

B-62 Study on the means for multilateral agreement on climate policies beyond 2012 (Abstract of the Interim Report)

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1. Introduction

The Kyoto Protocol has currently been the only multilateral agreement that calls for emission limitation for the developed countries. The Protocol sets emission targets only for the five years between 2008-2012, and targets for years beyond it need to be negotiated in the future. As the current Protocol does not involve the U.S., and it does not hold any emission limitation requirement to the developing countries, there is a stronger voice that such countries should be a part of international effort to mitigate climate change. Recently, there have been many new studies on what should be done after 2012. This study is one of those studies that aim at suggesting several different options for the future climate regime, based on social science, institutional studies.

2. Research Objective

The objective of this research project is to come up with a several different types of options for future climate change beyond 2012. Such options would include final comprehensive pictures of international institutions of the climate regimes, scenarios for negotiations to reach an agreement on those institutions, effects on environment, equity and economy, and other pros and cons.

To reach such objective, this research project set up three sub-groups. The first group deals with institutions, including evaluation of Kyoto Protocol and proposals for future regimes, effects of emissions trading, etc. The second group deals with decision making of major countries, such as the United State (U.S.), the European Union (EU) and developing countries. Positions of those countries are important, because any institutions must get agreements of major countries if the institutions were to be enforced. The third group focuses on developing countries, especially that of Southeast Asia. The future regime needs to incorporate developing countries' participation. Thus,

the institution needs to be compatible with sustainable development of those countries. The group deals with ways to activate such actions.

3. Research Output

(1) Study on international institutions to mitigate climate change

The aim of this sub-group is to study institutional aspect of the “beyond-2012” issue. The group studied various mechanisms that could be a part of future climate regime, and resulted in three options for the future.

(a) Review of existing literature and options for the future

A review study was organized to find major trends in proposals for future climate regime. More than 160 articles were reviewed, categorized and assessed. Nearly 80 percent of the whole literature were published by researchers in the EU or in the U.S. Less than 20% were by researchers in developing countries, although most of emission growth in the future is likely to occur in their countries. Proposals by researchers in the EU and those by researchers in the U.S. were based on very different assumptions, which could be called as “scenarios”. (This outcome leads to following research topic (g).)

(b) Study on long-term climate regime- an assessment from legal point of view

A study was conducted to assess long-term climate regime from legal point of view. Unlike many other international negotiations, climate change negotiation involves many unique features, such as scientific uncertainty and equity. Any climate regime may require an institution that is different from other type of international regimes.

(c) Study on scientific uncertainty and precautionary approach

Precautionary principle, or precautionary approach, is an important concept to deal with risk with scientific uncertainty. It was found that consensus building among stakeholders is an effective methodology to institutionalize precautionary principle.

(d) Relation with other international regime: WTO regime

The World Trade Organization (WTO) aims at creating a free trade regime, and it is often indicated that many international environmental regime have frictions with the WTO regime. Any future climate regime might have such problem, and thus it should be considered in advance.

(e) Study on international emissions trading

International emissions trading scheme is a unique mechanism that was formally initialized by the Kyoto Protocol. Even before the Protocol entered into force in 2005, the EU has started its regional trading. Some of states in the U.S. have also adopted the scheme, although the U.S. itself is not a Party to the Protocol. Thus, there is a growing awareness that a future climate regime need to harmonize with carbon market. A comprehensive study was conducted on EU emissions trading scheme, to find out its effectiveness, as well as points for further revision.

(f) Study on adaptation measures

There has been a growing interest in discussing adaptation strategies, especially in the developing countries. A future climate regime may be expected to involve not only emission mitigation measures but also adaptation measures. Adaptation strategies may play a role of giving incentives to developing countries to participate in a future climate regime. A review study was conducted to deal with adaptation needs.

(g) Study on sequestration by forests and land use change.

This study examined the rational and potential for forests for carbon sequestration in the context of the Kyoto Protocol. It looked at the role the sustainable forest management might play and at progress made thus far in utilizing forest to sequester carbon under the existing Kyoto arrangement. It also focused on the approaches, progress and problems of the EU, Japan, and Canada in using forestry to move toward their Kyoto targets. Additionally, this report began to think systematically about the types of issues that might to be addressed in the post Kyoto world and what types of international arrangements might be most useful in responding to a continuing climate problem with particular attention paid to the possible role of biological carbon sequestration under various arrangements. This approach included a discussion of the mechanisms of the Kyoto Protocol for forest sequestration and possible extensions of forestry activities for carbon sequestration under this and subsequent international agreements. The report also examined the implications of some hypothetical scenarios of future Kyoto type arrangements on the role of forest carbon sequestration in addressing climate change.

The interest in biological and forest sequestration derives from two aspects. First, the technology exists today, it need not be developed, to undertake programs to promote biological sequestration of carbon. Second, numerous studies have suggested that biological sequestration of carbon is likely to be relatively inexpensive compared to alternative carbon reducing approaches. The enthusiasm for biological sequestration varies considerably across countries. To some extent this appears to reflect the forest sequestration potentials of the various countries. For example, countries with modest forest and biological sequestration potential, such as most of Europe, have limited enthusiasm for forest sequestration. The limited potential in Europe has been suggested in studies such as Petroula (2002) and Amano and Sedjo (2003). By contrast, countries like the U.S., Canada and Australia, which appear to have substantial potential for forest and biological sequestration, have shown an enthusiasm for forest sequestration. Forest carbon was almost disregarded in the European group with their expectations that any remaining obligations would be met from Russian "hot air."

There is some indication, however, that some European countries, particularly the Netherlands, would like to make use of the CDM to promote and coordinate projects that promote AR-CDM carbon sequestration and sustainable forestry in developing countries. The research done by Petroula (2002) provides survey estimates of the countries intentions toward the use of forest and agriculture management projects under

Article 3.4 of the Protocol. The France, Ireland and Spain appear most likely at this time to use forest management activities to assist in meeting their carbon targets at this time. However, those same 3 countries are not inclined to undertake agricultural management for carbon objectives. The UK is the only country with a positive inclination toward agricultural management for carbon. For most of the countries, their intentions remain uncertain at this time according to this survey.

Table 1: Countries' position on Article 3.4 of the Kyoto Protocol

	Use of Article 3.4	
	Forest Management	Agric. Activities
EU 15		
Australia	?	?
Belgium	?/+	?/-
Denmark	?	?
Finland	?	?
France	+	-
Germany	?	?
Greece	?	?
Ireland	+	-
Italy	?	?
Luxembourg	?	?
Netherlands	?	?
Portugal	?	?
Spain	+	-
Sweden	?	?
United Kingdom	?/+	?/+

Notes:

+ = Yes

- = No

? = not decided yet

?/+ = not decided yet, but possibly yes

?/- = not decided yet, but possibly no

Source: ¹⁾ Petroula, 2002

Table 2: Sequestration and Emission from Sinks in Major Annex I Countries

Country	Forest Sink CAP	KP target as % of 1990 base	Actual 2003 % of 1990 base*
EU	8.9 Mt	-8.0 %	-1.4 %
Japan	13 Mt	-6.0 %	+12.8 %
Canada	12 Mt	-6.0 %	+24.2 %
USA*	50 Mt	-7.0 %	+13.3 %

*For comparison, not a party to the KP.

Source: ²⁾ IPCC 2005. <http://www.climatechange.gc.ca>

(h) Using scenario planning approach to develop options (Fig.1)

The scenario planning approach was introduced to develop scenarios that may become reality over the next 5–10 years. Two driving forces, *development of*

*international emissions trading, and, people's expectation towards innovative technology, were considered as most influential and uncertain driving forces that are likely to determine the future world related to climate change. With the two selected driving forces, the team developed three scenarios, namely **Carbon Market Initiative: Government-led Policies and Measures:** and **Technology Optimist.***

The team then categorized various existing proposals into three groups based on the three scenarios that may reflect underlying world view in each proposal. With this approach, any evaluation can be detached from concerns as to whether or not a certain proposal is agreeable to one party or another. We found that proposals that we classified under any given scenario shared common features, strengths and weaknesses. After making these assessments, the team offered additional ideas to minimize weaknesses of existing proposals, and developed a climate regime for each scenario, as outlined below. **“Carbon Credit Banking” “Dual Track Approach” “Technology + Compensation Funds”**

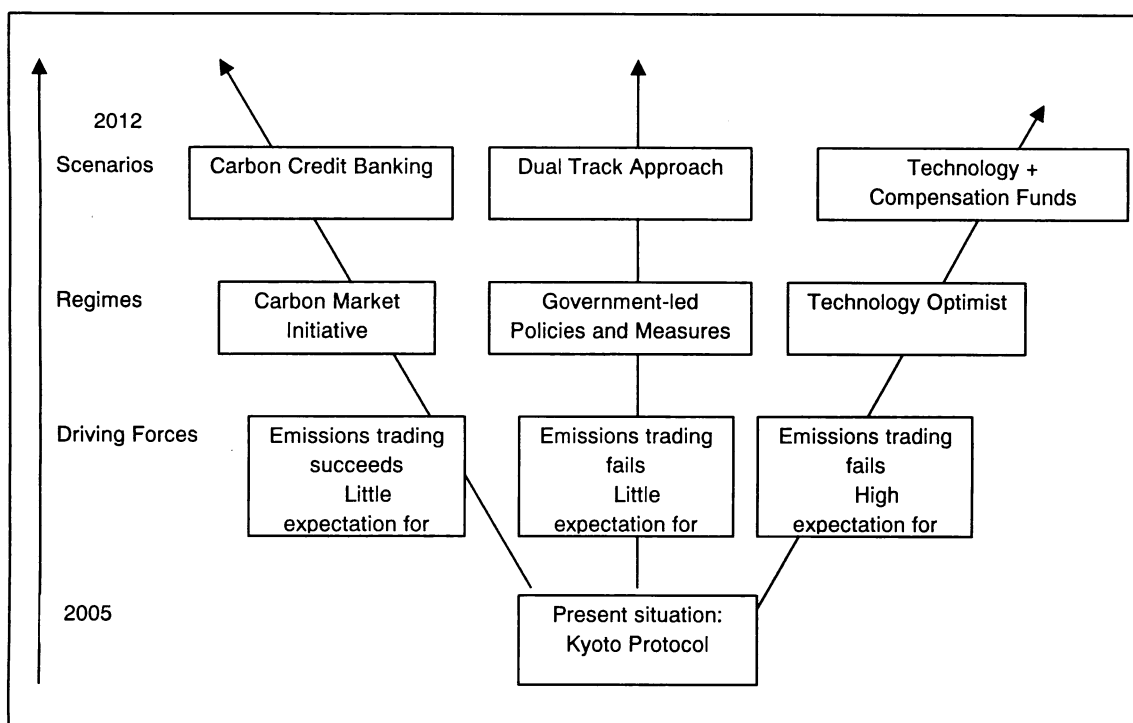


Fig.1 Structure of outcome of the study

There is no simple way to address the costs of abatement to allow a comparison of the three climate regimes, but distribution patterns of the costs are more predictable. Negotiating processes for regimes are expected to balance such benefits to other less profiting countries to be able to achieve an agreeable solution.

This exercise assumes that all scenarios have same possibility of becoming reality. It may be possible, however, to lead the world into one specific scenario if the intention exists. It is the governments' role to promote dialogue about what type of

world is ideal, in the context of climate change. In order to reach environmentally-effective agreements in any of the three scenarios, it is critically important that the public have adequate awareness of the seriousness of climate change.

(2) Study on Decision Making of Major Countries on Future Multilateral Climate Change Regime

This subgroup aimed at surveying major countries, such as the U.S., EU, Russia and some countries in Asia, to grasp the latest political actions on climate change at domestic level, and to find out ways in which those countries could find incentives to participate in an international climate agreement.

(a) Study on climate policies in the European Union (EU)

The EU has been the leader in developing climate regime in the past. A study was conducted in current situation in the EU, whether the EU would be able to reach its emission reduction target under the Kyoto Protocol, whether its regional emission trading scheme has been successful, and whether it would be able to maintain its leadership role in future negotiation on international climate regime.

(b) Study on climate policy in the U.S.

A study was conducted on the U.S. on its position towards multilateral climate change regime. Some points were raised which lead to understand difficulty of the U.S. to join multilateral cooperation to mitigate climate change. On the other hand, many climate-related actions were observed at state level as well as at local municipal level. Such local initiative may be a key for the U.S. to implement climate policies.

(c) Study on decision making of Russia concerning Kyoto Protocol

As ratification of the Kyoto Protocol by Russia was the conditionality for the Protocol to enter into force, Russia became one of the most important countries to be studied. It was concluded that Russia will benefit by the current Protocol, but that it may be more difficult for Russia to participate in the next round of negotiation.

(d) Study on EU emissions trading scheme and its effect on CDM

A study was conducted as to how such regional emissions trading could link to other carbon market such as that of the Kyoto Protocol, JI and CDM. There are also domestic emissions trading schemes such as those in the U.S. and Australia, and ways to link with such markets will affect negotiation on future climate regime.

(e) Study on the developing countries in Asia

It was found out that the developing countries have different types of incentives from developed countries for participating climate change regime. Future multilateral climate change regime need to reflect those needs of developing countries. A series of dialogue was conducted between the IGES and stakeholders in the Asian countries (China, India, Indonesia, Korea, and Vietnam) and points were raised to involve those countries in a future climate regime.

(f) Study on “leadership”

The study categorized “leadership” into three types; “structural”, “directional” and “instrumental”. It was found that those different types of leadership all play important roles in reaching an agreement on ambitious climate mitigation at multilateral level.

(g) Symposium and Workshops

Various symposiums and workshops were organized by the IGES, (some of them were co-organized with the NIES).

- * International symposium on future climate regime (Tokyo, October 2003)
- * Side Event at COP 9 “Global Climate Regime Beyond 2012: Incentives for Everyone!” (Milan, December 2003)
- * Japan-U.S. workshop on climate policy (Washington D.C., February 2004)
- * International symposium on future climate regime (Tokyo, September 2004)
- * Side Event at COP 10 “Kyoto Train: where does it go next?” (Buenos Aires, December 2004)
- * Japan-U.S. workshop on climate policy (New York, March 2005)
- * Japan-U.S. workshop on climate policy (Tokyo, May 2005)
- * Side Event at COP 11 “Asian Concerns on the Climate Regime Beyond 2012: Are you concerned?” (Montreal, December 2005)

(3) Study on Policies to Mitigate Emissions from Agriculture Sector, Especially of Those in the Developing Countries

In order for developing countries to introduce climate policy, it must be compatible with sustainable development. This group studied climate mitigation policy related to agriculture.

(a) Development of technique for quantitative estimation of carbon balance on arable land

We analyzed the changes of soil carbon content in arable land in Japan with the result of the Stationary Soil Monitoring Project conducted quinquennial data collection from 1979 to 1998. It revealed these facts as follows. Due to wide extent of Andosols and low temperature in the northern Japan, soil carbon content was high in this area. On the other hand, soil carbon content was low in the south-western part of Japan because of the dominance of Red and Yellow soils. Soil carbon content was high in the landuse which consist of Andosols as major soil type. Especially, tea garden showed significant increase of carbon content. It suggested an unique soil management practice. Pasture, Greenhouse and Orchard also showed increase of soil carbon while Paddy didn't show changes. It suggested the influence of soil management practice, namely soil amelioration by applying manure. Variations in soil carbon content in Upland showed different result. It suggested decreasing soil carbon by cultivation in Andisols which contained high soil carbon. Soil carbon status in different soil type showed that Andosols and Organic soils contained high soil carbon while Regosols, San-dune

Regosols and Red-Yellow soils contained low soil carbon. Originally high soil carbon content soils such as Andisols and Organic soils showed decreasing trend of soil carbon. Gray Lowland soils and Gely soils which were mainly used as paddy showed little changes of soil carbon content. Brown Forest soils, Red soils, Yellow soils and Brown Lowland soils, originally low carbon content soils, increased soil carbon content because of intensive application of manure as soil ameliorant.

We used those time-series measurement result to examine EPIC and Roth-C models for assessing soil carbon balance and cost-effectiveness at different crop management scenarios. As a result, we focused on SWAT (Soil and Water Assessment Tool) which consisted of EPIC model and localization for Japanese operating environment. Newly developed software, Japanese graphical user interface (GUI) with embedded Roth -C programmed by C++, was named J-SWAT.

We examined a performance of J-SWAT through applying existed data of field experimental study. J-SWAT simulation performed well in selected Japanese arable soils. Since soil type and field experimental study data were limited, further validation study of J-SWAT was needed to improve simulation performance. This study suggested the high feasibility of quantitative carbon balance assessment in arable land with J-SWAT which utilize existing soil data in Japan.

(b) Study on policies to reduce GHG emissions from animal husbandry

A model to estimate the amount of GHG emissions from milking cow and beef cattle of several feeding management systems was developed. The result of estimation showed that the main sources of GHG emissions were CH₄ derived from cattle and N₂O derived from excreta treatments. Total amount of GHG emissions of CO₂ equivalent of the slurry with aeration and injection to soil treatment was 2.4 - 3.0 times higher than that of the excreta composting with aeration treatment. The amount of GHG emissions of CO₂ equivalent from beef cattle was nearly half of that from milking cow.

To examine more effective measures to reduce GHG emissions in developing countries, amounts of GHG emissions were estimated by the model with parameters of Brazilian animal husbandry. Estimation was carried out using two cases, that is, present status and improved scenario (12 months shortening of growth period). Total amounts of GHG emissions of CO₂ equivalent in present status and the improved scenario were estimated 1069 kg/head/year and 1269 kg/head/year, respectively. Though the improved scenario was 1.19 times of the present status, considering the growth period, total amounts of GHG emission until slaughter were 2816 kg/head and 3427 kg/head, respectively. The improved scenario was 0.82 times of the present status.

In this study, the amount of GHG emissions was estimated from the total feeding management systems. It became clear that there was much difference of the amount and the contribution ratio of the origins of GHG emissions among the feeding management systems. According to this result, main countermeasure is the decrease of the CH₄ emission derived from cattle and the selection of the excreta treatment method

that minimizes both CH₄ and N₂O emission. It was also cleared that total amount of GHG emissions per head until slaughter in developing countries with dry season were larger than that in developed countries because of less productive efficiency caused by shortage of feed (grass) during dry season. Therefore, it is considered that decrease of number of head by increase of productive efficiency (shortening of period until slaughter) leads to decrease of amount of GHG emissions.

On the basis of above mentioned result, the correspondence for decrease of GHG emissions in developing countries in animal husbandry sector was examined under three future scenarios.

(c) Estimation of GHG Emissions from Indonesian Agriculture sector and effect of mitigation option

We considered material flow analysis (MFA) in the agricultural sector. MFA is a tool to know relationship raw material and CO₂ emission. As a first step, we focus on fertilizer flow in Indonesia. The objective of this study is to estimate the GHGs emission from Indonesia's urea fertilizer factories. The estimation GHGs emission based on natural gas and/or other fossil fuel consumptions was focused. The result of consumption in term of specific energy consumption, specific emission factor, and total annual GHGs emissions from urea fertilizer factories are described.

Currently there are no recommended methodologies to estimate GHGs emission of urea fertilizer factory. The GHGs emission was estimate based on natural gas and/or other fossil fuel consumptions. The consumption from 5 of 12 total Indonesia's urea fertilizer factories were collected for this study purposes. The specific energy consumption of Indonesia's urea fertilizer factories were estimate as total energy consumption per unit physical production.

The world CDM market is estimated to be 1.2×10^6 GgCO₂/Year and CDM amount until in Indonesia is estimated to be 1.25×10^5 GgCO₂. GHG reduction by agricultural CDM during 2008-2012 is less than 10% of total Indonesian CDM. In agricultural sector non Annex I Parties in are interested in not GHG reduction by production increase. However most agricultural CDM can be implemented in less cost than manufacture CDM. Manufacture CDM is \$1.83/CO₂kg, on the other hand agricultural CDM is \$1.86/CH₄kg=\$0.09/CO₂kg (improve livestock digest). Then Agricultural CDM will be focused on beyond 2012.

We analyzed and proposed potential of agricultural CDM beyond 2012. agricultural CDM is expected to be implemented in case that negotiation about sink by agricultural soil does not succeed. However in case that negotiation goes well and CER by agricultural soil is admitted, if QERLC is obliged to non-Annex I parties, agricultural CDM will be implemented as GHG option for non-Annex I parties. If new energy technology in low cost is not developed, CER price by CDM will increase and agricultural CDM will be important comparatively.

4. Discussion

This study developed three options for the future climate regime. At this point in time, there is uncertainty as to which scenario the world would follow. As the world proceeds in the next several years, we will be able to have better idea as to which scenario the world is approaching, and thus which type of international institution would be the most agreeable.

The informal dialogue on the long-term action has started this year, 2005. It is necessary for this research group to continue to follow the dialogue to be able to propose more concrete institution for the future regime, and to make more precise assessment of the proposed regime.

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