A STUDY OF CO_2 REDUCTION POTENTIALS IN JAPAN

Phase I: Interim Report
(Summary)

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Climate Change Strategy Team

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1. Major Findings

3.1 A 21.0% (11.6%) reduction of the national CO_2 emissions is to be achieved in 2010 (2005) from the 1990 level, if we:

-- implement policies to encourage the employment of 91 new technologies, which can surely be made available for practical use on a large scale by 2010;

-- maintain energy-consuming activities, such as material production, facilities and appliance use, motor vehicle transportation and waste disposal, at the 1995 level, and;

-- increase the utilization of solar and wind energy as sources for power generation by roughly one quarter of what is expected by the Environment Agency.

3.2 Policies and measures, realistic and feasible, exist in Japan to achieve the above option.

3.3 The net gain of 40.8 trillion yen (approximately US$340 billion) is to be generated from 2000 to 2010 when we choose the above "1995 level" option. The total cost to put the new technologies in use would be 54.7 trillion yen, while 95.4 trillion yen would be saved as the result of energy conservation.

3.4 A 24.5% (19.3%) increase of CO_2 emissions is expected in 2010 (2005) from the 1990 level in the "technology-fixed" case, where no further employment of the above 91 technologies happens and the level of energy-consuming activities rises as expected by government and industry.

3.5 An 8.1% (1.9%) reduction is to be achieved in 2010 (2005) from the 1990 level, if we implement policies to encourage the employment of the 91 technologies but do not keep the energy-consuming activities at the 1995 level (i.e., let the level of those activities rise as expected by government and industry).

2. Major Purposes of the Study

3.1 To determine how much CO_2 emissions will be reduced by the years 2005 and 2010, if we implement policies to encourage the utilization of new reduction technologies that can surely be employed on a large scale by 2010.

3.2 To determine what policies and measures will be feasible and necessary to realize the utilization of these technologies, and also to achieve further reductions of CO_2 emissions beyond the technological solution.

3. Study Method

3.1 (Bottom-Up Approach) We took a "bottom-up" approach, which made it possible to assess the reduction effect of each specific technology and examine the details of the factors such as the effect of each energy conservation measure and the change in the composition of energy source for power generation.

3.2 (Six Sectors Studied) We first broke down the national economy into six sectors: industry, transportation, household, service, waste disposal and power generation, and complied existing information into sector-by-sector inventories of CO_2 emissions.

3.3 (Technologies Assessed) We then assessed the effects of new reduction technologies available in each sector. All the technologies assessed in this study are either currently in commercial use or expected to be introduced for practical use very soon. We can safely expect them to be utilized on a large scale by 2010 if we support them by implementing appropriate policies. In our simulation we presupposed that new, better performing technologies would be employed without premature retirement of capital stock (i.e., following the natural cycles of capital replacement). The following 91 technologies were assessed:

Industry: Steel: 19 technologies including highly efficient continuous Annealing Furnaces
Cement: 6 technologies including energy-saving grinders
Paper/pulp: 22 technologies including lignin burning boilers
Transportation: 9 technologies including electricity-gasoline hybrid vehicles
Household: 15 technologies including highly efficient heat-pump air-Conditioning
Service: 13 technologies including highly efficient office appliances
Waste disposal: highly efficient waste-fired power generation
Power generation: 6 technologies including solar and wind power generation

3.1 (Major Options Examined) The four major "case/options" we developed and studied are as follows:

0: The "Technology-Fixed" Case

No further utilization of the above 91 technologies. The level of the energy-consuming activities (e.g. material production, facilities and appliance use, motor vehicle transportation, waste disposal) will rise as projected by government and industry. The composition of energy source for power generation remains the same as in 1994.

1: The "Technology Only" Option

Policies implemented to encourage the employment of the 91 technologies. The level of the energy-consuming activities rises as projected by government and industry.

The composition of energy source for power generation changes as projected by a consultative council for the Ministry of International Trade and Industry.

2: The "1995 Level" Option

Policies implemented to encourage the employment of the 91 technologies. The energy-consuming activities maintained at the 1995 level. The utilization of solar and wind energy as sources for power generation increases by roughly one quarter of what is expected by the Environment Agency.

3: The "1990 Level" Option

Policies implemented to encourage the employment of the 91 technologies. The energy-consuming activities maintained at the 1990 level. The utilization of solar and wind energy as sources for power generation increases by roughly a half of what is expected by the Environment Agency.

3.2 (Quantitative Output of the Study) For the above options, we projected the national CO_2 emissions by adding the sector-by-sector emission figures, which were obtained by multiplying the expected amount of energy consumed in each sector by the CO_2 emission unit.

3.3 (Qualitative Output of the Study) We further examined feasible policies and measures to meet the conditions of each option, and thereby developed policy portfolios as our recommendations.

4. Policies and Measures Examined

As for policies for encouraging the employment of highly efficient new technologies, we made extensive policy research both on the sector-by-sector and cross-sectoral bases. For example, we looked into the details of up-grading of the energy efficiency standards in the Energy Conservation Law; subsidies, tax reductions, and preferential or concessional loans based on the Energy Saving and Material Recycling Promotion Law and other ordinances; and commercial regulations to support specific energy efficient appliances. We have thereby completed a policy portfolio we can recommend.

For policies and measures to materialize the "1990 Level" and "1995 Level" options, we explored into the government expenditure system, especially in regard to road construction and nuclear power development; the legal system, with specific emphasis on regulations on large energy consumers in industry; and such transportation measures as the introduction of road pricing and auto restricted zones; among others.

5. Comparison with Other Studies and Projections

Table: Projected National CO_2 Emissions as Compared with the 1990 Level

CASA (Oct 1997)	2005	2010
Technology-Fixed Case	+19.3%	+24.5%
Technology Only Option	-1.9%	-8.1%
1995 Level Option	-11.6%	-21.0%
1990 Level Option	-22.7%	-32.5%
AIM (Matsuoka/Morita, Oct 1997)		
Technology-Fixed Case		+23.5%/+25.7%
Market-Inducing Case		+5.6%/+7.6%
Policy Case		-6.1%/-7.6%
AIM (WWFJ, Sep 1997)		
Market-Inducing Case	+3.4%/+4.7%	+5.6%/+7.6%
WWF Policy Case	-7.7%/-8.8%	-13.2%/-14.8%
Energy Supply/Demand Projection (MITI, Dec 1996)		
Current Policy Case		+22.0%
Enhanced Policy Case		+9.0%

Comment:

We regard CASA's "1995 Level" option and even the "1990 Level" option as politically acceptable in Japan. According to a public opinion poll conducted by government (Prime Minister's Office) in June 1997, as much as 72% of the respondents thought it okay to go back to a living standard before 1985 in order to prevent global warming.

CASA's "Technology-Fixed" Case and "Technology Only" Option are based on the assumptions similar to those of AIM's (Matsuoka/Morita) Technology-Fixed Case and Policy Case respectively, and both models have naturally projected similar figures of CO_2 emissions. AIM (Asian-Pacific Integrated Model), developed by National Institute for Environmental Studies and Nagoya University, takes a bottom-up approach like CASA's study. The Environment Agency, Japan, has projected CO_2 emissions based on this model.

AIM's WWF Policy Case shows much larger reduction possibility than CASA's "Technology Only" Option. This disparity mainly comes from the difference in the assumption about the rate of employing new technologies, such as electricity-gasoline hybrid vehicles, highly efficient industrial boilers and soft-drink vending machines, and new office appliances (e.g., facsimile telegraphs, computers, photocopying machines) with far less energy consumption to keep them on standby.

As for MITI's projection, a public access to basic data and the details of the study method has been precluded, but we suspect that MITI's Current Policy Case probably means no new policies for supporting new, better performing technologies, and that in that sense our baseline (i.e., CASA's "Technology-Fixed" Case) is relatively close to theirs (i.e., Current Policy Case). The projected CO_2 emissions in 2010 are relatively close to each other.

6. Further Study

In Phase II of this study (starting in October 1997) and beyond, we are going to examine the impact of the "1995 Level" and "1990 Level" options on the country's economy, in terms of GDP, employment, industrial structure, and international trade. We will also scrutinize the important issues left untouched in Phase I such as: the introduction of a carbon tax, the need to secure financial sources for policy implementation, and the problem of international carbon leakage.

7. Documentation

The following documents are available from CASA:

1. "A STUDY OF CO_2 REDUCTION POTENTIALS IN JAPAN, Phase I: Interim Report (Digested Version)" (55pp., Japanese)
2. "A STUDY OF CO_2 REDUCTION POTENTIALS IN JAPAN, Phase I: Interim Report (Technical Version)" (345pp., Japanese)

Contents of the Digested Version:

8. About CASA

CASA, Citizens' Alliance for Saving the Atmosphere and the Earth, was born in October 1988 as an advocacy NGO coping with both local and global environmental issues. CASA has since engaged in research from the citizens' point of view and made proposals/recommendations to promote environmental protection and conservation. Its projects are often conducted in cooperation with other Japanese and international NGOs. CASA is now supported by various organizations and individuals nationwide: 60 NGOs and some 500 researchers, lawyers and concerned citizens, as of October 1997. Climate change is one of the major issues CASA has been working on. CASA is a member of the Climate Action Network and a board member of Kiko Forum (Climate Forum 1997, Kyoto, Japan).

The Climate Change Strategy Team is composed of 15 researchers affiliated to CASA.

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