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Carbon Dioxide Emissions Trading Test Project in Japan

by

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FOREWORD

This paper was prepared by Takuya Ogushi and Seiki Kure (PricewaterhouseCoopers) for the OECD Global Forum on Sustainable Development: Emissions Trading and Concerted Action on Tradeable Emissions Permits (CATEP) Country Forum, held at the OECD Headquarters in Paris on 17-18 March 2003. The aim of the Forum was to bring representatives from OECD and non-OECD country governments together with representatives from the research community, to identify and discuss key policy issues relating to greenhouse gas emissions trading and other project based mechanisms for GHG emission reduction, such as Joint Implementation and the Clean Development Mechanism. The Forum also aimed to promote dialogue between the various stakeholder groups, and discuss policy needs in the design and implementation of tradeable emissions schemes. Forum participants included representatives from OECD and non-OECD governments, as well as from the research community. Those from industry and other institutions involved with emissions trading, joint implementation and clean development mechanism projects such as the European Commission and the World Bank were also represented.

The OECD Global Forums are one of the two pillars of the new architecture of the Centre for Co-operation with Non-Members, agreed upon by the Committee on Co-operation with Non-Members. The Global Forum on Sustainable Development (GFSD) provides a mechanism for achieving the OECD Ministers' outreach objective and will complement other work on sustainable development. Within the organisational framework of OECD, the GFSD will aim to facilitate a constructive dialogue between non-member and OECD economies on key issues on the sustainable development agenda.

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The ideas expressed in the paper are those of the author and do not necessarily represent the views of the OECD or its Member Countries.

TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY	4
2.	OUTLINE OF THE PROJECT	4
	2.1 Purpose of this project.....	4
	2.2 Rule development.....	5
3.	VISITS TO PARTICIPANT’S SITES.....	6
	3.1 GHG inventory.....	6
4.	THE RESULTS OF THE TRADING SIMULATION.....	7
	4.1 Emissions trading rules	7
	4.2 The cost of emission reductions in Japan.....	8
5.	FINDINGS AND OUR OPINIONS	9
	5.1 Suitable rules of emissions trading in Japan	9
	5.2 Demand from Japanese companies	9
	5.3 Emissions trading worked well in Japan.....	10

1. EXECUTIVE SUMMARY

The Mie Prefecture and the Ministry of Environment of Japan co-hosted GHG trading simulations in 2002. PricewaterhouseCoopers (PwC) Tokyo leads this project. Thirty companies participated in this project and discussed emissions trading rules, which they thought were suited for the Japanese situation. PwC Tokyo visited all the participants' plant sites and verified their emissions data. The paper will present and discuss a number of interesting findings from this exercise, including:

We found a real marginal cost curve of emissions reduction for Japanese companies. For Japanese companies, options for emission reduction are limited and very expensive. Even if they used the most expensive options for reducing emissions, which cost them 10,000USD per tonne-CO₂, they wouldn't reduce their missions more than 5%.

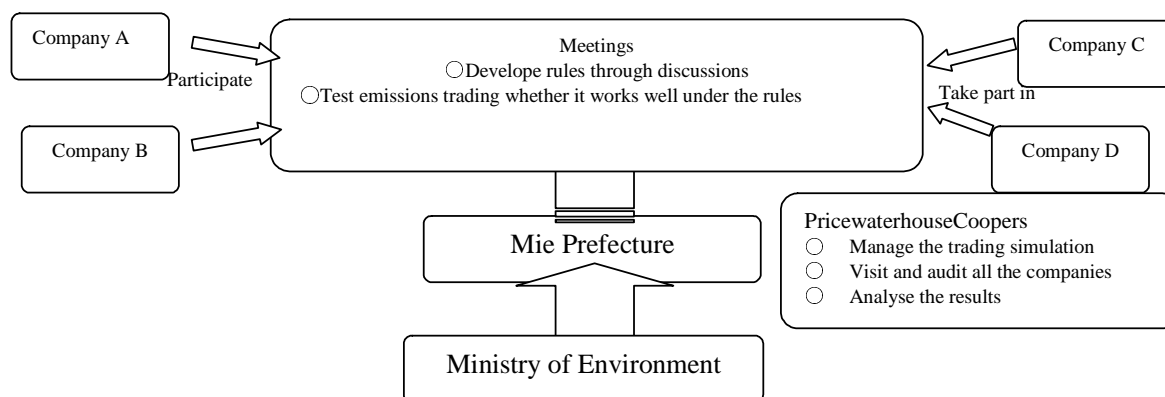
In the rule-making process, project participants proposed some options in which their early actions are accounted for. For example, one option is to exempt emissions caused by environmental facilities installed in order to reduce NO_x or SO_x emissions. Another option is to consider the emissions reduction credits which they made before the base year when reduction targets are set.

2. OUTLINE OF THE PROJECT

2.1 Purpose of this project

Japanese government, Mie prefecture and industries in Mie Prefecture tried new a scheme that use market based mechanism to tackle climate change issues. In this project, we have two main objectives.

- **To design a regulatory structure that allows cost effective emissions reductions:** The first objective was to design a new scheme that is better than the existing command and control rules. The idea is based on emissions trading. We'd like to confirm that emissions trading works well in Japan.
- **To make a proposal for Japanese emissions trading scheme:** The second objective was to make suitable rules of emissions trading and to propose those rules to the Japanese people. We discussed allocation method, a base year, reduction target and early action protection scheme with project participants.

Figure 1: Projects participants

Thirty companies and local government took part in this project. Project participants were from the chemistry, oil refinery, car manufacturing, semiconductor and food industries. The total volume of emissions is about 4 million CO₂ tonnes per year, which is about 1% of the total volume of emissions in Japanese industry. Industrial composition is similar to that of Japan. We think this volume is an adequate size for the first attempt of emissions trading because we need participants who can give us the idea of emissions trading.

2.2 Rule development

We had seven meetings with all the participants, in which we decided emissions trading rules for this project. The basic rules for this trading were cap and trade method and downstream allocation. The main points of the discussion were those below:

- How to urge early actions for climate change? Most of the participants are reluctant to take early actions regarding reducing emissions before regulations are set. This is because those actions may give the company the wrong effect if the allocated volume of the allowances is decided by their total emissions of a future year.
- How to allocate emissions allowances, auction or grandfathering? Most of the participants prefer grandfathering to auctioning because auctioning costs them more. Some of them, however, insisted that auction should be adopted even if the volume of allowances is a little in order to protect new entrants.
- Do we accept a relative target? We adopt targets defined in terms of emissions per unit of output –described as relative targets. When we adopt relative targets, some of the participants expressed the concern that the total emission volume would not decrease. But about half of the participants have energy conservation targets defined in relative ways, and would like to choose relative targets.
- What target we should set for this emissions trading test? The government made a scenario to comply with Kyoto target, 6%. From the scenario, the Japanese industry is planning to reduce emissions by 7% compared to 1990. On the contrary, the emissions volume of the Japanese

industry in 2003 has increased by 0.9%. We consider both of the elements and we set a reduction target of 7.9% compared to emissions in 2003. The period of this target is from 2005 to 2012.

3. VISITS TO PARTICIPANT'S SITES

PwC Tokyo visited each participant's factory or site to check their emissions data and plans for emission reductions for the future. Most of them had emissions inventory from 1990 to the present but we found that they didn't keep the evidence of emission reductions. We cannot expect that they can show us enough evidence to prove the inventory of the past year. Even for this year's inventory, they have to prepare for the purpose of proving the inventory.

3.1 GHG inventory

In the site visits, we emphasised the accuracy of the GHG inventory and evidence to reduce GHG emissions. Firstly we checked the accuracy of the inventory, we found some leakage of emissions sources. We were asked a lot of questions about the right way to calculate emissions. We recommended using the "ghg protocol" to prepare the inventory if they don't have calculation guidelines. Secondly we checked if the 1990 inventory was prepared well enough for verification. The results were better than we expected. Most sites had energy consumption records of past activities. However evidence provided did not support the inventory in most cases.

Table 1: GHG inventory preparation

Participants	Do you have inventory of 1990?	Evidence storage	Denominator of the relative target
A	Yes	NO evidence	Weight of the products
B	Yes	NO evidence	NA
C	Yes	NO evidence	Weight of the products
D	No	NO evidence	NA
E	Yes	NO evidence	NA
F	Yes	For 7 years	Their unique index
G	Yes	For 7 years	NA
H	Yes	NO evidence	NA
I	Yes	NO evidence	NA
J	Yes	NO evidence	NA
K	Yes	For 7 years	Length of the products
L	Yes	For 7 years	NA
M	Yes	For 7 years	NA
N	No	NO evidence	NA
O	Yes	NO evidence	Their unique index

4. THE RESULTS OF THE TRADING SIMULATION

4.1 Emissions trading rules

We simulated emissions trading five times adopting different rules of emissions trading. We changed the rules because we wanted the rules to be fair, simple and reliable in emission trading. The differences of allocation method and setting targets are the main points we wanted to know. Project participants claimed that “early action protection”, “emissions from environmental facilities” and “domestic projects” should be considered in this simulation.

Regarding setting a target, the absolute target was adopted as a main rule, but in Plan 3 we tried a relative target. Because the Japanese Business Federation set a reduction target per their output, some companies thought the relative targets were better than absolute targets. Secondly we changed the allocation method. We used grandfathering as a main allocation method. In Plan 4, we tried auction method. Half of the allowances were distributed by grandfathering and half were sold in an auction.

Project participants proposed some new rules to secure fairness. In Plan 2, we tried the special treatment for emissions reductions from early activities. In the early action protection provision, emission reductions from earlier actions before the mandatory years were allowed to earn credits. In Plans 3, 4, and 5, the emissions from the environmental facilities were exempted from accounting emissions. Some Japanese companies implemented NO_x gas remover facilities in order to protect the air but they consume lots of energy. They can comply with air regulations without these facilities. So they may stop these facilities if CO₂ emissions are regulated. They claimed special treatment was needed for the emissions from the facilities. The last one was emissions reduction projects in Japan. In order to enhance the chance of emission reductions, we adopted this rule in Plan 5.

After those five simulations, PwC-Tokyo sent questionnaires and assessed the rules of emissions trading. From the questionnaires, Plan 1 was selected as the simplest and most reliable plan because there were no special treatment rules in this plan. Regarding fairness, Plan 2 was considered the fairest plan. That is because most participants thought that the early action protections were needed. Plan 1 was also considered as fair. This result was interesting because there were no special rules. Lastly, we found that reliability had something to do with simplicity. They thought they could not maintain their data reliably with lots of complex rules.

Table 2: Rules

	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5
Absolute target	x	x	x	x	x
Relative target			x		
Auction				x	
Early action protection		x			
Consider emissions from environmental facilities			x	x	x
Domestic project		x			x

(x: an option adopted)

Table 3: Results

	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5
Simple rule	A	C	C	C	C
Fairness	AB	A	B	B	B
Reliability	A	B	C	B	C

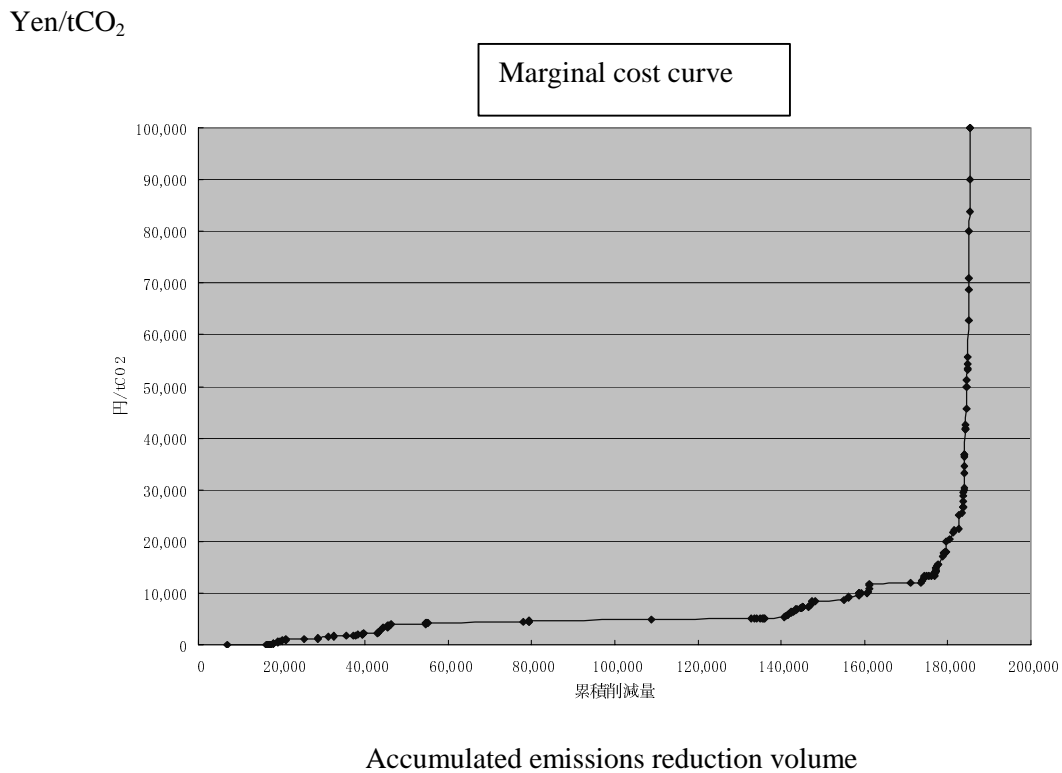
A: Excellent B:Good C:Bad

4.2 The cost of emission reductions in Japan

We gathered emission reduction investment plans from all the participants. From the analysis of this information, we finally succeeded to draw a graph that showed the marginal cost curve of emission reductions in Japanese companies.

We found very interesting points from this graph. Firstly we found that reduction options are divided into two groups. The first option has low cost and high volume reduction. The costs of the first group are below 5000yen (40USD) and the volumes of the reductions are 10,000 tonnes to 50,000 tonnes per year. Reduction options belonging to this group were carried out soon after regulations became mandatory in our simulation. The chief characteristic of the first group is using common technologies like co-generation, inverters, fuel conversion or reuse of waste heat. The second group has high cost and low volume reduction. The cost of the second group is above 5000yen and the volume of the reductions are below 10,000 tonnes per year. Reduction options belonging to this group are not realistic. The characteristic of the second group is using cutting edge technology like renewable energy.

Secondly we found that the marginal cost curve is almost vertical at around 190,000 tonnes of accumulated reductions. 190,000 tonnes is five percent of the total emissions of the simulation participants. That means even if Japanese companies paid all of their money, they cannot reduce CO₂ emissions by more than 5% in their factories. They may find better reduction options if they have a good technology experts, of course. But we can conclude that Japanese companies cannot reduce their emissions more than 5% with using common technology.

Figure 2: The cost of emission reductions in Japan

5. FINDINGS AND OUR OPINIONS

5.1 Suitable rules of emissions trading in Japan

To design a workable emissions trading scheme, fairness and reliability are very important to consider. We found that simple rules are preferred by project participants and this helps the scheme to be fair and reliable. However we think simple rules are difficult to be accepted at first because there are no special treatment.

5.2 Demand from Japanese companies

From the marginal cost curve of Japanese companies, Japanese companies cannot reduce their emissions by more than 5%. They will buy credits from abroad or other sources if the reduction target is set above 5%. And the Japanese industry sector is expected to reduce its emissions by 7% in the Government scenario.

5.3 Emissions trading worked well in Japan

We simulated greenhouse emissions trading with Japanese companies under five different rules. We succeeded in reducing emissions in all of the plans with less expensive cost. We realised that Japanese companies have only expensive investment plans to reduce emissions, but even so, they can reduce emissions through the use of emissions trading.