

Designing Institutions to Cope with Global Warming: Toward Toyako Summit

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The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) under the United Nations indicated that the earth's surface temperature has risen by 0.74 °C during 100 years from 1906 to 2005, and it basically concluded that human activities have been the cause of today's global warming. The report also warned that, unless measures are taken, global mean temperature will rise by 6.4 °C at the maximum in the end of this Century from the temperature at the end of 20th Century. In response to the Report's conclusion, some world leaders including former Prime Minister of Japan, Mr. Abe, proposed to halve greenhouse gas emissions by 2050 from the level of 2000.

Let us consider how difficult it is to achieve this target. The gross world product of 8 trillion dollars in 1950 rose to 67 trillion dollars or eight times by 2005. According to the projection made by the Earth Institute of the Columbia University, it would grow to about 420 trillion dollars by 2050, which is about 6 times as much as the level of 2005. The global carbon emissions to atmosphere, on the other hand, was about 1.6 billion tons in 1950 and increased to 7.9 billion tons by 2004, which was about five times. Assuming that energy efficiencies would improve at the rate of the latter half of the 20th century, it would be close to four times as much as the level of 2005 by 2050. In order to attain the target of halving carbon emissions by 2050, simple calculation indicates that the world must attain the energy efficiency eight times better than that around the turn of the century, i.e. year 2000. As this is a simple average of the world, the developed world including Japan will need to improve their energy efficiencies to the level ten to twenty times better than 2000 by 2050.

There is no greater challenge or difficulty than this. Now, the more difficult the problem is, the less chances for any unique, unusual, and extraordinary method to solve it, but orthodox and straightforward method.

Then, what can be the orthodox and straightforward method? First, we need to determine the pathway of global carbon emissions. Here, various scenarios developed by IPCC will undoubtedly help determine such global pathway. Secondly, we need to determine how to develop new technologies that can help achieve such pathway, how to develop a framework to disseminate such technologies, and most of all what country should bear how much burden. Although criticized as being the product of compromise, the Kyoto Protocol agreed in 1997 under the UN Framework Convention on Climate Change of 1992 is one sure step forward in the orthodox approach.

The Kyoto Protocol determined how much emission reductions countries and regions mainly of the developed world should achieve, and adopted an economic approach such

as emissions trading in order to allow these countries to achieve their targets. In other words, the Protocol stipulated the overall emissions allowed in the subjected region during the time frame of 2008 to 2012, and provided systems to facilitate the attainment of targets by adjusting the prices of carbon emissions. Based on such concept, the European Union launched their emissions trading scheme in 2005 and succeeded to give prices to carbon (dioxide) emissions.

Now Japan has not been able to give any price to carbon emissions. In other words, Japan let pass the past decade or so since 1997 inertly without doing anything. Let us take a simple example to demonstrate the significance of attaching values to carbon emissions.

If you go on a business trip and check in a hotel that adopts a system to ask a guest for a certain payment upon check out, depending on the amount of carbon emissions the guest used, you will likely make efforts to save carbon emissions whether you are interested in global warming or not. Now, if the hotel merely asks a guest to voluntarily "save the amount of electric power and hot water used" upon check in, the guest is likely to use the usual and lavish amount of electric power and hot water, unless they are interested in environmental problems. If a voluntary system is to make any significant savings, there should be some kind of enforcement method in the background.

The global warming is supposed to be a major agenda of the Toyako Summit 2008, and the host country, Japan, is campaigning for what they call the "sectoral approach." This approach is to have all the companies in the world belonging to the same industry sector sharing the best technology in that sector. To help those companies adopt such technologies, there should be an additional system to supply funds. In this sense, this sectoral approach is a system to disseminate above mentioned technologies. Yet, the technological dissemination system itself is not likely to be a framework for global greenhouse gas emission reduction. In other words, the sectoral approach is not a strategy for each industry sector to develop and achieve targets, but a tactic to be adopted once a target is determined. Of course, such technology transfer approach can be used without determining targets.

Some people may expect this sectoral approach to stand alone without determining global emissions target, but, unlike the calculation by the Japanese Government, such a system will not provide actual reduction in greenhouse gas emissions. Let us assume that Japanese technologies are to be transferred to developing countries or medium developed countries. Less costly production elements, such as lower wage, of technology recipient companies will eventually force those same sector companies in the developed countries to scale down or even to withdraw from the sector. Will Japanese business leaders consider this acceptable as long as it leads to the reduction in global greenhouse gas emissions? Even if so, won't this approach result in the increase of gross global emissions despite the decrease in greenhouse gas emissions per unit production of the sector in developing countries? It is entirely possible that such approach causes increased

production in the sector, thereby eventually resulting in the overall quantity of emissions to increase. Moreover, the vigor of economy stimulated mainly by the activated activities of such sector may lead to increased emissions in sectors connected to such sector and in others such as residential and transport sectors.

It is a possibility that, despite the control of greenhouse gas emissions from the sector concerned, the approach may lead to significant emissions increase in residential and transport sectors. This is what Japan experienced, and this "issue of Japan" can be exported to developing and middle developed countries, through the sectoral approach. I certainly hope that this logic will not come true. Yet, the calculation of computable general equilibrium model seems to support the above argument.

The most important factor arisen from the sectoral approach is that the approach does not give any price to greenhouse gas emissions. No matter how extensive the efforts made by each sector, the companies in that sector have to bear higher burden, if there is no global target. Companies in other sectors, on the other hand, do not need to bear much burden. In fact, some sectors may not need to bear any burden at all. If the shared burden differs from a sector to a sector, it may cause a sector that ought to make extensive efforts in reducing emissions to evade the burden, while a sector that do not need to bear much burden to be forced to make. This kind of problem can be solved, if we attach values and prices to emissions.

Now, is it really impossible to achieve the target of "halving by 2050"? To study this proposition indirectly, I have taken the examples of reducing global emissions by 10% with the use of currently available technologies only. One such calculation is done for the United Nations Emissions Trading system (UNETS). Under this system, UNETS is to own 90% of emission allowances, and to sell them to each country. Each country does not have a cap on emissions, but there is a cap on global emissions. Each country must possess sufficient amount of emission allowances to equal carbon contents of greenhouse gas they emitted. Moreover, UNETS uses its revenue of emission allowance sales to redeem the costs of developing countries or middle developed countries, and to promote technological development and dissemination. The important point is whether the system allows developing countries and middle developed countries to gain benefits as a whole without suffering any losses. Another point is whether the system can minimize damage to global economy. The answers to these two are "Yes" for both. The UNETS can minimize the damage to gross world product to 0.1% or less at the price of 25 USD per carbon-ton. Another example is GETS (global emissions trading system), which is to distribute equal amount of per capita emission allowances to each country in the world under the global target of 10% reduction, and use emissions trading to achieve the target. As in the case of UNETS, the GETS can minimize the decrease in world gross product to 0.1% or less at the price of 28 USD per Carbon-ton.

The message of this article is: "if we can do it, why not do it."