

Designing Post-Kyoto Institutions:
From the Reduction Rate to the Amount of Emissions

April 2007

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In February this year, the Intergovernmental Panel of Climate Change (IPCC) 4th Assessment report mostly came to the conclusion that human activity has induced global warming. Also, in January, the EU independently declared that they would reduce greenhouse gas emission by 20% from 1999 levels by the year 2020. On the other hand, the institutional design to come after 2013, when the first commitment period of the Kyoto Protocol ends, remains nebulous.

First, let us look at the controversial aspects of the Protocol with simple numerical examples. Suppose the amount of greenhouse gas emission of country "A" in a year is 10 units, and that of country "B" is 2 units. Set this year as the base year, and suppose that the Protocol stipulates that "A" should reduce by 10%, and "B" should reduce by 0%. Upon the end of the commitment period of the Protocol, the amount of emission of "A" is 8 units and that of "B" is 3 units.

Hence, country "A" achieved a 20% reduction, while country "B" increased emission by 50%. Let us suppose that the major factors of the achievement of "A" are the transition from coal to natural gas as coal subsidies ended, and the shift of major industries to overseas. In contrast, "B" is now in the process of economic development, and increases in the amount of emission are due to a growth in exports to country "A".

Let us now assume that both countries have achieved their Protocol goals as country "A" sold the 1 unit of emission credit to "B". If the reduction of country "A" is not due

to its efforts but to the reduction achieved naturally, "A" can reap economic benefits more by ratifying the Protocol than by not ratifying it. In contrast, country "B" incurs a loss.

Provided that country "A" is the one that has been emitting the greenhouse effect gas in bulk for over a hundred years, is it legitimate to say that country "A", which achieved a 20% emission reduction, is more environmentally advanced than country "B", which increased emission by 50% ?

Let us suppose that the above mentioned amount of emission is per capita. According to the Protocol commitment, country "A" has 9 units of emission credit per capita, and country "B" has 2 units per capita. Even though country "A" has achieved 20% reduction, why does it have 4.5 times more emission quotas compared with country "B"?

What is the source of the problem with this seemingly unreasonable framework? It is that they negotiated the issue with a focus on the percentages of emission reduction compared with the base year. What is truly significant for the prevention of global warming, however, is not the rate of reduction, but the amount of emission in the world as a whole. After the commitment period, the amount of emission of country "A" is 8 units, and that of country "B" is 3 units. We believe that taking responsibility for the total amount of emission should be the basis for designing Post-Kyoto framework.

One of the tools in line with this spirit is carbon tax. It should be proportional to the amount of emission. If the same tax rate is employed around the world, it is supposed to attain the cost minimum reduction. However, once the tax revenue is collected by each government, it would be hard to reallocate the money among the countries. Thus, the reallocation of the tax revenue would be the international negotiation itself. It seems difficult to get this issue under control since this negotiation is about which nation gets how much reallocation. Also, even if the rate of taxation is fixed, it does not necessarily mean that the quantity target of emission can be attained.

Therefore, we would like to propose the United Nation Emission Trading System (UNETS) as the new framework for Post-Kyoto period in order to take responsibility of all emissions, not the amount from the base year emissions. In this system, each nation

must take responsibility according to its total quantity of emissions.

First, all participants negotiate on which emission path to take over the next few decades. In this process, the research by IPCC on this matter would be useful.

Next, UNETS sells emission credits to each nation. Although the total global amount of emission over a certain period of time is regulated, each nation has no limit on its total amount of emission. In other words, each country does not have any “cap” on its emissions. Each country must purchase the emission credits from UNETS according to its total amount of emission.

UNETS obtains revenue from selling emission credits, and it reallocates the revenue to each nation. Two methods are used for the reallocation. One of them is to refund a part of, say a half of, the revenue from selling emission credits to each nation in accordance with its purchase. To do so, all the nations are divided into, for instance, three categories; developed nations, semi-developed nations, and developing nations. Each nation receives the amount that is calculated as

A country specific coefficient x the quantity of emission credits purchased x average sales price of emission credits

As shown in the table, regarding the country specific coefficient (the reimbursement rate of emission credits purchased), the more developed the nation is, the lower rate of the return it receives. The remaining half is reimbursed in accordance with factors such as GDP, which has no direct relation to the amount of emissions.

With this system, those who do not emit can benefit more since the reimbursement rate is less than 1. In other words, the incentive for reducing emissions is maintained. Also, semi-developed nations and developing nations can obtain net gain if they join this system. That is to say, it would be possible for them to utilize the return profit to invest in global warming prevention investments and to support the poverty programs. On the other hand, developed nations must bear the burden according to their ability. In this system, “common but differentiated responsibilities” means that all the nations take common responsibilities for emission, but it is the developed nations that bear the burden.

Semi-developed and developing nations will wholeheartedly approve if the framework is based on UNETS. To prevent the unparalleled danger of global warming, developed nations have to make the decision.

We estimated how UNETS would work under the condition that the total amount of world-wide emission should be limited to 90% of the current emissions. There are three levels of the reimbursement rate of emission credits purchased as shown in the table. It shows that the lower the rate, the more developed the nation.

There are six levels of the reimbursement rate based upon GDP. This also shows that the lower the rate, the more developed the nation. Only Japan has the lowest return rate of 0.25. That is to say, Japan bears the greatest burden. The EU has the second lowest return rate of 0.3, followed by the US and Canada with the rate of 0.45.

Under UNETS, the emission credit price is \$24.5/carbon ton. Compared with the emissions without the UNETS system, China shows the highest emission reduction rate. Due to the price effect, fuel conversion away from coal is promoted there. The same thing would happen to India as well. Furthermore, relatively energy inefficient nations such as the US, Australia, and Russia also show considerable emission reduction. Energy efficient countries and regions such as Japan and EU show relatively low emission reduction rate.

The net return profit, or the total reimbursement minus the total purchase of emissions credit from UNETS, is positive in Asia including China and India, as well as other countries (mostly developing). In contrast, nations and regions such as Japan, EU, the US, and Australia are the ones that bear the burden. The total amount of emission credit in the world sold by UNETS is 16.3 trillion yen, and it is not such a substantial amount. Moreover, it can be stated that the impact on economic growth rate is marginal.

This estimate in the table shows what kind of economic changes will take place in the world under UNETS. In other words, UNETS is a framework that controls the global amount of emission, and it should be noted that it does not include the effects of measures that each nation or region independently adopts. Various approaches and efforts to prevent global warming should make UNETS even stronger.

Japan and developing and semi-developed countries could be at the forefront of the Post-Kyoto international negotiation table and lead the world with the measure of “From the Reduction Rate to the Amount of Emission”.

	Reimbursement rate of emission credits purchased	Reimbursement rate based upon GDP	Net gain (\$1 million)	Emissions w.r.t. business as usual scenario rate %	Impact Rate on GDP %
Australia, New Zealand	0.3	0.5	-476	92.2	-0.07
China	0.7	0.7	176	66.5	-0.47
Japan	0.3	0.25	-458	96.7	-0.01
Korea, Taiwan	0.5	0.5	-428	95.1	-0.05
Thailand	0.5	0.7	-137	94.3	-0.06
Asia (Except China)	0.7	0.7	1,189	87.9	-0.14
United States	0.3	0.45	-1,491	92.6	-0.01
Canada	0.3	0.45	-650	95.0	-0.11
EU	0.3	0.3	-3,396	97.3	+0.07
Russia and others	0.7	1.2	-1,520	92.7	-0.21
Others	0.7	0.7	7,192	93.9	-0.08

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