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Domestic Emissions Trading Scheme for Decarbonizing Japan

Translation by the EC Delegation Tokyo

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March 2007

Executive Summary

Introduction

Even as we near the start of the Kyoto Protocol's first commitment period in 2008, greenhouse gas emissions in Japan continue to increase, with no sign of declining. According to preliminary statistics on greenhouse gas emissions for FY 2005, emissions in FY 2005 increased 0.6% over the previous year, resulting in an 8.1% increase over 1990 levels. This indicates, regrettably, that the Japanese government's climate change policy to date is not delivering results.

Incidentally, FY 2007 is also the year in which an evaluation and review of Japan's Kyoto Protocol Target Achievement Plan is scheduled to take place. The time is ripe, therefore, to put forward our proposal for introducing a policy framework that would prompt businesses and households become more active in effecting a transition to the decarbonized society, thereby enhancing the feasibility of measures to combat climate change. In order to realise this objective, we propose, as a policy instrument, the introduction of an emissions trading scheme. This scheme would cover large-scale emissions from industry, industrial process, and energy conversion sectors, and would promote a cost-efficient reduction of emissions, as well as providing an incentive for innovation. Our proposal consists of a "policy mix" in which the emissions trading scheme would be complemented by other policy instruments for sectors not covered by the scheme, i.e., transport, commercial, and household sectors and small- and medium-sized enterprises (SMEs).

What is an emissions trading scheme?

The Emissions Trading Scheme is a means of maintaining total greenhouse gas emissions under a certain level at minimum cost to society. While the government would impose a cap on total emissions, the scheme would permit individual companies to buy and sell allowances for emissions, allowing for flexibility in their decision-making. Denmark was the first to introduce such a scheme for greenhouse gas emissions, adopting in 2000 a carbon trading scheme limited to the electricity sector. Other examples such as the U.K.'s Emissions Trading Scheme (UK ETS) introduced in 2002, the Regional Greenhouse Gas Initiative (RGGI) scheduled to be implemented in seven states in the north-eastern U.S., and the NSW Greenhouse Gas Reduction Scheme (GGAS) already underway in New South Wales, Australia, show that emissions trading schemes are currently being implemented in various parts of the world. Especially, the EU ETS is the biggest cap&trade emissions trading scheme in the world operating since 2005, and covering 25 EU countries.

Eventually, these markets will link together and emissions trading will be carried out on a global level. In preparation for the emergence of such a global emissions trading market, Japan needs to promote the participation of its companies to establish its own domestic trading market and laying down the informational and institutional infrastructures, as well as the trading rules necessary for its operation. We therefore propose that a domestic emissions trading scheme to be introduced, not only to serve as a policy tool to ensure that emissions are reduced, but also because we believe that, if there is eventually

to be a global emissions trading market, a corresponding domestic market should be established in Japan at an early stage so as to allow Japanese companies to actively participate.

Targets and stages of implementation for a downstream emissions trading scheme

In implementing a domestic emissions trading scheme, it is necessary to first decide whether it should be implemented at the upstream (import, refining) or the downstream (consumption) stage in the flow of fossil fuels. Our proposal is to implement it in the downstream, which will ensure maximum incentive for reducing emissions by fixing the stage of regulatory action at the stage of fossil fuel consumption. With a downstream emissions trading scheme, companies actually responsible for the consumption of fossil fuels will be involved in the trading of permits for emissions.

As a result, companies will be able to make their own decisions as to whether to reduce emissions or to buy emissions allowances based on their price. Since these companies own the production technology, the adoption of a downstream emissions trading scheme would also serve as an incentive for innovation. It is true that an upstream scheme might also yield the same result as a downstream scheme since the price of carbon is transferred to fuel/electricity prices. However, the actual extent to which carbon prices are transferred to the price of fuel/electricity is not 100%, and is also likely to differ according to the type of fossil fuel, resulting in a loss of cost-efficiency.

On the other hand, the drawback of a downstream emissions trading scheme is that the target is limited to large-scale emitters, allowing for coverage over a smaller range of secrtors than an upstream scheme. It will therefore be necessary to establish a "policy mix" consisting of a combination of an emissions trading scheme with a complementary policy instrument that would cover the transport, commercial, and household sectors and SMEs.

In addition to the above, we propose that the emissions trading scheme be implemented based on "direct emissions". "Direct emissions" are calculated by measuring emissions resulting from the combustion of fossil fuels. "Indirect emissions", on the other hand, is to count emissions resulting from electricity and heat consumption on the consumer side as emissions of the entity responsible for it.

Therefore, since our proposal calls for the adoption of a downstream emissions trading scheme based on direct emissions, the target will be the industrial, energy conversion, and industrial process sectors. The result is that the proposed scheme would cover 64% of all emissions (not considering cutoff criteria of SMEs).

Establishing a cap

Once the decision is made to introduce a downstream emissions trading scheme, the next step in terms of designing the scheme is deciding how to establish the cap, which is outlined in the table below. It should be noted that in our plan, the immediate goal is to meet the Kyoto targets, despite the various problems involved.

The total maximum allowable greenhouse gas emission levels (6 gases) for Japan corresponds to Japan's emission reduction commitments under the Kyoto Protocol, i.e., a reduction of 6% compared to the base year, or 1.163 billion tonnes (CO_2 equivalent)[1]. Since accuracy is required in monitoring the emissions, and since the principal source of greenhouse gases are CO2 emissions, we propose limiting emissions trading to CO2 for the time being. Therefore, the target for CO2 emission levels for

[1] This figure is not the figure released on 30 August 2006 but the one mentioned in the Kyoto Protocol Target Achievement Plan, which was decided by the Cabinet in 2005.

2010 as set out in the Kyoto Protocol Target Achievement Plan, i.e., 1.126 billion tonnes, will be the base figure from which the cap in the emissions trading scheme is derived (Table, (3))[2].

After the maximum allowable CO2 emission level for Japan as a whole is set, the next step is dividing up emission reduction targets between the sectors that are covered by the emissions trading scheme and those that are not, and, for those sectors covered by the scheme, allocating allowances among individual sectors and sub sectors. Allocating reduction targets can be done in either of two ways: for a charge (auctions) or for free (grandfathering). Allocating allowances for a charge places a large economic burden on companies and therefore would probably be difficult to implement in the initial stages of launching an emissions trading scheme. We therefore propose to begin by adopting an alternative method, grandfathering, which allocates allowances for free according to past levels of emissions, as it will most likely gain social consensus. The details as to how the allocation will be carried out are as follows.

The first period of trading under the proposed scheme will be from 2008 to 2012. The five years between 2000 and 2004 will be considered a base period, and initial allowances will be calculated based on the average of emission levels during this period. This will be done according to the following procedure.

(1) The average emission levels in the base period are determined for each sector

(2) The average total emission level in the base period is determined

(3) The percentage of the average emission level for each sector in relation to the total emission level is calculated

(4) These percentages are multiplied to the cap to obtain the allowances for each sector

Following this process, the cap for the industrial, energy conversion, and industrial process sectors combined was calculated to be 0.71 billion tonnes (Table, B).

Table: Establishing the cap

A. Emission targets (2010) as set out in the Kyoto Protocol Target Achievement Plan	
(1) Energy source CO2 emissions	1,056
(2) Non-energy source CO2 emissions	70
(3) Total [(1)+(2)]	1,126
B. Cap for the industrial, energy conversion, and industrial process sectors	710
C. Exemptions from the cap	
(4) Auction reserve (5%)	35.5
(5) New entrants reserve (NER) (5%)	35.5
(6) Cut off criteria of SMEs (not considered)	0
D. Final Cap [B-(4)-(5)-(6)]	639

[Unit: million tonnes]

Auction Reserve

[2] From the perspective of feasibility, this proposal is based on the Kyoto Protocol Target Achievement Plan; however, it is possible that due to future discussions we may have to change the carbon reduction target.

However, as will be explained later, the grandfathering method also has many shortcomings and we believe that it would be best, at some point in the future, to replace it with an auction or benchmark method (in the benchmark method, baseline emission levels under standard production methods are established for each industry and allowances are allocated based on these baseline emissions. This provides an incentive for individual companies to pursue emission reduction beyond average levels). We therefore propose to also adopt the auction method on an experimental basis when the emissions trading scheme is initially introduced, albeit on a small scale. To this end, in allocating initial allowances, we propose that, out of the cap of 0.71 billion tonnes allocated to the industrial, energy conversion, and industrial process sectors, 5% (35.5 million tonnes) be reserved in advance for allocation using the auction method (Table, (4)).

New Entrants Reserve (NER)

It will also be necessary to allocate initial allowances to companies entering the market after the emissions trading scheme has been launched. If allowances are to be allocated to existing companies free of charge, new entrants should also be allocated their allowances for no charge, using the benchmark or other methods. However, simply allocating more allowances would cause total emission levels to exceed the cap. Therefore, we propose to reserve in advance a certain percentage of the cap for new entrants (5%, Table, (5)). This will balance out the conditions for competition between existing and new companies, while making sure that the cap is not exceeded.

Cut off Criteria

If the scheme were to include all the numerous existing small-scale emitters, the administrative costs of managing the scheme would become too high Therefore, we need to apply certain cut off criteria, so as to exclude small-scale emitters. In establishing these criteria, we propose adherence to the Law Concerning the Rational Use of Energy (revised in 2005; hereafter the "Revised Energy Conservation Law") and adopt, for our domestic emissions trading scheme, the cut off criteria applied to type 2 designated factories, i.e., energy usage of 1,500 kl/year (crude oil equivalent) (Table, (6)). After going through all of the steps above, the cap can be finally determined.

Allocation of allowances among facilities

Once the cap has been determined according to the procedure described above, the next step is to allocate allowances according to sub sectors: steel, chemicals, petroleum, etc. The basic method used here is the same as that used to allocate initial allowances among the various sectors, i.e., a grandfathering method based on average emission levels in the past five years. After the initial allocation according to sub-sector are established, emissions allowances can then be allocated to individual facilities. The procedure for this is basically as follows.

In calculating emissions allowances for individual facilities, the average emission levels of each facility over the past five-year period from 2000 to 2004 are used as a baseline. The average emission levels for all facilities in the same sub sector are added together. Naturally, this sum will exceed the cap for that sub sector, since it is simply the sum of the average emissions levels over the past five years.

In order to match the total allowances allocated to each facility with the cap, a "compliance factor" is applied. This is defined by the ratio of the cap for a particular industrial sector to average emission levels for the past five years for that sector. For example, if the cap for a certain industry is 90 and the average emission levels over the past five years is 100, the compliance factor is 0.9. Once the

compliance factor for each industry is established, it is then multiplied against the average emission levels over the past five years for each facility to obtain the facility's actual emission allowance.

Banking, borrowing, penalties, and the maximum price system

Banking and borrowing shall be permitted; however, they may not be carried over to the next trading period. In other words, excess allowances may not be carried over from the current to next trading period and allowances may not be borrowed in advance from the next period. Still, it is necessary to set penalty provisions for cases where a facility's emission levels are inconsistent with the allowances . Penalties should be set at around 4 to 5 times the expected market price of the emission allowances.

Proposal for designing a scheme which reflects lessons learned from the EU ETS

In designing a scheme for emissions trading, we can draw many lessons from the European Union's experience with its Emissions Trading Scheme (EU ETS). In the event that an emissions trading scheme is introduced in Japan, the design of the scheme should reflect these lessons learned. The first of these is the need for stringency in establishing the cap at the time of allocating initial allowances. If this is done with too much leniency, it will not only undermine the effectiveness of the environmental policy, it will also destroy the balance in supply and demand for emission allowances and cause prices to fall, since each company will be able to meet its objectives within its allocated allowance and therefore will not need to buy emission allowances.

The second lesson is that, with regard to the method for allocating initial allowances, the use of the auction and/or benchmark methods should be gradually increased so as to eventually make a complete shift from the grandfathering method to one or a combination of these two methods.

The third point we should keep in mind is that it is necessary to anticipate a "windfall profit" in the electricity sector and make sure that the scheme is designed in such a way so as not to aggravate the issue, since it could have a major effect on the industry's international competitiveness and on the fairness of the cost-sharing.

Proposal for a "policy mix"

Since the proposal for an emissions trading scheme outlined above is a downstream scheme based on direct emissions, it does not cover emissions in the transport, household, and commercial sectors apart from those related to electricity and heat consumption. Therefore, it will be necessary to introduce other policy instruments to cover these sectors, complementing the emissions trading scheme in a "policy mix". In this report, we offer the following four proposals concerning policy instruments to cover the transport, household, and commercial sectors, and small- and medium sized facilities, and discuss possibilities for a policy mix combining these instruments with the emissions trading scheme.

A policy mix consisting of an emissions trading scheme and a tax on emissions

The objective of introducing a policy mix consisting of an emissions trading scheme and a tax on emissions is to increase the range of areas covered by the climate change policy as a whole by applying a downward emissions trading scheme to suitable sectors such as industry, energy conversion, and industrial process, while at the same time making use of a tax to deal with sectors not targeted by the trading scheme. Such a scheme would allow for a division of responsibilities, while making the best use of the strengths of each method. Environmental tax rates could be reduced for sectors covered by the emissions trading scheme in order to make sure that the burden on these sectors is not overly heavy.

Introducing a baseline-and-credit system to be linked to the emissions trading scheme

The next proposal concerns the introduction of a policy mix which makes use of a baseline-and-credit-type emissions trading scheme, to be linked to the cap-and-trade scheme originally proposed. To begin with, for the commercial sector, a scheme should be set up where businesses that carry out emission reduction activities in their buildings and commercial facilities are allowed to use the resulting reductions in emissions as credits to be sold to sectors covered by ETS. An important part of realising this scheme is establishing a baseline; this would require developing and utilising methodologies that conforms to the Clean Development Mechanism (CDM). In order to make sure that credits resulting from reductions in electricity and heat consumption are not double counted, a "baseline and credit reserve" should be established. This means that, out of the cap allocated to the energy conversion sector under the emissions trading scheme, 1% will be put aside in advance as a "baseline and credit reserve". This would prevent the credits from being double counted, and ensure that the cap is not exceeded.

We also propose that such a baseline-and-credit system be introduced in the logistics sector as well. A scheme should be set up where consignors and carriers carrying out greenhouse gas reduction activities can use the resulting emissions reductions as credits and sell them to other businesses. In order to prevent an overlap with emission allowances in the industrial and energy sectors, a baseline and credit reserve should also be established in this sector. In addition, with regard to small- and medium-sized facilities, which do not come under the target of the emissions trading scheme proposed in this report, a similar scheme should be introduced where such facilities can carry out emission reduction activities and use the resulting reductions as credits to sell to sectors covered by ETS.

The greatest setback, however, for SMEs in undertaking greenhouse effect reduction projects is the difficulty of securing funding. Replacing and introducing new equipment to improve energy efficiency require large investments; therefore, we propose a policy to support and attract financing, specifically for SMEs. To start, in order to make financing appraisals by financial institutions less stringent, the government should establish a harmonized guideline for the environmental ranking of projects. Greenhouse gas reduction activities should also be added to the areas covered by the Credit Guarantee Association, which was established to facilitate financing for SMEs. Guaranteeing that a public body would take the final risk in providing funding to SMEs should make it easier for commercial financial institutions to finance them as well.

Introducing a specific policy objective-oriented trading scheme which will not be linked to the emissions trading scheme

Another proposal we would like to make is a separate trading scheme, which would not necessarily be linked to the domestic emissions trading scheme we have proposed earlier. This would be a " energy saving trading" scheme to be implemented among indirect emitters. The difference between this scheme and the baseline-and-credit scheme described in the previous section is that, under this scheme, it is the energy reduction amount, rather than CO2 emission reduction credits, that is traded.

More specifically, we propose that the target goals of "reducing energy consumption per unit of production by an average of 1% per year" under the Revised Energy Conservation Law be made compulsory for factories designated under the Law as Type 1 factories (including large-scale factories and consignors), and that this goal be made a numerical target. These Type 1 factories, which have an obligation to meet the target, will then become buyers of "Energy Savings Certificates", while, out of the factories classified as Type 2 , which have no target obligations, and those facilities and consignors, whose energy use is less than 1,500 kl/year (crude oil equivalent) become sellers of these certificates. In this way, by introducing an element of "trade" in the obligations to reduce energy consumption, the

energy reduction goals of "reducing energy consumption per unit of production by an average of 1% per year" can be met in a more flexible manner.

In addition to the above, for the transport sector, we propose a new scheme based on the highly evaluated existing Top Runner Programme, which will be based on the 2015 standards yet to be established, aiming to provide even more incentive to meet the Top Runner Standards. Under this scheme, targets are set according to car type (passenger or fleet vehicle) and converted into CO2 emission levels per km of travel (CO_2/km). Then, the average CO2 emission efficiency (CO_2/km) for the types of cars currently being sold is calculated for each company manufacturing or domestically selling automobiles. Each company whose CO2 emission efficiency exceeds the standards can sell the excess to the government for a fixed price. Companies failing to meet their targets are not given a penalty, but will continue to be regulated as before under the Top Runner Programme.

A policy mix consisting of an emissions trading scheme and other policy instruments (regulatory and information methods, voluntary efforts, etc.)

One other alternative policy instrument we would like to propose is regulatory measures for buildings. This scheme takes the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) one step further and evaluates buildings from the perspective of preventing global warming based on two criteria, "environmental load" and "energy", and ranks them into 5 categories (A-E). Detailed evaluation and ranking are carried out at the planning and designing stage, and building permits (building confirmation) are issued for buildings ranked A, B, or C. For buildings ranked D or E, however, an improvement order is issued and the design must be reviewed. If the re-submitted design specification is ranked A, B, or C, a building permit (building confirmation) can be issued at this stage. With this system, it will be possible to gradually reduce the number of high energy-consuming buildings.

It is also necessary to make effective use of informational methods of providing consumers with environmental and energy information about particular products, which influence their decision-making with regard to purchases. Some concrete examples of this are the equipment labelling system based on Top Runner Standards, and the automobile labelling system indicating carbon emission levels per km of travel.

Addendum: Effects on the economy and on energy supply and demand resulting from the emissions trading scheme and other domestic measures

Some have asserted that implementing measures to combat global warming in Japan entails a high cost so that it is better to meet the Kyoto targets by purchasing emission reduction credits from other countries through the CDM or international emissions trading, than to implement additional measures. However, based on the view that the world market for renewable energy, especially in Europe and the U.S., is certain to grow (the global market for renewable energy alone is estimated by some to reach 22 trillion yen by 2015), the idea that a domestic market should be nurtured in advance is also considered to be a sensible proposition. U.K. Prime Minister Blair has talked of a "Green Industrial Revolution", and in the state of California, it is known as the "Cleantech Revolution". In terms of theory, the "Porter Hypothesis" proposed by Professor Porter of Harvard University is quite well known. Using data from 71 countries around the world, Professor Porter has proven that the stricter a country's environmental regulations are, the more efficient its production becomes, with the result that it achieves higher industrial competitiveness (Porter 1995, Esty and Porter 2001).

In our analysis, we have not only made traditional cost comparisons between (1) the cost of purchasing emission reduction credits from abroad, and (2) cost of domestic measures, but have also looked at (3) decreased import of energy and (4) increase in GDP due to the nurturing of "green

industries" or "clean technology" industries, and have considered two possible scenarios: one where no additional measures are implemented (Business as Usual: BAU) and one where the Kyoto Targets (CO2 emission to decrease to 1990 levels) are achieved through the implementation of domestic measures (Emissions Trading Scheme: ETS). In doing so, we have compared costs, and have quantitatively measured the resulting energy supply and demand structure, as well as the impact on the economy and employment.

Our conclusion is that, in 2010, the costs of implementing domestic measures will be slightly higher than the positive effects of nurturing the industry, and Japan will have to bear an economic burden of 3.2 billion yen per year. However, by 2015, the positive effects of nurturing the industry will have led to a GDP growth of 19 trillion yen, bringing an economic merit of 14 trillion yen after deducting the costs for implementing domestic measures. In addition to revitalising the economy, this will result in Japan's shifting to an industrial structure with higher concentrated added value, so that the number of employees will grow to 280,000 in 2010 and 14 trillion in 2015. The unemployment rate, which, in the BAU scenario will be 5.3% in 2010 and 6.3% in 2015, will decline in the ETS scenario to as low as 4.9% in 2010 and 4.0% in 2015.

Furthermore, in the ETS scenario, which will reach the 1990 level-targets by 2010 and achieve a level of -5% over 1990 levels by 2015, the costs of implementing domestic measures would be approximately 1.8% of the GDP in both 2010 and 2015. Normally, these costs would have to be compared with the costs of damage due to global warming (according to the Stern Report, 5-20% of the GDP); however, in this report we have limited our observation to short-term cost and benefit to the economy.

The degree of dependence on imports for primary energy was, in the BAU scenario 84% in 2010 and 82% in 2015, while in the ETS scenario, figures went down to 76% in 2010 and 73% in 2015. In the ETS scenario, the marginal costs for reducing carbon dioxide emission to 1990 levels by 2010 was 24,000 yen/tonnes C.

Ratio of renewable energy was, for BAU 2% for both 2010 and 2015, but in the ETS scenario was 3% in 2010 and 7% in 2015. Costs also decreased, and solar energy generation capacity in the BAU scenario only went as low as 500,000 yen/kW in 2015 (in the case of a service life of 20 years with a utilisation factor 12%: 24 yen/kWh), but in the ETS scenario decreased to 220,000 yen/kW (same conditions: 10 yen/kWh). For solar water heaters, which currently suffer from decreasing domestic installation capacity, the costs in the ETS scenario decrease from the current 300,000 yen/unit in 2006 to150,000 yen/unit in 2015.

It has become clear from our analysis that implementing domestic measures would appear to be more costly in the short term but would nurture export industries in the mid- to long term and cause the industrial structure to have higher concentrated added value, leading to increased employment. In addition, due to drop in dependence on imports for energy by approximately 8% points, as well as lower renewable energy technology costs, such measures could lead to expectations of even higher increases in energy self-sufficiency beyond 2015.

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