Internationally Harmonized Carbon Tax for Developing Countries

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Abstract

Even though rich countries are dominantly responsible for the climate change, endangered developing countries cannot afford to wait for international agreement and financial support yet to come. It is time for major developing counties to take possible action to push developed countries and to avoid pressing disasters. This paper points out the limit of an international cap & trade such as Kyoto protocol, and proposes an alternative scheme based on an internationally harmonized carbon tax and trade measures. The major advantage of this approach is that this scheme can be initiated even by developing countries without global consensus, can meet the fiscal need of each country, and paves the path of energy efficient economic growth.

Introduction

At the Copenhagen Conference of UNFCCC (COP15, Dec. 2009), representatives from more than 190 countries and regions gathered to discuss climate change issue. It is encouraging that a common worldwide understanding is being formulated on this issue. But the Copenhagen Accord, which is worked out by leaders of 28 major countries including Japan, USA, EU and emerging economies, was merely "taken note of" without being formally adopted. In the Accord, the goal of limiting the global temperature rise under +2°C is now commonly shared, the financial supports toward developing countries about 30 billion US$ from 2010 to 2012 and about 100 billion US$ annually until 2020, but developed countries could not agree with national reduction targets. The earth-cooling effect of this Accord seems approximately zero.

In November last, IEA has published an energy scenario which shows the possibility of radical reduction until 2030 in line with the +2°C goal (450 Scenario, fig. 1). But the key to this success is international cooperation. Therefore, the real emission path will be very similar to the Reference Scenario.

Needles to say, the Developed Countries which emitted much Greenhouse Gases (GHG) historically have most part of the responsibility for climate change, and less responsible Developing Countries will suffer from the damage. The principle of "common but differentiated responsibility" claims that rich countries should take positive actions for climate protection and help

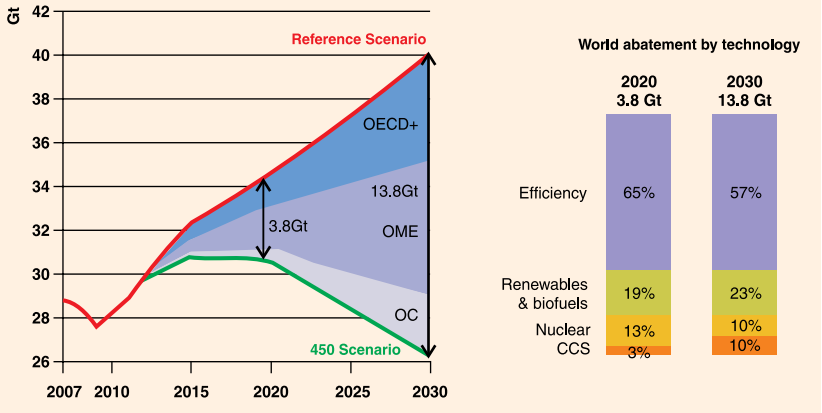

Fig. 1. The 450 Scenario of IEA and the Breakdown of Abatement Technologies
Source: IEA (2009) World Energy Outlook 2009
Note: OECD+ is OECD countries and other non-OECD EU Members, OME (Other Major Economies) includes Brasil, China, Middle East, Russia and South Africa, and OC is all other countries including India and ASEAN.

poorer countries financially for mitigation and adaptation.

But it depends on the will and political situation surrounding the developed countries if they take the concrete step. Environmentalism has also economic fluctuations. Can developing countries afford to wait for the developed countries move? The climate change may change into ecological crisis and devastate the basis for life earlier than expected. Primarily the island states and delta areas of South Asia would suffer from increasing cyclones; scarcity of drinking water due to extinction of glaciers in Himalaya would be faced by people in China, India and Southeast Asia.

There is no dispute that developed countries are morally obligated to support developing countries. According to IEA, in order to establish the low-carbon energy system in-line with 450 scenario, the developing countries require 200 billion US$ annually until 2020. However, the amount proposed in Copenhagen Accord corresponds to half of this. CDM projects take a major role for financial and technical transfer. The gross transaction volume of CER (CDM Credit) in 2007 amounted to ca. 7.4 billion US$, three times more than total financial amount of Global Environmental Facility (GEF) from 2002 to 2006 (ca. 2.3 billion US$ for 5 areas including biodiversity, Takamura 2008). These figures show that massive amount of money is already moving. But it depends on the will of developed countries if sufficient money continues to flow in the future, and the future of CDM depends on the still non-existing international climate policy framework.

However conscientious the rich countries' governments be, it is hard for them to carelessly promise ambitious GHG reduction target in the international negotiation. Every country has its domestic political conflicts about the climate policy, and face opposition from strong lobby of heavy industries who are against effective market based instruments such as carbon tax or emissions trading. The industries are frightened with the rapid economic and technical catch-ups of emerging economies, and concerned with the possible loss of international competitiveness caused by the international climate policy framework which force only developed countries to reduce GHG emissions. As we see later, the Kyoto-type international framework has the structure entailing a problem similar to the so-called "prisoner's dilemma" whereby ambitious countries are structurally disadvantaged.

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If a developing country recognizes concrete crises it faces, it cannotwait for a move of the rich. It has to implement effective policy measures and get the financial resources to survive by its own, in a way that ensures the economic prosperity. At the same time, developing country should show their action in order to break the stalemates. A key for it is an Internationally Harmonized Carbon Tax.

The limitation of an International Framework based on Cap & Trade

The reality of emissions trading

In order to reduce the use of fossil fuel, it is inevitable to introduce any concrete market based instrument such as carbon tax or emissions trading scheme (ETS or the cap & trade). An international carbon tax or an ETS is necessary at the international level, and a domestic carbon tax or cap & trade is requested at the national level. Each scheme has different proponents, and the comparative merits and demerits are discussed among economists[1]. In general, proponents of an ETS are attracted by the setting of overall emission limit, and supporters of a tax emphasize the larger coverage, transparency and lower administrative costs.

In the recent reality, while the application of carbon tax is stagnated in developed countries, an international cap and trade is already launched by the Kyoto Protocol, and the European Union has successfully started up the gigantic European Union Emissions Trading Scheme covering whole EU member states. Therefore, in the context of recent policy discussion the ETS seems more realistic, and the preparation is going on in several OECD countries such as the USA, Japan or Australia.

But here we need to pay attention to the difference between international and domestic context. Although we do agree with the effectiveness of domestic ETS, we believe that an international cap and trade is very hard to realize and maintain because of several reasons explained later. In addition, an ETS is a very difficult instrument for the majority of developing countries with limited administrative capacities.

The limit of an international cap and trade

A domestic ETS is in fact a flexible command and control mechanism, which works under an authority and can force every GHG emitters such as factories to participate in the scheme and comply with the rule. But in the international context, there is actually

[1]For example, Yale Environment 360 (2009) posts the opinions of 8 US key persons such as Beinecke (a proponent of ETS) or Sachs (who supports Tax).

no authority above the actors in the scheme, namely sovereign states, so that nobody can force any country the participation and compliance, and it is very difficult to expand and maintain the international ETS scheme which entails international payment[2]. The success of a *supranational* EU-ETS is a rather exceptional case, because the European Commission has been sometimes more powerful than each member state, which has historically given up a part of their sovereignty and couldn't stay outside the scheme.

The most problematic of all is the negotiation of national reduction targets which is in fact the initial distribution of limited tradable emission allowances. This is essentially a zero-sum game where the interests of countries collide. In the negotiation about the burden sharing for a so-called global public good, a rational diplomat representing the interest of its citizens is, willingly or not, compelled to demand more emission rights.

In order to understand this problem, let us consider a classic case of "Prisoner's Dilemma" about an international public good (table 1). In this case, two symmetrical countries (A and B) seek economic growth emitting cross-border pollutants. Let's assume these pollutants do harm both of two countries evenly, therefore a reduction effort of any country do good evenly. For example, assume that if a country takes a reduction effort which costs 6 (monetary) units, it generates the benefit of 10 units, and each country reaps the benefit of 5 units. If both of the two countries take this effort, each of them pays 6 units cost while reaps 10 units benefit, that is, the sum of benefit amounts to 20 units. In this case, it seems very rational for each country to take this effort, but the game-theory predicts they do not cooperate. According to the table 1, the net benefit of not taking the reduction effort is higher for each country regardless of any decision of the other country. Please note that any conflict-creating international framework such as cap and trade is not assumed in this setting.

Net benefit of reduction (A, B)		Country A	
		Reduce	Not reduce
Country B	Reduce	(4, 4)	(5, -1)
	Nnot reduce	(-1, 5)	(0, 0)

Table 1. The Prisonner's Dilemma of Pollution Reduction

In reality, the world is very large, the number of countries is very much, and the fruits of any reduction effort mostly diffuse to other countries without staying at home. Furthermore, a regime in which each country shall set its reduction target and which is supplemented with the trade of emission allowances, pledging ambitious reduction target is factually digging its own grave. That is, the dilemma shown in the table 1 is more serious in the real world.

The table 2 shows the Kyoto reduction targets of major economies converted into the per capita value of emission allowances. The unit value of allowances are assumed to be 30 US$/tCO2. This shows entirely different picture from seemingly equal reduction targets such as 6% for Japan, 7% for USA and 8% for EU. Actually, the emission quota for a Japanese or European citizens is only about the half that of a US, Australian, Russian or Canadian citizen. A Japanese as the most efficient industrialized country accepted the smallest slice of the pie. It has been relatively more difficult for Japan to reduce the GHG emission than other countries, and the severe target had not lead to the implementation of domestic carbon tax or ETS, so that it had been far from reaching the Kyoto target. Japan had purchased massive amount of CDM credits or foreign allowances, as it couldn't escape from the agreement with the name of its old capital city, and awarded the

	GHG Emission 1990 (Mt-CO2eq)	GHG Cap as Kyoto Target (proportion to 1990 level [%])	Value of GHG Cap (when 1 tCO2=$30, Bill. US$/yr)	Per Capita Cap (US$/yr, based on Pop. in 1997)
Australia	418	108	13.5	740
Japan	1,272	94	35.9	285
EU15	4,258	92	117.5	316
USA	6,229	93	173.8	637
Russia	2,990	100	89.7	610
Canada	596	94	16.8	560
Annex-I Total	18,709	Average 95	533.2	–
China	4,057 (in 1994)	assumption 100	121.7	99
India	1,214 (in 1994)	assumption 100	36.4	38

Table 2. The Value of Emission Allowances by the Kyoto Protocol

Note: Data of Annex-I Countries are based on FCCC/SBI/2007/30, p.17; Data of China and India are based on FCCC/SBI/2005/18/Add.2, p.14. Both are excluding LULUCF.

[2]The arguments in this section are mainly based on Victor (2001), Nordhaus (2005) and Stiglitz (2006).

"fossil prize" annually by the environmental NGOs.

On the other hand, if we calculate the value of the per capita emission quota for China and India based on the 1994 emission (oldest available data by UNFCCC), it is even far less than the case of Japan. The strong position of China or India rejecting the reduction target based on past emissions seems now fairly understandable.

This contradiction is caused by the fact that the "flexible mechanism" which initially intended to ease the achievement of national target leads to the cross-border monetary transaction. It may be argued that this scheme is not unequal, because even if a country accepts a smaller amount of quotas, it can also sell the extra quotas by reaching the target with more stringent efforts. But this argument does not make sense. The distribution of huge assets worth billions of dollars annually is fixed by the results of initial negotiation. However, this is only the part of problems. A country has to buy emission allowances if the actual emission is higher than the assigned cap. But the concern is whether a country is willing to buy "a part of the air" without real utility value continuously, while the repeated trade conflicts show the fact that the permanent monetary outflow even for useful goods is strongly unwelcomed? Or, all participating countries are willing to open the real emission data which reveal incompliance? All these questions raise cocern about sustainability of international cap & trade. In fact, Article 27 of the Kyoto Protocol prescribes the right to withdraw, implying that any country can drop out from the scheme without paying.

These facts show that international ETS cannot be a sustainable scheme. We have to work out an international scheme not entailing a "social dilemma" in which a country's cooperative behaviour brings profit to it. One of the schemes conceivable is the internationally harmonized carbon tax.

The Internationally Harmonized Carbon Tax

The merits of another approach

In the case of climate change, to reach annual reduction target exactly is not important, as long as the global GHG concentration declines in the long-run. And it is admissible that countries with declining emissions (especially developed countries) whereas countries with growing emissions (especially developing countries) exist at the same time. Then, it is even not important that each country sets and reach its reduction target, if sufficient number of countries can agree with introducing an adequate level of carbon tax.

Although at a first glance, tax seems to be a burden intolerable for poor nations, in fact carbon tax brings the economy several utilities.

Firstly, differently from higher import energy price, the revenue from carbon tax prevents the loss of domestic money and can be spent for the public welfare. If sufficient number of countries could introduce carbon tax, the producer price of fossil fuels is kept low globally.

Secondly, if the consumer price is kept high, energy efficient technologies and renewable energy will never be "luxury goods" but "necessity goods", and its accelerated diffusion boosts further technological development. As tax rates are unlikely to be reduced if the carbon tax contribute to essential part of public finance of a country, it can give every firm and investor a clear vision for future investment on development, deployment and commercializaion.

Thirdly, the drop in fossil energy demand will push the price down, which will then curb the controversial oil and gas exploitation under the arctic sea bed which surely nourishes the future global warming.

Finally, as every country can dispose of its own tax revenue in principle, this scheme is free from confrontations which beset the international cap & trade.

Different from national reduction targets which never guarantee the implementation of any effective domestic policy measures, like the case of Japan, a harmonized carbon tax directly lead to the implementation of effective domestic carbon tax. This provides stable domestic tax revenue to governments of developing countries which heavily rely for necessary public services on unstable tax sources such as tariffs. In fact, the revenue of carbon tax is fairly easy to predict.

The basic design of the internationally harmonized carbon tax

The basic design of this scheme is as follows. Firstly, an international body such as UNFCCC periodically analyzes the *global* GHG emissions or the GHG concentrations *in the atmosphere*, compares them with the *global* targ et, and set the minimum carbon tax rate for every country which is enough to reach the target. Then each country has to set the domestic carbon tax in the form of *excise tax rates* for fossil fuel products which correspond to at least higher than the minimum carbon tax rate. The compliance of each country is judged by the table of tax rates and actual results of tax collection, not by actual GHG emissions. In other words, as long as a country has introduced the carbon tax determined by the international body, it is qualified as fulfilling the obligation regardless of the amount of emissions. In this case, already existed tax rates should

be counted in for compliance, otherwise any country will just rename the existing energy tax as "new carbon tax".

As mentioned above, every government can use its tax revenue freely according to their social and economic situations. As the tax rate getting higher, the tax revenue is expected to be fairly large amount. Therefore it is a very important option that the revenue should be used to reduce the tax on income or other commodities, shifting the tax burden *from labor or capital to environment*.

To impose carbon tax is easier even for developing countries in comparison to the emissions trading which requires to set up new market and to monitor the actual GHG emissions of each emitter. Here, we believe we do not have to differentiate the minimum tax rate between developed and developing countries, because as basically an average citizen in developing countries tend to consume less fossil energy, this scheme automatically meets the principle of "common but differentiated responsibility". Furthermore, the unified carbon tax rate meets the requirement of minimum economic cost (equalization of marginal abatement cost). Above all, to keep the energy tax is harmful for efficiency improvement in the developing countries, and brings no good for providing public services necessary for economic development. Of course, it should be pointed out the carbon tax burden on poorer citizen may tend to relatively heavier, but every country can and should cope with this problem by better design of total tax system.

Even if there is a clear international agreement on carbon tax, it must be very difficult to force countries out of compliance to pay a penalty. A possible penalty in international context is a (rather passive) trade measure. As non-compliant countries can produce goods at lower costs enjoying competitive advantages, this could be regarded as "eco-dumping" or "illegal subsidy". Therefore, the other state parties should be able to apply a trade measure such as the countervailing tariff stipulated in the WTO rules. Of course, the non-compliant country cannot take any countermeasures against a legitimate trade measure. For this kind of measure, the common rule may be necessary to calculate the proper rate of countervailing duty. The potential of a trade measure will give an incentive to introduce a carbon tax even for the countries which are not interested in or not cooperative to the climate protection.

Even if such an international agreement is not realized, a country can unilaterally introduce a carbon tax without suffering from competitive loss by using the "border tax adjustment" which is common for indirect taxes such as a value added tax.

Although there are criticisms against the trade measure as the "trigger of the trade war", this view is unfair, because it is a necessary tool to ensure a level playing field in the global economy which is a common challenge for human beings. The reason why most rich countries couldn't introduce a carbon tax was the concern for competitive disadvantage and the so-called "carbon leakage".

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The energy price and efficiency

The carbon tax should be seen as a tool to boost the economic and energy efficiency. Figure 2 shows the specific energy consumption of major economies. USA or Brazil is twice, Philippines or the Republic of Korea is three times, India or Thailand is five times, and China is 8 times as inefficient as Japan. That is, if they reach the efficiency of Japan, they can enjoy growth without raising the energy consumption. Then,

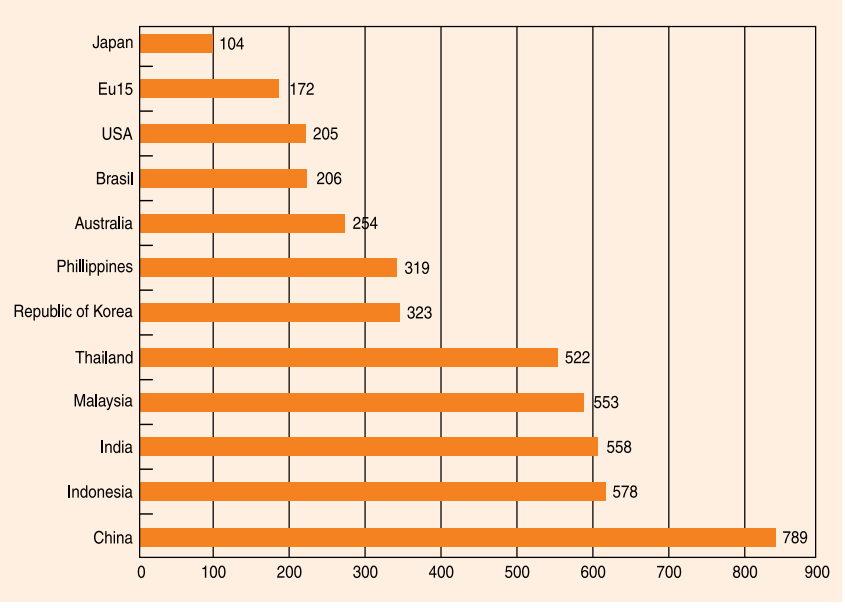

Fig. 2. Energy Intensity of Major Economies (in 2006, TOE/US$2000)

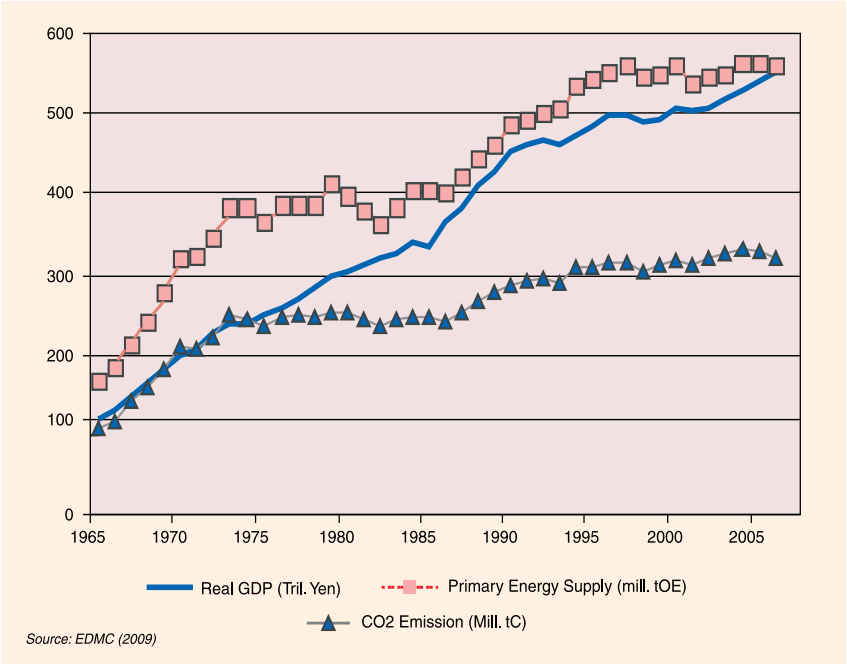

Fig. 3. The Relationship between GDP and Energy in Japan

how can a country raise its energy efficiency?

There is a close relationship between the energy price and efficiency. If the price is high, all economic agents strive for energy (or money) saving. Hybrid automobiles, newest iron-making technology, efficient household appliances or houses, and municipal transportation technologies, which already exist but sometimes more expensive than less efficient alternatives, should be boosted by a high energy price policy.

Figure 3 shows history of Japan's energy consumption. At first glance, it seems that GDP and energy supply went up parallel, but after two oil crises, the energy supply had stagnated in spite of growing economy during 1974 to 1985. In those days, Japan's government had not tried to reduce the energy tax. That is, the most efficient economy is the product of high energy price. But after 1985, as the oil price went down and yen has strongly appreciated, economy and energy went up again hand in hand.

Figure 4 shows the clear negative correlation between the gasoline price (including the gasoline tax) and per capita transportation energy use (mainly automobile fuel). A low price country such as USA was a very tough market for compact and efficient cars, which turned out to be a reason for the latest decline of the BIG3. Furthermore, in the high-price country many people use the "BMW (bicycle, municipal transportations, and walk)". Such relationship will be observed in other areas such as household appliances or building.

The tool for high-price policy is the energy tax. The market price and tax rate gives different signal to the energy consumption. Unlike the volatile market price which can unexpectedly go up and drop, as the tax rate is unlikely to be reduced again, it gives stronger incentive for investor or consumer to install or purchase more efficient option even if the initial cost is somewhat higher. The result of our panel-data analysis based on the OECD's energy and tax statistics is that a unit (US cent/Liter) raise of gasoline tax induces ca. 1.76 times greater reduction of gasoline consumption than a unit pre-tax price change, that is, 2.128 vs. 1.121 (Liter/person) (Park 2010).

As it requires the replacement of energy appliances and infrastructures, we may not see the result of overall improvement of energy efficiency in the near future. But the low-price policy will promote the installation of inefficient facilities with lifetime of tens of years, and will fix the energy wasting social structure. Such a policy is a "sweet poison" which will reduce the

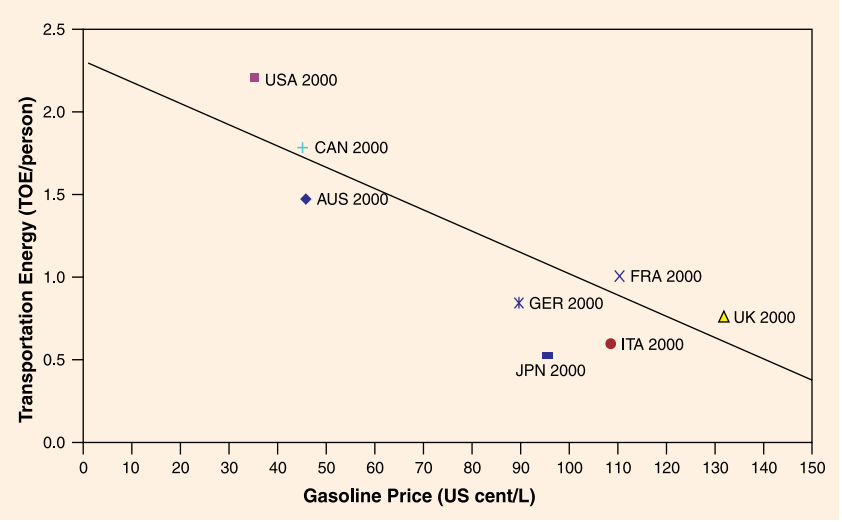

Fig. 4. Gasoline Price and Transportation Energy

economic efficiency and confound the dependency on foreign energy sources. Even poor countries have to employ the most advanced technologies for the future development from now on. The carbon tax plays a role of the "oriental medicine" for the health of economy in the long-run, ensuring the profitability of the best technology.

The Double Dividend of an "Environmental Tax Reform"

If a country introduces a carbon tax forced by a "good outside political pressure" caused by an international agreement, it can also enjoy a benefit from the viewpoint of the public finance, the so-called "double dividend" of an environmental tax reform. A government usually relies on the public revenue on the taxes which brings a profound distortion for the economy such as excise taxes, tariffs or taxes on labour or capital. In other words, citizens bear the "excess burden" other than the *pure* tax payment as other sorts of economic losses such as unemployment and loss of GDP growth. If the carbon tax contributes to the main part of public revenue, other tax should be designed as *distortion-free* as possible playing minimum role for redistribution of income. The experience of some European countries, a revenue neutral environmental tax reform, in which the additional revenue from energy tax is spent to reduce taxes or social security contributions imposed on labour, improves the employment or other economic indicators. The German Institute for Economic Research (DIW) has shown that the German Environmental Tax Reform since 1999 brings about 250 thousand additional employment (Bach et al. 2002), and the COMETR Study testified the economic gains of actual environmental tax reforms in Germany, Netherland, UK and other countries using an Europe-wide economic model and data for historical tax rates (Andersen et al. 2009).

Citizens may demand that all the revenue from carbon tax should be spent on environmental purposes. But a higher carbon tax rate leads to fairly much revenue, therefore it is wrong to earmark it only for environment. Otherwise the carbon tax will be a great tax boost and will bring a great burden on the economy.

Other policy measures for renewable energy and energy efficiency

The renewable promotion scheme for renewable energies

Although the carbon tax gives strong incentive for diffusion of renewable energies, it is not enough. Therefore we would like to explain the renewable energy policy of Germany which is regarded to be a success model. Germany has already achieved the national Kyoto-target of reducing the GHG emissions 21% below the 1990 level in 2008. The main policies contributed to this success are the environmental tax reform since 1999, EU-ETS since 2005, and the feed-in tariff (FIT) scheme for renewable energies. This scheme requires utility companies to purchase electricity from renewable energies at fixed official prices for 20 years, impose an obligation to invest on grid capacity, and shift the additional cost to electricity consumers by a slight increase of the electricity price (about 5% in 2008).

The official prices are for example 12.67 eurocent for small hydropower (under 500 kW), 11.67 eurocent for biomass (under 150 kW), 13.00 eurocent for offshore windpower, 43.01 eurocent for photovoltaics (under 30 kW) etc. These prices are finely differentiated by the kind and scale of power sources (inversely related to the scale), and set so as to guarantee the cost recovery (BMU 2008).

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This scheme has succeeded in mobilizing massive private funds, as it could give a clear future vision for investors and financial institutes involved in renewables. The official target for renewable electricity is 12.5% in 2010, which has already been achieved in 2007. Now, the renewable energy contributes to 15.1% of the electricity, and to 9.5% of final energy. And the expansion of domestic markets established the international competitiveness of German industries for wind turbine and photovoltaic.

The FIT similar to German scheme has been already applied even in East Asian economies such as China, the Republic of Korea and Taiwan province of China, and companies of these economies have become a part of major world players. Japan has adopted a renewable portfolio standard (RPS) similar to British scheme in 2003, but it has not succeeded in growth of Japanese renewable markets and industries. Therefore, former legislation has introduced FIT scheme only for photovoltaics, and current Hatoyama administration is considering the implementation of a German-type FIT for every renewable energy.

The renewable energies are valuable domestic energy sources and a key

for growth and employment also for developing countries. But as they are not yet mature, an effective support scheme such as FIT is necessary.

Other necessary regulations

There are several structural or information barriers against diffusion of efficient building or household appliances. Especially, as a building or a house remains tens of years once built, it is necessary to set the strict standard for insulation, to prohibit the nonconforming constructions, and to enrich public supports for efficiency renovations for existing buildings. Good examples are the minimum energy performance standard and related obligation of energy performance certificate for buildings in the EU (EUROPA 2007).

For the efficiency improvement of household appliances, the top runner regulation and the labelling scheme are good examples. This scheme sets future minimum efficiency standards for appliances according to the best product in today's markets, and the conformity of a product is made clear by the attached label. In this way, this scheme promotes the technical innovation and wise choice of consumers, ensuring the retirement of inefficient products from the market (ECCJ 2008)

Conclusion

Even though it is expected that most damages from climate change may fall on in developing countries, despite rich countries being dominantly responsible for it, developing countries cannot afford to wait for international agreement and financial support from developed countries. It is time for major developing counties to take possible action to push developed countries and to avoid pressing disasters.

This paper pointed out the limit of an international cap & trade based on international agreement, and proposed the internationally harmonized carbon tax as an alternative. The major advantage of this approach is that the scheme can be initiated even by developing countries without global consensus, which can meet the fiscal interest of each country, improving the economy-wide energy efficiency, and can bring a healthy economic growth. Of course a carbon tax will raise the production costs of heavy industries, but the net benefit of this policy could be made positive by an adequate design of total tax system and by accompanying countervailing duty or border tax adjustment which neutralizes the negative effects on competitiveness.

Even though, the carbon tax is not an all-purpose drug so that other regulations are also required. The feed-in tariff (FIT) is a preferable instrument to establish the domestic market and cultivate domestic producers for renewable energies which are applicable also for developing countries. And for building and household appliances there are good instances in the EU and Japan.

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