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OA/ID Number: 9555
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Folder Title:
Environment - Japan-U.S. Climate

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Withdrawal/Redaction Sheet

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DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. fax	To Francine from Betty Wong re: May 10 meeting [PII] [partial] (1 page)	05/06/1993	b(6)

COLLECTION:

Clinton Presidential Records
Council of Economic Advisers
Stiglitz, Joseph
OA/Box Number: 9555

FOLDER TITLE:

Environment - Japan-U.S. Climate

2017-0713-F

bg242

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

- P1 National Security Classified Information [(a)(1) of the PRA]
- P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P3 Release would violate a Federal statute [(a)(3) of the PRA]
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RR. Document will be reviewed upon request.

Freedom of Information Act - [5 U.S.C. 552(b)]

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- b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

F. Enomoto Japan-US
NON-PAPER
U.S.-JAPAN SHARED UNDERSTANDING

In the interest of reducing global imbalances and strengthening the multilateral trading system, the USG and Japan should reach agreement on a set of policy changes that would be expected to produce faster and more balanced world growth. External surpluses can have a dampening effect on growth in other countries, as do the difficulties that competitive foreign exporters have in gaining market access. Therefore, we look to strong domestic demand growth as well as a change in Japan's underlying structural bias against imports.

free &
open
world
trading
system

Specifically, a decrease in Japan's current account surplus to the range of 1.0-1.5 percent of GDP within three years and an increase in Japan's manufacturing imports as a share of GNP by about one-third within the same period should reasonably assist in meeting these objectives. These specific goals would be treated as indicative of the magnitude of policy changes that could be expected rather than specific targets.

Japan's Current Account Surplus

Today Japan's large current account surplus stands out among the deficits of the other major industrial countries. Japan's surplus is divided roughly evenly among Japan's trading partners, with consequences for lower growth and employment in each.

US used to be the
artificially
restrained

The suggested current account target is a medium-term goal. As the needed macroeconomic policy changes operate with a lag of several years, these new policies need to be in place now to produce shifts in the current account within three years.

Given that Japan's average surplus over the past twenty years was 1.5 percent of GDP, and Japan's current account surplus in 1990 was even smaller, our target is well within the range of the past patterns of activity found in the Japanese economy.

Import Penetration in Japan's Market

Rather than development assistance, what is most useful to developing or emerging economies is open export markets. Relative to the size of its economy, Japan imports roughly half as much in manufactured goods as does the U.S. or other OECD members. This lower share of manufacturing imports in GNP suggests that Japan has higher formal and informal barriers to manufacturing imports than other OECD countries.

Attainment of a goal of a one-third increase in manufactured imports as a share of GNP would carry Japan less than halfway to the OECD standard. It would involve rapid growth of manufacturing imports, but no faster than Japanese manufacturing imports grew between 1986 and 1990.

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Japan
((FRAMEWORK FOR A NEW ECONOMIC PARTNERSHIP))

In Washington on April 16, 1993, President Clinton and Prime Minister Miyazawa agreed to strengthen the foundation of the long and productive friendship between the U.S. and Japan by defining a new economic partnership. They agreed that the new partnership, responding to the needs of a new era, must be balanced and mutually beneficial, and firmly rooted in the shared interest and responsibility of the United States and Japan, as the world's two largest trading nations and source of 40 percent of the world's GNP, in promoting global growth, maintaining open markets and forging a vibrant world trading system. In this connection, the President and the Prime Minister agreed that a successful conclusion to the Uruguay Round is essential. They agreed that the U.S. and Japan, individually and together, must take steps to expand economic opportunities not only in the two countries, but throughout the world. To this end, the U.S. and Japan agree to work together under the "Framework for a New Economic Partnership," based on a shared understanding and long term vision of the key role of our economic relationship, bilaterally and globally.

The Shared Understanding

Recognizing that the U.S. and Japan, working together, have the potential and share the responsibility to drive world economic growth and strengthen the world trading system,

Japan agrees to:

1. Put into place policies that can be expected to lead to a substantial decline in its current account surplus within a reasonable period. $\frac{CA}{Y} \approx 1.5\%$
2. Put into place policies that can be expected to lead to a substantial increase in import penetration of manufactured products in its market within a similar period. $\frac{mtg}{Y} \approx 1\%$
3. The Framework for ~~continuing discussions~~ described below.

In return, the USG agrees to:

1. Carry through on its plans to achieve substantial reductions in its budget deficit, along with substantial increases in public investment.
2. Maintain its current open market and investment policy, as long as there is satisfactory progress towards a more open world trading system. sawdr 1.1p
GATT
3. The Framework for ~~continuing discussions~~ described below.

Structure

The Framework is in line with President Clinton and Prime Minister Miyazawa's April agreement to develop a plan to address, in a concrete fashion, both structural and sectoral issues, ((and to discuss other areas in which we can cooperate.)) It is a ((five-part)) structure that includes:

- note: Ongoing discussions*
- A. Heads of State Meetings. Bi-annual meetings with joint public statements that are executive summaries of progress *results achieved to date* reports on the sector/structural, macroeconomic and ((global cooperation)) discussions.
- B. Pre-Heads of State Meetings. Three weeks before each bi-annual Heads of State meeting, U.S.-Japan principals meet at deputy or subcabinet level to prepare executive summaries of the progress reports on basket negotiations for the joint statement by the Heads of State.
- C. Sector and Structural Baskets ((Basket Negotiations)).
- o Automotive Industry - Talks *multiple documents* would build on existing *undertaking* agreements, including indicators, and would apply to both Japanese imports and use of U.S.-made parts in transplants. *1-2*
 - o Government Procurement - *Talks would* focus would be on insuring foreign access to Japanese government procurement. Special emphasis would be given to industries in which the U.S. is highly competitive, such as supercomputers, computers, medical technology *construction* and telecommunications. A multiple benchmark system would be established with monitoring of private and public market trends in Japan, Europe and the rest of the world. *5*
 - o Regulatory Reform and Regulated Industries - Talks will center on Japanese government rules and regulations that impede access to Japan's markets for foreign products and services. This would include competition policy and distribution issues, as well as *n* financial services issues, including insurance. Multiple indicators would be set up to monitor progress.
 - o Compliance Umbrella - All existing agreements, e.g., semi-conductors, will be tightly monitored and completed, on an expeditious schedule, to the fullest extent, including achievement of ~~any agreed~~ results.

- 3 -

- o U.S.-Japan Economic Integration - Includes areas in which the U.S. and Japan can work together to reduce asymmetries in our business environments and foster mutually beneficial integration of our economies, e.g., including foreign investment, technology-IPR, emerging technology issues and long-term business to business relationships. Mechanisms for monitoring progress will be put in place.

D. Macroeconomic Issues. An update on progress toward reducing current account imbalances would be integrated in the Heads of State joint statement. Progress also would be reviewed at the pre-Heads of State meetings. While ongoing talks would be anchored in the G-7 process and central bank dialogue, other contacts with the GOJ will offer the opportunity to discuss these concerns, e.g., CEA-EPA discussions.

((

E. Global Cooperation. The U.S. and Japan agree to identify steps to increase our cooperation in addressing key transnational issues, including promotion of democracy, environmental protection, population and AIDS. Agreement on a basic framework for cooperation will be followed by discussion between counterpart departments and agencies. Progress in this area will be reviewed at the pre-Heads of State meetings, and integrated in the Heads of State joint statement.))

TIMETABLE THROUGH SUMMER 1994

- | | | |
|----------------------------------|---|---|
| Thursday,
May 27 | - | USG-GOJ Meeting, Subcabinet level, in Tokyo to Review U.S.-Japan Economic Framework. |
| June | - | Follow-up USG-GOJ Subcabinet or Technical level meetings to discuss Economic Framework |
| Early July | - | U.S.-Japan Agreement on Economic Framework |
| <u>G-7 Summit</u>
July 7-9 | - | President Clinton and Prime Minister Miyazawa announce new Sector and Structural Economic Framework for discussions. |
| Summer/Fall
1993 | - | U.S.-Japan bilateral negotiations under Framework baskets; barometers within each basket are fixed. |
| <u>January 31,</u>
1994 | - | President Clinton and Prime Minister Miyazawa first bilateral meeting with joint press statement reviewing progress under Framework. |
| Spring 1994 | - | Basket negotiations continue. |
| <u>G-7 Summit</u>
Summer 1994 | - | President Clinton and Prime Minister Miyazawa second bilateral meeting with joint press statement reviewing progress under Framework. |

Environment (Japan/US Climate Change)

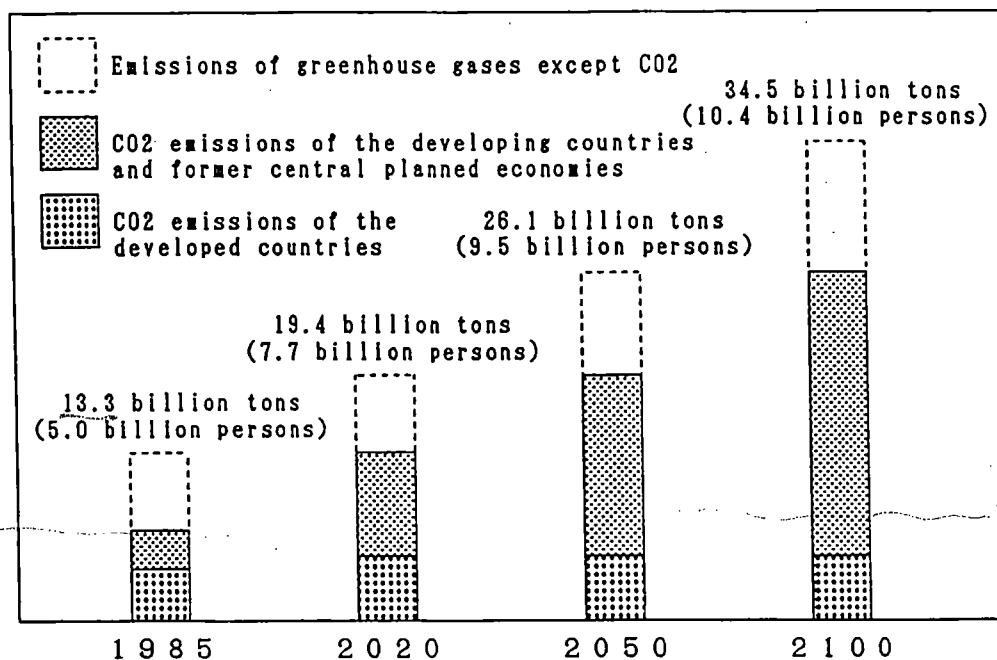
The "New Earth 21"

1. The Need for Technological Breakthrough and International Cooperation

A lasting solution to global environmental problems requires an undertaking within a framework of international cooperation, among not only the developed countries but developing countries. Technological breakthrough is necessary to reconcile economic development and environmental protection on the global level.

About global warming problems, CO₂ emissions are expected to increase in step with economic growth in the developing countries.

A Projection of Greenhouse Gas Emissions



(Note)

- Estimates are made based on working material in the Intergovernmental Panel on Climate Change (IPCC).
- The amount of emissions are expressed in tons of carbon equivalent.
- Greenhouse gases are weighted according to their global warming potential.

① The global population will reach 10.4 billion by 2100. Greenhouse gas emissions will more than double by then, even if the developed countries stabilize their CO₂ emissions at current levels.

② Technological breakthrough as well as technology transfer under

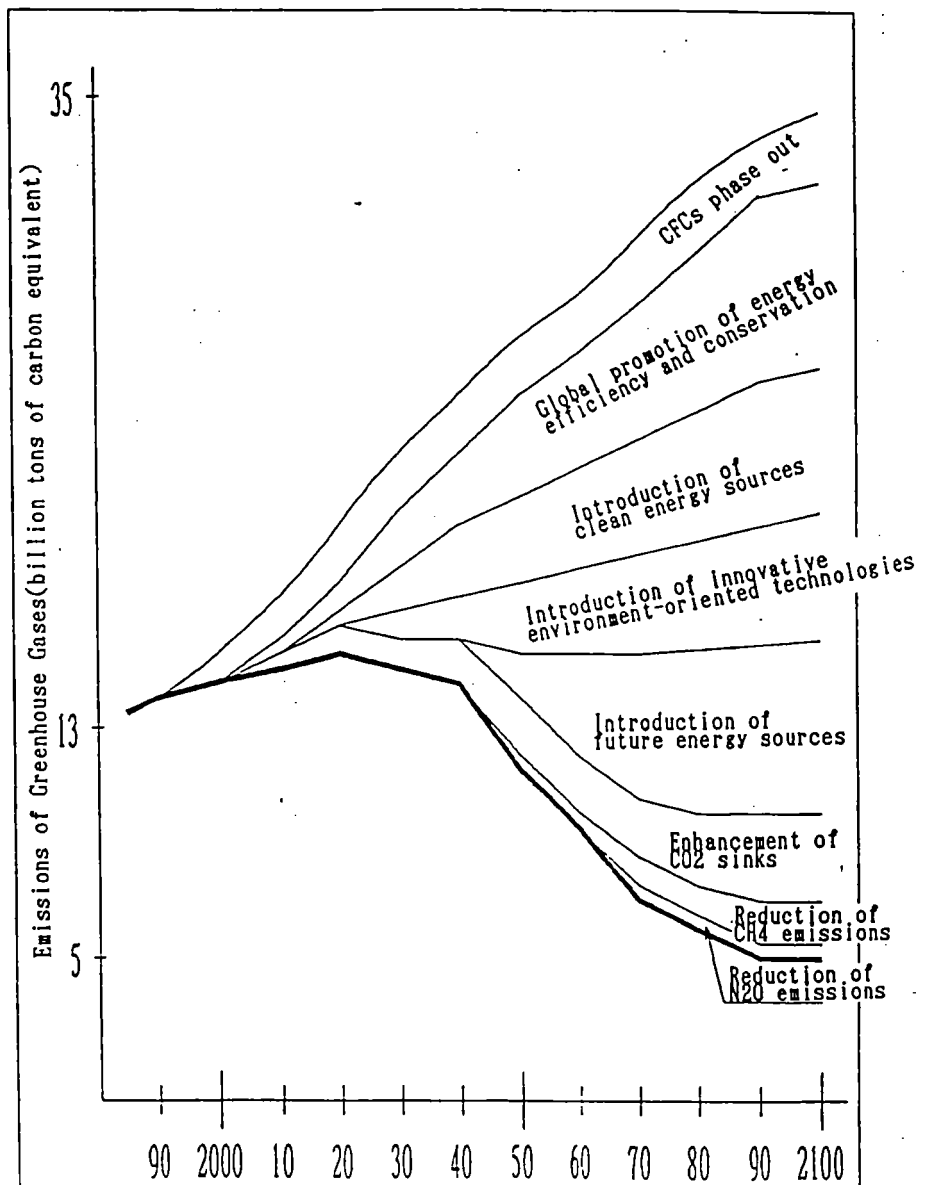
2. The Basic concept of the "New Earth 21"

"New Earth 21", the Japanese proposal to the global community, is a dynamic and evolving strategy for international cooperation to restore the Earth over the future decades to resolve global environmental problems through technology. Its essence is ① the promotion of world-wide diffusion of environmentally sound technologies and ② the development of innovative environmentally sound technologies.

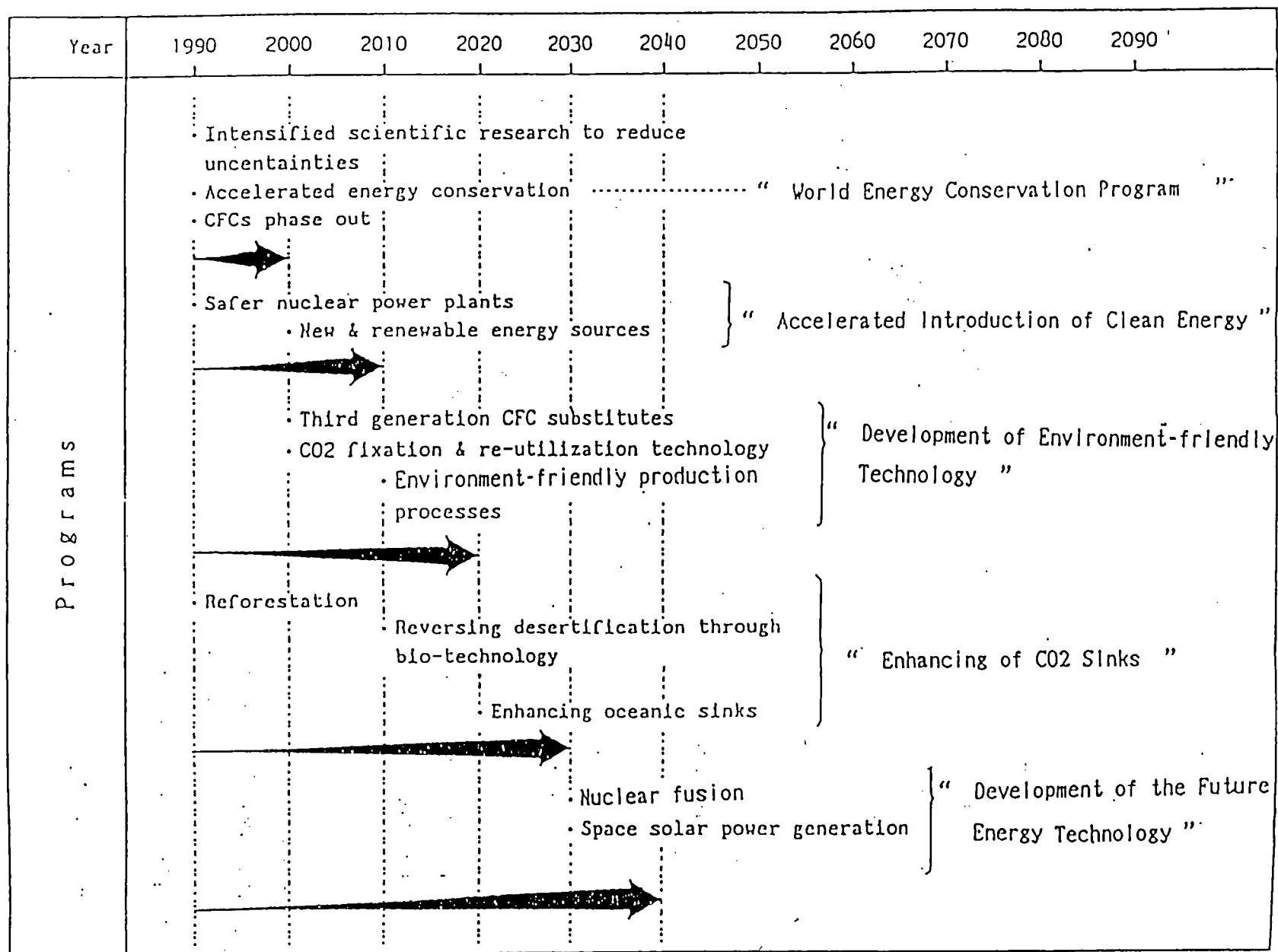
Regarding global warming problems, it is necessary to reduce of greenhouse gases accumulated during the past two centuries since the Industrial Revolution. The "New Earth 21" calls for the following.

- ① Consolidation of the scientific knowledge, ② Global promotion of energy efficiency and conservation, ③ Massive introduction of clean energy sources, ④ Development of innovative environment-oriented technologies, ⑤ Enhancement of sinks, ⑥ Development of the future energy technologies, ⑦ Promotion of measures to reduce CFCs, CH₄ and N₂O emissions

A Scenario of Greenhouse Gas Emission Reduction by Means of Various Measures (The New Earth 21 Case)



"The New Earth 21"
— Action Program for the 21st Century —



TECHNOLOGY RENAISSANCE FOR ENERGY AND ENVIRONMENT (TREE)

May 1993

Ministry of International Trade and Industry

1. Purpose of the proposal

- To solve global environmental issues, breakthroughs by technologies are essential. At the Houston Summit, Japan advocated an Earth Revitalization Plan -- New Earth 21, a plan to solve these issues by technology development and technology transfer. Since then, in economic declarations at summits and in The Rio declaration on environment and development at UNCED, the importance of science and technology has been recognized.
- Developing innovative technologies in the field of energy and environment especially is a task needing both a long-term focus as well as an immediate starting. These technologies have the potential to change drastically the forms of production and consumption which underlie our current civilization. Because these technologies might be in fields which are not suitable for the private sector to develop, governments of the major advanced nations should tackle them. Thus governments will be able to contribute to solving global environment problems, including the problems in developing countries.
- Recognizing the issues mentioned above, governments of the major advanced nations should start immediately an international technology development project in cooperation with each other. In preparation, ad hoc international meetings of governmental representatives and intellectuals will be held to discuss possible cooperation and to analyze further the strategic potential of developing energy and environment technologies by the major advanced countries.
- Japan proposes the following ideas, and is prepared to respond flexibly to constructive comments thereon.

2. The way of progress of the program

- Preparation stage

Ad hoc meetings will be held to make consensus of governments.

- Enforcement stage

Based on the consensus of ad hoc meeting, governments will cooperate in the implementation of concrete projects in the fields of energy and environment technology development.

3. *Ad hoc meetings*

1) Composition of ad hoc meetings

Ad hoc meetings will be consist of high level policy group and "Wise men" group.

a) High level policy group

- Recommended members

The group would consist of Director General (DG) and Assistant Secretary level officials of agencies and ministries dealing with energy and environment technology development (e.g., the Executive Office of the President, DOS, EPA, DOE) of the G-7 nations (Japan, U.S., Germany, France, U.K., Canada, Italy, EC) and DG level officials of international organizations, including IEA/CERT and the OECD Environmental Policy Bureau.

- Mandate to the group

Responsible government officials from each country, who deal with energy and environment technology development, will come to a consensus on the coverage, contents, and form of government level cooperation in energy and environmental technology development, and will link the consensus to further concrete cooperation.

b) "Wise men" group

- Recommended members

This group would consist of authorities on global environmental science and technology, including energy and environment technology development, mainly from countries whose representatives attended the meeting of high level policy group.

- Mandate to the group

Based on the first meeting of high level policy group, meetings of intellectuals in the energy and environment field will be held to summarize the current status and problems of energy and environment technology development, and to put forth a proposal to the next meeting of high level policy group.

2) Schedule and place of ad hoc meetings

Fall 1993 The first meeting of the high level policy group
(At this meeting, representatives will agree to a need
for cooperation by major advanced countries in the

fields of energy and environmental technology development.)

(The meetings of "Wise Men" group will be held during this period.)

Spring 1994 The second meeting of the high level policy group
(At this meeting, representatives will discuss ideas for concrete cooperation in the fields of energy and environment technology development based on proposal from "Wise men" group)

3)The Japanese Government would be pleased to sponsor both the first meeting of the high level policy group and the first meeting of "Wise men" group.

4)Subjects to be discussed at the ad hoc meetings

a)Comprehensive strategy on energy and environmental technology development

-As contents of comprehensive strategy, development potentiality, conditions and effects of practical use, effects on economics and society of energy and environment technologies which require international actions to solve global environmental problem and are expected to develop between 2000 and 2030 should be discussed.

b)Possible forms of concrete cooperation on international cooperative research and development

-Regarding pre-competitive technologies, fields of international cooperative research and development should be discussed taking into account the necessity, possibility and feasibility of practical use of the technologies. (The Japanese proposal about fields of international cooperative research and development appear in The appendix.)

-Coverage, contents, and form of cooperation which are appropriate for each project should be discussed.

*Technology development projects to which
Japan is ready to contribute for international cooperative R&D*

1. Earth observation satellite project

-Technology to analyze observation data obtained by satellites will be developed. Data needed to elucidate mechanisms of global warming will be collected.

2. Advanced power distribution R&D project

-Technology dealing with high frequency electric power supply which uses dispersed electric sources will be developed. Power consumption by electric products will be reduced.

3. H₂-NET project

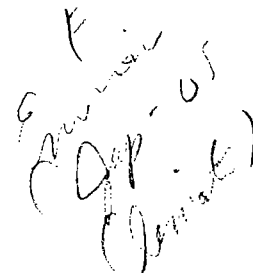
-Technology dealing with the generation, transportation, storage, and utility of hydrogen energy will be developed. A clean energy system, instead of existing fossil fuels, will be established.

4. Solar power generation technology project

-Low cost mass production, and appropriate application, technology will be developed dealing with solar batteries which will target their worldwide introduction, including in deserts and at the north pole.

5. CO₂ fixation and effective utilization technology R&D project

-To separate, collect, fix, and effectively utilize carbon dioxide, R&D will be conducted on CO₂ filter technology and on the technology to produce photosynthetic microorganisms.



January 19, 1993

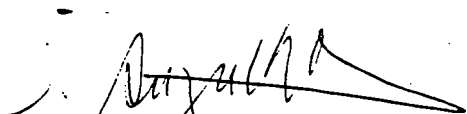
If you consider that the workshop should be held much earlier and does not matter whether it will be held under the Agreement or not, a possible way to have a joint meeting is as follows: the joint meeting had better be held by the host of the U.S. side; if it is possible, we are willing to delegate about ten members of above mentioned group.

financially manageable number, to the meeting by our cost; if you kindly invite some of them by your cost, the participants from Japan will be increased.

I would prefer the second choice because the workshop on this theme should be held as soon as possible. What do you think?

For detailed communication, please contact to Dr. Shuzo Nishioka, Director of the Center for Global Environmental Research. We are looking forward to hearing your thought soon.

Sincerely Yours,



Dr. Tsuguyoshi Suzuki
Executive Director
Center for Global Environmental Research
National Institute for Environmental Studies
Environment Agency of Japan
16-2 Onogawa, Tsukuba, Ibaraki 305 Japan

For further contact:

Dr. Shuzo Nishioka
Director
Center for Global Environmental Research
National Institute for Environmental Studies
Environment Agency of Japan
16-2 Onogawa, Tsukuba, Ibaraki 305, Japan

cc: Dr. Shuzo Nishioka, CGER
Dr. Fred Bernthal, National Science Foundation, U.S.A.
Dr. Robert Corell, National Science Foundation, U.S.A.
Dr. Ray Squitieri, ERNRE

Withdrawal/Redaction Marker

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Federal Coordinating Council for Science, Engineering and Technology
COMMITTEE ON EARTH AND ENVIRONMENTAL SCIENCES

National Science Foundation
1800 G Street, N.W., Room 305
Washington, DC 20550
Tel. 202/357-7353; FAX 202/357-7830

TELEFAX TRANSMISSION

DATE: 5/6/93
TIME: 1:50 p.m.

PAGE(S) ATTACHED none

FROM: Betty W. Wong



CENTER FOR GLOBAL ENVIRONMENTAL
RESEARCH
NATIONAL INSTITUTE FOR
ENVIRONMENTAL STUDIES
ENVIRONMENT AGENCY OF JAPAN

TO: Francine, CEA
OEOB, Room 315
Tel. 202/395-5036
FAX. 202/395-6947

DR. SHUZO NISHIOKA
Director

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PHONE: 0298-51-6111 EXT. 380
FAX: 0298-58-0645
snishio@nies.go.jp

REMARKS:

Francine:

For the 2:30 p.m. Monday, May 10, meeting, please process a security clearance for the following people:

- Edgerton, Sylvia (from the Nat'l Science Foundation) - (b)(6)
- Nishioka, Shuzo (from Japan) - (b)(6)

Many thanks.

- Betty

MAY 10 - 2:30

From: Francine P. Obermiller (OBERMILLER_F)
To: Stiglitz_J
Date: Monday, May 3, 1993 3:39 pm
Subject: Req for Appt fr NSF-Shuzo Nishioka

Betty, from the Committee on Earth & Environment Design, National Science Foundation (of which she said you are the Subcommittee Chair for Environmental Technology) called to request that Dr. Shuzo Nishioka, Director for Center for Global Environmental Research, in Japan, have an appointment with you on Mon, May 10, between 9:30 and 11:30, or after 2:30.

Will you meet with him?

(357-7353)

Betty will call
in morning
w/DOB ?

additional name

yes

*F
Environment
(Gopals
Committee)*

SUMMARY
OF
TECHNOLOGICAL ASSESSMENT OF MEASURES
TO REDUCE CARBON DIOXIDE EMISSIONS

MAY,1992

COMMITTEE TO EVALUATE COUNTER-ACTIVE TECHNOLOGIES
AGAINST GLOBAL WARMING , JAPAN ENVIRONMENT AGENCY

TECHNOLOGICAL ASSESSMENT OF MEASURES TO REDUCE CARBON DIOXIDE EMISSIONS

1. Background and Contents of the Evaluation

In December, 1990, 2 months after the announcement of the Japan's Action Program to Arrest Global Warming, the Committee to Assess Counter-Active Technologies Against Global Warming (Chairman: Yoichi Kaya, Professor of Engineering, Tokyo University) was established to identify the current conditions of various counter-active technologies and to conduct a comprehensive and quantitative evaluation of such technologies to contribute to the promotion of the measures envisaged by the Action Program. The Committee was also given the task of identifying problems and policy themes to assist the thorough implementation of these technologies. While the Action Programme covers measures relating to other greenhouse effect gases, including methane, and forest conservation measures, etc., The Committee has limited the scope of technological assessment to carbon dioxide which is believed to be the largest contributor to global warming, therefore necessitating the urgent implementation of emission reduction measures.

The Committee was composed of 5 sub-committees, i.e. 4 sub-committees dealing with specific sectors (industry, residence and commerce, transport and energy) and one sub-committee assigned to evaluate the possibilities in reducing carbon dioxide emission volume of Japan. These sub-committees met more than 30 times to examine the results of interviews with all relevant industrial organizations and the collected data. The findings and conclusions of the sub-committees on the carbon dioxide emission reduction potential of counter-active technologies and problems encountered in the course of putting these technologies into practice have now been compiled into the present report.

2. Carbon Dioxide Emission in Japan

As shown in Fig. 1, the total carbon dioxide emission volume in Japan in fiscal 1990 was approximately 1,170 million tons (converted to CO₂: 313 million tons carbon-based), of which the industrial, residential/commercial, and transport sectors accounted for 46%, 23% and 19% respectively.

Changes in the carbon dioxide emission level (Fig. 2) indicate 3 distinct periods, i.e. a period of increase from fiscal 1965 to fiscal 1973, a period of stability from fiscal 1974 to fiscal 1986 and another period of increase from fiscal 1987 onwards. The total emission volume and the per capita emission volume were very stable between fiscal 1984 and fiscal 1986 because of the policy of encouraging the diversification of energy sources and energy saving to alleviate the negative impacts of the first and second oil crises. Since fiscal 1987, however, the commitment to energy saving efforts has lost its momentum due to low oil prices and both the total emission volume and the per capita emission volume are again showing an increasing tendency.

3. Carbon Dioxide Emission Reduction Potential of Each Sector

The evaluation results for the 4 subject sectors are shown in Figs. 3 - 7.

(1) Industrial Sector (Fig. 3)

When trying to quantify the emission reduction potential in the future, both such emission suppression factors as the new orientation of industries to softwares and such emission increase factors as an increased production volume must be taken into consideration. The present evaluation, however, assumes the status quo of the industrial structure and the production volume level. The reduction potential is, therefore, the accumulated total of the potential of energy conservation, recycling and other measures.

(2) Residential/Commercial Sector (Fig. 4)

In the case of an anticipated increase of the emission volume in accordance with the present trend without implementing any special measure, an economic model was used to calculate the future emission volume based on an increased number of households and an increased floor area for business purposes, in turn estimated on the basis of past data and other sources. Carbon dioxide emission can be reduced if a wide range of counter-active technologies are introduced. In addition, when the present building stock is completely replaced by new stock incorporating counter-active technologies and measures in the year 20X0, the carbon dioxide emission factor for household or unit floor area will substantially decline from the present level. Assuming that the present trend of energy consumption/household hits a peak in 2010, the reduction potential will be quite substantial.

(3) Transport Sector (Figs. 5 and 6)

Based on the forecast for the traffic volume of automobiles by the Ministry of Construction, the expected travel mileage of each type of vehicles and the resulting carbon dioxide emission volume in the future were estimated. This estimated carbon dioxide emission volume can be reduced if a wide range of counter-active technologies are introduced. Apart from such technologies, a change in life style can also contribute to reducing carbon dioxide emission in the processes of automobile manufacturing.

(4) Energy Conversion Sector (Fig. 7)

With the successful achievement of the current electric power supply target which is consistent with the targets of the Action Program and also with a substantial increase in the use of non-fossil energies, especially nuclear power generation, the rate of carbon dioxide emission factor for electric power generated by large-scale power plants can be cut by some 10%-14% in the year 2000 and by some 27%-31% in the year 2010. It is suggested that the wide use of such dispersion power sources as solar photovoltaic power generation, the repowering of privately-generated power and waste incineration heat power generation, etc. will significantly contribute to reducing the rate of carbon dioxide emission in power generation.

4. Comprehensive Evaluation of Counter-Active Technologies (Table 1 and Figs. 8 and 9)

Based on the study results for each sector, a comprehensive evaluation of identified counter-active technologies across their original subject fields, including the classification of technologies based on technological maturity and the administrative priority of application, was conducted. In addition to dispersion power sources, including solar power generation of which the maximum potential was calculated based on the maximum physical installation of facilities, the potential of each technology ranges from several million tons to 20 million tons in the year 2000 and from several million tons to 40 million tons in the year 2010. There is no specific technology of which the potential is significantly larger than that of others.

(1) Evaluation Based on Technological Maturity (Fig. 10)

Counter-active technologies were classified into the following 3 groups based on their technological maturity and the total potential was calculated for each group.

- ① Well established technologies ready for diffusion.
- ② Highly promising technologies although their diffusion depends on further development to a certain extent.
- ③ Other technologies of which diffusion depends on further development.
 - As the combined potential of the technologies in Group ① accounts for more than 40% of the total potential, the steady application of these technologies is the first priority.
 - As the potential of Group ② is larger than that of Group ①, the earnest promotion of the development of these technologies is important.
 - The small potential of Group ③ is explained by the small number of technologies in this group of which the potential can currently be quantified.

(2) Evaluation Based on the Necessity of Administrative Commitment (Fig. 11)

Depending on the different degree of the required administrative commitment to promote the diffusion of counter-active technologies, the technologies were classified into the following 2 groups and the total potential of each group was calculated.

- ① Technologies of which diffusion to a certain extent can be expected following the present trend.
- ② Technologies of which the diffusion requires strong administrative commitment.
 - Some form of strong administrative commitment is believed to be necessary to realise approximately two-thirds of the total potential.
 - Those technologies or measures for which administrative commitment is absolutely essential include conscious energy saving efforts and others, the implementation effects of which depend on changes of the behavioural patterns of such end users as consumers. To realise their potential, not only economic incentives but also the provision of information and environmental education to improve the public awareness and morals vis-a-vis the global environment will play a crucial role.

(3) Priority Fields (Fig. 12)

The priority fields in which Japan should implement carbon dioxide emission reduction measures in the future were generally identified as the following 5 fields and the total potential of each field was calculated.

- ① Introduction of dispersion power sources, particularly the use of natural energies.
- ② Further promotion of the application of those technologies which are currently in the course of diffusion in the manufacturing industry.
- ③ Improved energy efficiency of high energy consumption-type durable goods.
- ④ Strengthening of energy conservation measures for buildings.
- ⑤ Reduction of carbon dioxide emission in raw material manufacturing by means of extensive recycling and other means.

- The total potential for ① is extremely large, partly because the maximum physical installation of facilities was assumed to calculate the potential.
- In the case of large energy consumption-type durable goods (③), the total potential in the year 2010 is fairly large as it will take some time for stock to be renewed.
- In the case of buildings (④) where the renewal of stock will take a longer time than in the case of durable goods, the total potential value in the year 2010 is not as large. However, the total potential value for the year 2010 when improved thermal insulation and other energy conservation measures are applied for all houses and commercial buildings is extremely large.

5. Estimated Emission Volume in Year 2000 With Implementation of Reduction Measures (Fig. 13)

Based on the study results on reduction potential, the carbon dioxide emission volume in the year 2000 with the maximum implementation of counter-active technologies was estimated to determine the possibility of stabilising carbon dioxide emission.

(1) Estimate of Future Emission Volume of Industrial Sector (Fig. 14 and Table 2)

The carbon dioxide emission level of the industrial sector has been dependent on the following 5 factors.

- ① Energy conversion
- ② Improved energy efficiency
- ③ Emergence of highly value-added products (change in products' composition)
- ④ Shift from the material industry to the processing industry (change in composition of industrial sector)
- ⑤ Economic growth of the industrial sector (change in total added value)

In order to accurately estimate the emission volume of the industrial sector, it is necessary to set a future scenario based on a clear understanding of the trend towards highly value-added products, a shift from the material industry to the processing industry and the future economic growth prospect of the industrial sector. In the case of the present evaluation, however, the following simplified estimates have been made.

- Assuming the continuance of the present trend of a shifting emphasis from the material industry to the processing industry and the trend towards highly value-added products (when combined together representing changes of the industrial structure) upto the year 2000 and also assuming Japan's future annual economic growth rate of 3%-4%, the emission volume will increase by 0.5%-1.5% annually based on factors ③, ④ and ⑤.
- If energy conversion follows the present trend and if investment in energy conservation, which has been declining in recent years, is revived by the wide application of counter-active technologies in the manufacturing industry, an annual reduction of some 2% is feasible based on factors ① and ②.
- The combination of all factors, i.e. ① through ⑤, will enable emission reduction in the manufacturing industry at an annual rate of some 0.5%-1.5% upto the year 2000.

In short, the total carbon dioxide emission of the industrial sector can be reduced to the 87%-96% level (1990:100) (86%-95% for the manufacturing industry).

(2) Overall Potential (Fig. 15)

The total domestic emission level in the year 2000 was estimated using the weighted average of the estimated emission volume in each sector following the application of counter-active technologies and the actual emission volume of each sector in fiscal 1990 while assuming a constant emission level of the self-consumption of energies in the energy conversion sector. The result is that the total domestic emission volume in the year 2000, based on technologies of which the potential has been quantified, will be around 97%-104% of the fiscal 1990 level.

Given the above evaluation result, it is possible to meet the target of the Action Programme if relevant measures are earnestly promoted by both the public and private sectors together with the contribution of non-technological factors, such as a change of the industrial structure. Nevertheless, as often asserted in this report, it will be necessary to realise the maximum potential of each technology to meet this goal. As many problems remain unsolved, a wide range of administrative efforts is required.

6. Policy Themes

Policy themes to which Japan should given priority in the future are described below for each sector based on the understanding referred to in 5 (2) above.

(1) Industrial Sector

- The key points are the promotion/diffusion of counter-active technologies, of which application is currently spreading, and the increased use of recycled resources. The progress of counter-active measures in the industrial sector reacts most sensitively to the cost of energy. The stable energy cost at a low level in the previous several years has resulted in a noticeable reduction in energy saving investment and the application of counter-active technologies has accordingly slowed down. It is essential to introduce measures to create a positive investment environment, necessitating the clarification of targets for the measures/technologies to be implemented and the promotion of investment in energy conservation facilities and measures through the provision of economic incentives. The consolidation of a system in which enterprises can properly identify their carbon dioxide emission levels and systematically implement emission reduction measures is also important. Moreover, the full potential of counter-active measures/technologies must be realised.
- The importance of measures associated with social systems, such as the transfer of surplus energy, the use of recycled resources, active linkage between industries and linkage between different economic sectors, etc., has been increasing. To make these measures a reality, it is necessary to ensure the consolidation of related social systems, the introduction of financial assistance and the provision of funds to support such financial commitment.

(2) Residential/Commercial Sector

- The steady application of counter-active technologies for new housing or housing alteration and the systematic application of such technologies in both urban and regional infrastructure improvement projects are very important in view of their strong effectiveness. Therefore, it is important to ensure the consolidation of the related social systems, the introduction of financial assistance and the provision of funds to support such financial commitment in view of the systematic and steady application of these technologies.
- It is important to ensure the improved energy efficiency of household electrical appliances and the wide use of solar heat utilisation equipment. In addition to the clarification of targets to accelerate technological development, the introduction of financial assistance is required to achieve these objectives.

(3) Transport Sector

- It is important to reduce the carbon dioxide emission level of each vehicle and the wider use of low-emission vehicles should also be promoted. The clarification of targets for manufacturers, including the required emission standards, followed by the introduction of preferential measures for investment in plant and equipment are essential to promote technological development and the application of newly developed technologies. Users should be encouraged to opt for fuel economy and durability. A comprehensive policy mix should be pursued by the government to achieve these objectives.
- The consolidation of infrastructure and the introduction of an appropriate fare system for truck transportation are important to promote a modal shift. Financial assistance with firm funding is required for the consolidation of infrastructure.

(4) Energy Conversion Sector

- In addition to the promotion of the use of non-fossil energies, the active development and utilisation of such dispersion power sources as natural energies and cogeneration, etc. will be very important in the future.
- For the active development and utilisation of localised power sources, an administrative response which includes a review of the existing systems should be made together with the promotion of systematic and/or structural measures, including the systematic improvement of the related infrastructure and the provision of financial assistance with budgetary appropriation for these measures.

Basic directions and policy themes are proposed here in relation to Japan's future efforts to promote the wide application of carbon dioxide emission reduction technologies and to achieve the targets of the Action programme.

① Understanding and Cooperation of the Public

The implementation bodies for measures to combat global warming are the government, local governments, enterprises and individual persons. In particular, a new awareness of the importance of these measures and actions based on such an awareness on the part of individual persons are essential for the promotion of counter-

active measures against global warming. Therefore, the first key point is to repeatedly explain to the public in plain language and/or other forms for easy understanding the current conditions of global warming, the necessity to combat global warming and concrete measures so that the implementation of these measures can be assisted by a proper understanding and the active participation of the public.

② Urgent General Inspection

The stabilisation or even reversal of the increasing trend of carbon dioxide emission, acutely observed between 1986 and 1990, is urgently required. There is no specific medicine resulting in the reduction of carbon dioxide emission in a specific field. Therefore, it is extremely important for all those emitting carbon dioxide to try to implement feasible counter-active technologies or measures as soon as possible in full force.

Measures which can be immediately adopted include saving in the hitherto wasteful use of energy, improvement measures with a small investment cost and improved operation methods (an immediate 6% energy use saving is said to be possible for any small factory). All energy users are, therefore, called upon to conduct an immediate general inspection and to prepare and implement a strategic action programme.

③ Timely Introduction of Measures

In addition to the adoption of technological measures by all users, it is necessary to ensure a structural change of social systems in order to further promote carbon dioxide emission control.

It is important to ensure that technologies with low carbon dioxide emission are used for the construction of new buildings and structures, the alteration of old buildings and structures and the implementation of urban and regional development projects, etc. If the proper timing of the use of these technologies is missed, the implementation of counter-active technologies is delayed by the life-time of the buildings or structures in question. In the case of buildings which generally have a long life-time, a particularly long lead time is required for the application of counter-active technologies in all buildings to be completed.

In order to improve the general energy efficiency of society, it is necessary to systematically construct an improved social infrastructure as an essential component of diffusion efforts to achieve the efficient use of surplus power and heat, the utilisation of surrounding heat and a modal shift, etc.

A systematic or strategic approach is essential to achieve the timely implementation of various measures from the medium and long-term perspective, necessitating the identification of relevant policy targets and administrative methods to achieve such targets and the consolidation of relevant systems, funding and organizations, etc.

The following policy themes will require stronger commitment in the future.

- ① Implementation of Action Programme
- ② Administrative Guidance Using Standards and Targets
- ③ Use of Economic Measures
- ④ Coordination with Related Systems
- ⑤ Systematic Consolidation of Social Capital
- ⑥ Technological Development and Consolidation of Technological Basis
- ⑦ Active Introduction of Counter-Active Technologies by Central and Local Governments
- ⑧ Manufacture of Products with Low Carbon Dioxide Emission
- ⑨ Establishment of Environmental Conservation-Oriented Life Style
- ⑩ Provision of Information

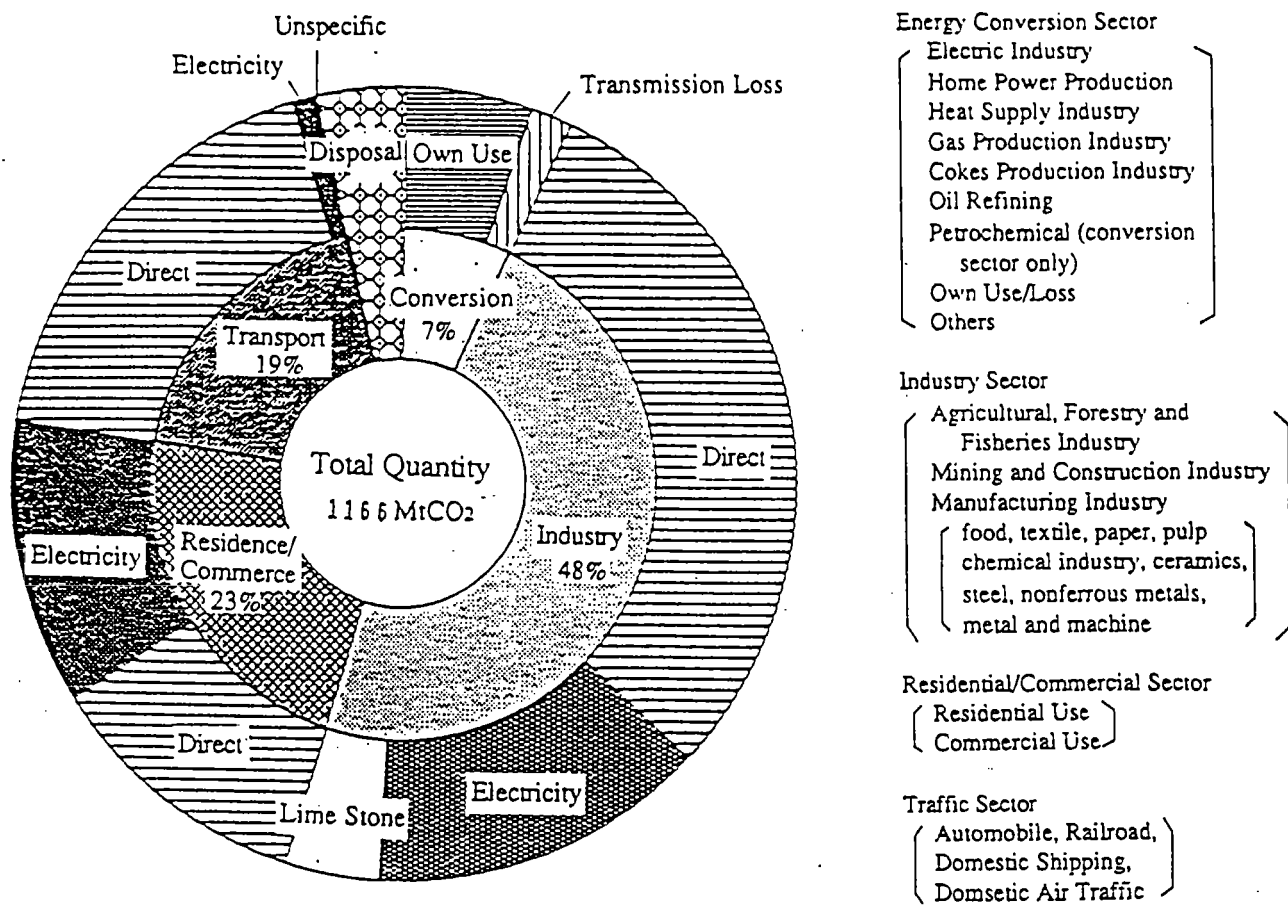


Fig. 1 Details of Quantity of Carbon Dioxide Emmission in Fiscal 1990

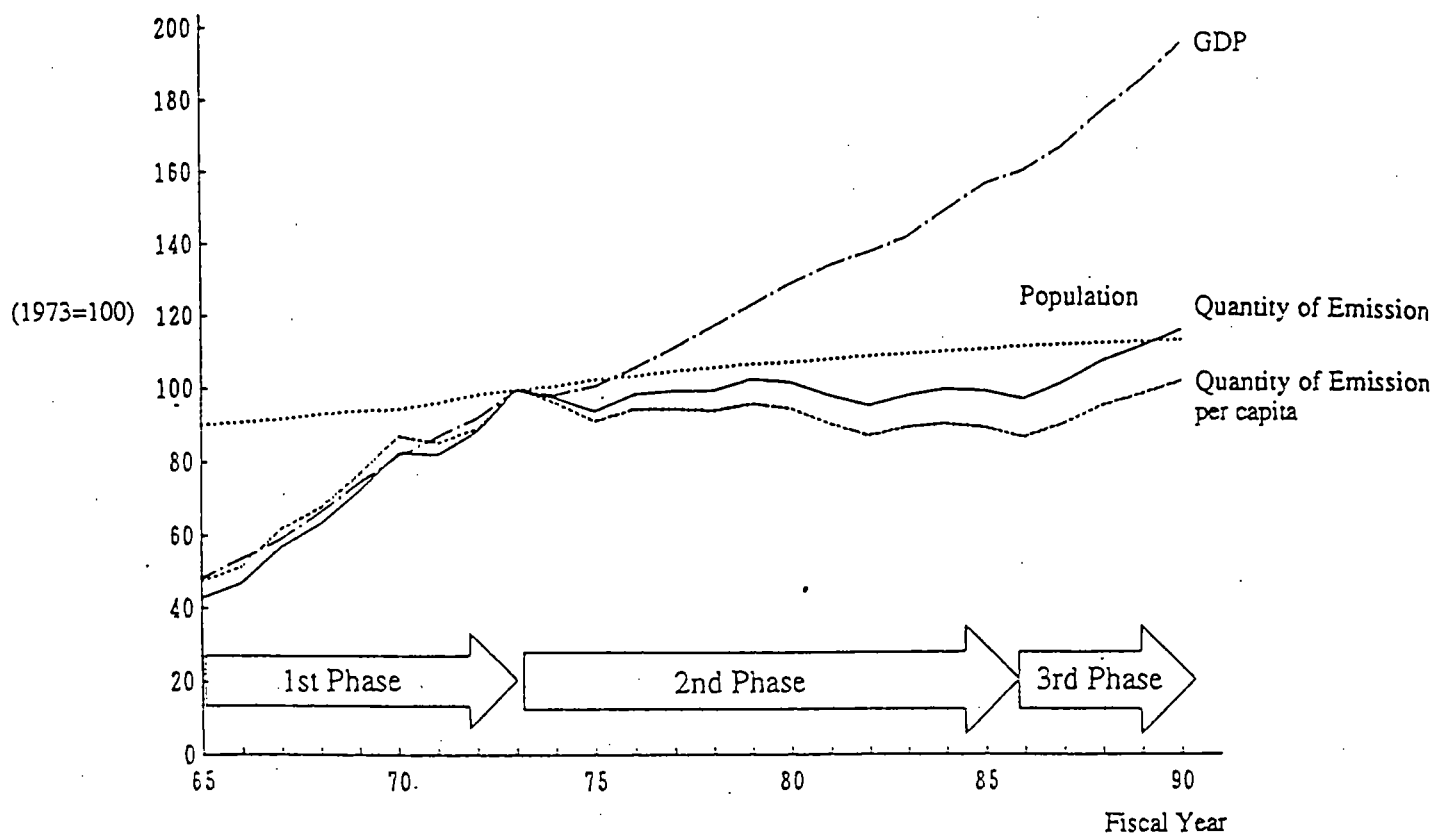
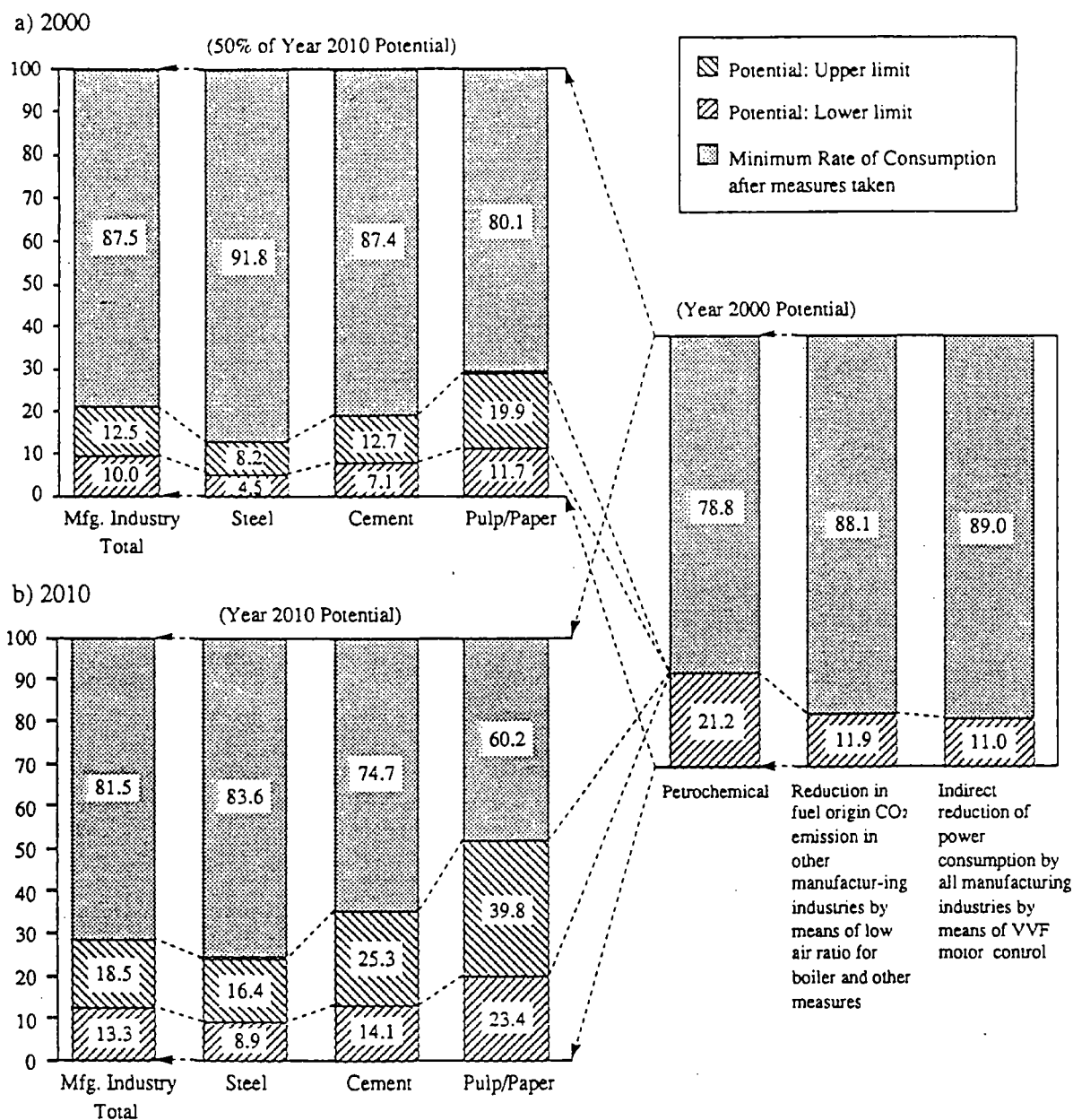


Fig. 2 Changes in Total Quantity of Carbon Dioxide Emission in Japan



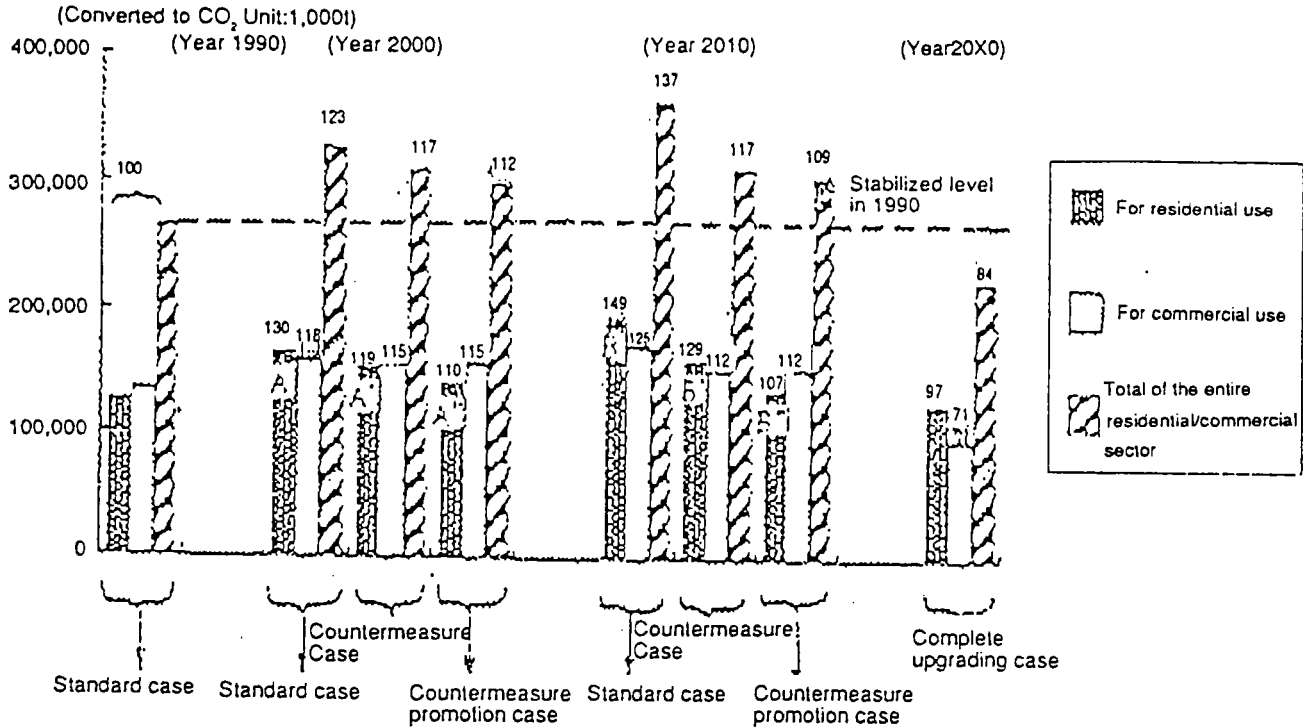
Note Assumption A: The potential for those industries and fields where the potential for the year 2000 is estimated will stay at the year 2000 level in the year 2010.
Assumption B: The potential for those industries and fields where the potential for the year 2010 is estimated will be 50% of the year 2010 level in the year 2000.
Based on these assumptions, the total potential of the manufacturing industry in 2000 and 2010 is estimated by the weighted average method using the actual emission level of every industry and field in 1990.

<Main CO₂ Reduction Measures Assumed for 4 Main Industries>

Steel	Cement	Pulp/Paper	Petrochemical
(New Technologies at Diffusion Stage) • coke dry quenching • hot charge rolling • hot direct rolling • dry type BF top pressure recovery turbines • closed type BOF gas recovery • coal moisture control • DC electric arc furnace • others (Future Technologies) • smelting reduction furnace (Recycling) • improved rate of scrap use	(New Technologies at Diffusion Stage) • waste heat power generation • preliminary crushing mill • energy saving mill • NSP kiln (latest facility) • Others (Recycling) • increased mixed cement ratio through use of blast furnace cement	(New Technologies at Diffusion Stage) • bearing dehydration device • high performance size press • black liquid recovery boiler • high performance evaporator • pre-infiltration continuous cooking • defuser bleaching • others (Future Technologies) • direct caustification • high density pulp paper (Recycling) • improved rate of old paper use	(New Technologies at Diffusion Stage) • gas turbine power recovery • PP vapour conversion • recovery of low level waste heat • high efficiency compressor • others

Fig. 3 Result of Reducing Carbon Dioxide Emissions in Industrial Sector

Residential /commercial sector (in total)



Effects after technical countermeasures are taken in residences

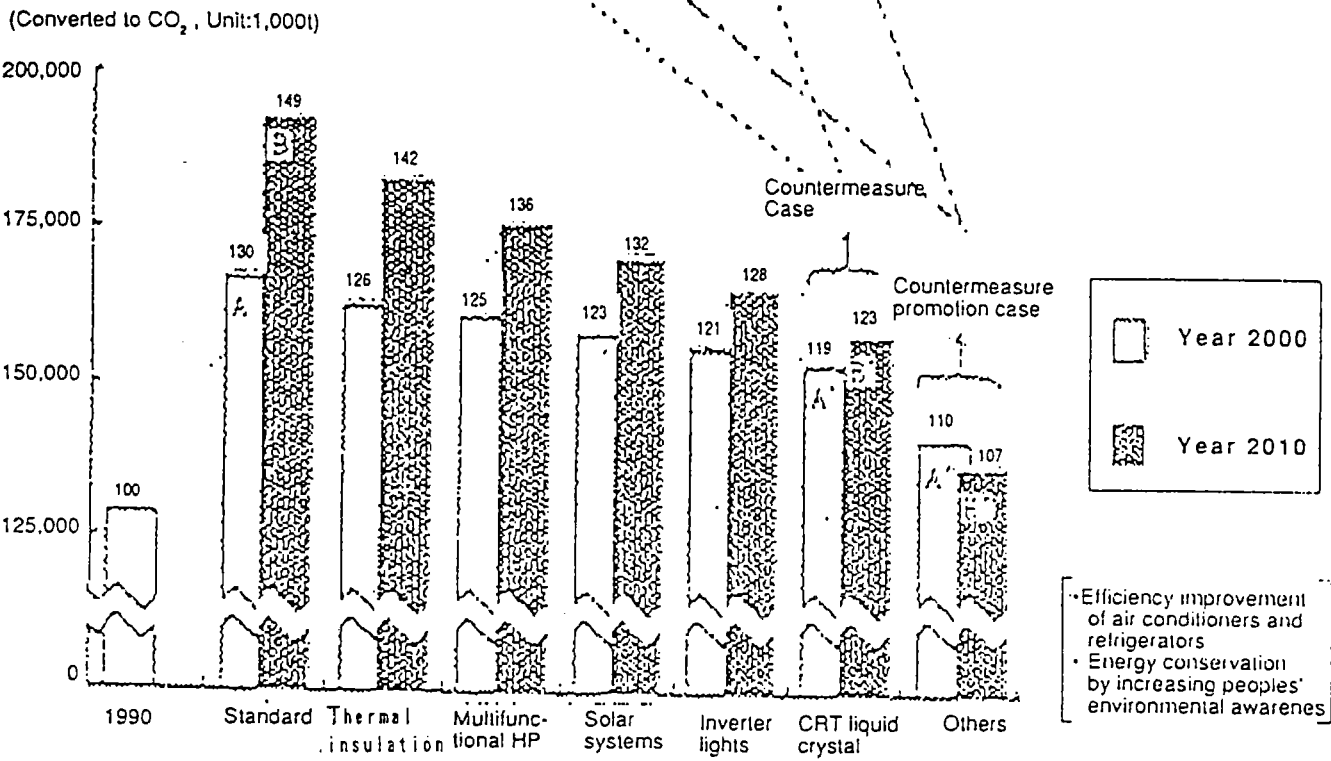


Fig.4 Results of Reducing Carbon Dioxide Emissions in Residential and Commercial Sector

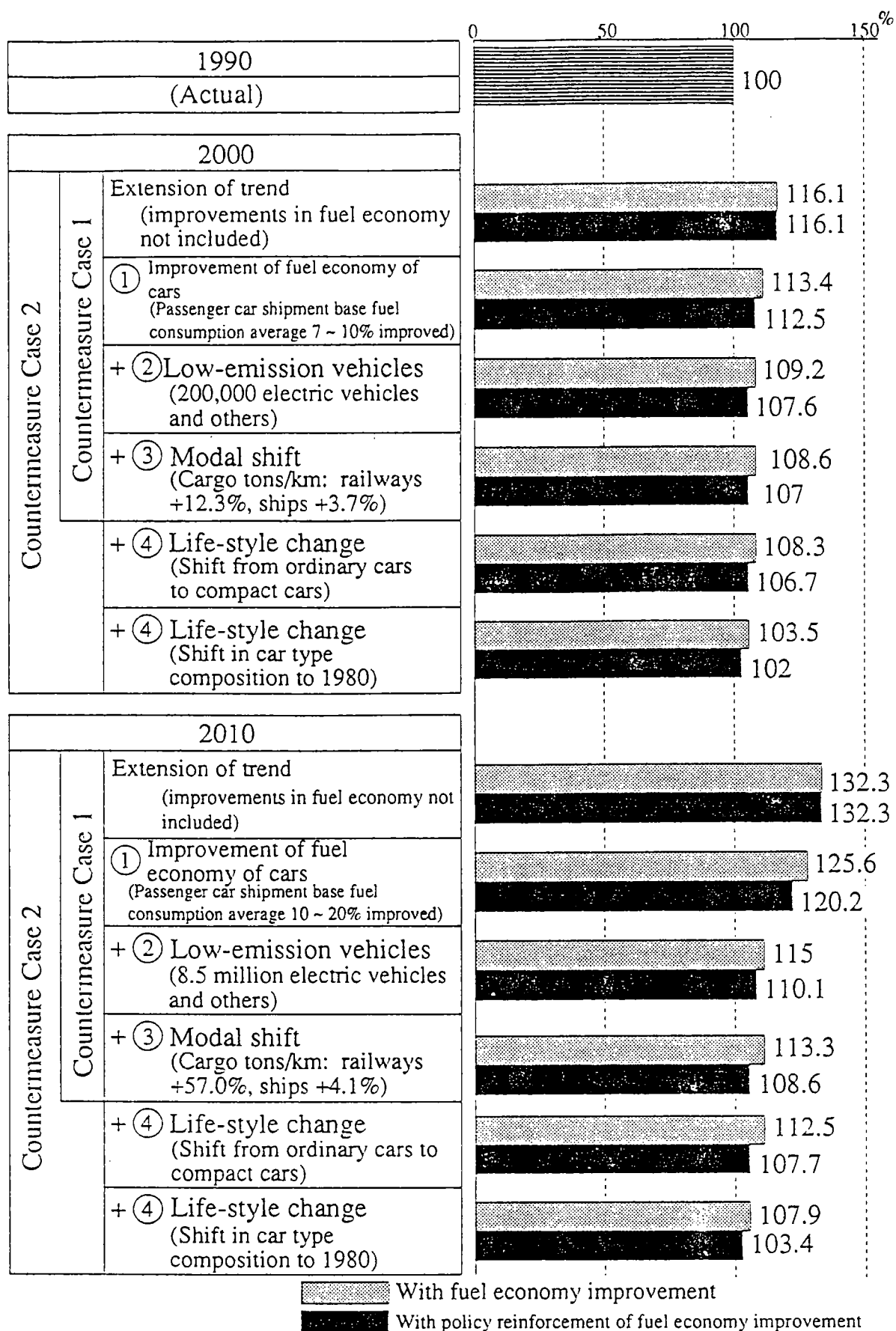


Fig.5 Results of Reducing Carbon Dioxide Emmissions During Car Operation

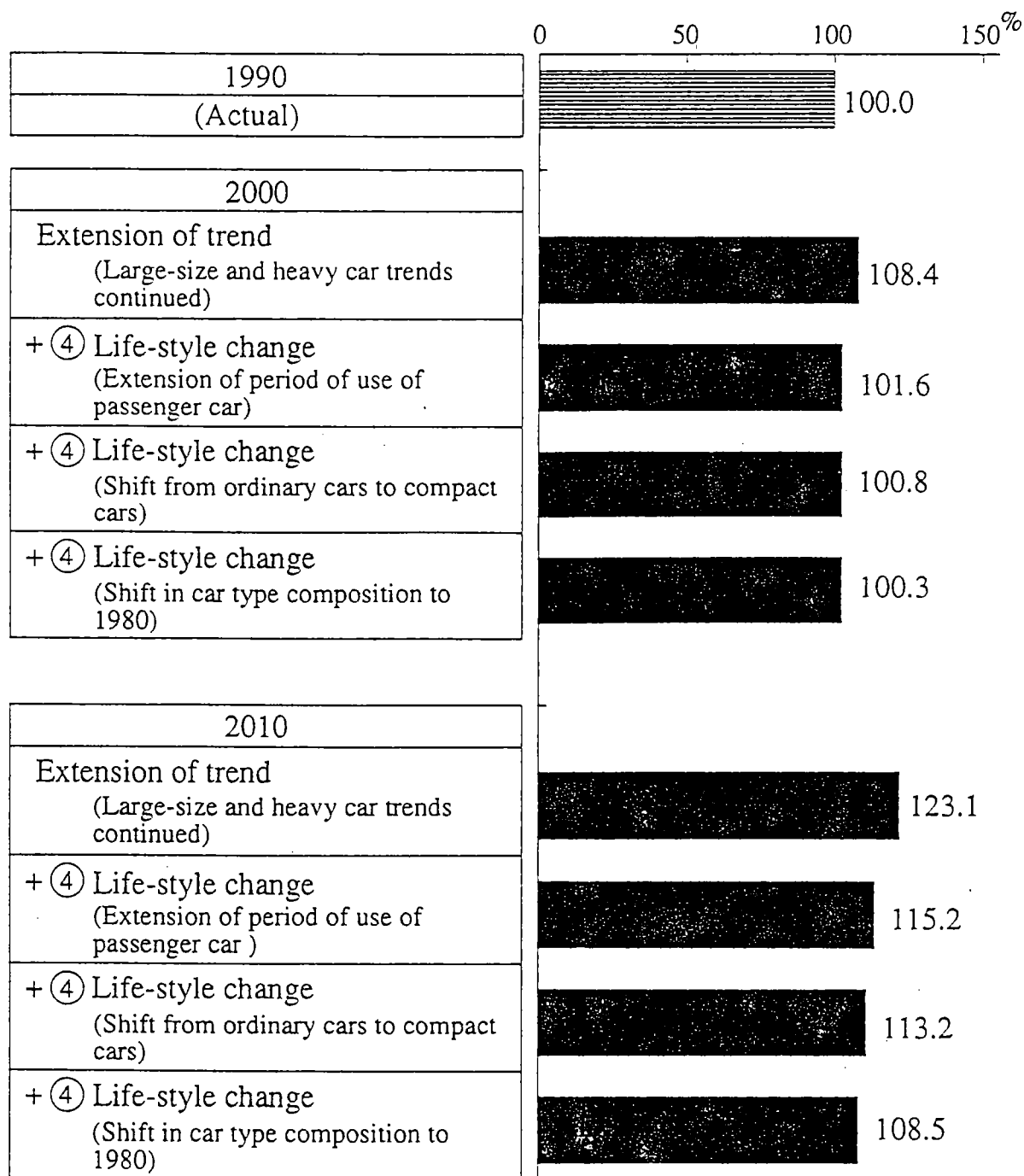


Fig.6 Results of Reducing Carbon Dioxide Emmisions During 4-Wheel Manufacturing

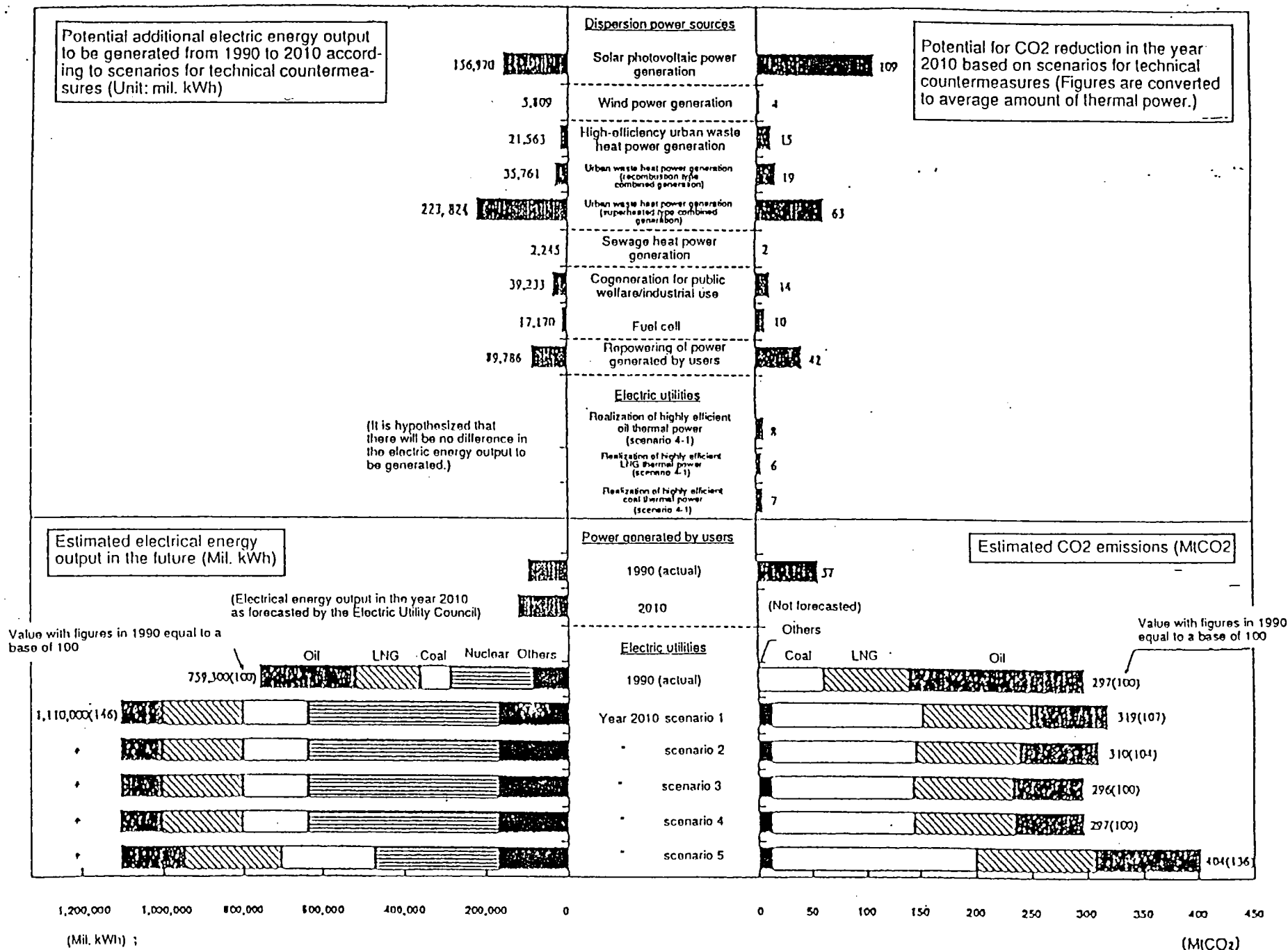


Fig. 7 Results of Reducing Carbon Dioxide in Energy Conversion Sector

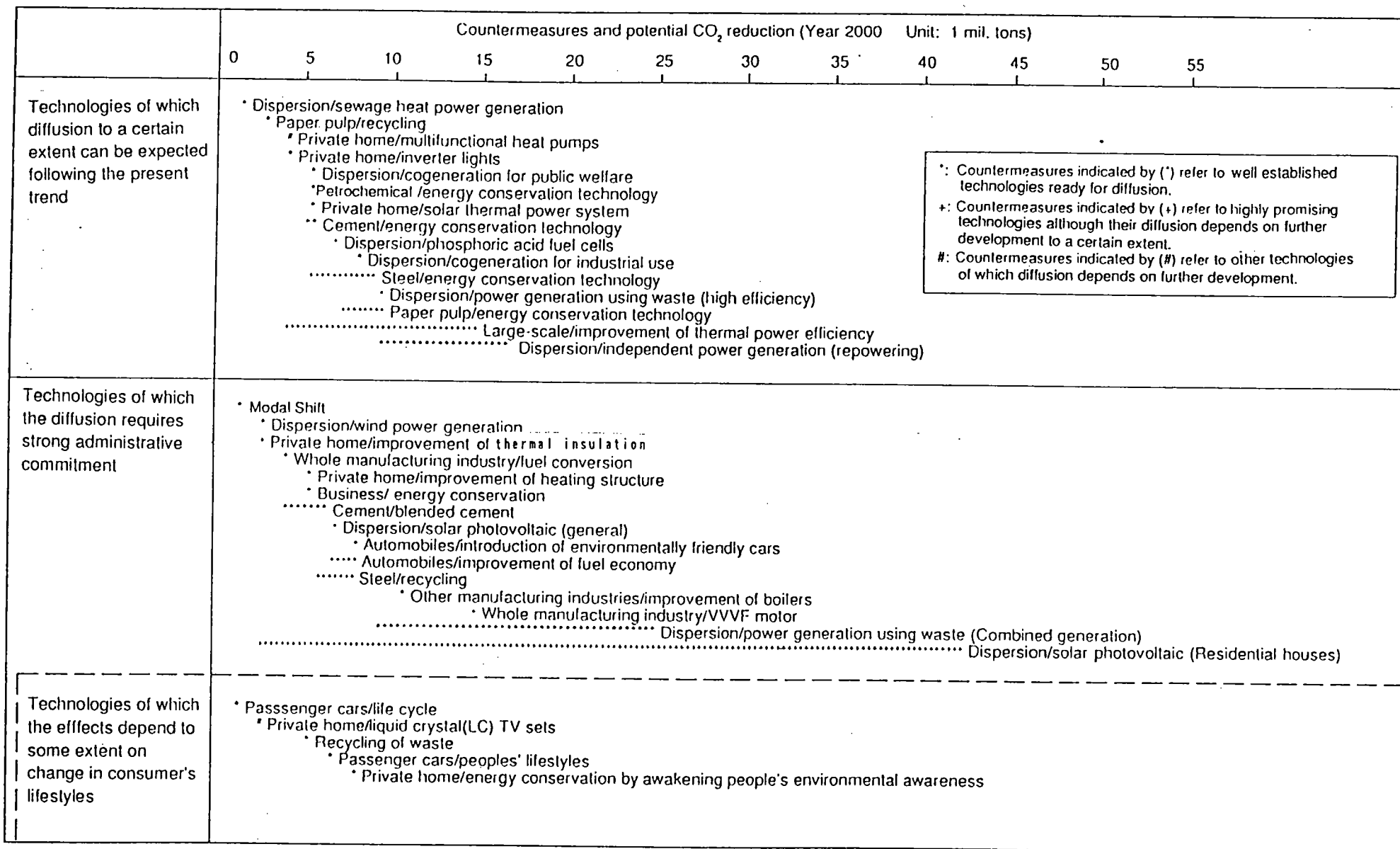


Fig.8 Potential Carbon Dioxide Reductions which can be Achieved by Technical Countermeasures (Year 2000)

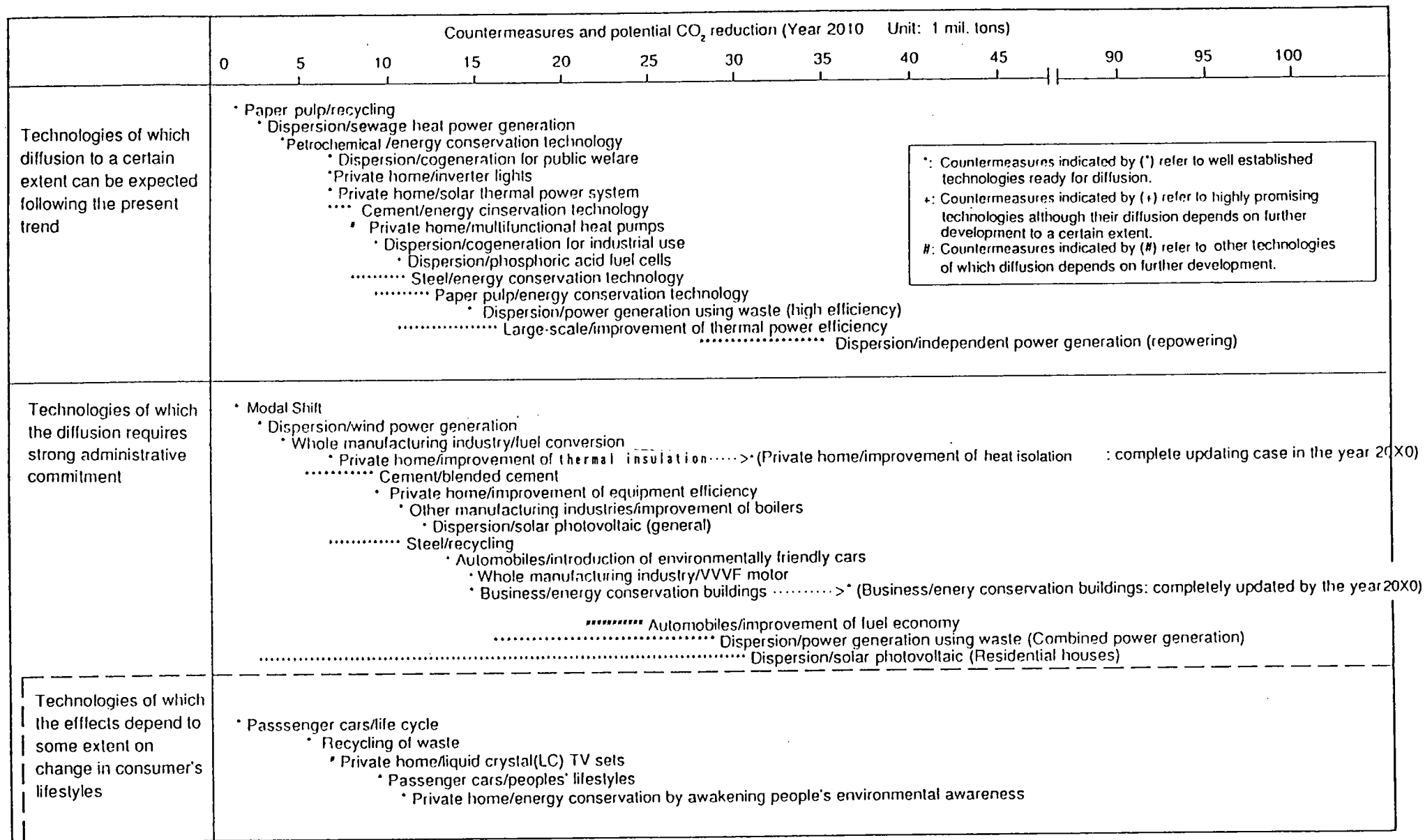


Fig.9 Potential Carbon Dioxide Reductions which can be Achieved by Technical Countermeasures (Year 2010)

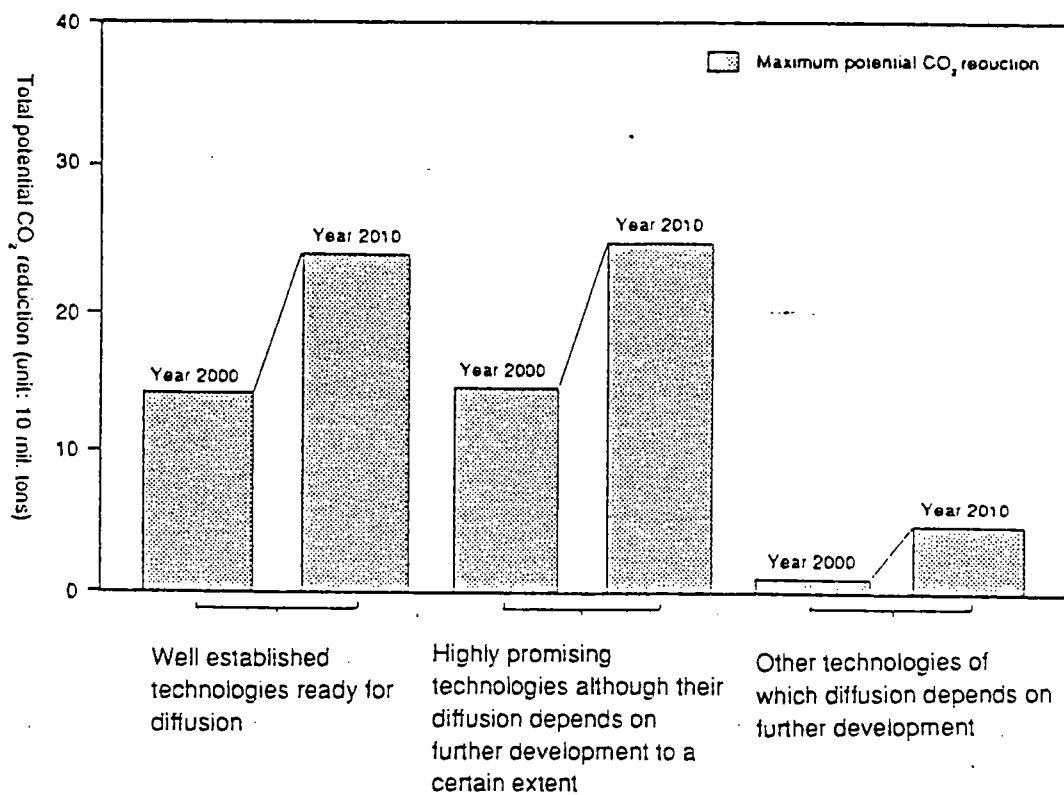


Fig.10 Evaluation Based on Technological Maturity

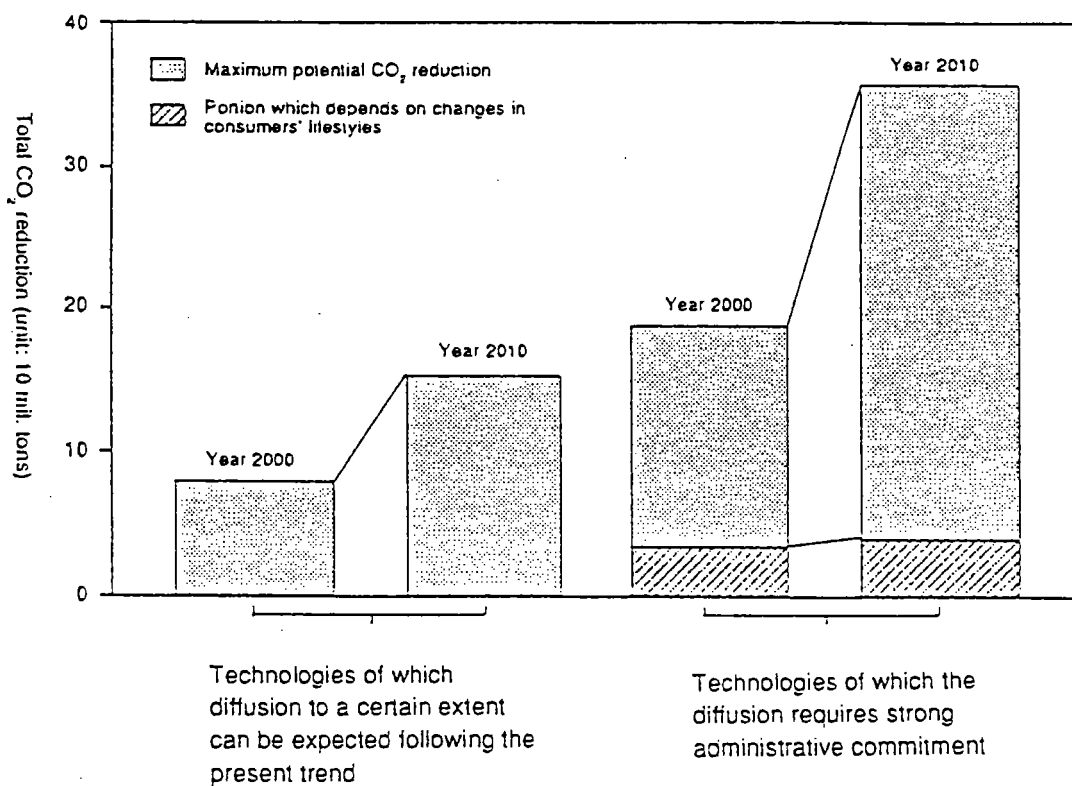


Fig.11 Evaluation Based on the Necessity of Administrative Commitment

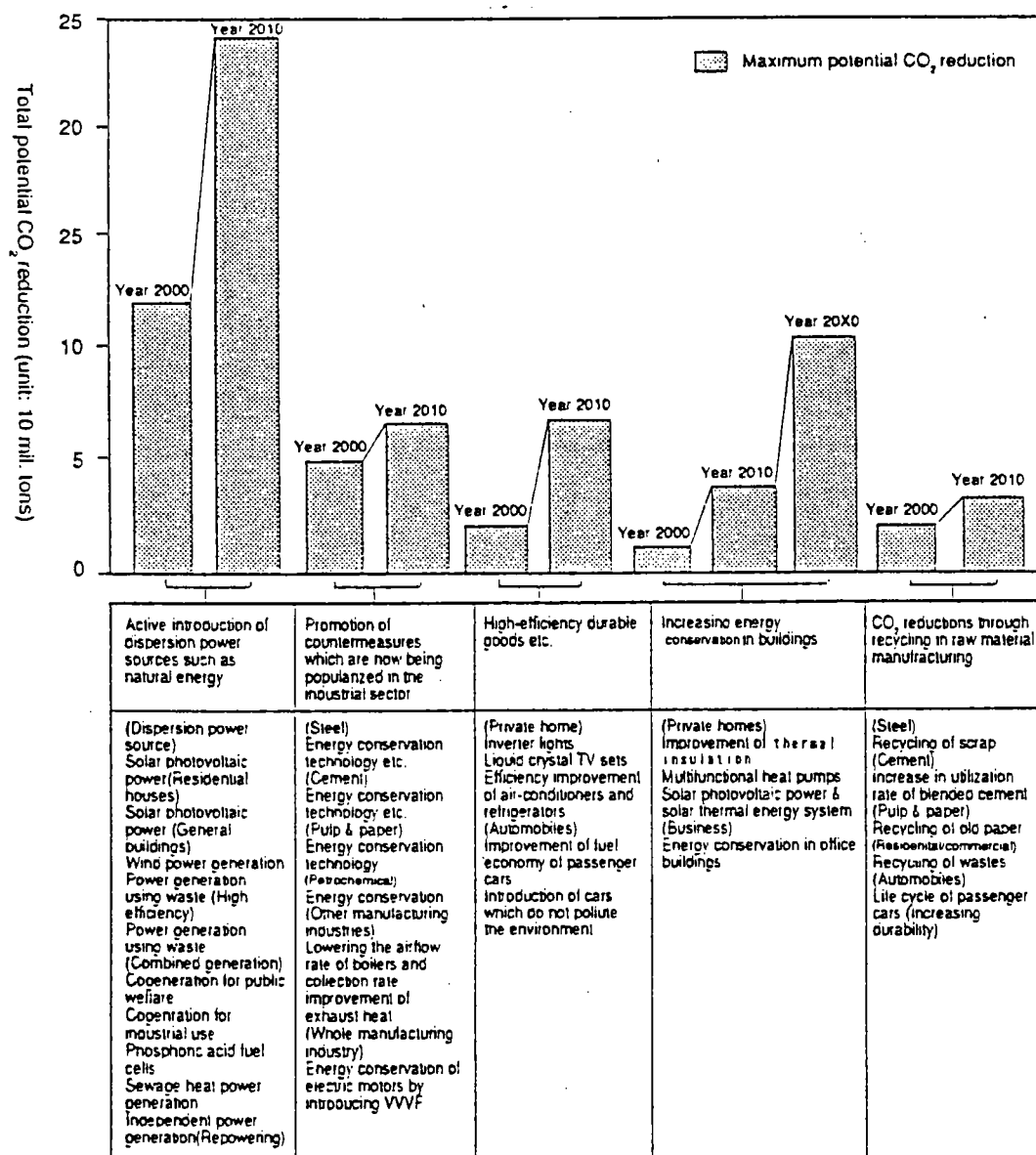


Fig.12 Comparison of Potential Carbon Dioxide reductions in the Priority Five Fields

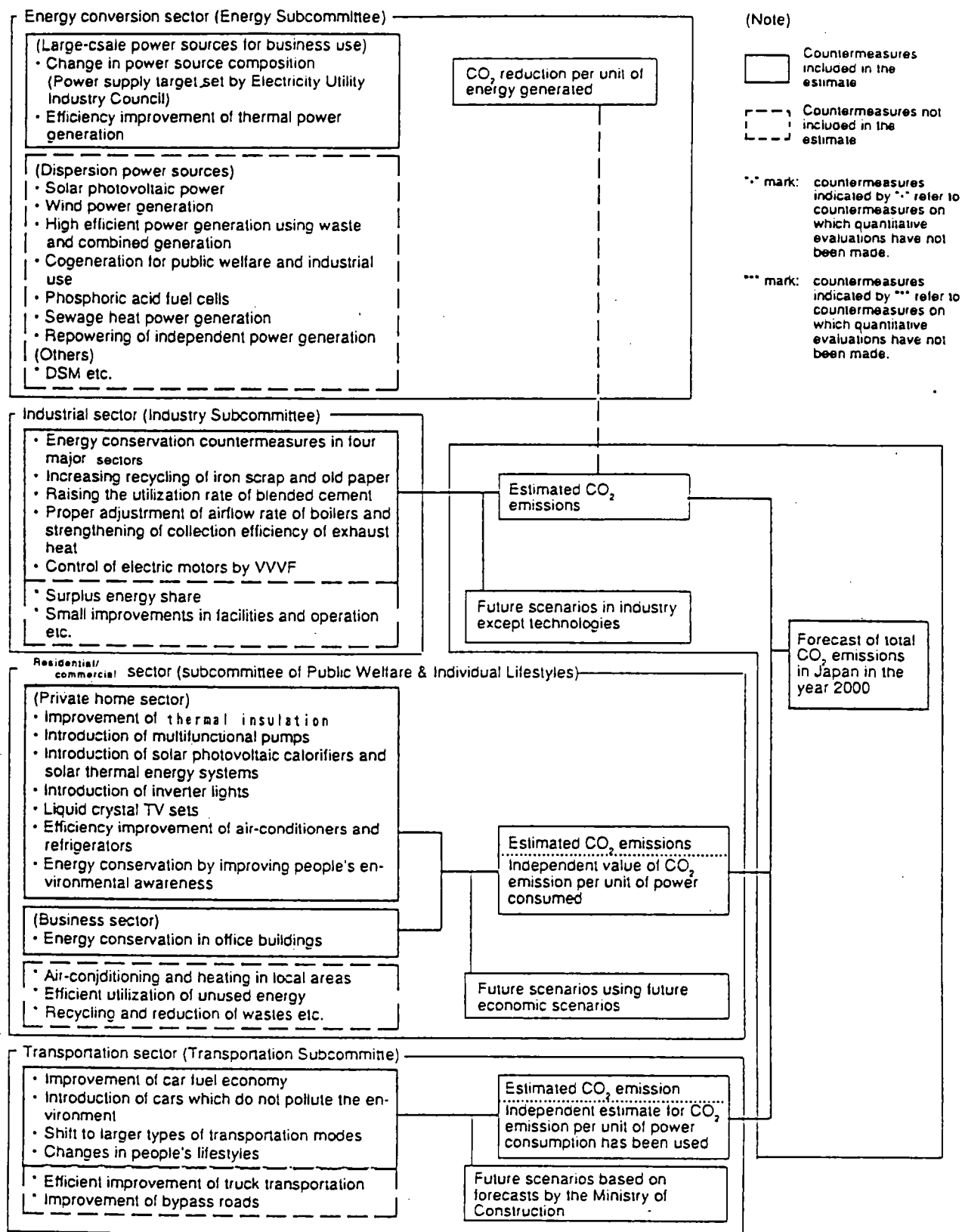


Fig.13 Summary of Methods used to Estimate Total Carbon Dioxide Emissions in the Year 2000 in relation to the Action Plan Targets

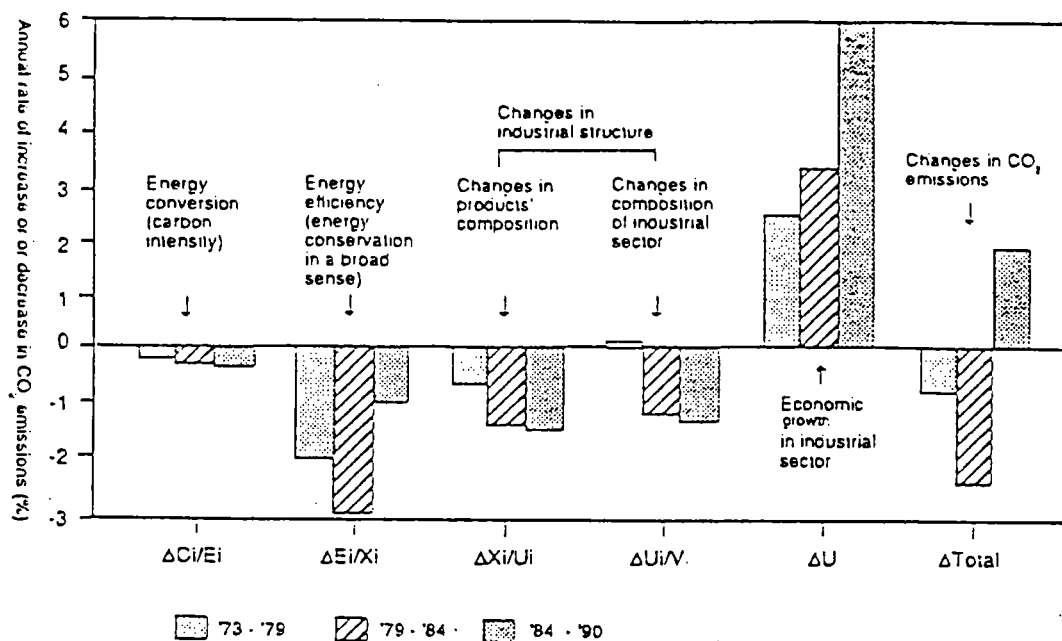
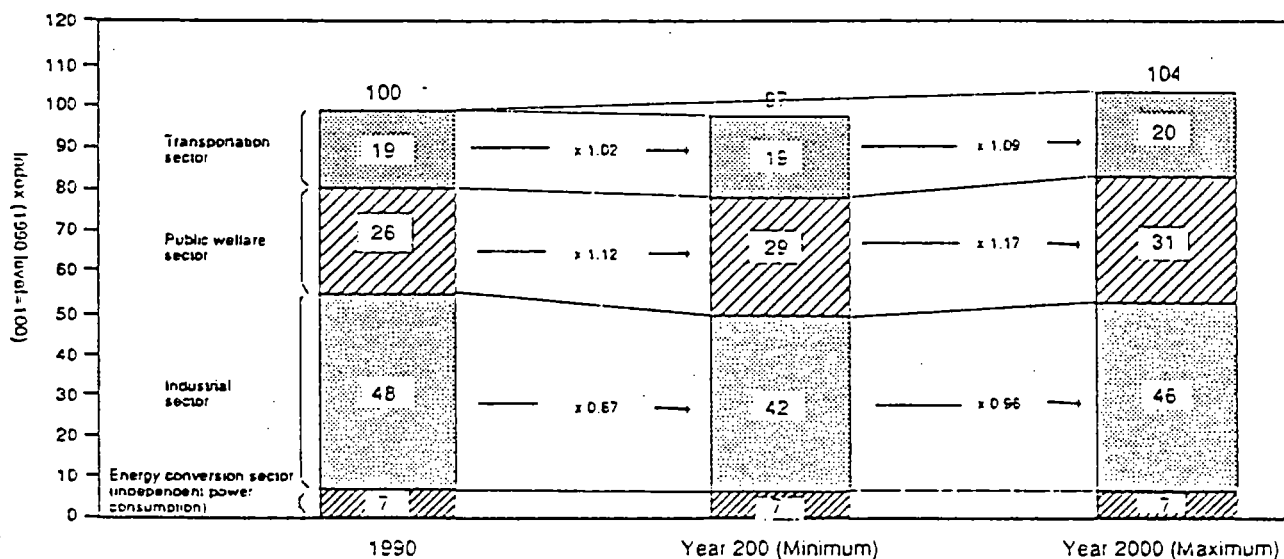


Fig.14 Factors causing an Increase or Decrease in Energy related Carbon Dioxide Emissions in the Industrial Sector



Note: * CO₂ emissions in each sector include indirect CO₂ emission by power consumption

* Since CO₂ emission from waste is included in the public welfare sector, the emission rate in 1990 differs from the value stated in Chapter 2.

Fig.15 Estimates for Carbon Dioxide Emission after Introducing Countermeasures in the Year 2000

Table 1 List of Potential Carbon Dioxide Emission for Individual Sectors after Countermeasures have been Taken

	Sectors	Types of businesses or areas / countermeasures	Year 2000		Year 2010		Hypothetical scenarios
			Amount of CO ₂ reduction (unit: 10,000t)	Rate (unit: % in sector)	Amount of CO ₂ reduction (unit: 10,000t)	Rate (unit: % in sector)	
Countermeasures for which quantitative evaluations have been made	Industrial sector (amount and percentage of CO ₂ reduction compared to the 1990 level)	Steel/energy conservation technology	325 - 631	0.58 - 1.13	650 - 1262	1.16 - 2.25	By the year 2010, all technologies, which are not yet popularized, will be popularized. Popularisation rate of directly melting reduced iron will be 10 to 20%. By the year 2010, the rate of iron ore will decrease to 0.665 to 0.6 (Present rate is 0.745). By the year 2010, BAT will be introduced in more than half NSP. By the year 2010, the percentage of blended cement to slag cement will be raised to 35 to 55%. (Current percentage: 18%) By the year 2010, BAT will be popularized along with future technologies. By the year 2010, the utilization rate of recycled paper will be raised to 61%. (Current percentage: 49%) By the year 2000, CO ₂ reduction per unit energy generated in the latest existing plants will be achieved 100%. By increasing passenger car durability from the present nine years to ten years, the number of passenger cars produced will be reduced. As for boilers, whose capacity is more than 10t/h, the percentage of low temperature air will be adjusted for optimal conditions. 100% heat withdrawal by exhaust gas boiler will be realized. VVVF, whose electricity conservation rate is 25%, will be introduced to 50% of three phase alternating current motors and 12% of compact motors which are being used for various purposes. The use of coal in various fields including the steel and chemistry sectors will be replaced by oil. The conversion rate from oil to LNG will be 5% by the year 2000 and 10% by the year 2010.
		Steel/recycling	417 - 744	0.75 - 1.33	835 - 1488	1.49 - 2.66	
		Cement/energy conservation technology	229 - 315	0.41 - 0.56	458 - 631	0.82 - 1.13	
		Cement/blended cement	234 - 509	0.42 - 0.91	468 - 1019	0.84 - 1.02	
		Pulp and paper/energy conservation technology	378 - 688	0.68 - 1.23	756 - 1376	1.35 - 2.46	
		Pulp and paper/recycling	62	0.11	124	0.22	
		Petrochemical/energy conservation technology	253	0.45	253	0.45	
		Passenger cars/life cycle	195	0.35	223	0.40	
		Other manufacturing industries/improvement of boilers	1292	2.31	1292	2.31	
		Whole manufacturing industry/VVVF motors	1758	3.14	1758	3.14	
		Whole manufacturing industry/fuel conversion	296	0.53	591	1.06	
	Residential/commercial sector	Private home/improvement of thermal insulation	403	1.23	962	2.65	In all newly built houses after 1995, heat insulation material and double pane glass will be used. As for existing houses, double pane glass will be introduced at the annual rate of 5%. Multifunctional heat pumps will be introduced to 2.5% of current detached houses by the year 2000 and 7.5% by the year 2010. Solar thermal energy systems will be introduced to 45% of houses where this system can be installed by the year 2000 and 90% by the year 2010. 50% of lights used in private homes will be replaced by inverter lights by the year 2000 and 100% by the year 2010. 50% of cathode-ray tube TV sets currently in use at private homes will be replaced by liquid crystal TV sets by the year 2000 and 100% by the year 2010. The efficiency of air-conditioners and refrigerators will be improved at the speed of 1.5 times the past speed after 1995. In 50% of private homes, energy conservation will be realized by increasing people's environmental awareness. By the year 2000, 44.3% energy conservation will be realized in 25% of newly built buildings constructed after 1995 and by the year 2010, at 50% of newly built buildings. The recycling target set by the Environment Agency will be achieved by the year 2000.
		Private home/multifunctional heat pumps	206	0.63	709	1.96	
		Private home/solar thermal energy systems	263	0.80	546	1.50	
		Private home/inverter lights	207	0.63	509	1.40	
		Private home/liquid crystal (LC) TV sets	273	0.83	671	1.85	
		Private home/efficiency improvement of equipment	216	0.66	1053	2.90	
		Private home/awakening people's environmental awareness	965	2.95	1073	2.96	
		Business/energy conservation buildings	421	1.29	1785	4.92	
		Recycling of wastes	620	1.89	620	1.71	
			Transportation sector	Automobiles/cool effective fuel	460 - 725	2.28 - 3.60	
Automobiles/introduction of cars which do not harm the environment	721			3.58	1717	7.48	
Modal shift	116			0.58	252	1.10	
Passenger cars/lifestyle	876			4.35	940	4.10	
	Energy conversion sector			Dispersion (energy)/ solar photovoltaic (for general use)	691	1.78	1302
		Dispersion/solar photovoltaic (for residential houses)	195 - 4851	0.50 - 12.52	380 - 9520	0.98 - 24.57	
		Dispersion/wind power generation	202	0.52	404	1.04	
		Dispersion/power generation using waste (high efficiency)	650	1.68	1453	3.75	
		Dispersion/power generation using waste (combined power generation)	890 - 3091	2.30 - 7.98	1937 - 6333	5.00 - 16.34	
		Dispersion/cogeneration for public welfare	252	0.65	503	1.30	
		Dispersion/cogeneration for industries	448	1.16	896	2.31	
		Dispersion/phosphoric acid fuel cell	316	0.82	903	2.54	
		Dispersion/sewage heat power generation	46	0.12	151	0.39	
		Dispersion/independent power generation (repowering)	1201 - 2111	3.10 - 5.45	2401 - 4221	6.20 - 10.89	
Large scale (energy): efficiency improvement of thermal power	185 - 1508	0.48 - 3.89	892 - 2119	2.30 - 5.47			
Countermeasures for which quantitative evaluations have not been made	Sectors	Countermeasures	Qualitative evaluation of potential CO ₂ reduction				
	Industrial sector	Replacement of boilers with heat pumps Energy conservation of lighting and energy conservation type buildings Improvement of small factories and operations Energy sharing between industries	It could play a major role depending on research and development of technology. Examples exist which can be seen at individual factories which result in a significant amount of energy conservation. It is estimated that in medium- and small-sized companies, on average nearly 6% of energy consumption can be conserved. If realized, the results could be significant.				
	Public welfare sector	Heating and air conditioning in local areas Green roof and water permeable pavement, etc. Introduction of a daylight saving system	Significant results could be achieved if unused energy is utilized. Proper locations must be selected. In the Tokyo area, more than 50% of buildings have green roofs. Because of this, nearly 6% of total electricity consumption is saved in daytime during July and August. According to some investigations, it is said that the daytime saving system helps reduce CO ₂ emission. However, since this system could increase energy consumption in some other ways, a further study is necessary.				
	Transportation sector	Promotion of utilization of public transportation, bicycles, etc. Promotion of shared transportation and delivery Promotion of utilization of freight for business use Increasing travelling efficiency by improving the road system	Significant results can be achieved depending on the areas. Some reports show that through this method, automobile traffic for delivery & transportation work could be reduced by 50%. CO ₂ emission per ton or kilogram of commercial transport is one-third that of private transport. Improvement of travelling efficiency of cars might increase traffic demand, leading to further CO ₂ emission.				
	Countermeasures common in these three sectors	Energy share between industrial sector and public welfare sector Utilization of environmental heat	If realized, the results could be significant. But more detailed feasibility studies regarding each area will be necessary. If realized, the results could be significant. But more detailed feasibility studies regarding each area will be necessary.				

Note: CO₂ emission factors of electric power use for business used for this estimate for public welfare and transportation sectors are future estimate.As for the industrial and energy conversion sectors, the current estimate was used. The rate of reduction is the percentage of CO₂ emission in each sector relative to the total amount of CO₂ emission.

Table 2 Results of Past Factorial Experiments and Estimated Values
for Future Scenario in Industrial Sector

Rate of Increase by Each Factor (%)	1979-1984	1984-1990	1990-2000 (Estimate)	Requisites to Reach the Estimate
Energy Conversion	-0.3	-0.3	-2.0	Lower rate of emission from commercial electric power
Improved Energy Efficiency	-2.9	-1.0		Extra efforts to promote investment in energy saving
Changes in Products' Composition	-1.3	-1.5	-3.0	Continuance of recent trend of industrial structural change
Changes in Composition of Industrial Sector	-1.1	-1.3		
Economic Growth of Industrial Sector	3.2	6.0	3.5 ~ 4.5	Slowdown of industrial growth rate
Total Increase of CO ₂ Emission of Industrial Sector	-2.4	1.8	-0.5 ~ -1.5	—

D R A F T

日米科学技術協力協定

地球変動研究ワークショップ - 気候変動の予測・影響評価 -

The 3rd Global Change Research Workshop

Prediction and Assessment related to Global Warming

1. 気候温暖化予測モデル

Global Warming Prediction Model

- ・ 水文過程 Hydrologic Cycles
- ・ 化学過程、物質輸送過程 Chemical Process and Material Transport
- ・ 雲 Cloud Influence
- ・ 極域（雪氷域） Polar Region (Snow and Ice)
- ・ 海洋 Ocean Influence

2. 生態系への影響評価

Assessment for Ecosystem

- ・ 植生環境 Vegetation Environment
- ・ 海洋生物 Ocean Ecosystem
- ・ 農林資源 Agriculture Resoureces

3. 諸環境及び諸現象への影響評価

Assessment for Natural Phenomena

- ・ 水文過程 Hydrologic Cycles
- ・ 海洋循環 Ocean Circulation
- ・ 沿岸地域 Coastal Region
- ・ 気象現象 Meteorological Phenomena

4. 人間生活への影響評価

Assessment for Human Activity

- ・ エネルギー消費 Energy Consumption
- ・ 健康 Human Health
- ・ 都市環境 Urban Environment
- ・ 社会経済 Socioeconomic