How Can Greenhouse Gases Be Reduced After 2013?

By Hiroshi HAMASAKI

Introduction

With global attention focused on a new framework to succeed the Kyoto Protocol on climate change, one may say that international attempts to craft a viable mechanism remain blanketed in a pall of thick fog.

As many scientists and researchers point out, a question mark remains about the effectiveness of the protocol in combating greenhouse gas (GHG) emissions. However, the current debate is based on the protocol and it may take some more time before an utterly different framework can be crafted and implemented. This report will first assess the efficacy of developed countries utilizing emission reductions outside their own territory within the framework of the protocol. The new Japanese government of Prime Minister Yukio Hatoyama has pledged to cut GHG emissions by 25% from 1990 levels by 2020 without clarifying how far Japan will go on its own. By comparing two different cases – one based on Japan's own emission cuts and the other based on positive utilization of reductions outside its national boundaries, the report will try to clarify the latter's possible effects and impacts. It will also discuss a global emission trading scheme as an alternate framework in which all countries can participate, unlike under the Kyoto Protocol. This is based on the assumption that in country-by-country allocation of emission amounts, the principle of "common but differentiated responsibilities (CBDR)" can be realized as stipulated in Section 1, Article 3 of the United Nations Framework Convention on Climate Change.

Will Extension of Kyoto Protocol Do?

The 25% GHG reduction target promised by the Hatoyama government is way higher than the one set by its predecessor, the government of Prime Minister Taro Aso, which aimed for an 8% cut from 1990 levels. *Table 1* shows medium-term reduction targets as envisaged by major countries. Among those targets, only the one set by the Aso government does not count on reductions to be achieved outside Japan through GHG abatement projects in developing countries. Attention needs to be paid to the fact that the other goals, including that of the Hatoyama government, take into account reductions to be attained by way of the Kyoto mechanism.

TABLE 1

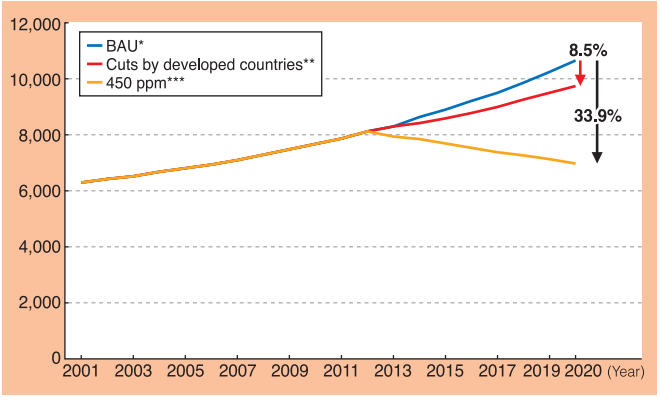
Medium-term GHG emission reduction targets by major countries

	Base year	Reduction target (2020)	Use of Kyoto Protocol mechanism
EU	1990	-20 to -30%	Yes
Japan (Hatoyama gov't)	1990	-25%	Yes
Japan (Aso gov't)	2005	-15%	No
United States	2005	-14%	Yes

Source: Hiroshi Hamasaki (2009), "Negotiation points ahead of COP15 and appropriate strategies for the DPJ," Center for International Public Policy Studies (CIPPS) joint workshop, October 26, 2009

CHART 1

Amount of GHG emissions



*Note: *Business-as-usual level (no emission-cutting efforts made)*
***Assumed reduction targets (25% by Japan, nil by United States, 30% by EU and 3% by Canada, all in 2020 from 1990 levels)*
****Concentrations of CO_2 equivalent*
Source: Hiroshi Hamasaki (2009), "Negotiation points ahead of COP15 and appropriate strategies for the DPJ," Center for International Public Policy Studies (CIPPS) joint workshop, October 26, 2009

Chart 1 gives three options of global GHG emission amounts: the BAU (business-as-usual) amount (when no abatement efforts are made), the volume when developed countries (Japan, the United States, the EU and Canada) will have achieved their reduction targets, and the volume required to attain a target of 450 ppm in concentrations of CO_2 equivalent. Achievement of 450 ppm would require a 33.9% cut from the BAU level in 2020. Even a full attainment of the targets by the developed countries would bring about a cut of only 8.5% from the BAU level that year. If the 450 ppm target were to be achieved through reductions by the developed countries alone, they would have to accept much higher targets individually.

Can Japan Attain 25% Target on Its Own?

A major topic at the moment is how much of the Hatoyama government's 25% target Japan is going to attain within its own territory. Here, we will simulate two different cases – (1) achieving the whole target on its own and (2) making the most of Japan-aided reductions in foreign countries, and evaluate the impact the former case would have on the national economy and society.

Marginal reduction costs will be $14.2 per ton of carbon in the second case and $269.5 per ton of carbon in the first case, or 19 times as much. This clearly indicates that the costs can be substantially lowered if Japan relies on the second scenario.

Table 2 shows the impact the first scenario would have on Japan's industrial activities. It could entail huge extra costs to be borne by individual industries and undermine their production.

On the other hand, some experts warn against Japan's excessive reliance on overseas GHG reductions. *Table 3* shows the amount of money to be paid or received by major countries in 2020 in the second

TABLE 2

Impact on production in key industries (2020)

Industry	Output change (%)
Steel	-4.4
Mineral products (incl. cement)	-3.2
Pulp/paper	-1.1
Chemicals/rubber/plastics	-1.5
Transportation	-2.2

Source: Hiroshi Hamasaki (2009), "Japanese strategies to meet 25% target," Fujitsu Research Institute (FRI) opinions

TABLE 3

Money to be paid/received by major countries (2020)

Country/territory	Transfer of money ($1 mil.)
China	6,456
India	902
Japan	-1,221
United States	-3,742
Canada	-582
EU	-4,483

Source: Hiroshi Hamasaki (2009), "Japanese strategies to meet 25% target," Fujitsu Research Institute (FRI) opinions

TABLE 4

Impact on GDP (2020)

Country/territory	Output change (%)
China	-2.5
India	-1.2
Japan	-0.5
United States	-0.9
EU-15	-0.9

Note: Divergence from BAU levels
Source: "Japanese Industries' Competitiveness in Low Carbon Era," research report commissioned & funded by Japan Economic Foundation, Fujitsu Research Institute (2009)

TABLE 5

Money to be paid/received by major countries in emission trading (2020)

Country/territory	Transfer of money ($1 mil.)
China	40,548
India	112,117
Japan	-16,228
United States	-125,378
EU-15	-58,121

Source: "Japanese Industries' Competitiveness in Low Carbon Era," research report commissioned & funded by Japan Economic Foundation, Fujitsu Research Institute (2009)

scenario. Japan will pay $1.2 billion while China will receive $6.5 billion. If a country spends the proceeds from the sale of its emission credits on low-carbon technology R&D programs, it can hope to enhance its competitive edge in a gigantic GHG-related market that is expected to be created. Part of the revenue can be spent to purchase weapons. To prevent this, a mechanism needs to be put in place to ensure such revenues are used to finance GHG-reducing activities.

Is Global Emission Trading Scheme Effective?

We will now assess a global emission trading scheme as an alternative to the Kyoto Protocol. One prerequisite for the stabilization of climate change is the formation of a framework open and acceptable to both developed and developing countries. Such a system will be able to control the volume of global emissions required to attain climate change abatement. The simulation here is based on the assumption that the den Elzen scenario (2008) of stabilizing CO_2-equivalent concentrations at 450 ppm can be achieved. Country-by-country tradable emission permits are allocated in proportion to population. *Table 4* refers to the impact the trading scheme may have on national GDP. One characteristic point is that the impact will be greater on developing countries than on developed countries. China will be most seriously affected, followed by India. However, since the simulation assumes that emission reduction activities are carried out only for eight years from 2013 to 2020, the overall impact on the two emerging economies with high growth potential may prove relatively modest. As we will see later on, both China and India will be able to count on revenues from the sales of emission permits. By making an effective use of their revenues, they may also be able to ease the impact on GDP.

Our simulation puts the price for GHG emission permits at $168.2 per ton of carbon. This is substantially lower than the marginal cost ($269.5 per ton of carbon) Japan would have to pay to meet its 25% target. Flow of money in the emission trading scheme is given in *Table 5*. Among the major countries listed, India and China will be the net recipients. While India accounted for 16.8% of the world population in 2005, it emitted only 6% of the global total in the same year. This entitles the country to huge emission allowances, much bigger than what its BAU-level emissions would permit, and to potentially low-cost emission cuts. Unlike India, China accounted for 20.4% of the world population while emitting 19% of the global total in 2005; the population and emission shares are very close to each other. This means that China's revenues will be smaller than India's although it will be able to cut its emissions at a very low cost.

Conclusion

We have simulated two scenarios for Japan's GHG emission reduction – doing it all on its own and utilizing cuts to be made by other countries. The aim was to consider how effective the latter formula is. Japan has already attained one of the world's highest energy efficiencies and would have to make a great amount of additional investments if it were to achieve its reduction target solely on its own. The adverse impact on the economy would be far from modest. Our study suggests that using the latter method could immensely cut the reduction costs and lessen the possible economic impact. Moreover, it would increase the possibility of Japanese energy-saving technologies being utilized in other countries. Meanwhile, it will be necessary to ensure that proceeds from the sales of emission permits are effectively used to fund the cost of GHG emission reductions.

We have then taken up a global emission trading scheme as an alternate framework to succeed the Kyoto Protocol. One of the problems with the Kyoto Protocol was that it had set the reduction targets in accordance with different base years for countries and territories. Under this mechanism, only developed countries and a handful of other countries were obliged to cut GHG emissions. Even if all those countries achieved their reduction targets, the results would not be sufficient to stabilize the climate. We have looked into the global emission trading scheme because it may function to resolve many of those problems. The trading scheme is conditional on participation by all countries. It will set a global GHG reduction target, with the amount of emissions allocated to countries in proportion to population. This way, the CBDR principle should be realized. The regime will make it possible to control the global amount of emissions and set a single price tag for global GHG emission permits. This should allow the process of emission reductions to start where the costs involved are lower. Allocation of larger emission permits to developing countries will generate revenues from their sales. Developing countries will be able to use their revenues to cut their emissions. This should help resolve their fund shortage, one of the factors responsible for the slow progress in emission reductions in developing countries. JS

Hiroshi Hamasaki is research fellow, Economic Research Center, Fujitsu Research Institute, and visiting fellow, Center for International Public Policy Studies.