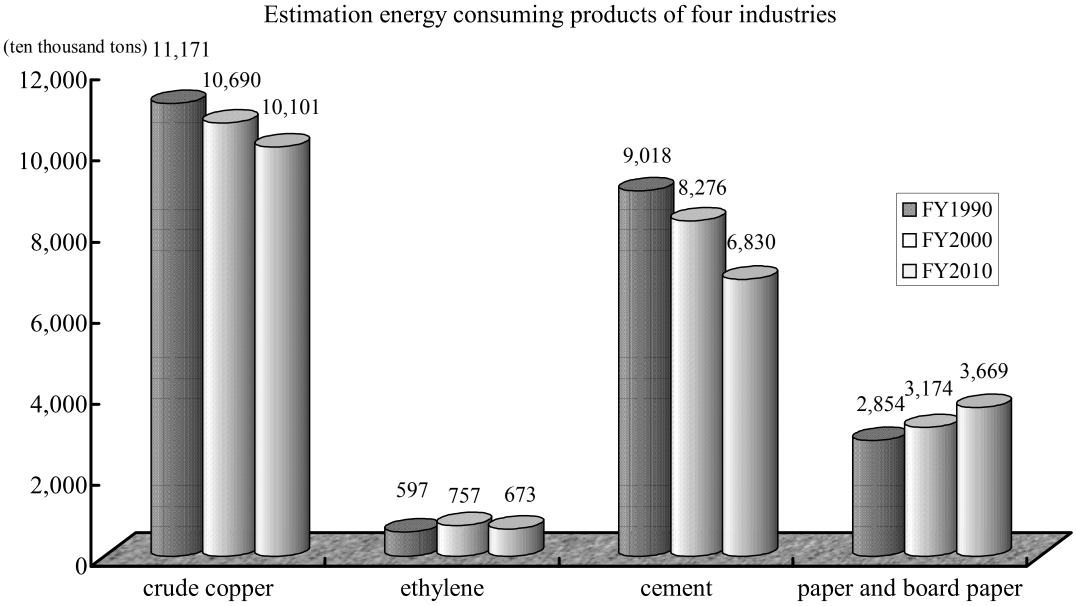
—It is assumed that the economy will grow through the initiatives of civilian demand such as personal consumption and private capital investment in the future. On the other hand, in the public sector, expenditures will be suppressed on the basis of the "Mid-term prospect of structural reform, economy, and finance."

[Industry sector]

・Change of industrial structure

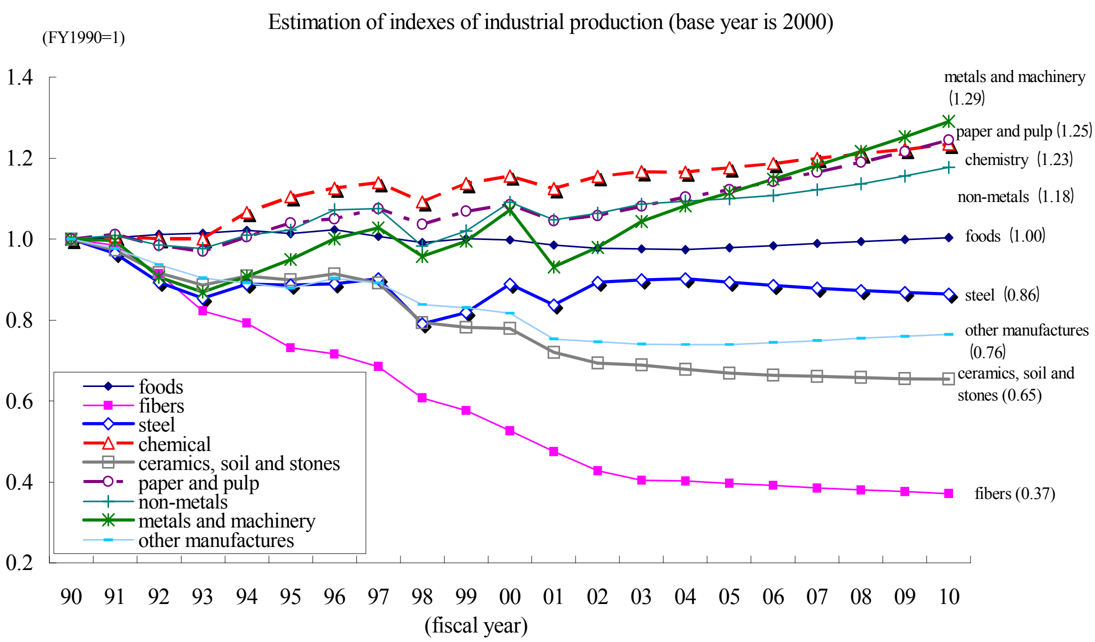
—In the manufacturing industry in general, the shift from material industry to processing and integrating industry will continue, and the activities in the metal and mechanics industry will expand. On the other hand, foreign demand, including China, will underpin the energy consuming industry. The production level will tend to decrease toward 2010 due to the enhancement of production capacity in China and the decrease in domestic demand growth. In addition, adding high value will proceed and the indexes of industry production (IIP) will increase in general.

Fig 3-3.



(1) the value of cement is the sum of the production of "cement for structures" and clinker for export
(2) the value for FY2010 is estimated under a certain assumption and it should be understood within a broad range

Fig.3-4.



Note) the value for FY2010 is estimated under a certain assumption and it should be understood within a broad range

(Source: Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)-, Energy Supply and Demand Subcommittee, Advisory Committee for Natural Resources and Energy, June 2004)

[Domestic/ residential sector]

- The number of households
  - —calculated by using the future population and the "number in a family" estimated by the National Institute of Population and Social Security Research.
  - —The growth of the number of households has stopped due to the decrease in population.
- Lifestyle
  - —The percentage of possessed appliances (the number of appliances possessed by a household) tends to increase, and up-sizing and high value adding will proceed.

[Domestic/ commercial sector]

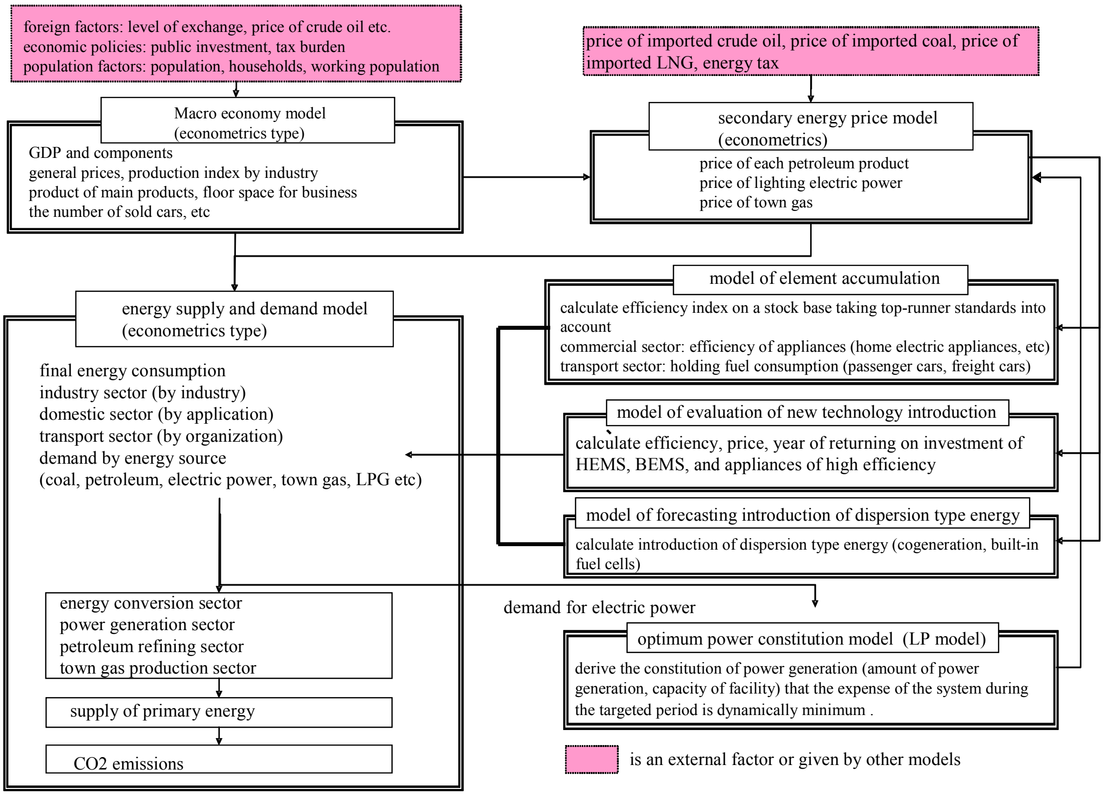
- Floor space
  - —The share of the service sector will extend further in the industrial structure and extends to nearly 60%.
  - —Floor space will increase among buildings used for offices under the background of the expansion of service sector. Medical and welfare related sectors will steadily increase due to aging.

[Transport sector]

- Transport volume
  - —Passenger transport will increase. Freight transport will tend to decrease due to the stoppage of growth in economic activities and efficient logistics.
  - —The number of cars possessed will steadily increase. The number of trucks will decrease due to the stoppage of growth in economic activities and efficient logistics.

[Reference : basic structure of the model]

○CO2 emissions from energy sources



(Source: Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)-, Energy Supply and Demand Subcommittee, the Investigating committee of total resource and energy, June 2004)

○three gases including fluorocarbon substitutes (HPC, PFC, SF6)

economic activities (1) x emission intensity (2) = emissions of HFC, PFC, SF6

(1) economic activities

As there is a certain uncertainty for the market scale of each industry in the future, “high level estimation” and “low level estimation” are estimated under the following assumptions:

(1) GDP growth rate is 3%, and each activity parameter* is maximum (high level estimation)
(2) GDP growth rate is 1%, and each activity parameter is minimum (low level estimation)

*activity parameter: In addition to a change of activities linked with the economic growth rate of the whole country, assumptions are considered for each activity, for example, how much the market scale of fluorine resin of which fluorocarbon is an intermittent material, if the high growth rate of surrounding countries including China is maintained and manufacture for export will continue to increase, if the measure for light-weight cars, which is a measure for energy saving, will be accelerated.

1. From the standpoint of maintaining consistency between the entire government and economical policies, the reason GDP growth rates of 1% and 3% are derived from the actual economic growth rate (average is about 2%) shown in reference material (prepared by Cabinet) of “the mid-term prospective for structural reform and economy and finance,” regarding it as mean value and selecting a value of 1% higher and lower.

(reference) the mid-term prospective for structural reform and economy and finance (advisory committee for economy and finance, February 16, 2004)

(fiscal year)	2003	2004	2005	2006	2007	2008
actual growth rate	2.0%	1.8%	2.0%	2.0%	2.1%	2.1%

2. The method for estimating activity for each sector is estimating market scale in each sector in the future by calculating components such as “capital investment of private companies,” “housing investment in the private sector,” and “final consumption outlay in the private sector” based on the above actual GDP growth rate (low level 1%, high level 3%), and by analyzing the correlation of the component and market scale of each field. (as a result of taking adjustment analysis executed by the sectors into account, the method of estimation is not always united.)

(2) emission intensity

For example, the emission rate of HFC in manufacturing air conditioners for cars or refrigerators for households, recovery rate of SF6 at the check of transformers.

Basically, estimated by summarizing estimations in each sector by the Ministry of Economy, Trade and Industry.

In order to ensure the successiveness of the emissions report (raw data of the inventory that are reported to NFCCC by the Japanese government) submitted to the Global Environmental Subcommittee, chemistry and biology taskforce, Industrial Structure Council every year, consistency with the collection method defined in the IPCC inventory guideline IPCC good practice guidance is adjusted.

*targeted field of emissions estimation of three gases including fluorocarbon substitutes (evaluation of measures)

- manufacturing HFC etc. --- bi-production of HFC-23, HFC manufacturing, PFC manufacturing, PFC manufacturing, SF6 manufacturing
- foam and insulation material --- urethane foam, pushing foam polystyrene, dense foam polystyrene, phenol foam
- aerosol etc. --- aerosol, MDI
- cooler air-conditioner --- cooler air-conditioner for businesses, car sir- conditioner, air-conditioner for household, refrigerator for households
- cleaners and fluxes --- cleaning electronic parts, cleaning semiconductors, cleaning liquid crystals
- semiconductor manufacturing --- semiconductor manufacturing, liquid crystal manufacturing
- electric insulator --- breakers, open/close devices
- metal products --- casting magnesium

(source: 10th Global warming prevention subcommittee, chemistry and biology taskforce, Industrial Structure Council, May 14)

(7) Outlook of greenhouse gas emissions

1) Summary of evaluation

○ Regarding energy derived CO_2 in the industry sector, energy intensity was improved by voluntary works of the industry sector. The production level will tend to decrease toward 2010 due to the stoppage of growth in domestic demand for energy consuming industries and the trend of production in China. As a result, CO_2 emissions in FY2010 will decrease by 7% compared to FY1990. As for greenhouse gases, other than energy derived CO_2 in the industry sector, the substantial improvement of emission intensity is expected by fluorocarbon substitutes provided by the voluntary works of the industry sector. The target reduction of emissions of fluorocarbon substitutes in 2010 is +2% compared to the total emissions in the base year may be achieved.

○ As for the residential sector and domestic sector, the improvement of efficiency of appliances will proceed. However, the number of households and the number of appliances possessed will increase. Hence CO_2 emissions in FY2010 will increase by 21% compared to FY1990. As for the commercial sector of the domestic sector, the effects of improvement in energy intensity can be expected by the improvement of appliance efficiency and introduction of a control system. However, the contribution of the increase in emissions due to an increase in floor space is larger than this. As a result, the CO2 emissions in FY2010 will increase by 24% compared to FY1990.

○ Regarding the transport sector, the energy intensity will be improved because of substantial progress in the improvement in fuel consumption and measures for traffic. However the increase of emissions due to the increase of the number of cars possessed and up-sizing will negate the gains of the effect. As a result, CO_2 emissions in FY2010 are estimated to increase by 41% compared to FY1990. As for freight sector, energy intensity will improve because of a modal shift and emissions tend to decrease because of a stoppage of growth in economic activities. As a result, CO_2 emissions in FY2010 are estimated to decrease by 2% compared to FY1990.

○ As for energy supplying sectors, introduction of new energy in the heat sector has not progressed smoothly in some fields. In addition, CO_2 emission intensity of electric power, the target of voluntary action plan in electric power companies will not be achieved if the current situation continues.

○ As for innovative technologies for countermeasures for global warming, although it will be hard to achieve the target of CO_2 emissions in 2010 in some fields, each technological development is expected to proceed smoothly. Assuming that technological development will succeed as planned and that such technologies will be realized and introduced into markets for technological themes that hold promise in the emission reduction, the effects of the reduction of CO_2 emissions in 2010 is estimated to total 7.5 million tons of CO_2. This is a result of adding up the totals of the industry sector, domestic sector, and transport sector, hence the target of 7.44 million ton-CO_2 is expected to be achieved.

○ As for national efforts, the effects of CO2 reduction of 15 million tons-CO_2 - 2.2 million tons CO_2 is expected. However, the environmental committee concluded that it is difficult to evaluate the effects. In addition, the Industrial Structure Council has not yet been evaluated.

2) <u>Outlook of emissions</u>

○ On the basis of the evaluations mentioned above, the emissions of energy derived CO2 in 2010 are estimated to be 1.106 billion ton-CO2, that is +5% compared to FY1990, if the current measures proceed as planned. In order to achieve the reduction target of energy derived CO2 emissions of 0% compared to FY1990, as defined in the current Program for promotion of countermeasures for global warming, additional measures for 58 million tons -CO2 are necessary (see the following table).

Tab. 3-14. Estimation of energy derived CO_2 emissions (excluding the effects of national efforts and innovative technological development)

million tons-CO2		FY1990	FY2000		FY2010	
					outlook of energy supply and demand	
		emissions	emissions	emissions growth rate compared to FY1990	emissions (current measure promotion case)	growth rate compared with FY1990
total CO2 emissions		1,048	1,161	+ 11%	1,106	+ 5%
excess from FY1990		-	113	-	58	-
Industry		476	470	- 1%	441	- 7%
Domestic		273	344	+ 26%	335	+ 23%
	residential	129	158	+ 22%	156	+ 21%
	commercial	144	186	+ 29%	179	+ 24%
Transport		217	264	+ 22%	261	+ 20%
	passenger	114	158	+ 38%	160	+ 41%
	freight	103	107	+ 3%	101	- 2%
Conversion		82	83	+ 1%	68	- 17%

(Source: Prepared from the prospect of energy supply and demand/emissions of energy derived CO_2 summarized in "Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)-", the Investigating committee of total resource and energy, June 2004)

* The above estimation was calculated in accordance with the calculation method for energy derived CO_2 emissions in the inventory (inventory of emissions) that the Japanese government reports to the secretariat of the Convention on Climate Change.
* Note that the actual value of FY1990 (=target value in the new Climate Change Policy Program) is different from those in the previous report (2001) due to a revision of statistics (1.053 billion tons-CO_2 in the previous report).
* It is necessary to note that CO2 emissions in each sector may vary depending on not only the measures through supply and demand implemented in each sector itself but also the measures through supply and demand implemented in other sections, and the situation of economic trend. Also in the new Climate Change Policy Program, CO2 emissions for each sector is positioned as an aim of estimation.

○ Also the prospect of total emissions, including greenhouse gases other than energy derived CO_2, are 1.283 billion tons - 1.305 billion tons-CO_2 in 2010. That is +3.7%, - +5.5% compared to the base year. In order to achieve the target defined in the current Program for promotion of countermeasures for global warming, related to the current domestic measures for reduction of greenhouse gases (-0.5% compared to the total emissions of the base year), additional measures for 52 million tons - 74 million tons-CO_2 to the current measures are necessary (see the following table).

Tab.3-15. Estimation of total greenhouse gas emissions

million t-CO2 (converted)		base year	target of the Program		outlook for FY2010		difference between the target of the Program and outlook for FY2010	
		emissions	emissions	ratio to total emission in the base year	emissions	ratio to total emission in the base year	emissions	ratio to total emission in the base year
total of emissions		1,237	1,231	- 0.5%	1,283 〜 1,305	+ 3.7% 〜 + 5.5%	52 〜 74	+ 4.2% 〜 + 6.0%
excess form the base year		-	-6	-	46 〜 68	-	-	-
CO2 emissions form energy sources		1,048	1,024	- 2.0%	1,076 〜 1,098	+ 2.2% 〜 + 4.0%	53 〜 75	+ 4.2% 〜 + 6.0%
	energy supply and demand	1,048	1,048	+ 0.0%	1,106	+ 4.6%	58	+ 4.6%
	+ innovative technologies	0	-7	- 0.6%	-7	- 0.6%	0	+ 0.0%
	+ efforts by various sectors and the general public	0	-17	- 1.4%	-22 〜 0	- 1.8% 〜 + 0.0%	-5 〜 17	- 0.4% 〜 + 1.4%
three gases including fluorocarbon substitutes		50	74	+ 2.0%	74	+ 2.0%	-1	- 0.0%
CO2 emissions from non-energy sources, CH4,		139	133	- 0.5%	133	- 0.5%	0	+ 0.0%

(Note)

* Emissions in the base year were calculated from the inventory in 2002.
* Estimation for 2010 is based on each estimation. The estimation was calculated taking uncertain factors into account with certain assumptions, hence the values should be understood with a certain margin. They

are tentative and will be changed.

* As for energy derived CO2 (energy supply and demand), the values are from “Current Measure Promotion Case” in the outlook of energy supply and demand in 2010 included in the Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)-” summarized by the Investigating Committee of Total Resource and Energy.
* As for the innovative technologies, the estimated values are from the follow-up working group for the innovative technologies for measures addressing global warming, research and development committee, industrial technology taskforce, Industrial Structure Council.
* As for the “Activities for preventing global warming by nations for each field and level (national efforts)”, the Environmental Committee concluded that it is difficult to evaluate. In addition, the Industrial Structure Council has not yet been evaluated. Hence the value for national efforts are indicated with a certain range from that for the case without any measures to that for the case of expected effects (maximum).
* As for the three gases, including fluorocarbon substitutes, the value is the highest estimated emissions (74 million tons-CO_2) from the quantitative evaluations by the chemistry and biology taskforce under the Industrial Structure Council (estimated emissions for 2010: 61 million tons - 74 million tons-CO_2).
* As for non-energy derived CO_2, CH_4, and N_2O, the targets defined in the new Climate Change Policy Program for promotion of countermeasures for global warming (total emissions compared with the base year of -0.5%) shall be assumed to be realized.

4. Direction of measures for suppressing and reducing domestic emission of greenhouse gases in the future

(1) Basic viewpoint

1) Japan has perused establishing an economic society with extremely high energy efficiency as a result of two oil shocks, and in light of the fact, Japan is a highly environment conscious national. The 21st century has been called the “environmental century,” and the creation of measures addressing the global warming problem are becoming an important task for human beings, as this problem needs to be solved by international society. Japan should take the initiative and become the leader of environmentally advanced countries and a model for other countries in engaged energy conservation, etc.

2) The problem of global warming is a task that should be addressed on a global scale from the mid and long-term point of view. In regards to countermeasures for global warming for the first commitment period of the Kyoto Protocol, it is important to pursue measures that most effectively reduce greenhouse gases within the mid and long-term and on a global scale and not to address the problem from the short term and local point of view. Inside of this, it is necessary to consider the points of view of promoting innovation and proceed with international cooperation.

＊In the study by Advisory Committee for Natural Resources and Energy (the Energy Supply and Demand Subcommittee on the 16th of June (draft of interim report), Energy Efficiency and Conservation Subcommittee (draft of the interim report)), it was shown that it will be possible to substantially reduce domestic energy derived CO_2 emissions by 2030 if various innovations relevant to energy efficiency and conservation, new energies, increases in energy efficiency progresses and efficient systems and appliances are introduced. If Japan proceeds to introduce such technologies and systems and if they are used abroad, it will greatly contribute to countermeasures for global warming and are what such situations should be based on.

3) In addition, when discussing measures for reduction of the greenhouse gas emissions, including CO2 emissions from energy sources closely related to social economic activities, several points of view, including the environment, economy, and energy, are indispensable. For example, how to maintain economic vitality in an aging era with a low number of children, how to maintain a stable energy supply in Japan, which has a weak energy supply, are important elements that need to be considered.

4) On the basis of such viewpoints, it is necessary to make the maximum effort,

regardless of whether or not the Kyoto Protocol is enforced, to achieve the targets defined in the new Climate Change Policy Program for promoting countermeasures for global warming.

(a) Promotion of the reduction of energy derived CO_2 emissions

- Measures for reducing CO_2 emissions through energy supply and demand
  --- comparison ratio to the total emissions in the base year ±0.0%
- Promotion of the development of innovative technology and activities for preventing global warming by nations for each field and level
  --- comparison ratio to the total emissions in the base year -2.0%

(b) Promotion of measures for suppressing emissions of three gases, including fluorocarbon substitutes
--- comparison ratio to the total emissions in the base year +2.0%

(c) Promotion of measures for suppressing emissions of CO2 emissions from non-energy sources, CH_4, and N_2O
--- comparison ratio to the total emissions in the base year -0.5%

Total comparison ratio to the total emissions in the base year -0.5%

* the base year of three gases, including fluorocarbon substitutes is 1995, and that for the others is 1990

5) As previously mentioned, it is expected to be impossible to achieve the emissions reduction target for domestic greenhouse gases with the current measures. It is necessary to make additional efforts to achieve the target by finding potential reductions in possible sectors and realizing them. With regards to this, it is necessary conduct studies applying the following directions based on viewpoints 1)-4) mentioned above and under the basic principle of “contribution to both the environment and economy.”

(a) Countermeasures for global warming, including CO2 emissions from energy sources that account for of the largest share of greenhouse gases, are closely related to social economic activities. In order to promote measures, while taking the viewpoint of virtuous spiral, which can be applied to the global warming problem, will improve economic social activities, facilitate to ensure international competitive power, and contribute to the prevention of global warming.

(b) Specifically they are as follows:

- Regarding energy supply, promote policies that increase energy that emits lower CO2 emissions and establishment of an efficient energy supply system (note).

  （Note） Appropriate combination including a large scale intensive system and dispersive system, efficient and environment friendly use of petroleum and coal.

- Regarding energy demand, further the improvement of energy use, that is, maximize the improvement of energy intensity by ensuring sound economic activities, realizing a comfortable life, using the worlds' most advanced energy efficiency and conservation technologies and applying the best international ideas (see below for intensity). While, it is important to encourage the changing conscious of nations to improve efficiencies mentioned above. In addition, a measure, which limit economic activities against a nation's will or suppresses a nation's standard of living, should not be promoted.

* the intensity is,

★ relevant to energy derived CO_2

[Emissions of energy derived CO_2]

= [(a)energy supply CO_2 intensity] x [(b)energy use intensity] x [economic activities]

(a) energy supply CO_2 intensity・・・emitted CO_2 accompanies supply of one energy unit（* the amount of carbon contained in one energy unit is different for each energy）

(b) energy use intensity・・・energy consumption that is necessary for one unit of economic activity or nations' life（*by multiplying this to the CO_2 emission intensity relevant to energy supply of each energy of (a), the CO2 emission intensity of one unit of economic activity etc. can be obtained.）

★relevant to those other than energy derived CO_2 such as three gases including fluorocarbon substitutes

[Emissions of three gases including fluorocarbon substitutes]

= [(c)emission intensity of three gases including fluorocarbon substitutes] x [economic activities]

(c) emission intensity of three gases including fluorocarbon substitutes・・・the amount of emissions of three gases including fluorocarbon substitutes accompanies one unit production.

(c) Furthermore, in order to suppress and reduce greenhouse gas emissions in Japan, a measure, which promotes the transfer of domestic industries abroad, imposes imports from abroad, or compels actions that enable the temporary sustainability of Kyoto Protocol targets, should not be promoted because such a measure does not contribute to resolving the global warming problem at all.

(d) In any event, there is uncertainty surrounding the question of whether or not the target can be achieved. This is due to the fact domestic greenhouse gas emissions are decided by various factors, including changes in economic activities. For this reason, Kyoto mechanisms, which contribute to the reduction of greenhouse gas emissions in developing countries, should be effectively used.

*The Kyoto mechanisms have effects that promote further reduction of emissions on a global scale by using technologies and funds that Japan possesses in developing countries in which an increase in energy supply is expected accompanying economic growth in the future.

6) In evaluating measures for suppressing and reducing greenhouse gas emissions, it is necessary to use intensity and its improvement ratio, which are the most appropriate indexes to evaluate the efforts for reducing emissions by each entity. In forecasting the amount of emissions and the amount of reduction in FY2010, this intensity and its improvement ratio are multiplied by economic activities, which are calculated on the basis of transparent and reasonable reasons for each economic index. When evaluating the new Climate Change Policy Program, it is important to use intensity and its improvement ratio.

(2) Reduction potential

○ In analyzing additional measures for suppressing and reducing domestic greenhouse gases in the future, it is important to estimate the fields that have further reduction potential, while considering the fact that the target year of 2010 is approaching. The Council evaluated reduction potential of sectors on the basis of the amount of reduction that can be achieved by improving energy efficiency by using the world's most advanced energy efficiency and conservation technologies in Japan and maximizing the possibilities of ideas in the private sector.

○ In the future, when reviewing the new Climate Change Policy Program it is necessary to make efforts to clarify and quantify the evaluation of reduction potential, to clarify the work done by nations for each field and level and to adopt the viewpoint that the government shall take measures for effectively deriving the work.

1) Reduction potential in the industry sector

<Energy derived CO_2>

○ In the industry sector, energy use efficiency has been improved steadily under the voluntary action plan implemented by industry. An emission reduction of 7% by 2010, compared to 1990, is expected to be achieved, with estimates based on current measures

○ There is possibility that a further reduction will be achieved in the future through collaboration of several enterprises beyond the work of individual companies.

○ In regards to the industry sector, continuous work is being conducted on technology innovation in production facilities for work on the problem of global warming. On the other hand, there is a certain international limitation on technologies that are usable in production facilities. In this type of situation, it is useful to evaluate efforts by each industry and evaluate the international level of industry by using indexes such as energy intensity. In a follow-up to the Voluntary Environmental Action Plan by the Japan Federation of Economic Organization, conducted by the Subcommittee and Advisory Committee for

Natural Resources and Energy, international comparisons for main industries were shown using indexes according to the characteristics of each industry. (see attachment 3)

<Green House Gases except energy derived CO_2>

○ Regarding the three gases, including fluorocarbon substitutes, industry has been proceeding actively with works and the soundness of the achievements are growing. It should be noted here that the achievement of the defined target in the new Climate Change Policy Program is by no means an easy task. In the future, there is a possibility of an additional reduction of emissions by progress of technological development of non-fluorocarbons such as manufacturing fluorocarbon substitutes and manufacturing non-fluorocarbon metals, by introduction of facilities and by measures for improving fluorocarbon recovery from refrigerants and industrial processes.

2) <u>Reduction potential in the domestic sector</u>

○ In the domestic sector, reduction of roughly 21% in the residential sector and roughly 24% in the commercial sector in 2010, compared to 1990, is expected to be achieved based on current measures.

○ Regarding commercial appliances that consume large amounts energy such as refrigerators, air-conditioners, water heaters, there is a possibility that purchases and diffusion of products with high energy efficiency (appliances with energy waving performances that exceed top-runner standards, non-fluorocarbon refrigerators, high efficiency heat pump devices, latent heat recovering type water heaters) will be accelerated. The control and saving of energy supply and demand through IT technologies will proceed under the background of improvement in the environment consciousness of the nation.

○ If enterprises, including public organizations and agencies, hospitals, schools, wholesalers, office buildings, hotels and restaurants, realize improvements of energy use efficiency, it is possible that further reductions could be achieved, particularly in the commercial sector.

3) Reduction potential in the transport sector

○ In the transport sector, an emission reduction of about 41% in the passenger sector and about 2% in the freight sector are expected to be achieved in 2010, compared to 1990 and based on the current measures.

○ The green scheme for taxation of cars, which targets cars that achieve 5% excess over the current top-runner standards, was implemented this fiscal year. Therefore, there is a possibility of a dissemination of cars with higher fuel consumption performance. In addition, the nation’s environmental awareness is growing, and citizens have begun to drive cars while implementing energy efficiency and conservation techniques such as ecological driving.

○ As for the freight sector, there is the possibility of progress in efficiency of logistics and modal shifting through the enhancement of collaboration between shippers and carriers. In addition, concerning measures for the improvement of traffic, it is possible to realize traffic with lower environmental loads by promoting comprehensive programs, including establishing infrastructure from a long-term view point of view.

4) Reduction potential in the energy supply sector

○ Regarding the energy supply sector, there is a possibility of further improvement in the CO_2 emission intensity of user-end electric power due to the fact additional measures will be executed by the Federation of Electric Power Companies of Japan to achieve the target defined in the Voluntary Environment Action Plan. In addition, if work on the introduction of new energies by local governments is enhanced, further introduction of new energies may be pursued.

(3) Challenges by nations for each level and each entity

Greenhouse gases, especially energy derived CO_2, which accounts for almost 90% of total greenhouse gases, are emitted as a result of all economic and social activities. From the point of view of realizing the reduction potential mentioned in (2), it is indispensable for enterprises of various industries, habitants, the public sector, NPOs and mass-media to work according to their roles. The Subcommittee intends to encourage voluntary work and to create opportunities for proceeding with the countermeasures for global warming in order to promote a national movement through listing the possibilities of work to be done by each entity as “challenges” and by fostering chances to proceed with specific measures.

1) Challenges for the industry sector

(a) In order to improve energy use efficiency input and efficiency of energy consumed in manufacturing processes, it is necessary to make continuous efforts to pursue the possibility of further reductions such as energy efficiency and conservation, technological development of non-fluorocarbons and investment.

(b) Willingly and actively publish greenhouse gas emissions in the disclosure of environmental information relevant to their own business activities.

(c) Contribute to the emission reduction in commercial and transport sectors by working on developing and manufacturing commercial appliances and cars with high energy efficiency, work on saving energy in the commercial sector at head-quarter’s buildings and related companies, aim to increase efficiency of logistics through the shipper and through activities such as emission reduction from the total lifecycle of products.

(d) Actively provide information on offering products and services in order to support and encourage habitants to choose and behave appropriately taking the environment into account.

(e) The individual company clarifies the tasks to work on and establishes schemes for the purpose, and then actively executes the specific actions including education concerning the environment for employees.

Note）The industry sector includes all private enterprises such as manufacturing, distribution, services, and local small and medium enterprises.

2) Challenges for the electric power companies

(a) The target of user-end CO_2 emission intensity in FY2000, outlined in the “environmental action plan by electric power companies,” is to decrease actual emissions by 20% compared to 1990（decrease to 0.34kg-CO_2／kWh）. In Current Measure Promotion Case, estimating the CO2 emission intensity in 2010 by taking into account the operation of four additional nuclear plants, currently under construction, and the installation of facilities and operation plan by the electric power companies, the improvement compared to 1990 is 0.36 kg-ＣＯ2/kWh, which corresponds to 15%.

(b) Therefore in order to achieve the target emission intensity outlined in the Voluntary Environment Action Plan, additional measures are needed and the electric power companies shall make the maximum efforts to achieve the targets by combining the following measures:

- Increasing the capacity factor of atomic plants by realizing scientific and reasonable operation controls such as shortening the regular inspection period through efforts by the companies.
- Further improvement of thermal efficiency of thermal power generation and coordination of operation methods of thermal power generation taking into account environmental characteristics.
- Use of Kyoto mechanisms by the companies.

3) Challenges for habitants

(a) In regards to refrigerators, air-conditioners, water heaters, and cars that are energy consuming products, choose and buy products with high energy efficiency and conservation performance and non-fluorocarbons when substituting by new appliances.

Note1) When buying them, it is important to take into account not only the prices of the products but also the running expenses for fuels and lighting.

Note2) It is important to take into account the viewpoint of recovery of fluorocarbons at the disposal of air-conditioners mounted on cars.

(b) When constructing new houses, buy houses that qualify as having excellent energy efficiency and conservation performances, when possible and when reforming buy and use products with high energy efficiency and conservation performance such as multilayer glass or thermal insulating sashes.

(c) At home, increase energy efficiency and conservation awareness, save excess energy such as temperature setting of air-conditioners, make effort toward ecological driving and using public transport and bicycles. Actively introduce HEMS (Home Energy Management System), which indicates the energy use cost using IT technology and properly controls energy consumption of main appliances in households.

4) Challenges for enterprises in the commercial sector

(a) The commercial sector consists of various business entities and it is necessary to proceed with each work in accordance with each present situation.

(b) At the present stage, only a portion of enterprises have begun work on energy efficiency and conservation such as office buildings. If such movements are widely and rapidly disseminated and many enterprises work on energy efficiency and conservation voluntarily, a large amount of reductions can be expected. First, it is important for each proprietor to increase awareness of controlling energy demand and establish schemes to control energy such as placing persons in charge of energy control. In addition, it is important to act specifically by introducing ESCO (Energy Service Company) and BEMS (Building Energy Management System). Through such work, it is expected that effective energy control will be diffused widely and energy efficiency and conservation can be realized on a large scale.

(c) It is important to introduce buildings with high energy efficiency and conservation at the time of construction of the building.

(d) The public sector, including the government and local governments, plays an important role as an entity in the commercial sector. It is important to actively execute leading works such as the introduction of ESCO business.

5) Challenges for enterprises in the transport sector

(a) A large amount of reductions can be expected by improvements in the efficiency of loading and modal shifting by collaboration between the carriers and the shippers, in the situation where work on increasing efficiency of logistics is pursued by shippers.

(b) Truck carriers shall pursue fuel conscious driving by individual drivers by actively introducing low air-pollution trucks and installing supporting ecological driving devices.

6) Challenges for NPOs, labor unions, and mass media

(a) In addition to offering information to nations through government publicity, NPOs, labor unions, and mass media have been making efforts to increase the nations' awareness of global environmental problems. In the future, it is expected that information will be actively provided to nations through various media sources.

(b) Actively convey information that will increase the awareness of work on energy efficiency and conservation and the environment such as matters relating to comprehensive global environmental problems and the methods of specifying work on energy efficiency and conservation to be done by households.

7) Challenges for the local governments

○ Local government shall encourage each household to work on energy efficiency and conservation with area-closed methods and thoroughly implement energy efficiency and conservation of their own managed buildings, schools, hospitals, water supply and drainage, and welfare facilities by introducing ESCO businesses and facilities with high energy efficiency. Also actively promote introducing new energy based on the situation and characteristics of each region.

(4) Roles of the government

1) Viewpoints for discussing future measures

The government plays an important role in deriving specific challenges for nations at each level and each entity of (3) and to encourage voluntary actions from the viewpoints of (1) on the basis of reduction potential by sectors in (2). From such a point of view, the following viewpoints are important to discussing additional government measure:

○ Many measures and programs have been implemented in many sectors under the New Climate Change Policy Program. Even if the current measures are implemented steadily in the future, the estimation of domestic greenhouse gas emissions in 2010 still exceeds the target. Firstly, this situation shall be recognized, and the situation should be accurately relayed to nations.

○ There is not much time remaining until the first Kyoto Protocol commitment period (2008 - 2012). In order to execute the specific actions by each entity to realize the reduction potential, political methods with the most effectiveness, lowest adverse effects and low administrative cost should be carefully designed. Then they should be selected by clarifying how much reduction potential exists and in what fields and industry. Finally, the situations should be monitored. For the process, the viewpoints of analyzing optional measures should be considered from the cost-effective point of view and economic pervasive effects such that preferable measures effect on the improvement of economic vitality and enhancement of international competitive strength of industry.

○ The measures implemented with priority are mainly those that focus on works by the manufacturing industry and energy conversion industry and are sensitive to energy cost such as energy efficiency and conservation in plants, application of top-runner standards to commercial appliances and cars that have high energy efficiency and conservation performance with the possibility of technological innovation and are accepted by consumers. Owing to the voluntary efforts by companies, results at certain levels have been achieved.

○ However, CO_2 emissions in the domestic and transport sector are still increasing. In order to proceed with further energy efficiency and conservation in the future, it is indispensable for the energy demand of each household and an unspecified number of general public facilities, including office buildings, government offices, retailers, schools, and hospitals, to work on increasing the efficiency of energy use in addition to the current works.

○ As seen in (2), it was confirmed that further reduction potential is expected in the domestic and transport sectors, through the diffusion of appliances with high energy use efficiency, control and saving energy demand by using IT and an increase in efficiency logistics.

○ Japanese nations and enterprises have a high level of awareness of energy conservation and the environment. If proper information and specific options (e.g., energy efficiency and conservation appliances with high efficiency can be bought easily) are provided, the information anomaly in the market will be corrected and the market mechanism will work. It is expected that the nation and the enterprises will behave voluntarily in accordance with energy efficiency and conservation as a result of common sense.

○ The implementation saving energy is accompanied by economic values that lead to a cost reduction for enterprises and the reduction of expenses for lighting, fuels and petroleum for households. In addition, it is supposed that they can feel a sense of satisfaction derived from the fact that their voluntary action has contributed to the preservation of the global environment by efficiently using energy obtained from precious natural resources stored in earth. By pursuing such values, it is expected that new business chances will disseminate through various ideas that will occur in the process of actively implementing energy efficiency and conservation by broad range of entities.

○ This can be applied to measures for suppressing and reducing the emission of gases other than energy derived CO_2 such as fluorocarbon substitutes.

○ Based on these points, the government has an important role, which is to discuss additional specific measures from the point of view of how to derive voluntary works by the nation at each level and each entity on the basis of reduction potential.

2) Concrete direction of additional measures

[1[Enhancement of measures focused on the domestic and transport sectors in which energy demand and CO2 emissions are increasing

(a) Promotion of efforts by industry toward the reduction of emissions in the domestic and transport sectors

The industry and energy conversion sectors are in a position to be able to contribute to the reduction of emissions in the domestic and transport sectors. This is possible by offering products with high energy efficiency and non-fluorocarbon products, saving energy in the commercial sector through projects such as headquarters' building, increasing efficiency of logistics, supplying materials and fuels that lead to the reduction of emissions. It is important to appreciate such contributes and to actively support them.

(b) Promotion of providing information to habitants through enterprises that offer energy or energy consuming appliances

- Energy consuming products with high energy efficiency and conservation performance that habitants buy are increasingly on the market. They are commercial appliances such as air-conditioners that meet top-runner standards, low fuel consuming cars and houses that meet the next generation energy efficiency and conservation standards. In the future, it is important to promote offering energy efficiency and conservation appliances by review and adding to the top-runner standard.
- It is important to thoroughly establish a mechanism to have the seller inform habitants of products with high energy efficiency and conservation performances. In addition, it is important to establish a mechanism that promotes the energy supplier, who supplies energy to habitants, to offer information on energy use.

(c) Thorough control of energy by the commercial sector

In commercial sector, which consists of various kinds of industries, it is important to promote improvement of efficiency in energy use and to reduce CO_2 emissions by increasing the awareness of enterprises on energy control. For that purpose, it is important to study mechanisms that can accurately grasp the state of energy use. Also, as an assumption that promotes such works by enterprises, it is important to prepare circumstances, including statistics, to accurately grasp the state of energy use by enterprises in the commercial sector. It is important to take measures to support promotion of use of ESCO business or BEMS.

(d) Promotion of collaboration between entities

The measures by which reduction can be pursued are implemented by individual entities. It is important to promote works by which further reductions can be achieved by collaboration between several entities such as shippers and related enterprises of carriers.

(e) Leading works of the public sector

The public sector (governmental offices, hospitals, welfare facilities, schools, etc.) has a significant presence in the business and transport sectors. It is important to increase the degree of recognition of energy efficiency and conservation measures and to diffuse each energy efficiency and conservation service from evocating initial demand to real prevalence by introducing ESCO businesses, stopping idling cars and provide information on the results to nations.

(f) Traffic measures

- In order to promote further reduction of emissions in the transport sector, it is important to pursue a traffic system with a comprehensively low environmental load, which includes detailed measures to proceed with a modal shift and improvement of the convenience of the public traffic system.
- It is important to forecast the effect of programs quantitatively and to prepare mechanisms to measure the effects regularly and statistically.

(g) Measures for houses and buildings

In order to proceed strongly with the diffusion of houses with high energy efficiency and conservation performance, it is important to promote the use of schemes indicating performance of houses such as energy efficiency and conservation. In addition, promote the enhancement of measures such as promotion of introduction of products with high energy efficiency and conservation performance such as multilayer glass and thermal insulation sashes when reforming.

[2] Realizing remaining reduction potential in the industry and energy conversion sectors

(a) Promotion of collaboration between entities

The measures by which reduction can proceed are implemented by individual entities. It is important to promote works by which further reduction can be achieved through collaboration between several entities, including related enterprises in industrial clusters such as industrial complexes.

(b) Promotion of introducing new energies

In order to achieve the quantified target of introduction of new energies in FY2010, 19.1 million kl (converted to oil), it is important for local governments to take additional measures. These measures should be focused on the heat field such as promotion of using heat generated by new energies at the regional level, active promotion of further introduction including introduction to the public sector, lowering costs, promotion of the introduction of wind power generation and the smooth implementation of the RPF law for generation of new energies.

(c) Promotion of measures for reducing emission of three gases, including fluorocarbon substitutes

It is important to proceed and further suppress emissions of the three gases, including fluorocarbon substitutes. This should be pursued by promoting additional measures such as supporting the introduction of non-fluorocarbon manufacturing facilities, installation of facilities that contribute to suppress emission of three gases, including fluorocarbon substitutes, such as recovering devices of fluorocarbon emitted from manufacturing processes, supporting technological development of synthesizing fluorocarbon substitutes, technological development of a manufacturing method for magnesium alloy that doesn't use SF_6, and the investigation of demonstrating a recovering system for fluorocarbon from cooling air-conditioners for business at disposal.

(d) Promotion of nuclear

・ Nuclear generation, which does not emit CO_2, for power generation is very important to preventing global warming. It is expected that nuclear will continue to play a role as a mainstay power source in Japan. Also, the nuclear fuel cycle further improves the property of nuclear generation, which is excellent for stability of supply. It is necessary to promote nuclear generation including nuclear fuel cycle in collaboration with public and private sectors under the assumption of ensuring safety.

- In order to improve the capacity factor by realizing scientific and reasonable operation control, it is necessary for interested parties to make further efforts.

[3] Deployment of national movement by nations at each level and each entity and appropriate follow-up

(a) Providing information on nations' actions effective for energy efficiency and conservation and countermeasures for global warming

- Prior to the first commitment period of the Kyoto protocol, it is important to provide proper information on that what behavior of nations at each level and each entity is effective for energy efficiency and conservation and countermeasures for global warming. In addition, it is also important to offer information by enterprises, in order to realize Japan's maximum reduction potential. Especially in residential sector, it is important to provide information on energy efficiency and conservation performance of home electric appliances, cars, and houses. Furthermore, information, on works and ideas on energy efficiency and conservation for ones' daily home life and on the supporting system for improving energy use, including HEMS and energy efficiency and conservation navigation, should be provided.
- It is important to study effective measures to promote national movements together with public and private sectors.

(b) Appropriate follow-ups relating to the establishment of statistics and effectiveness of measures

- In order to study effective measures and to accurately grasp the effects of the measures, it is important to accurately grasp the state of energy supply and use accurately and to promote establishing related statistics.
- It is important to grasp the realities of the actions of nations at each level and each entity, to voluntary measure quantitatively after implementation, and to follow up the effects of measures properly.

[4] Others (acceleration of technological development, realization, works from

mid and long-term viewpoints)

(a) Promotion and development of technology relevant to energy efficiency and conservation

It is important advance the following: to accelerate strategic technological development and dissemination from the viewpoint of measures for demand; to adopt technologies with sufficient energy efficiency and conservation effects; to select fields that have a high necessity for realization of energy efficiency and conservation measures by 2010, while considering the current energy situation in each field.

(b) Realization of technology and a system that can enable a drastic reduction of emissions from the mid and long-term point of views and the reform of urban structures including establishing infrastructure

At this moment, it is important to realize work on the realization of technologies and systems, including CO2 separation and fixation technology, fuel cells, and hydrogen related technology, that may enable a drastic reduction of emissions from the long-term point of view be promoted and pursued as much as possible. Also it is important to study ideal urban planning from the point of view that the urban structures, including infrastructure, will be transformed to one with a lower environmental load.

（reference）

At present, the Ministry of Economy, Trade, and Industry implements as national business (a) technological development of separating and recovering CO_2 (b) demonstrative experiment of sequestering CO_2 in soil and evaluation of forecasting impacts of the environment accompanying marine separation CO_2 (c) separation and fixing of CO2 for technological development using CO_2 effectively, and technological research and development of efficient use CO2. It is important to realize the fixation and useful use of CO2 early, by systematically developing these basic technologies for separation, recovery, transport, and separation.

3) About economic instruments

○ In regards to the so called environment tax, which intends to suppress and reduce energy derived CO2 emissions by taxing fossil fuels, it is important to suppress the emission of greenhouse gases by each entity through flexibility of prices. It was pointed out that an environment tax should be considered as one of the methods from the standpoint of achieving the target of the Kyoto Protocol. On the other hand, the introduction of an environment tax was opposed because the effect of the measure on the domestic and transport sectors, for which energy consumption is remarkablely increasing, is unclear. It not only adversely effects international competitive strength of Japanese industry, which is competing with the USA and China in the case the tax increase is an addition to already existing energy related taxes, but also results in inhibiting the prevention of global warming because it facilitates production transfer abroad, and the budget for measures for global warming is ensured within the existing framework and it should be effectively used. In regards to dealing with an environment tax as an economic instrument, it is important to comprehensively and carefully analyze the situation by considering the fore-mentioned opinions, comparisons with other instruments, international trends, actual results and the evaluation of the countermeasures for global warming now taken place.

○ It was pointed out that the “cap and trade type emission trading scheme” should be considered. In the scheme, reduction of greenhouse gas emissions can be pursued by setting emission limitation and trading in markets. The content of the scheme is that the proprietor of emissions officially defines the amount of gas and if excess emissions accrue, the amount of the shortage can be ensured by using other enterprises of emissions or Kyoto credits. On the other hand, the emission trading scheme was opposed because it is an instrument that the government regards with deep concerns, if the government were to allocate the emission limitations. It was questioned if the government can decide the amount of energy use that should be decided by companies themselves in the market mechanism can be defined fairly and objectively in advance. In industry sector, the effect of CO_2 emission reduction has been achieved by voluntary action plan. It is important to discuss on effective instruments comprehensively to increase transparency and reliability of such voluntary works. As for dealing of emission trading scheme as an economical instrument, it is important to study comprehensively and carefully by considering the fore-mentioned opinions, comparison with other instruments, international trends, and actual results and evaluation of the countermeasures for global warming now taken place.

(5) Outlook of greenhouse gas emissions on the basis of additional measures

○ In the study by Advisory Committee for Natural Resources and Energy (Energy Supply and Demand Subcommittee on 16th June (draft of interim report), Energy Efficiency and Conservation Subcommittee (draft of interim report)), it was shown that it will be possible to suppress energy derived CO_2 emissions in FY2010 by +0% compared with that in 1990 by implementing additional reviewed measures. These additional measures are consistent with items reviewed by this committee.

Tab.4-1. Outlook greenhouse gas emissions on the basis of additional measures

Million tons of CO2	FY1990	FY2000		FY2010							
				Reference		Current Measure Promotion Case		Additional Measures			
			Growth rate compared with FY1990		Growth rate compared with FY1990		Growth rate compared with FY1990			Growth rate compared with FY1990	
Total CO2 emissions	1,048	1,161	+ 11%	1,167	+ 11%	1,106	+ 5%	about	1,053	about	+ 0%
Increase/decrease compared with FY1990	-	113	-	118	-	58	-	about	5	about	-
Industries	476	470	- 1%	456	- 4%	441	- 7%	about	433	about	- 9%
Domestic	273	344	+ 26%	362	+ 33%	335	+ 23%	about	305	about	+ 12%
residential	129	158	+ 22%	170	+ 31%	156	+ 21%	about	135	about	+ 5%
commercial	144	186	+ 29%	192	+ 34%	179	+ 24%	about	169	about	+ 18%
Transport	217	264	+ 22%	276	+ 27%	261	+ 20%	about	250	about	+ 15%
passenger	114	158	+ 38%	166	+ 46%	160	+ 41%	about	156	about	+ 37%
freight	103	107	+ 3%	110	+ 7%	101	- 2%	about	94	about	- 9%
Conversion	82	83	+ 1%	73	- 12%	68	- 17%	about	65	about	- 21%

(Source: prepared from the outlook of energy supply and demand/ emission of energy driven in "Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)- edited by the investigating total energy.)

* The above estimation was calculated in accordance with the calculation method for energy derived CO_2 emission in the inventory (inventory of emission) that the Japanese government reports to the secretariat of the Convention on Climate Change.

* Note that the actual value of FY1990 (=target value in the new Climate Change Policy Program) is different from those in the previous report (2001) due to revision of statistics (1.053 billion ton-CO_2 in the previous report).

* It is necessary to note that CO_2 emissions in each sector may vary depending on not only the measures through supply and demand implemented in each sector themselves but also the measures through supply and demand implemented in other sections, and situations of economic trends. Also in the new Climate Change Policy Program, CO2 emissions for each sector are positioned as aim of estimation.

* The energy derived CO_2 emissions in FY2010 in the "case of additional measures" is estimated to be 10.48 million tons-CO_2 if the target of the environmental action plan by the Federation of Electric Power Companies of Japan including the use of Kyoto mechanisms is achieved (CO_2 emission intensity at user end is about -20%, see P42 and P57 for details)

○ In addition to the above, the prospect of total emissions, including greenhouse gases other than energy derived CO_2, in FY2010 is 12.3 million - 12.52 million tons CO_2.This is estimated to be -0.6% - +1.2% compared to the base year. There is possibility that the target of the current Fundamental Principle for measures for global warming on the measures for reducing domestic greenhouse gases (-0.5% compared to the base year) can be achieved (see the following table).

Tab.4-2. Outlook total greenhouse gas emissions

million tons of CO2 (conversion)		base year	target of the Program		outlook for FY2010		difference between the target of the Program and outlook for FY2010	
		Emissions	Emissions	Compared to total emissions in the base year	Emissions	Compared to total emissions in the base year	Emissions	Compared to total emissions in the base year
total emissions		1,237	1,231	- 0.5%	1,230 ～ 1,252	- 0.6% ～ + 1.2%	-1 ～ 21	- 0.1% ～ + 1.7%
excess from the base year		-	-6	-	-7 ～ 15	-	-	-
CO2 emissions form energy sourrces		1,048	1,024	- 2.0%	1,023 ～ 1,045	- 2.0% ～ - 0.2%	0 ～ 22	- 0.0% ～ + 1.8%
	energy supply and demand	1,048	1,048	+ 0.0%	1,053	+ 0.4%	5	+ 0.4%
	+ innovative technology	0	-7	- 0.6%	-7	- 0.6%	0	+ 0.0%
	+ efforts by various sectors and the general public	0	-17	- 1.4%	-22 ～ 0	- 1.8% ～ + 0.0%	-5 ～ 17	- 0.4% ～ + 1.4%
three gases including fluorocarbon substitutes		50	74	+ 2.0%	74	+ 1.9%	-1	- 0.1%
CO2 emissions from non-energy sources, CH4,		139	133	- 0.5%	133	- 0.5%	0	+ 0.0%

Note）

* Emissions in the base year were calculated from the inventory in 2002.
* Estimation for 2010 is based on each estimation. The estimation was calculated taking uncertain factors into account with certain assumptions; hence the values should be understood with a certain margin of error. In addition, they are tentative that will be changed.
* As for energy derived CO2 (energy supply and demand), the values are from “the case if current measures are promoted” in the outlook of energy supply and demand in 2010 included in the Outlook for Energy Supply and Demand in 2030 -Interim Report(Draft)-” summarized by Advisory Committee for Natural Resources and Energy.
* As for the innovative technologies, the estimated values are from the follow-up working group for the innovative technologies for measures addressing global warming, research and development committee, industrial technology taskforce, Industrial Structure Council.
* As for”Activities for preventing global warming by nations for each field and level (national efforts)”, the Environmental Committee concluded that it is difficult to evaluate. Also the Industrial Structure Council has not yet evaluated, hence the value of national efforts are indicated with a certain range from that for the case without any measures to that for the case of expected effects (maximum).
* As for the three gases, including fluorocarbon substitutes, the value is the highest estimated emission (74 million ton-CO_2) from the quantitative evaluations by the chemistry and biology taskforce under the

Industrial Structure Council (estimated emissions for 2010: 61 million tons - 74 million tons-CO_2).

* As for non-energy derived CO_2, CH_4, and N_2O, the targets defined in the new Climate Change Policy Program (total emissions compared to the base year of -0.5%) shall be assumed to be realized.

(6) Outlook of greenhouse gas emissions and viewpoints on achievement of the commitment to the Kyoto Protocol

○ It was shown that there was possibility to achieve the target of +_0% compared to the base year defined in the current Fundamental Protocol due to further challenges by the nations for each level and each entity and the additional measures by the government to derive them. Taking into account the nations efforts and the effect of measures for innovative technological development and the results of evaluation of measures for fluorocarbon, the target of the measures for suppressing and reducing domestic greenhouse gases of -0.5% compared to the base year can be achieved. However, even after enforcing these measures and adopting additional measures, it may be difficult to achieve the commitment to the Kyoto Protocol due to factors such as change of economic activities and delay of realization of the effect of the measures.

○ That is, there remain uncertainties in the process of making maximum efforts for achieving the commitment to the Kyoto Protocol such as the trend of economic growth, changes in the degree of achievement of the targets for each field and sector and progress of each measure and program. Therefore, it is important to increase the reliability of finally achieving the Kyoto Protocol commitment of -6%, by coping with various changes mentioned above and flexibly based on the reality of the existence of such uncertain factors.

○ As an effective measure to promote such approaches, Kyoto mechanisms should be actively used. This will contribute to reduction of emission of global scale greenhouse gases and contributes to Japanese international contribution to prevention of global warming and to achievement of commitment to the Kyoto Protocol.

5. Use of Kyoto mechanisms

(1) Basic viewpoint

- ○ Kyoto mechanisms are measures that were internationally agreed under the Kyoto Protocol. Due to the fact these mechanisms contribute to the promotion of suppressing and reducing the emission of greenhouse gases in developing countries and transition countries, which aim for sustainable growth development superior technologies of developed countries for energy and environment related and funds, and should be used actively in Japan, which has the worlds' top level technologies, from the standpoint of global scale international contribution.

- ○ On the other hand, it is possible that the emission of domestic greenhouse gases will differ from the forecast figures due to economic growth, and still difference of -6%, -1.6% compared to the base year, remains for achieving the commitment the Kyoto Protocol, even though the target in the current Program is achieved by the efforts of nations <u>for each level and each entity</u> for the measures addressing the suppression and reduction of domestic greenhouse gases. Therefore, Kyoto mechanisms are useful measures for realizing the achievement of Japanese commitment surely, reasonably and cost-effectively.

- ○ It is indispensable to use Kyoto mechanisms actively and with planned manner on the standpoints of "Japanese global scale international contribution" and "increasing reliability for achieving the commitment to the Kyoto Protocol".

(2) Period of use

- ○ On the standpoint of achieving the commitment to the Kyoto Protocol, the time left until the first commitment period (2008 - 2012) is short. Assuming that three to five years are needed for the implementation of CDM/JI projects to obtain credit, it is important for Japan to proceed with work using Kyoto mechanisms in a planned manner by working on searching for and implementing, specific projects during the second stage (2005 -2007).

- ○ It is necessary to steadily work on CDM/JI projects, even if it is prior to the enforcement of the Kyoto Protocol under the assumption that it is effective for suppressing and reducing additional emission of greenhouse gases when it is based on a specific project for reducing the emission of greenhouse gases.

(3) Scale of use

○ There still remain uncertainties for achieving the commitment due to economic growth, even if maximum efforts are made to realize potential of suppressing and reducing domestic greenhouse gases such as improvement of energy consumption and improvement of CO_2 emission intensity by every entity on the basis of the new Climate Change Policy Program for measures for global warming.

○ On the other hand, under the basic principle of "contribution to both the environment and economy," the measures that suppress economic activities and a nations' standard of life should not be taken. Therefore the uncertainties due to economic growth should be addressed by the use of Kyoto mechanisms.

○ Therefore, it is important for Japan to proceed actively using Kyoto mechanisms on scale that ensures the credits (reduction of emission) necessary for achieving the commitment of -6% compared to total emissions of the base year in Kyoto Protocol, while assuming that Japan make the maximum effort towards measures for suppressing and reducing the emission of domestic greenhouse gases.

(4) Specific way of use by the government

○ It is important for the government to promote works using Kyoto mechanisms in a planned manner during the second stage (2005 - 2008) from the point of view of achieving the commitment to the Kyoto Protocol, while taking into account the -1.6% compared to the total emissions in the base year in the case no measures are taken in the current Fundamental Principle. At first, it is proper to focus on implementation of many projects with the background for reduction of emissions such as CDM and extending future supply of credits.

○ When the government use Kyoto Mechanisms, it is important to develop the policies of use on the using methods and targeted projects and regions in order to clarify the meanings and objectives of using Kyoto mechanisms and to proceed with the works based on it.

○ The government should discuss, as soon as possible, the coordination of budget that is necessary for using Kyoto mechanisms.

(5) Use by private enterprises

○ It is important to promote broad works in order to motivate private enterprises use Kyoto mechanisms voluntarily to achieve their own voluntarily targets.

○ For this purpose, it is important for the government to prepare fundamental schemes for the case that private enterprise retire the credit voluntarily and to consider measures for smooth trading, including using market mechanisms according to the state of use if necessary.

(6) Initiative for developing international rules

○ It is important for the government to successively take the initiative concerning the development of international rules of the United Nations and its efficient operation and to work on preparing an international framework to promote the further use of Kyoto mechanisms.

6. Tasks in the future

The Committee has mainly been reviewing the problems for evaluation and review of the new Climate Change Policy Program since January 13th of this year. In the future, there are tasks to be further discussed from the point of view of reviewing the new Climate Change Policy Program to increasing its reasonableness and effectiveness based on the this interim report.

Also, in order to comprehensively build future measures for global warming, there are two issues that are as important as the achievement of the commitment to reduction by a country during the first commitment period of the Kyoto Protocol. One of the two is an issue that addresses what Japan should do to make the international framework after 2013 effective in regards to achieving many participants. The second issue is to meaningfully and creatively discuss technologies from the viewpoint of pursuing approaches to an ultimate resolution to the global warming problem. It is necessary to review and discuss this many times after the interim report.

The Committee will review and discuss the issues from broad viewpoints on countermeasures for global warming, including the issues described below.

(1) Tasks for evaluation and review of the new Climate Change Policy Program for countermeasures for global warming

1) Realizing challenges by nations of each level and each entity

○ Under the situation that nations of each level and each entity need to cope with the global warming problem, it is necessary to further discuss the roles each entity plays, what kind of works should be promoted, and the method of collaboration between several entities.

○ On the viewpoint of furthering promotion of works for energy efficiency and conservation by nations of each level and each entity, it is considered to be useful to encourage nations' efforts to provide information on the efforts of energy efficiency and conservation that are required for nations of each level in a manner that the nations can easily understand as “indexes of nations action.” For example, in the residential sector by indicating the efforts of energy efficiency and conservation by substituted indexes (saved amount of charges of electricity, gas, and fuel oil), which are closely related to life, and by setting the target value the efforts for energy efficiency and conservation will be understood and can be related to life and more voluntary behavior will be encouraged. The discussion to realize such viewpoints should be promoted.

○ Moreover, the measures to raise a national movement to work on the global warming problem should be discussed by participants from wide range, and work toward the diffusion of information regarding the fact that habitants increase the load on environment such as power of commercial appliances in household, energy consumption, and consumption of petroleum used for cars in the domestic and transport sectors.

2) Realizing emission intensity of greenhouse gases as a follow-up index

○ The efforts for suppressing and reducing emissions by each entity should be evaluated by discriminating the change of emission intensity of greenhouse gases such that the energy use efficiency improves and economic activity changes. It is necessary to proceed with discussions addressing the question, what indexes are proper for each entity for post evaluation?

○ Also as for measures and programs by the government, it is necessary to proceed while discussing the proper indexes for evaluation in order to make a quantitative validation and evaluation of the effects of individual measures and programs, and review of measures and programs possible in the follow-up.

○ In regards to these two points, it is necessary to study the measures to address each task accompanying collection and analysis of data such as preparation of statistics.

3) Study of additional measures

○ Further study is necessary to realize effective additional measures by collaborating with relevant ministries and agencies and relevant sections.

（examples）

・Measures for the introduction of ESCO businesses lead by public sector.

・ Measures for promoting increasing efficiency of logistics by the collaboration between shippers and carriers (promotion of green logistics partnership (tentative))

○ Regarding greenhouse gases other than CO2 emissions from energy sources, further discussions will be required if additional reduction is expected by further efforts of interested parties.

○ For the purpose of evaluation and review of the new Climate Change Policy Program, issues relating to transparency, reliability and reliability of achieving targets in The Keidanren Voluntary Action Plan on the Environment and for each industry that was pointed out on March 10th of this year at the joint subcommittee of the Subcommittee and the investigating subcommittee of total resources and energy, including the positioning of the new Climate Change Policy Program, should be progressed as far as possible. In addition, the trend of companies that accept work on global environmental problems from the viewpoint of increasing competitive strength, the mechanisms for publishing emission of greenhouse gases and work on the global warming problem at the individual proprietor level should be discussed.

4) Kyoto mechanisms

Policies for using Kyoto mechanisms should be developed and announced at an early stage by the government and in a planed manner through discussing specific contents on the active use of them.

5) Others

In the future, it is appropriate to address new issues that warrant attention, including additional measures, and review these issues from various viewpoints such as by economic means and methods.

<u>(2) Tasks from point of the mid and long-term view</u>

1) <u>About international framework on the global warming problem after 2013</u>

○ The Kyoto Protocol prescribes work that should be done up until 2012. It describes only the first step for a long-term effort to resolve the global warming problem. In order to cope with the climate change problem, it is important to build a framework that is more effective, sustainable and that includes the United States of America and developing countries. In July of last year, this point of view was summarized in the Subcommittee’s interim report, “Perspectives and actions to construct a future sustainable framework on climate change.”

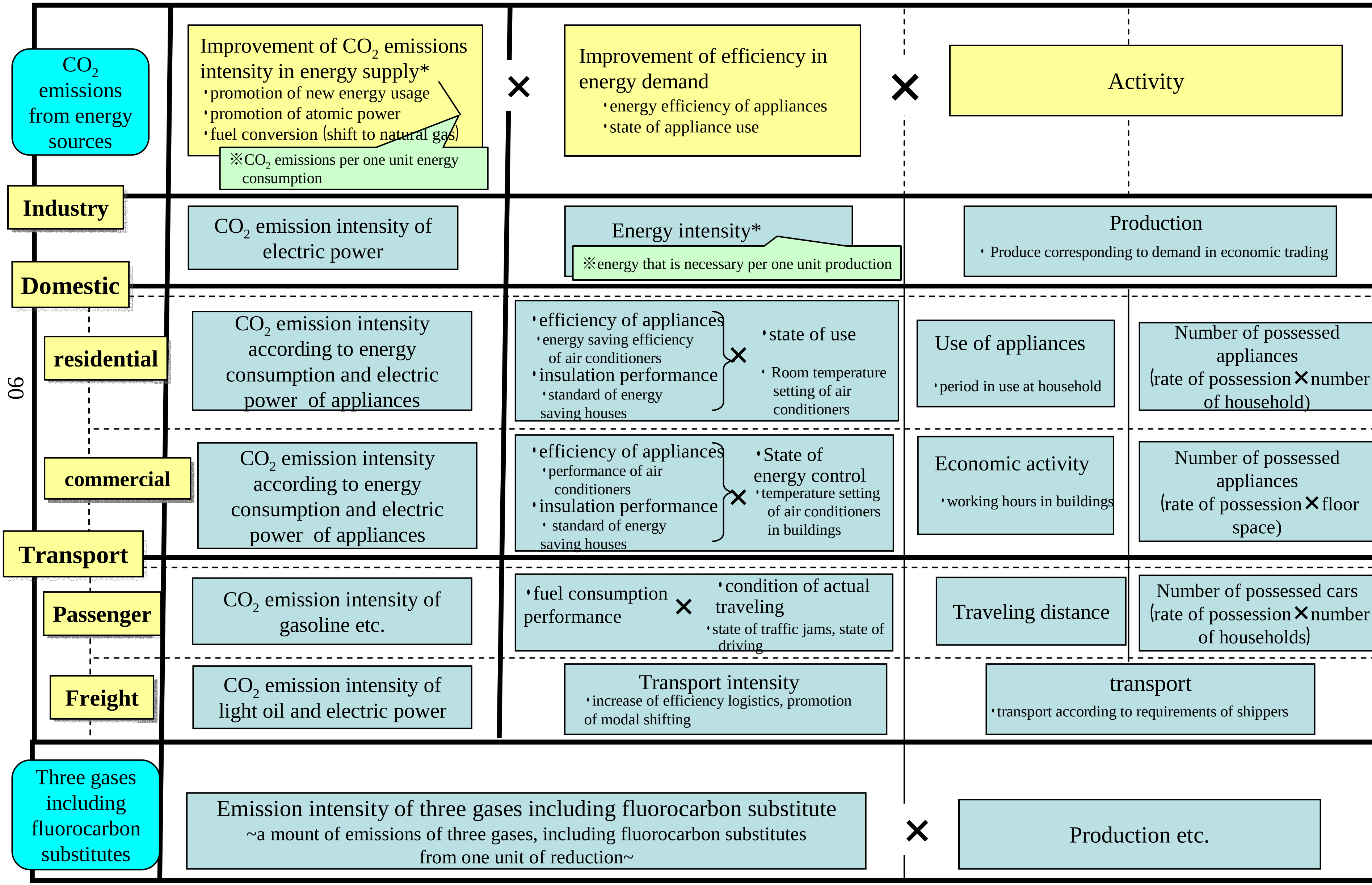
○ In the future and regarding the international future framework after 2013, it is necessary for the Subcommittee to show specific ways, both inside and outside of Japan, and what kind of work is necessary from the long-term point of view, including development of innovative technologies in order to achieve the ultimate target of the Framework Convention on Climate Change (stable concentration of greenhouse gases), based on the studies conducted by the special committees established under the Subcommittee.

2) <u>Direction of measures for global warming from mid and long-term point of view such as technological development</u>

From the viewpoint of pursuing approaches for the ultimate resolution of the global warming problem, the issue on development of technologies relevant to global warming such as CO_2 isolation and fixation technology, renewable energy technology, and hydrogen technology should be further discussed. In addition, measures that promote resolutions and are used on global scale should be further discussed from the mid and long-term viewpoint, viewpoint of international cooperation, and viewpoint of changing industrial structure.

(Attachment 1)

Structure of emission of greenhouse gases



(Attachment 2)

Structure of emission of domestic greenhouse gases and positioning of each measure in the New Climate Change Policy Program

CO_2 emissions form energy sources

Improvement of CO2 emission intensity in energy supply* × Improvement of intensity of energy use* × Total economic activity/total appliance use

*CO_2 emissions per one unit of energy consumption

*Energy consumption per one unit of economic activity

Energy supply (all sectors):

①New energy
Introduction of new energy in power generation and heat field (target 12.1 million kl (converted to crude oil))

②Atomic power, electric power
・Reduction of CO2 emission intensity in the electric power field

Industry

・Intensity of energy use
- The Keidanren Voluntary Action Plan on the Environment
- Facilitation of introducing energy saving facilities, Promotion of spread of energy saving technologies

Production
・produced according to the demand in economic trading

Domestic

residential

・Efficiency of appliances
- improvement of appliances by the top-runner standard
- reduction of power consumption of stand-by mode
- diffusion of high efficiency water heaters
- diffusion of high efficiency lights

・Efficiency of insulation
- improvement of thermal insulation of houses

× ・State of use
- HEMS

Appliance use
・Use period in household

Number of possessed appliances (rate of possession × number of households)

commercial

・Efficiency of appliances
- improvement of appliances by the top-runner standard
-diffusion of high efficiency water heaters
-diffusion of high efficiency lights

・Efficiency of insulation
- improvement of thermal insulation of buildings

× ・State of energy control
- BEMS

Economic activity
・working hours in buildings

Number of possessed appliances (rate of possession × floor space)

Transport

Passenger

・Performance of fuel consumption etc.
- improvement of fuel consumption by the top-runner standard
- promotion of dissemination of clean energy cars

× ・Condition of actual raveling
- measures for energy efficiency and conservation relating to traffic systems

Traveling distance

Number of possessed cars (rate of possession × number of households)

Freight

・Transport intensity
- increase of efficiency of logistics, state of promotion of modal shift

Transport
・transport according to requirements of shippers

Three gases including fluorocarbon substitutes

・Emission intensity of three gases including fluorocarbon substitute
- voluntary action plan by association of 22 enterprises in 8 fields
- development and diffusion of substitution substances
- recovery of fluorocarbons based on the law

×

Production etc.
・produced according to the demand in economic trading

* Current measures

(Attachment 3)

International comparison of work and efforts for countermeasures for global warming by main industries

1. Steel

According to an individual hearing from the Korean Association of Steel and China Association of Steel Industry, the energy intensity levels of end-to-end steel works of Korea is 105, that of the EU is 110, 120 for the US, while that of large steel works in China is 130 and 150 throughout China, compared to Japan's 100.

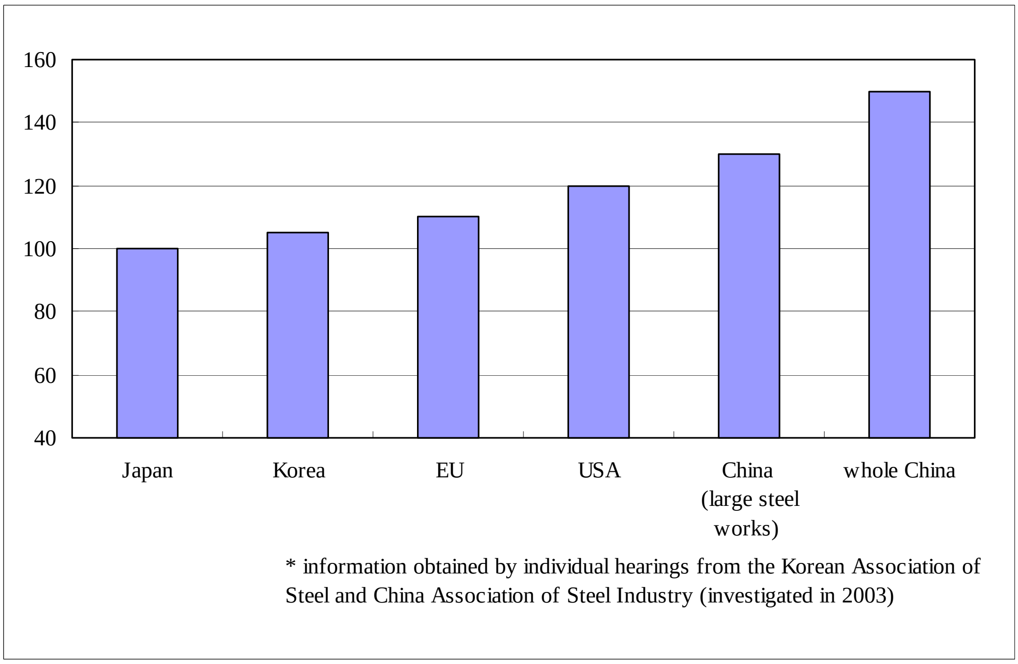


Fig.7-1. Energy intensity of end-to-end steel works
(Survey by the Japan Iron and Steel Federation)

2. Paper Industry

In 1999, total energy intensity of actual results in Japan, USA, Canada, Sweden and Germany were as follows: Although the constitution of the paper production category is different in each country, Japan's total energy intensity was excellent. Germany's intensity was also excellent because the intensity was low as Germany depends on imported pulps and therefore energy consumption for producing pulp is zero. In addition, the national difference of low demand for paper quality such as the degree of whiteness of toilet paper played a role.

Tab.7-1. Total energy intensity in the paper industry

	Japan	USA	Canada	Sweden	Germany
Total energy intensity (GJ/t)	19.8	28.5	26.6	24.4	10.3
Index (Japan＝100)	100	144	134	123	52

(calorific value bought electric power = 3.6MJ/kwh bought steam=2,675MJ/et)

Source) Japan : "Dynamic statistics of consumption of oils etc", Follow-up survey by the Japan Paper Association（FY2003）

USA: "Annual Statistics 2002", American Forest & Paper Association

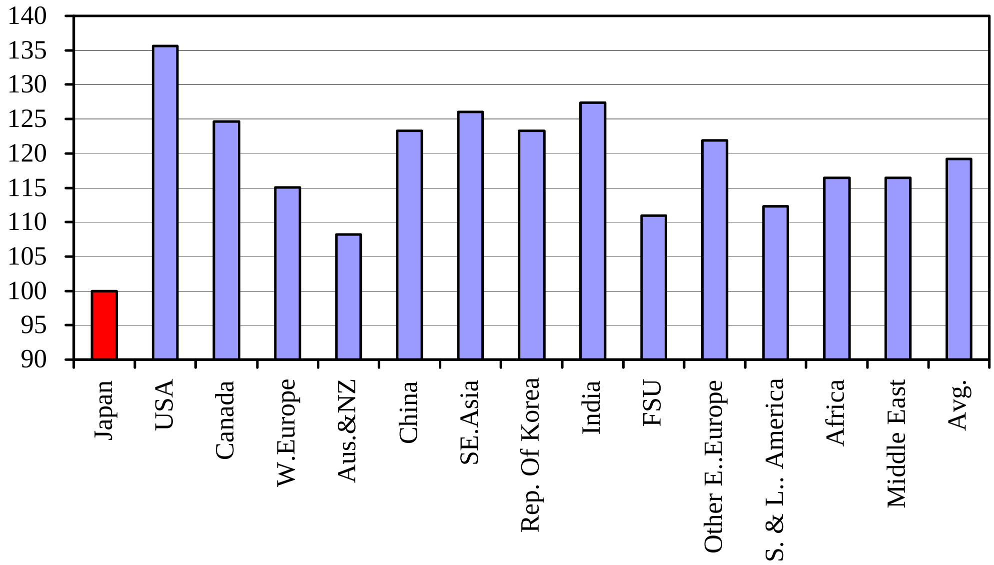
Canada: "Report on the environment 2000-2001", Forest Product Association of Canada

Sweden and Germany: "Energy Profile 2001", Confederation of European Paper Industries

(Investigated by the Japan Paper Association)

3. Cement Industry

As shown in the figure, when CO_2 emissions per 1 ton cement in the Japanese cement industry is set to 100, other countries largely exceed largely exceed Japan.



Source: "Toward a Sustainable Cement Industry Substudy 8: CLIMATE CHANGE (March 2002)"(Battelle)
Note: the emissions per 1 ton of cement is the comparison of values including raw material derived CO2 emissions

Fig.7-2. International comparison of CO_2 emissions per 1ton of cement (2000)

* Japan=100

(investigated by the Japan Cement Association)

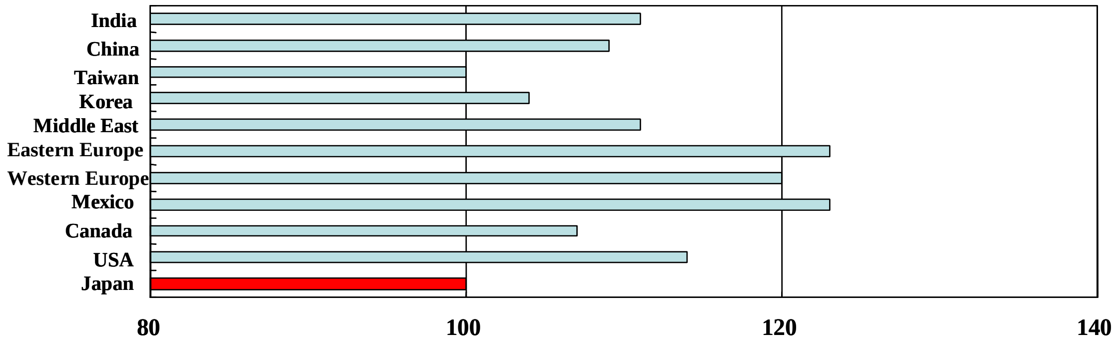
4. Chemical industry

As shown in the following table, the CO_2 emissions intensity in ethylene plants in Japan is behind to USA and European countries. In addition, power consumption for manufacturing electrolytic caustic soda is less than in other countries.

Tab.7-2. Capability of manufacturing ethylene and CO_2 intensity

	Japan	Europe	USA	world
Capability of manufacturing (million tons)	7.3	23	29	111
Raw material	naphtha	naphtha	ethane	—
CO2 intensity	**1.4**	**1.8**	**(1.4) (Note)**	**1.7**

Note) the figure for USA CO2 intensity is given in a bracket in estimated value Source: NEDO Mar, 2003



Japan=100 Source : estimated from SRI Chemical Economic Handbook and Soda Handbook

Fig.7-3. International comparison of power consumption for manufacturing electrolytic caustic soda

(investigated by the Japan Chemical Industry Association)

(Reference) electric power companies

Japanese electric power companies have been working on reducing CO_2 emissions. As a result, CO2 emissions intensity is at the lowest level among developed countries, although it is not quite as low as that of Canada, which has a high share of hydro power, and that of France, which has a high share of nuclear.

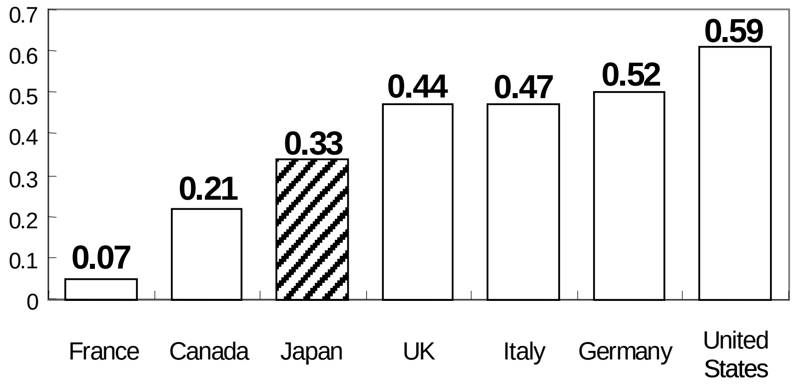


Fig.7-4. International comparison of CO2 emissions intensity（power generation end）
(investigated by the Federation of Electric Power Companies of Japan)

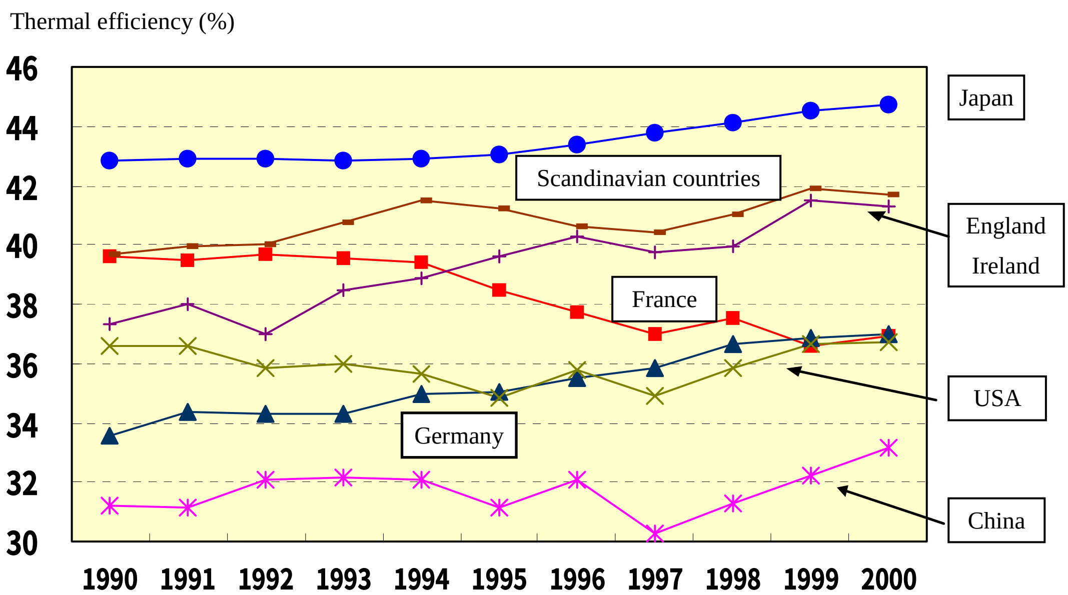


Fig.7-5. Thermal efficiency of Japanese thermal power stations compared to other countries

Source: Other countries: COMPARISON OF POWER EFFICIENCY ON THE GRID LEVEL, 2004 (ECOFYS)
Japan: Summary of Electric Power Industry, 2002
(Agency for Natural Resources and Energy, Japan)
(Investigated by the Federation of Electric Power Companies of Japan)

* Thermal efficiency is generation-end thermal efficiency of weighted average of coal, petroleum, and gas. （low level calorific standard）
* In foreign countries, a low level calorific standard is generally used. Due to constraints of data obtained by ECOFY, Japan’s data (high level calorific standard) were converted to the low level calorific standard for comparison. Here the values of the low level calorific standard is higher than those of the high level calorific standard by 5～10%.
* Facilities of private power generation are out of the scope.