Comparison of Options Available to Japan for Acquiring Emission Certificates

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Japan is currently facing difficulty in achieving its Kyoto target, because its greenhouse gas (GHG) emissions have increased since 1990 by 7.6 percent as of 2002. This means it has to reduce emissions by about 13.6 percent—corresponding to 168.232 million tonnes of carbon dioxide equivalent (Mt CO2e)—in order to achieve its target of 6 percent below the 1990 level (set out in article 3.1 of the Kyoto Protocol, which was adopted in 1997 and entered into force on February 16, 2005).

In recognition of this situation, the Japanese government decided in its Kyoto Target Achievement Plan to procure certificates corresponding to 1.6 percent of its 6 percent reduction target by utilizing the Kyoto mechanisms, which can be broken down into three distinct options:

1. **Purchasing emission reduction units (ERUs) generated by joint implementation (JI) projects in (a) the Central and Eastern European EU member states and EU accession countries, and (b) in other countries**
2. **Purchasing certified emission reductions (CERs) generated by Clean Development Mechanism (CDM) projects**
3. **Purchasing assigned amount units (AAUs) according to article 17 of the Kyoto Protocol**

Moreover, since adoption of the Protocol, the following two novel options for acquiring certificates have been developed:

4. **Establishing green investment schemes (GIS)**
5. **Establishing a domestic emissions trading system in Japan and linking it with other national emissions trading systems, particularly the EU Emissions Trading Scheme (EU ETS)**

As the final installment of this project to explore options for acquiring certificates from abroad, this conclusion paper examines the pros and cons of each option—based on the analysis conducted in the three background papers of this project—with the aim of identifying the best option(s) for Japan to acquire and use certificates to achieve its Kyoto target.

1 Current situation in Japan

1.1 Introduction

As shown in figure 1, Japan's GHG emissions had already increased by 7.6 percent since 1990 as of 2002. Therefore, it is necessary to reduce emissions by a total of 13.6 percent on average for the first commitment period (2008–2012) in order to achieve the Kyoto target of reducing its emissions by 6 percent relative to the 1990 level.

As described in Background Paper 1, *Current Japanese Climate Policy from the Perspective of Using the Kyoto Mechanisms*, a review of existing climate policies and measures was conducted in 2004, based on the step-by-step approaches laid out in the New Guideline for the Promotion of Preventive Measures to Address Global Warming, which Japan adopted in 2002 when it ratified the Kyoto Protocol. This was done in order to examine the effects of existing policies and measures and, if necessary, the need to introduce additional policies and measures for the second step from 2005 onwards.

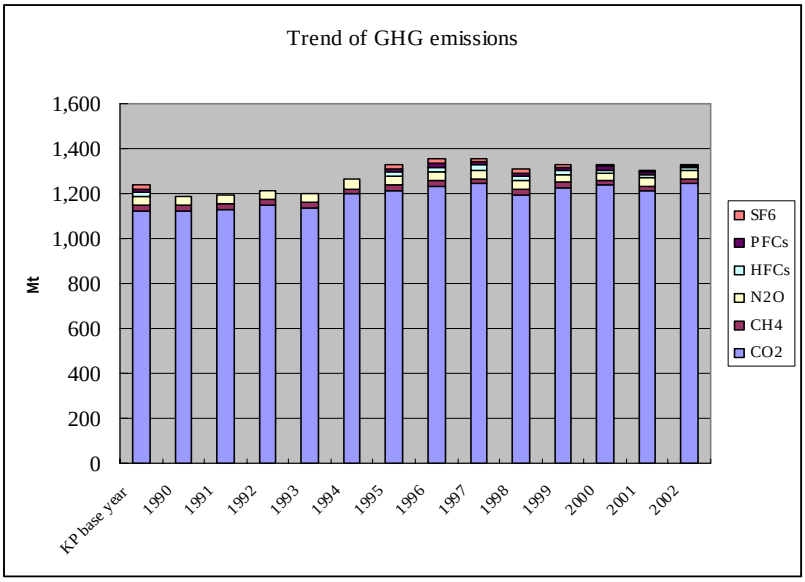

Figure 1: Japan's GHG emissions trend (1990–2002)

Note: SF_6 = sulphur hexafluoride; PFCs = perfluorocarbons; HFCs = hydrofluorocarbons; N_2O = nitrous oxide; CH_4 = methane; CO_2 = carbon dioxide

The 2004 review revealed that Japan's emissions, at the current rate, will be at least 6 percent above the 1990 level in 2010. Therefore, an average reduction of at least 12 percent will be necessary for achieving Japan's emissions reduction commitment for the first commitment period. In consideration of this, the draft of Japan's Kyoto Target Achievement Plan (KTAP) clearly states that out of 12 percent, 6.5 percent will be reduced by domestic policies and measures, 3.9 percent through the full utilization of sinks, and 1.6 percent—which corresponds to a reduction of 19.79 Mt CO_2e per year (or a

total of 98.96 Mt CO_2e) for the first commitment period—by using the Kyoto mechanisms (METI 2005; MoE 2005b). Both the government and Japanese stakeholders recognize the urgent need to rapidly prepare to utilize the Kyoto mechanisms, because there is concern that the easiest "low-hanging fruits" will be picked first by other industrialized countries that have ratified the protocol, especially Western European countries. First, member states of the European Union can utilize CERs and ERUs surrendered by energy-intensive companies covered by the EU ETS for complying with their targets set in the scheme. Second, some EU member states have launched national purchasing schemes to procure ERUs and CERs. Besides the above, the lead time of CDM/JI projects is usually three to five years, and only three years remain until the start of the Kyoto Protocol's first commitment period in 2008. This means that any project which is supposed to generate certificates during the first commitment period should already be on the drawing board.

Based on the recognition of this situation, the Japanese government and stakeholders have begun preparations to start utilizing the Kyoto mechanisms.

First of all, the Japanese government secured 5.7 billion yen (US$54 million) as the budget for CDM/JI assistance projects.[1] The MoE allocated 2 billion yen in 2005, a more than threefold increase from the 0.6 billion yen allocated in 2004 (MoE 2005a), and METI allocated 3.7 billion in 2005, a more than 1.5 times increase from the 2.4 billion yen allocated in 2004 (METI 2005; Yamagata 2005). Second, it is planned to use these funds to make upfront payments, instead of payment on delivery, in order to encourage companies to undertake CDM/JI projects. According to the budget plans, certificates equal to 8.45 Mt CO_2e will be acquired,[2] which is, however, far less than the required 19.79 Mt CO_2e/year (total of 98.96 Mt CO_2e) needed for the first commitment period.[3] Therefore, CDM/JI assistance projects will not provide a sufficient amount of certificates to correspond to the 1.6 percent portion. Private companies also created the Japan Greenhouse Reduction Fund (JGRF), which was established in December 2004 with 14.8 billion yen ($141.5 million) in funding. The JGRF will be operated until 2014 with the aim of acquiring certificates to be issued in 2012, the last year of the first commitment period. It plans to acquire 10 to 20 Mt CO_2e worth of certificates during the whole period, depending on the price. Using a calculation of 5 euros per tonne, it will acquire around 22 Mt CO_2e worth of certificates for the whole period, or an average of 4.4 Mt CO_2e/year.

The above analysis reveals that the currently planned measures to utilize the Kyoto mechanisms are not sufficient to provide certificates corresponding to 1.6 percent of Japan's 1990 GHG emissions. It is also uncertain whether it is possible to achieve a 6.5 percent reduction in 2010 through domestic policies and measures, considering that GHG emissions have been increasing so far and that no drastic policies or measures have been introduced. Furthermore, sinks will probably only deliver an amount equal to 3.1 percent according to the current estimation; therefore, the full utilization of 3.9 percent through sinks will be difficult. Moreover, it is unclear how all of the certificates acquired by the JCF will be transferred into Japan's national account to be utilized for compliance with the Kyoto Protocol. Under the current regulation there is no scheme to have the certificates that private companies acquire from abroad transferred into Japan's national account; only certificates corresponding to the CDM/JI project assistance budget (8.45 MtCO_2e for the whole period) are slated to be transferred into the national account.

1. 1 US dollar = 105 yen
2. 1 CER/5 euros; 1 euro = 135 yen
3. 1.6% of base year emissions (1,237 Mt) = 19.79 Mt

The analysis of Japan's current climate policies and measures clearly illustrates the urgent need to quickly identify and act on the best option for Japan to acquire certificates from abroad (Watanabe 2005a). The pros and cons of potential options are analyzed in section 3, and then in section 4 is an examination of the best ones for Japan to use to acquire certificates and utilize them for compliance with the Kyoto Protocol.

2 Options—pros and cons

2.1 The Kyoto mechanisms

2.1.1 Joint implementation

2.1.1.1 Joint implementation in Central and Eastern European EU member states and EU accession countries

As pointed out in Background Paper 2, *the EU Linking Directive and its Impact on the Potential for JI Projects in the New EU Member States and EU Accession Countries*, the potential for reducing GHG emissions in Central and Eastern European countries is substantial (Sterk et al. 2005). Our analysis shows that the largest and most cost-effective emission reductions can be found in the waste and power sectors. Further large potential is found in district heating systems, renovation of dwellings, and expansion of renewable energy use.

However, the interplay of the introduction of the EU ETS in the countries that have acceded to the EU, or will do so in the near future, and the baseline and double-counting provisions of the EU's Linking Directive significantly reduce the potential for JI.[4]

Regarding the baseline issue, the Linking Directive states that the baselines of JI projects must be based on the *acquis communautaire* (the total existing body of EU legislation). This provision has significant impacts on JI projects, since in many areas EU environmental legislation is much more demanding than the regulations which had previously applied in the new EU member states and accession countries. Therefore, many activities which could previously have been counted as "additional" to business as usual are now required by law and thus no longer eligible for JI. The actual impact depends on the legislation relevant to the respective project. One example is the EU Landfill Directive, which renders most of the reduction potential at landfills to the baseline, since it requires the collection of landfill gas at all landfills in operation from 2009 onwards. Moreover, the collected gas has to be flared as a minimum. Additionality is thus limited to the following:

- Crediting in 2008
- Projects at closed landfills

4. The European Union in 2004 adopted the so-called Linking Directive to provide for the integration of CDM and JI into the EU ETS. It is the first large-scale incentive for private companies to participate in CDM projects.

- Projects at landfills in operation that utilize the collected gas for energy production instead of flaring it off

The so-called double-counting issue arises because, without regulation, a CDM or JI project affecting an installation covered by the EU ETS would result in (a) the issuance of CERs/ERUs and (b) the freeing up of EU emission allowances (EUAs) for trading. In other words, the reduction would be rewarded twice. In order to systematically address the double-counting problem, three different types of JI projects in EU member states must be distinguished, as listed in table 1.

Type	Description	Regulation (New article 11[b] Emissions Trading Directive)
1	*JI projects with direct links to the EU ETS.* These are project activities undertaken at installations covered by the EU ETS, e.g., refurbishing or fuel switching in a power plant (above 20 megawatts).	ERUs may be issued if the operator of the respective installation cancels an equal number of EUAs.
2	*JI projects with indirect links to the EU ETS.* These are project activities that have no direct link to installations covered by the EU ETS but indirectly lead to emission reductions at such installations, e.g., the development of a wind park leading to the displacement of electricity from a power plant within the EU ETS, or the improvement of energy end-use efficiency leading to a decreased withdrawal of electricity from a power plant within the EU ETS.	ERUs may be issued if an equal number of EUAsare cancelled from the national registry of the respective member state.
3	*JI projects without links to the EU ETS.* These are, for example, project activities that reduce emissions at sources not connected to the EU ETS. For example, renewable energy projects that are not connected to the national grid or projects in the agriculture or transport sectors.	These do not pose a problem and are therefore not regulated by the Linking Directive. ERUs may be issued without restriction.

Table 1: Types of linkages between JI and the EU ETS and their regulation according to the Linking Directive

Note: Table by Sterk.

The impact on JI is difficult to evaluate, since now there is essentially competition between financing emission reductions via JI and via the EU ETS. An installation operator has the following options:

1. Reduce emissions at the installation by itself, resulting in no need to buy additional EU allowances or even having a surplus of allowances which it can sell.
2. Agree to have emissions reduced by an external company and transfer the corresponding amount of allowances to this company. This might be an attractive option if it cannot raise the necessary capital itself or if the external company can reduce emissions at a lower cost than the installation operator can.
3. Agree to have emissions reduced by an external company, as in option 2, but by means of a JI project.

Regarding the third option, as pointed out in Paper 2, the Czech Republic and Slovakia have already indicated that they are not in favor of allowing JI projects with direct linkage. Even if they are allowed, dealing with the double-counting problem raises transaction costs. One can therefore probably assume that the potential in the sectors covered by the EU ETS has now largely been removed from JI (*nega-*

tive impact on JI potential due to EU accession). A different option for non-EU countries to access this potential is to establish their own domestic emissions trading scheme and link it with the EU ETS (this option will be examined later).

Of the reduction potentials that are in principle suitable for JI and have been quantified in the literature surveyed, about 60 Mt CO_2e per year do not seem to be affected by EU accession. This chiefly relates to renovating buildings, district heating systems, and afforestation projects. Adding measures that feature indirect linkage with the EU ETS, mainly renewable energy projects, raises the potential to about 130 Mt CO_2e per year. However, the exact treatment of projects with indirect linkage is still unclear.

It is important to note that the figures in the literature surveyed usually only refer to technical potentials, where it is not clear which part of them could feasibly be implemented. This is especially the case for renewable energy projects. At the same time, many possible reduction measures were not quantified at all. The above figures have therefore only limited value.

Another issue with joint implementation is that of its first track vs. second track:

- Countries which fulfill all the eligibility criteria laid down in the Marrakesh Accords qualify for the first track, which essentially leaves the whole project procedure to the discretion of the host country, although they can also choose to use the second track.
- Countries which fulfill only the minimum criteria for being able to participate in JI can only use the second track. This will entail an international procedure similar to the CDM under the yet to be established JI Supervisory Committee, and will thus be more cumbersome than the first track.[5]

It is not yet clear if the Central and Eastern European countries will qualify for the JI first track, Moreover, since the details for both tracks are still to be worked out, it is not possible at the moment to estimate the transaction costs that JI will entail in either case.

2.1.1.2 Potential joint implementation projects in the Ukraine and Russia

JI potential in the Ukraine and Russia is even more substantial than in Central and Eastern Europe. Here, as well, there is great uncertainty as to the concrete figures, but JI in those two countries could easily generate several hundred Mt CO_2e per year (in theory).

It should be noted, however, that both countries are generally not considered to be the best venues for direct foreign investments. Critics cite barriers such as a weak judiciary, a relatively extensive black market, corruption, and a poorly developed capital market. Furthermore, both countries have so far taken only limited steps to put in place the national infrastructure necessary for the implementation of JI projects. Evidently, the uncertainty regarding which JI track will be used applies here as well, and probably even more so than for the EU member countries. As pointed out in Paper 3, *Demand and Supply on the Global Market for Emission Certificates*, due to the poor general investment climate and JI-specific institutional shortcomings, the combined JI supply from both countries might not exceed 30 Mt CO_2e per year (Sterk et al. 2005).

5. Annex of Decision 16/CP:7: Guidelines for the Implementation of Article 6 of the Kyoto Protocol.

2.1.2 Clean Development Mechanism

Paper 3 puts the total theoretical CDM potential at 423.85 Mt CO_2e per year. However, the CDM process has so far been very slow, which raises the question of whether or not it would actually be able to handle this amount. If one assumed that the average project would deliver 200,000 tonnes of CO_2e per year, then more than 2,000 projects would be necessary to deliver this potential. At the time of writing, however, only four projects have been officially registered. The CDM Executive Board is one obvious bottleneck, and the current severe lack of funding will further delay the process if not resolved (the Executive Board's April 2005 meeting even had to be cancelled due to insufficient funding) (*delay of process*). Many host and investor countries are also far from establishing the necessary infrastructure for the implementation of projects (*capacity issue*). The CDM will therefore need substantial efforts by all relevant actors, especially governments, if a significant part of the theoretical emissions reduction potential is to be realized.

Another issue is that the CDM seems to be in danger of failing to fulfill its mandate to promote sustainable development in the host countries. There is currently a marked shift in the project portfolio towards projects reducing emissions of GHGs with high global warming potential, such as methane or hydrofluorocarbons (HFCs). These projects provide cost-effective emission reductions, but they are end-of-pipe fixes that provide few, if any, development benefits. HFC projects alone are estimated to have a potential of 100 Mt CO_2e per year, with abatement costs of about $0.50 per tonne. There is therefore a risk that these projects could drive down the price for CERs to such an extent that projects such as renewable energy or energy-efficiency projects, which usually entail significant development benefits but also entail higher abatement costs, will no longer be viable (Ellis et al. 2004).

2.1.3 International emissions trading (article 17)

As outlined in Paper 3, although reliable data concerning projections for GHG emissions in 2010 were not available for all countries, it seems safe to say that all new EU member states and EU accession countries, except for Hungary and Slovenia, will not only meet their Kyoto commitments but will indeed be below, in some cases far below, their GHG emission reduction targets.

According to their national communications under the United Nations Framework Convention on Climate Change (UNFCCC), the accumulated surpluses of these countries are estimated to be 151.6 Mt CO_2e annually in the "with measures" scenario, but one has to note that only nine of the ten EU accession countries are included. In the "with additional measures" scenario the surplus amounts to 227.5 Mt CO_2e, but only information from eight countries is included.[6]

Projected surpluses for Russia and the Ukraine are even more substantial, although estimates vary widely. For the Ukraine, they range from 168 to 300 Mt CO_2e annually. An estimate of the Russian surplus for 2008–2012 is only available for carbon dioxide, and it is expected to be 524.3 Mt CO_2 annually in the "positive scenario" and 725.4 Mt CO_2 annually in the "unfavorable scenario" defined in Russia's third national communication.

However, there are at least three caveats connected to these figures.

6. The national communications under the UNFCCC usually contain three emission scenarios: "without measures," "with measures," and "with additional measures." The "with measures" scenario usually reflects the impacts of already implemented or currently planned policies and measures, and can thus be regarded as the baseline, whereas the "with additional measures" scenario includes policies and measures that have been suggested but have not yet been introduced into the domestic political process. The "without measures" scenario is usually only a hypothetical benchmark to measure against the impacts of measures.

First, it is not clear if these countries will be able to deliver their surpluses to the market. Eligibility to participate in any of the Kyoto mechanisms is "dependent on its compliance with methodological and reporting requirements under Article 5, paragraph 1 and 2, and Article 7, paragraphs 1 and 4, of the Kyoto Protocol."[7] Moreover, the modalities, rules, and guidelines for emissions trading under article 17 list further eligibility requirements to transfer and/or acquire Kyoto units. These relate especially to putting in place a national system for the estimation of anthropogenic emissions by sources and removals of GHGs by sinks, submitting an annual inventory of GHGs, and supplying additional information on the assigned amounts.[8] Especially in the cases of the Ukraine and Russia, it is not clear how far they will be able to meet these requirements (*eligibility requirement*) (table 2).

Second, even if they are able to participate in international emissions trading under article 17, they will not necessarily make all of their surpluses available. As pointed out in Paper 3, Russia might limit sales to 2 to 3 percent of its surplus and the Ukraine to 30 percent. Given the estimates outlined above, this might mean an annual supply of only about 100 Mt CO_2e (*market control*).

Third, buying the Central and Eastern European countries' surpluses would inevitably raise the "hot air" issue (*hot air*). This term was coined to denote the fact that these surpluses are not the result of active climate policy but due to the fact that business-as-usual emissions in these countries are already below the targets adopted under the Kyoto Protocol. Trading hot air would not violate the integrity of the protocol in a formal sense, but critics argue that this would violate its underlying aim of climate protection. The emission reductions underlying the hot air have already taken place "by themselves," and if there were no trading (and all countries met their Kyoto targets), then global emissions would be even lower than agreed under the protocol. Conversely, if hot air is purchased instead of reducing emissions domestically, then overall global emissions will be higher than if there were no emissions trading. The emission targets in the Kyoto Protocol are being criticized as being much too weak anyway, and using this option therefore raises the risk of bringing the instrument of emissions trading, if not the whole protocol, into disrepute.

7. Paragraph 5 of Draft Decision -/CMP.1 (Mechanisms): Principles, nature, and scope of the mechanisms pursuant to articles 6, 12, and 17 of the Kyoto Protocol.
8. Paragraph 2 of the annex to Decision 18/CP.7: Modalities, rules, and guidelines for emissions trading under article 17 of the Kyoto Protocol.

	International emissions trading (article 17)		JI track 1		JI track 2		CDM
	Acquire	Transfer	Acquire	Transfer	Acquire	Transfer	Use for compliance
Party of the Kyoto Protocol	○	○	○	○	○	○	○
Calculate and record assigned amount units pursuant to article 3, paragraphs7 and 8	○	○	○	○	○	○	○
Establishment of a national system for the estimation of anthropogenic emissions by sources and anthropogenic removals by sinks of all GHGs not controlled by the Montreal Protocol, in accordance with article 5.1 and the requirements in the guidelines decided thereunder.	○	○	○	○	○		○
Establishment of a national registry, in accordance with article 7.4 and the requirements in the guidelines decided thereunder.	○	○	○	○	○	○	○
Submission of the most recent required inventory, in accordance with article 5.2 and article 7.1 and the requirements in the guidelines decided thereunder, including the national inventory report and the common reporting format.	○	○	○	○	○		○
Submission of the supplementary information on the assigned amount, pursuant to articles 3.7 and 8, including for the activities under articles 3.3 and 4, in accordance with article 7.4, and the requirements in the guidelines decided thereunder.	○	○	○	○	○		○

Table 2: Eligibility requirement for the Kyoto mechanisms

Source: Watanabe 2005b.

2.1.4 Evaluating the Kyoto mechanisms

As mentioned above, room still remains to conduct JI projects in Central and Eastern European countries, despite the accession of these countries to the European Union and the application of the *acquis communautaire*, including emissions trading and the linking directives in these countries. But in practice, as pointed out above, it is difficult to conduct JI projects that are directly or indirectly linked to the EU ETS. The JI potential is much higher in the Ukraine and Russia than in Central and Eastern Europe. However, the two countries are not exactly the best for direct foreign investments. Although

the theoretical CDM potential is quite large, it is dubious whether all the potential can be realized, mainly due to the slow approval process of the CDM Executive Board and the lack of capacity in many countries, especially the host countries.

Finally, trading AAUs under article 17 of the Kyoto Protocol raises at least three issues, namely, the eligibility requirement, market control, and hot air.

Due to these problems connected with all of the Kyoto mechanisms, it seems worthwhile to further explore the novel mechanisms that have been developed more recently, i.e., GISs and the linkage of domestic emissions trading schemes.

2.2 Novel instruments

2.2.1 Greening AAUs/green investment schemes

The concepts of the green investment scheme (GIS) and the green assigned amount unit (AAU) have been developed in order to address the issues connected with article 17 emissions trading, as outlined above. Greening AAUs is used as a term covering all transactions of AAUs with a condition that the money transferred be utilized for GHG reductions, including GIS. A GIS is a more systematic AAU transaction scheme to earmark funds generated from the sale of AAUs for use in mitigation projects or the effective implementation of certain pre-defined activities, such as implementation of demand-side management programs, dismantling of energy subsidies, or capacity-building activities related to climate change. The World Bank defines the former as “hard” greening and the latter as “soft” greening (World Bank 2004). Some use a wider definition, which includes all environment-related projects not contributing to the mitigation of GHG emissions. The GIS would be set up by the seller countries and would operate as a domestic scheme within their respective climate policy frameworks, with operational details to be agreed on a bilateral basis between buyer and seller nations.

Below, we will summarize the merits and demerits of green investment schemes with reference to findings in the existing literature.

One of the biggest benefits of the GIS concept is that AAUs generated from hard greening GIS projects are backed by actual emission reductions, similar to JI. Therefore, it is effective in addressing the negative perceptions that surround the trading of surplus AAUs and provides an acceptable political basis for the buyer, while increasing demand for AAUs and providing additional liquidity to the market (*hot air issue*) (Blyth and Baron 2003; World Bank 2004).

Flexibility is another merit of the GIS concept. With GISs there is no limit on the time period during which the emission reductions are credited, which is different from JI. Therefore, emission reductions taking place before 2008 can also be rewarded with AAUs (World Bank 2004). Under the World Bank Prototype Carbon Fund and the Dutch ERUPT program, a contract is concluded with seller countries to acquire so-called “early JI credits,” under which seller countries transfer AAUs corresponding to their emission reductions before 2008.[9] Under a GIS it is also possible to transfer AAUs against emission reductions realized after 2012 if several conditions are fulfilled (World Bank 2004), including

9. ERUPT stands for emission reduction unit procurement tender.

effective emission reductions to be measured up to 2012, the project in operation at that date, and a high probability of continuing to generate emission reductions in the future (*flexibility of timeframe*). Due to the flexibility of timeframe explained above, GISs may also contribute to inducing investments in projects with emission reductions even after the first commitment period (*mid- and long-term impact*).

In the soft greening case, a GIS under article 17 of the Kyoto Protocol allows full flexibility on the side of the seller to channel funds to greening activities (Blyth and Baron 2003; World Bank 2004). This could provide funds for preparing institutions fundamental to addressing the climate change issue through activities that would otherwise have difficulty getting funds, such as capacity building and the establishment of a registry and inventory. This is particularly effective for addressing the first issue of the transfer of AAUs (*eligibility requirement***)**. Since most Central and Eastern European countries are behind in planning and short in funds to establish proper institutions for implementing environmental regulations—especially with issues of monitoring, reporting, and human capacities—GISs could contribute to providing funds for these countries to fulfill the eligibility requirement.[10] While GIS provides the aforementioned merits, the following issues still need to be addressed:

The World Bank raises the issues of payment and resource risk (delay in receiving payment), price risk (volatile AAU price), counter-party risk (project sponsors fail to implement the project/generate emission reductions), risk related to the financial manager of the GIS (failure to deliver projects/emission reductions), and the financial risk of the government (financial risk of the host country government). All these, however, are not particular to GISs but will also be issues for JI as well as for "traditional" article 17 emissions trading. The eligibility requirement to utilize article 17 is one of the biggest issues identified in the JI and AAU sections of this paper (*eligibility requirement*). Another issue is monitoring and verification of emission reductions in the case of soft greening (*proper monitoring, reporting, and verification*). As already mentioned, acquiring the funding for the soft greening case or environment-friendly projects that do not directly generate emission reductions is one of the largest benefits of GISs compared to JI. It could be a problem at the same time, however, because in the case of soft greening or environment-friendly projects that do not reduce emissions there is no clear basis for determining the amount of AAUs that should be allocated to projects. There is also a substantial risk that the funds will be used for non-environmental purposes. Considering the above, GISs must be limited to the hard greening case, unless the governments involved elaborate clear criteria for this allocation and find a way to avoid the "green" investment scheme turning to an easy justification of the normal transaction of AAUs.

Since GISs are agreed bilaterally between the seller and buyer countries, the design of each will ultimately differ. In order to maximize the aforementioned merits and to minimize potential issues, however, a common standard for monitoring and verification of the credits to be allocated to projects should be established. In responding to our interviews, officials in the Czecz Republic, Hungary, and Romania also pointed out the necessity to develop a common standard for operationalizing GISs in these countries (Chmelik 2004; Feiler 2004; Trusca 2004). A common standard would contribute not

10. The Environmental Action Programme Task Force in Central and Eastern European Countries rates projects two out of five (best to ambient monitoring system and human resources and facilities supporting project execution in both Russia and the Ukraine). For the ambient monitoring system, two means that a well-documented ambient monitoring system exists; while five means that monitoring results are reliable and are fully used in decision-making. For human resources and facilities supporting execution, two means that there is awareness of the necessary expertise, facilities, and operational costs for the short and long term, while five means that a predictable and sustainable mechanism exists for fully satisfying the needs in human resources and facilities (OECD 2005).

only to developing the opportunities for buyer countries to leverage the involvement of their private sector companies in resulting projects but also to addressing the second issue of the transfer of AAUs (*market control*), since a standardized scheme will limit the room for negotiation between buyer and seller countries. Box 1 details a project between Japan and Slovakia in the transaction of green AAUs.

Slovakia is a country that has long prioritized emissions trading other than JI, because it did not see JI as promising for the future due to the cost of verifying the additionality requirement and getting approved by the Article 6 Committee if track 2 is applied. The Slovakian government considered that it did not have the necessary human resources to undertake such complicated procedures and that its surplus is not large enough to bear additional costs.

In one early experience, in 2002, a Slovakian company called Menerek Engineering concluded a contract on transferring AAUs with the Sumitomo trading company in Japan. About 30 companies conduct emissions reduction projects at their installations, and Menerek collects the reduction amounts and transfers them to Sumitomo. Slovakia's government guaranteed the transfer of AAUs under the following conditions: establishment of a registry in Slovakia, Kyoto's entry into force, and allocation of AAUs to Slovakia (Fischerova 2004; Mojeek 2004).

Slovakia encourages the transfer of AAUs, especially the GIS type of transaction, for the reasons explained above. Its recent accession to the European Union and the application of the *aquis communitare* are further pushing the Slovakian government in this direction. It is currently considering the establishment of emissions trading at medium and small installations not covered by the EU ETS, in order to allocate AAUs to them directly, and converting EU emissions allowances (EUAs) into AAUs through trading between installations covered by the EU ETS and those to whom AAUs are directly allocated (Fischerova 2004; Mojeek 2004).

Box 1: A contract to transfer green AAUs between an engineering company in Slovakia and Japanese trading companies

Note: Box 1 by Watanabe.

The concepts of green AAUs and GISs were originally developed with the aim of greening Russian surpluses (Tangen et al. 2002), but they can be applied to all other countries that have emission surpluses. Blyth and Baron (2003) also concluded that GISs have the largest potential in Russia and the Ukraine and also in countries that did not participate in the first wave of joining the European Union, namely, Bulgaria and Romania. Moreover, interviews conducted in Central and Eastern European countries revealed that the new EU member states are also interested in GISs, not only due to the aforementioned merits but also due to the difficulties with implementing JI projects caused by their accession to the EU and resulting application of the *acquis communautaire*, including the IPPC Directive, Large Combustion Plant Directive, Landfill Directive, the Emissions Trading Directive, and the Linking Directive (Chmelik 2004; Feiler 2004; Fischerova 2004; Jaworski et al. 2004; Kozakiewicz 2004).

2.2.2 Linking domestic emissions trading schemes

Another way to acquire certificates from abroad is to establish a domestic emissions trading scheme and link it with other markets. For this option, it would be necessary for Japan to establish its own emissions trading scheme and link it with the EU ETS or other markets. The participants of the Japanese scheme would then be able to purchase certificates from the other schemes, or via CDM and JI projects, and use them for complying with their domestic obligations.

Linking domestic emissions trading schemes is an attractive option for acquiring certificates from abroad in so far as it would make it easier to acquire certificates from the new EU member states and

accession countries in the form of EUAs—thus bypassing the issues surrounding JI projects—which will be backed by the exchange of AAUs. This also applies to the certificates of other countries like Canada if they also establish domestic emissions trading schemes. Moreover, by using this option the Japanese national account can absorb the certificates that private entities acquire from abroad without having to use taxpayers' money.

Linking two or more emissions trading schemes is generally supposed to improve the efficiency of the overall emissions trading market due to enhanced market liquidity. It is also supposed to lead to economic benefits at the macro level by providing the participants a broader range of emission reduction opportunities and lowering the overall cost of compliance (*cost efficiency*) (Blyth and Bosi 2004; Stowell 2005). It could also contribute to making more ambitious targets acceptable to participants by providing lower-cost options, although the linkage itself is regarded as environmentally neutral (*environmental integrity*) (Blyth and Bosi 2004). Also, industries should be less concerned about the competitiveness issue if the ETS is linked with those of other major industrialized countries (*political acceptability*). Furthermore, in Japan's case, it would provide an additional option to acquire certificates from Central and Eastern European countries, since transfers of EUAs will be backed by the corresponding amount of AAUs. Linking domestic cap-and-trade emissions trading schemes entails high upfront costs for establishing the schemes and negotiating the linkages. Once the market has been established, however, costs would be relatively low, since in principle no regulatory intervention is needed in the market itself.[11] This is in contrast to baseline-and-credit systems like the CDM and JI, where every transaction needs to be certified and approved individually (US EPA: 2-7–2-9).

Despite the above merits, the linkage of different emissions trading schemes could have a negative impact on market function if not carefully designed. This is exactly why the European Union established the EU-wide scheme rather than trying to coordinate different national schemes. Based on a survey of existing literature, we identified the following potential issues to be considered when linking schemes.

- **Compliance regime and penalties.** With regards to compliance regime and penalties, three basic types of regimes can be distinguished: (1) schemes with a sufficient penalty for non-compliance, (2) price cap or safety valve-type regimes,[12] and (3) voluntary schemes. If the linked schemes set penalties at the same level, then there is no problem for linkages in terms of the compliance regime and penalties. Even if the levels of penalties are different, it should not be a problem as long as they are sufficient to ensure overall compliance. However, linking between a scheme with penalties and a voluntary scheme would be a problem, since a voluntary scheme would by definition not entail penalties. Linking the fixed-penalty type of compliance regime with a price cap type of regime or safety valve type of regime would face problems too, since additional allowances issued at a certain price fixed in advance in a price-cap type of regime may also be available to installations operating in the fixed-penalty rate scheme, which undermines the compliance regime in the fixed-penalty rate scheme (Blyth and Bosi 2004; Philibert and Reinaud 2004; Meadows 2004).
- **Monitoring, reporting, and verification.** Transparent and robust monitoring, reporting, and verification (MRV) are fundamental to achieving a credible GHG trading system and the underpinning

11. However, there exists no experience with carbon markets yet, so reality still has to prove if they really work. Nevertheless, a huge international market (e.g., of the EU and Japan) is generally expected to have enough liquidity and prevent players from dominating the market.
12. A safety valve type regime means that the system sets the highest price in advance and the government provides certificates at that price if the market price exceeds the highest price, in order to avoid the compliance cost becoming too expensive.

value of the traded units. Therefore, the establishment of standardized MRV is desirable. Even if MRV systems between two schemes are different, this should not cause a problem in linking as long as both systems are sufficiently transparent and robust. However, if the MRV system of one country is not sufficiently robust, then the installations located in the country could sell unqualified allowances resulting from an inaccurate MRV system, which would damage the efficient operation and environmental integrity of the combined trading system (Blyth and Bosi 2004; Philibert and Reinaud 2004; Meadows 2004).

- **Definition and recognition of trading units.** The units to be utilized to achieve the targets in each scheme must be agreed upon. For example, the EU ETS does not allow the use of AAUs or CERs from land use, land-use change, and forestry (LULUCF) for achieving the target. However, if the EU ETS is linked with the scheme under which these certificates are eligible then certificates could be indirectly used for the EU ETS installations. Due to the rule of supply and demand, certificates not allowed in the EU ETS are likely to be cheaper than certificates allowed in all systems that have been linked. Installations in the non-EU countries would therefore have an incentive to fill their accounts with non-EU ETS-eligible certificates and sell the corresponding amount of EU ETS-eligible certificates into the EU ETS. The non-eligible certificates would therefore still have an impact on the EU ETS, even though the European Union has banned them. This would undermine its political decision to restrict the units eligible for compliance in its scheme. The EU will therefore probably insist on a common definition of which units are eligible (Blyth and Bosi 2004; Meadows 2004).
- **Stringency of environmental targets.** As long as the targets in both schemes are stringent (beyond business as usual), there should not be any technical problems in linking schemes with different levels of stringency. If stringency is lower than required under business as usual in one scheme, however, then linking could undermine the environmental effectiveness in the combined scheme, especially the scheme with more stringent targets (Blyth and Bosi 2004; Meadows 2004).

Apart from the issues discussed above, coverage of gases and sectors, absolute versus relative targets, allocation method, compliance period, and banking have been identified as other potential issues to address (Blyth and Bosi 2004; Philibert and Reinaud 2004; Meadows 2004; Hasselknippe 2003; Storell 2005).

As box 2 shows, some industrialised countries that have ratified the Kyoto Protocol have started to establish domestic emissions trading schemes following the lead of the European Union. Discussions on the linkages of different emissions trading schemes, however, have just started. The question of how much the differences between schemes are an obstacle to linking requires more in-depth study based on the accumulation of actual experiences.

The European Commission expressed their willingness to link the EU ETS with other emissions trading schemes with the aim of promoting market liquidity and to make the EU scheme a kind of de facto standard for international emissions trading through bottom-up linkages (*Point Carbon*, June 18, 2004 [http://www.pointcarbon.com]). Point Carbon also reported that discussions with Norway, Canada, Switzerland, Russia, Australia, and the United States are ongoing.

Among them, it was already decided to establish a linkage between the EU ETS and the Norwegian scheme. Norway designed its scheme in view of linking with the EU scheme in order to establish access to a larger market and to promote market liquidity (ibid.). Therefore, the two schemes are very similar and should not experience a problem in linking.

Canada, another country that ratified the Kyoto Protocol, declared it would launch its domestic emissions trading scheme from 2008. Although Canada is of the opinion that the linkages of different emissions trading schemes is possible as long as the requirements stipulated in Marrakesh Accords are fulfilled (Storell 2005, pp. 215), it would be difficult to link the proposed Canadian scheme and the EU ETS due to the differences between the two schemes in the aforementioned points.

	EU ETS	Canada	Norway
Compliance regime and penalty	40 euros in the period 2005–07 and 100 euros in the period 2008–12	To be decided, but should be higher than $15 CDN	40 euros
Monitoring, reporting, and verification	Monitoring guidelines by the EU Commission	Mandatory monitoring system	*
Definition and recognition of trading units	• EUAs, CERs, and ERUs • No AAUs • No CERs from sink projects	AAUs, CERs, and ERUs	*
Stringency of allocation	Not stringent for the phase from 2005 to 2007	Not stringent	Not stringent for the phase from 2005 to 2007
GHG coverage	CO_2, but may include more gases from 2008	CO_2	CO_2, but may include more gases from 2008
Sector coverage	Covers energy-related activities of more than 12,000 installations, which includes combustion installations with a rated thermal input exceeding 20 megawatts and other high-energy industrial installations, including metal ore roasting or sintering and the production of steel, pig iron, cement clinker, glass, ceramic products by firing, paper and board, and pulp from timber or other fibrous material.	Covers approximately 650 firms in industries classified as large final emitters (LFEs), i.e., thermal electricity, oil and gas, and mining and manufacturing.	Part of energy- and emissions-intensive industries exempted from the tax
Target	Absolute	Relative	Absolute
Possibility for banking	No for the period 2005–07. Yes for the period 2008–12	Yes	*
Allocation method	• Grandfathering • Auction is allowed for up to 5% in the period 2005–07 and up to 10% in the period 2008–12	Grandfathering	Partially grandfathering, partially auctioning
Others		Price assurance: $15 CDN**	

*Information not available.
**The price assurance functions as a price cap. If the price of allowances on the market goes above $15 CDN, the Canadian government is responsible for the additional costs/or for providing allowances at the price cap level.

Box 2: Comparison of emissions trading schemes in the European Union, Norway, and Canada

Source: Box 2 by Watanabe, based on information in Hasselknippe 2003; Stowell; 2005; and Convey et al. 2005.

3 Conclusion—Comparative evaluation of options

This paper examined the pros and cons of different options available to Japan for acquiring emission certificates. Here, we compare and assess the options in order to propose the best way for Japan to achieve its Kyoto target, based on the following criteria (see table 3):

- **Environmental integrity.** Each certificate bought from abroad means that one less tonne of GHG emissions will be reduced in the buyer country. To maintain the environmental integrity of the system it is therefore vital to ensure, through proper monitoring and verification procedures, that each certificate is backed up by the corresponding emissions reduction elsewhere.
- **Cost.** One of the biggest concerns raised by the countries that have ratified the Kyoto Protocol is the fear of a negative impact on their competitiveness vis-à-vis developing countries and industrialized countries that have not ratified the protocol. Even in the case that industries do not have any obligation to contribute to achieving the national target, if (for example) a tax is utilized to achieve the target, then it could ultimately affect the economic prosperity of the country. Therefore, in general, the option that brings the same amount of certificates with less cost is the most desirable. Cost is divided into certificate price and transaction cost (administrative cost of the transaction). Transaction cost is further divided into the administrative cost for negotiating the transaction of certificates and for establishing the scheme. When evaluating the cost for establishing the scheme, the duration of the system should also be considered. If the system is designed for a long duration, it may be worthwhile to establish the scheme even if the initial cost is high, while a smaller cost may still be too high if the lifespan of the system is expected to be short.
- **Size of potential.** As indicated in section 1, certificates corresponding to a reduction of at least 19.79 Mt CO_2e per year (or a total of 98.96 Mt CO_2e) for the first commitment period (2008–2012) need to be procured by using the Kyoto mechanisms. In order to acquire certificates effectively, the size of potential that could be delivered by each option is also an important factor in the selection.
- **Political acceptability.** This should be taken into account to select the option(s) most likely to meet with the highest degree of cooperation from stakeholders and can thus be introduced smoothly and implemented most effectively. These depend on the environmental integrity and distributional impact of options, since selecting option(s) ultimately relates to burden sharing among stakeholders, especially between the industry/energy sector and the other sectors (transportation and households).
- **Long-term impact (beyond the Kyoto period [BKP]).** Addressing climate change requires a long-term strategy for giving the right signals for investments. Since the Kyoto Protocol sets out emission reduction targets for the first commitment period only, and difficulties are observed in reaching agreement on the future regime which would strengthen the targets, then the best option is one that contributes to bringing about reductions in GHG emissions regardless of the existence of a Kyoto Protocol-like international climate regime after 2012. Therefore, long-term impacts should be analyzed with regard to the long-term prospects of the respective scheme as such and the emission reductions achieved.

3.1 Assessment of options using selected criteria

3.1.1 Joint implementation

Environmental integrity. This depends on the stringency of modalities in the case of JI track 2. In the case of JI track 1, seller countries can decide on the amount of ERUs to be transferred to buyers. Because of this, there is a danger that environmental integrity could be undermined by seller countries allocating more certificates than actually reduced. However, the details of JI track 1 still need to be worked out. Moreover, the seller and the buyer countries usually conclude a memorandum of understanding establishing the general framework for their cooperation. As a result, the Japanese government (and other buyer governments) can still work to safeguard the environmental integrity of the mechanism.

Price. As the market is still in its infancy, it is very difficult to estimate and compare the prices of the different options. The price of ERUs is generally expected to remain lower than the price of EUAs and higher than the prices of CERs and AAUs. This is borne out by the current developments in the EU market, where EUAs are more expensive than ERUs and CERs.[13] Comparison of ERU and GIS/AAU prices is difficult. AAUs are theoretically considered to be the cheapest option, but no actual trades have taken place so far. The price could be more expensive than other standardized options, however, since it is negotiated between buyers and sellers. The officials we interviewed in Central and Eastern European countries also estimated that EUAs will be the most expensive, but they expected that the EU ETS could develop into the "lead market" that determines all prices and the price of all options will probably converge in the future.

Transaction cost. JI track 2 will probably be the second most expensive option after the CDM. JI track 1 reduces the administrative cost in the case of Russia and the Ukraine. It also contributes to reducing the administrative burden of projects in the new EU member states and accession countries, but in these countries there will also be additional costs related to avoiding the double-counting issues. Moreover, finalizing the rules for JI projects—much of which could be based on the rules for CDM projects—requires a substantial effort. The Japanese government will also need to invest in efforts to negotiate memoranda of understanding with the host countries which require their conclusion a precondition for approving projects.

Size of potential. Despite the adoption of the *acquis communautaire*, the technical potential in the new EU member states and accession countries is still large. The actual potential will depend on the policies of these states and on the possibility of bundling small projects not covered by the EU ETS. In Russia and the Ukraine the potential is very large, in theory, but the realization of this potential depends on capacity and institution building and improving market conditions.

Political acceptability. JI is regarded to be at least not negative because (1) JI projects generate actual emission reductions in other Annex I countries, and (2) it is neutral in terms of distributional impact.

13. The current price of one EUA was around 16 euros, as of March 2005, while that of one CER was 5 euros. Nevertheless, the CER price is an estimation of average price. The CDM Executive Board had approved 19 projects as of September 2005; however, no CERs have been issued yet. Once CDM projects start generating CERs, the price of CERs, ERUs, and EUAs will probably converge.

Long-term impacts. The achievement of emission reductions for the long term depends on the type of project. Under the framework of JI, projects that will generate emission reductions even after the first commitment period could be conducted. Whether such projects secure investments depends highly on a continuation of the Kyoto regime. If it is sure that the Kyoto regime does not continue after the first commitment period, buyer countries and investors would be more interested in projects that generate as many emission reductions as possible during the first commitment period. It is also questionable if projects that are implemented will continue operating after 2012 if their emission reductions will no longer have value. Therefore, the long-term prospect of JI as a scheme and of the potential long-term emission reductions depends on the continuation of a Kyoto Protocol-like regime.

3.1.2 The Clean Development Mechanism

Environmental integrity. Depends on each project.

Price. As explained above, the price of CERs is generally expected to remain lower than prices of EUAs and ERUs, and higher than the price of AAUs, although the price of all options will probably converge in the future.

Transaction cost. The CDM is probably going to be the most expensive option due to costs for validation, approval, registration, verification, and certification. Since the CDM is already fully operational, there will be no further costs for establishing the scheme. What remains is for the Japanese government to conclude memoranda of understanding with host countries.

Political acceptability. The CDM is basically regarded in a positive way, since it is designed to contribute to sustainable development for non-Annex I Parties while reducing compliance costs for Annex I Parties. If the project is not beneficial to sustainable development (such as in case of HFC or methane projects), however, political acceptability may be negative. The CDM is also neutral in terms of distributional impact.

Size of potential. Large in theory. The actual realization of potential, however, depends on the removal of current bottlenecks.

Long term-impact. Same as in the case of JI.

3.1.3 International emissions trading

Environmental integrity. The transaction of AAUs is neutral in terms of environmental integrity, as defined above.

Price. As explained above, AAUs are theoretically considered the cheapest; however, the price could be more expensive than other standardized options since it is negotiated between buyers and sellers. Especially when Russia attempts to maximize its profits by pursuing an active market strategy, which includes buying as well as selling and holding back the larger part of its surplus (as *Point Carbon* indicated), then the normal transaction of AAUs might not be a cheaper option. Our interviewees also expressed concern about the strong influence of Russia and the Ukraine on the AAU market (Chmelik 2004; Feiler 2004; Mojeek 2004). The sellers could to a large extent dictate the terms and prices, especially if there is a “last-minute scramble” for AAUs as the last remaining opportunity for buyer coun-

tries to come into compliance. The same could apply to GISs. In this sense, the prices of ERUs, CERs, and EUAs are much more transparent.

Transaction cost. The transaction of AAUs is theoretically the cheapest option.

Size of potential. There is a large potential of AAUs in theory, but the realization of this potential depends on institution building and the policies of EIT countries, especially Russia and the Ukraine.

Political acceptability. The normal transaction of AAUs (hot air) would probably not be supported by the general public due to the perception that money is expended without achieving additional emission reductions. However, it is neutral in terms of distributional impact.

Long-term impact. It is unclear what the revenue coming from the sales of AAUs will be utilized for. Therefore, the transaction of AAUs has possibly the least long-term impact among the options. In terms of the long-term prospects of the scheme itself, it is dependent on not only a continuation of the Kyoto Protocol but also on the stringency of target in the future commitment periods, i.e., the existence of surpluses in countries with emission targets.

3.1.4 Green investment schemes

Environmental Integrity. Hard greening could achieve direct and verifiable emission reductions. In the case of soft greening and other environment-friendly projects, however, GISs either do not generate direct emission reductions or it is at least very difficult to measure them. In the case of soft greening there is also a serious risk that the monetary flows will be used for non-environmental purposes.

Price. Certificates from GISs will probably be cheaper than project-based certificates and might be more expensive than normal AAUs. As already mentioned, however, the price of all options will probably converge in the future.

Transaction cost. There would be costs involved in setting up the GIS system; therefore, in terms of cost for establishing the system, GISs are more expensive than other Kyoto-based options, although not more than the linking of different emissions trading schemes. Nevertheless, it would be effective to standardize the transaction and lower transaction costs compared to normal AAU trading once the system is established. The life expectancy of the system is probably only very short, however, since it depends on the EIT countries having surpluses, which may be the case only during the first commitment period.

Size of potential. There is a large potential in theory, but the realization of it depends on institution building and the policies of the EIT countries.

Political acceptability. Political acceptability of GIS is basically positive in the case of hard greening, since it achieves actual emission reductions and has no distributional impact. In the case of soft greening and other environment-friendly projects, political acceptability might be as negative as that of normal AAU trading due to the ambiguity of the actual contribution to emission reductions.

Long-term impact. The hard greening case is positive in terms of long-term impact, since projects would generate emission reductions even after the first commitment period. The soft greening case is also positive if projects contribute to establishing institutions fundamental to addressing climate change issues, such as the preparation of MRV and capacity building. In terms of the long-term prospects of the scheme itself, it is dependent on not only a continuation of the Kyoto Protocol but also on

the stringency of targets in future commitment periods, i.e., the existence of surpluses in countries with emission targets.

3.1.5 Linkage of domestic emissions trading schemes

Environmental integrity. The environmental integrity of this option depends on the modalities for MRVs and on the compliance regime.

Price. The linkage of emissions trading schemes currently appears to be the most expensive option, as the price of EUAs indicates. However, the EU ETS market does not yet seem mature enough to allow a final conclusion. Moreover, the EU ETS could become the "lead market" determining the prices of all certificates, in which case the price advantage of the other options would largely disappear.

Transaction cost. The linkage of domestic emissions trading schemes first requires establishing a domestic emissions trading scheme in Japan and then linking it with other emissions trading schemes, particularly the EU ETS. Establishing domestic emissions trading will require comprehensive discussions in the country to ensure the full understanding of stakeholders. In order to link up with different emissions trading schemes, all the technical issues examined and detailed in this report need to be resolved. Therefore, this will be the most expensive option in terms of initial transaction cost. Once the scheme is established, however, the transaction costs of running would be relatively low. Moreover, by exercising this option the Japanese government would automatically obtain the foreign certificates acquired by Japanese companies.

Political acceptability. This option would possibly face the largest opposition from industrial stakeholders, while it could be supported by the general public since it would reduce the burdens of the household and transportation sectors (where the general public has to participate in taking responsibility), and also reduce the amount of taxation necessary to purchase certificates from abroad.

Long-term impact. Emission reductions for the long term depend on the scheme and the stringency of targets. As for the long-term prospect of the scheme itself, however, this option is probably the most positive, since once the system is established the market itself functions to keep it running. This could continue all by itself even after the first commitment period, which would support the international climate protection regime, rather than depending directly on the continuation of a Kyoto-like regime as the other options do.

Criteria	Joint implementation (JI)	Clean Development Mechanism (CDM)	International emissions trading (AAUs, hot air)	Green AAUs	Linkage of emissions trading schemes
Environmental integrity (emissions reduction)	Depends on the modalities and on the actual project. If track 1 is applied, it could be negative.	Depends on the project.	The transaction of AAUs itself is neutral in terms of environmental integrity.	Depends on the scheme design. Positive in the hard greening case. The soft greening case or other environment-friendly project cases is dubious, unless the MRV to precisely measure the reduction effects are established.	Depends on stringency of the MRV.
Price	Cheap[14]	Cheap	Theoretically the cheapest. However, it could be the most expensive since the price is bilaterally negotiated, especially if there is a "last-minute scramble."	More expensive than AAUs.	Currently most expensive, with EUA prices at 16 euros/tonne (as of March 2005). However, the EU ETS does not yet seem mature enough to allow a final conclusion. Moreover, the EU ETS could become the "lead market" determining prices of all certificates.
Transaction cost (administrative burden)	High. If track 1 is applied, it would be lower.	High	Depends on the negotiation cost.	There is an upfront cost to establish a scheme. Transaction cost depends on the scheme. If the scheme were standardized, the cost would be low. Nevertheless, it's considered lower than JI.	High upfront cost to establish a domestic emissions trading scheme and to solve all the technical issues resulting from the linkage, but low cost to run the scheme once established.

Table 3: Comparative assessment of options for Japan

14. Cheaper than EUAs if comparing the current EUA price and the current prices of ERUs or CERs. Nevertheless, the price of ERUs or CERs is an estimation of average prices. The CDM Executive Board had approved four projects as of March 2005; however, no CERs have been issued yet. Once CDM projects start generating CERs, the price of CERs, ERUs, and EUAs will probably converge.

Table 3 continued

Criteria	Joint implementation (JI)	Clean Development Mechanism (CDM)	International emissions trading (AAUs, hot air)	Green AAUs	Linkage of emissions trading schemes
Size of potential	• Central and Eastern Europe: technical potential still large. Actual potential depends on the policies of Central and Eastern European (CEE) EU states and on the possibility of bundling small projects. • Russia and the Ukraine: very large in theory, but it depends on capacity and institution building and market conditions.	Large in theory. Realization depends on removal of current bottlenecks.	Large in theory, but it depends on institution building and the policies of Russia and the Ukraine.	Large in theory, but it depends on institution building and the policies of CEEs, Russia, and the Ukraine.	Central and Eastern Europe: Potential is large. It's easier to tap the certificates through the linkage of emissions trading schemes than JI. Independent of policies of individual states.
Political acceptability					
Environmental integrity	Depends on the project.	Depends on the project; however, if the project is not beneficial to sustainable development, then might be negative.	Negative in terms of environmental integrity since the usage of money transferred is uncertain.	Positive in the hard greening case. In other projects, the ambiguity remains.	Depends on the scheme.
Distributional impact	No distributional impact.	No distributional impact.	No distributional impact.		• Industry is negative to the introduction of the cap-and-trade scheme. • The general public might be positive because it would reduce the burdens for the household and transportation sectors.

Table 3 continued

Criteria	Joint implementation (JI)	Clean Development Mechanism (CDM)	International emissions trading (AAUs, hot air)	Green AAUs	Linkage of emissions trading schemes
Long-term impact (BKP)	Depending on a continuation of the Kyoto regime, it could achieve emission reductions even after the first commitment period.	Depending on a continuation of the Kyoto regime, it could achieve emission reductions even after the first commitment period.	The least possibility to generate reductions for the long-term.	Depending on a continuation of the Kyoto regime, it could bring emission reductions even after the first commitment period.	Depends on the scheme.
Emission reductions					
Long-term prospect of the scheme itself	Depends on continuation of the Kyoto regime	Depends on continuation of the Kyoto regime	Depends on continuation of the Kyoto regime	Depends on continuation of the Kyoto regime	Independent of continuation of the Kyoto regime.

Note: Table by Watanabe, Sterk, and Lechtenböhmer.

The following conclusions can be drawn based on the above comparison:

JI is highly rated under most criteria. Negative aspects are transaction costs in the case of track 2, the current lack of clarity about the environmental integrity of track 1, and the long-term prospects of the scheme itself.

The Clean Development Mechanism is also highly evaluated under most criteria. Negative elements are the transaction costs involved and the long-term prospects of the scheme itself. There is also the problem of projects like HFC and methane projects, which reduce emissions but typically do not contribute substantially to sustainable development.

International emissions trading gains the most negative evaluation in terms of political acceptability, while the best in price and transaction cost. It is also negative in terms of the long-term prospects of the scheme itself.

GIS also gains good ratings under most criteria. It is highly evaluated in environmental integrity in the hard greening case, size of potential, and political acceptability. Negative elements are the cost for establishing the scheme and the long-term prospects of the scheme itself. Due to the dependence on a continuation of a Kyoto-like regime and the availability of surpluses in countries with reduction targets, it is expected that GIS will have a short life, although the idea of "hard greening" could be applied in the case of Annex I Parties with lower surpluses and non-Annex I Parties that might adopt commitments in the future, but possibly with a lot of surpluses. This could also be a model for bilateral cooperation for the reduction of GHG emissions even without the existence of a Kyoto-like regime.

The linkage of domestic emissions trading schemes costs the highest upfront for establishing the scheme itself, and it faces the largest opposition from industry. Once the system is established, however, it provides the lowest transaction cost, a very effortless way for the Japanese government to acquire certificates, and the best option in terms of long-term impact, including the fact that it could be a strong and viable instrument for emissions reductions even without a continuation of the Kyoto regime. In contrast to all other options discussed here, the ETS is not only an instrument for purchasing certificates from abroad but also for promoting cost-efficient domestic emission reductions.

Comparing all the available options, JI and the CDM are more promising in the short term, since they are cheaper in terms of price, and the mechanisms have largely already been established. Considering that the prices of all options will probably converge once the market is fully functional, "short term" means the period until the second half of 2007, when the Enforcement Branch of the Compliance Committee makes a decision on the eligibility requirement to use the Kyoto Mechanisms[15] (Watanabe 2005b). After that, it will become much clearer which Parties fulfill the eligibility requirement for international emissions trading and JI track 1. Thereafter, international emissions trading and GIS will become viable. However, since GISs still need to be established, work would need to start now if this option is to be pursued. In the longer term, however, linkage of domestic emissions trading schemes would also be a good option, since it would provide easier access to the emissions reduction potential in the new EU member states and accession countries. Moreover, once the scheme has been established, the Japanese government would automatically obtain the foreign certificates acquired by Japanese companies without having to use taxpayers' money.

[15] Paragraph 5 of Draft decision-/CMP.1: (Mechanisms), principles, nature, and scope of the mechanisms pursuant to articles 6, 12, and 17 of the Kyoto Protocol, paragraph 22 of ANNEX of Draft decision-/CMP.1 (Article 6) , paragraph 3 of ANNEX of Draft decision-/CMP.1(Article 17)

3.2 Proposed best options for Japan to achieve its target

The comparison and assessment conducted in section 4.1 examined the pros and cons of each option. In this section we propose the best option for Japan to acquire certificates from abroad, considering the issues it faces in achieving its Kyoto target, as explained in section 1, i.e., (1) the current scheme cannot procure a sufficient amount of certificates to correspond to the envisaged 1.6 percent of its GHG emissions, and (2) the government cannot utilize all the certificates acquired by Japanese entities for national compliance, since it currently has no means of drawing these certificates into its national account (figure 2).

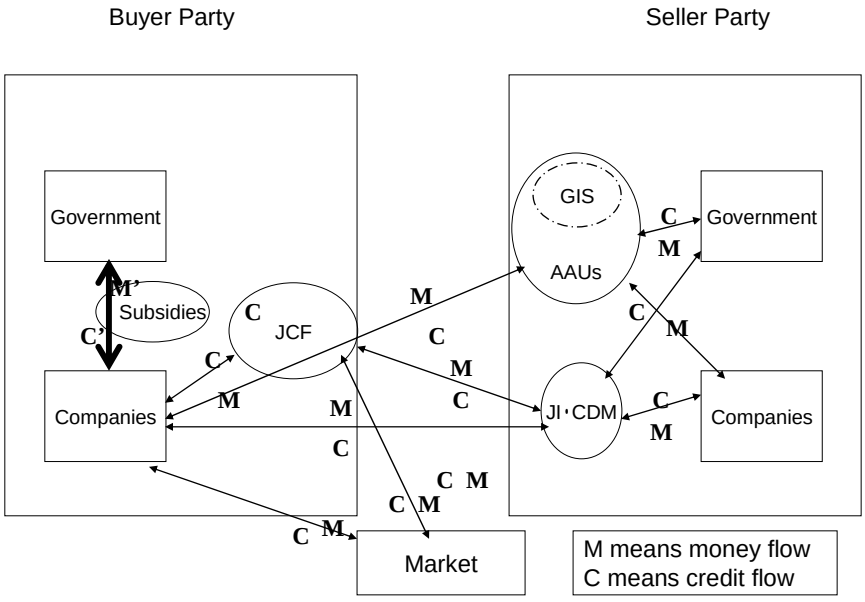

Figure 2: Current money and credit flows in the Japanese case

Note: M = money flow, C = credit flow

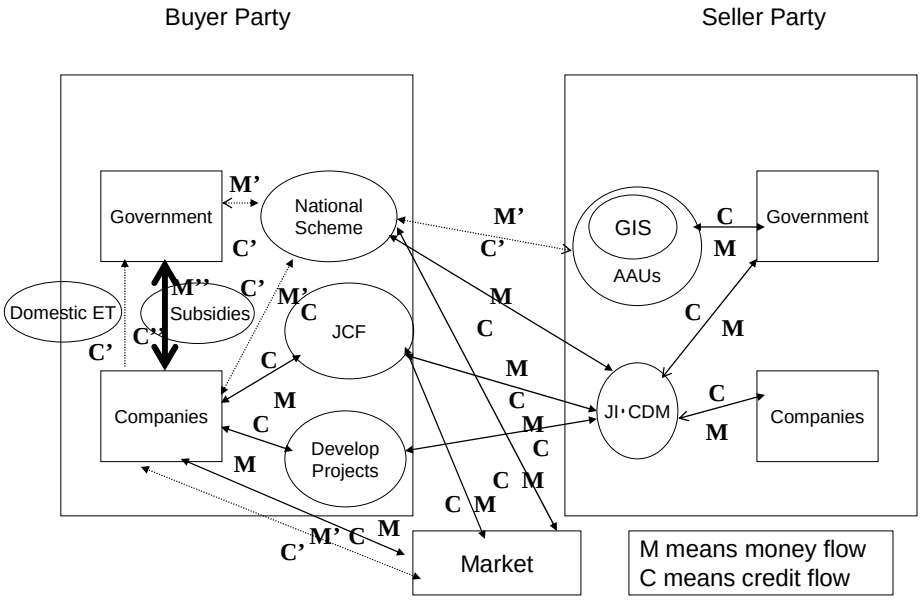

Figure 3: The credit and money flows created by establishing a national credit-purchasing scheme

Note: M = money flow, C = credit flow

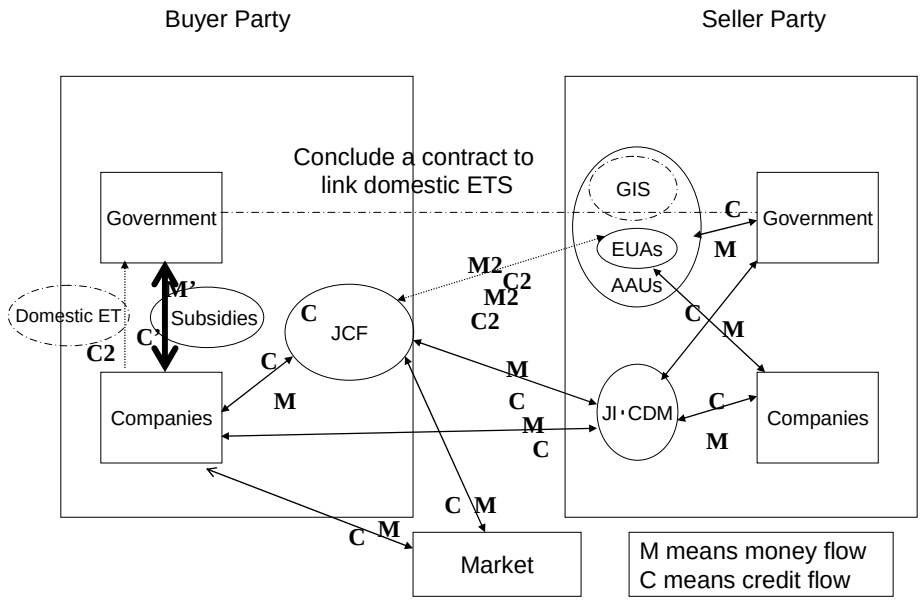

Figure 4: The credit and money flows created by establishing a domestic emissions trading scheme and linking it with other markets

Note: M = money flow, C = credit flow

As the best option for Japan to acquire certificates from abroad, based on the above analysis, it is recommended that Japan first establishes a national purchasing scheme, then establishes a domestic emissions trading scheme and links it with other emissions trading schemes.

A national purchasing scheme—which would enable Japan to systematically acquire the certificates necessary for compliance with its Kyoto target—should be established as soon as possible in order to purchase ERUs and CERs before the market is fully functional and the prices of all options converge. It is recommended that investments in JI/CDM projects be made up to the first half of 2007, and then shift to GISs after it becomes clear which Parties fulfill the eligibility requirement (Watanabe 2005b). In this regard, it is recommended that in the meantime Japan cooperate with countries that have surpluses to establish GISs. In order to ensure the environmental integrity of GISs, however, they should be limited to the hard greening case. Although soft greening is attractive in terms of flexibility—which is beneficial for both host countries and buyer countries in addressing the issue of eligibility requirements in host countries—there is a risk of distorting the environmental integrity of GISs and undermining their effectiveness in addressing the hot air issue in the normal transaction of AAUs. The institutional and capacity constraints of the seller countries should be addressed by means other than soft greening. One idea might be to conclude framework package agreements with seller countries that encompass capacity building measures on the one hand and hard greening GIS projects on the other. By establishing a national purchasing scheme, the government could also purchase the certificates acquired by Japanese entities, as shown in figure 3 (M1 and C1).

In the long term, however, establishing a domestic emissions trading scheme and linking it with other emissions trading schemes is highly recommended. First, as a short-term benefit, it would make it easier to acquire certificates from the new EU member states and accession countries, since in this case Japanese entities would be able to utilize EUAs to achieve their targets set in Japan's domestic emissions trading scheme. Therefore, Japanese companies as well as the government can acquire certificates as EUAs—thus bypassing the issues surrounding JI projects—which will be backed by the exchange of AAUs between national schemes. This also applies to the certificates of other countries if they also establish domestic emissions trading schemes. Second, Japanese companies will have obligations to achieve their own targets for which they will utilize certificates acquired from abroad. Therefore, Japan's national account can absorb the certificates that private entities acquire from abroad without using taxpayers' money. In the long term this option could continue even after the first commitment period, once the system is established. The Japanese government could thus effectively install a permanent conduit of foreign certificates. Moreover, this option would support the international climate protection regime and even induce emission reduction efforts regardless of a continuation of a Kyoto-like regime.

Although this option is highly rated under most criteria in section 4.1, it will probably have distributional impacts on industrial stakeholders. In order to address this issue, discussion involving all stakeholders is necessary. Therefore, it will take longer to adopt this option than the others. Even so, it is highly recommended to start implementing it in the near future, considering that it would enable Japan to acquire certificates from Central and Eastern European countries, which are probably the most reliable among the countries with surpluses and inexpensive reduction potential. Besides, the cost to achieve the 6 percent target solely through a national purchasing scheme might be too expensive,[16] and

16. Using the calculation of 5 euros/tonne, it will cost 100 million euros (13 billion yen) per year to procure certificates corresponding to 1.6%. Considering that the prices of all certificates will converge, the actual cost may be higher.

the option to link domestic emission trading systems has a positive long-term effect regardless of a continuation of the Kyoto or similar regime.

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References

Blyth, W., and M. Bosi. 2004. Linking non-EU domestic emissions trading schemes with the EU Emissions Trading Scheme. COM/ENV/EPOC/IEA/SLT(2004)6, OECD/IEA.

Blyth, W., and R. Baron. 2003. Green investment schemes: Options and issues. COM/ENV/IEA/SLT(2003)9.

Chmelik, T. 2004. Interview with Mr. Thomas Chmelik, Director, Climate Change Department, Ministry of Environment, Prague, Czech Republic, by Rie Watanabe and Jusen Asuka, November 4, 2004.

Convey, F., L. Redmond, and L. Ryan. 2005. Emissions trading and other policy instruments for climate change policy-linkage across frontiers. Contribution of the University College Dublin Team to the International Collaboration Projects on Sustainable Societies for the Economic and Social Research Institute, Cabinet Office, Government of Japan, 2004/05.

Ellis, J., J. Corfee-Morlot, and H. Winkler. 2004. *Taking stock of progress under the Clean Development Mechanism (CDM)*. Paris: Organisation for Economic Cooperation and Development (OECD)/International Energy Agency (IEA), COM/ENV/EPOC/IEA/SLT(2004)4/FINAL.

Feiler, J. 2004. Interview with Mr. Josef Feiler, Head of Department, Ministry of Environment and Water Department of Climate Policy, Budapest, Hungary, by Rie Watanabe and Jusen Asuka, November 8, 2004.

Fischerova, G. 2004. Interview with Ms. Gabriela Fischerova, Officer, Air Protection Department, Ministry of Environment, Blatislava, Slovakia, by Rie Watanabe and Jusen Asuka, November 2, 2004.

Jaworski, W., et al. 2004. Interview with Mr. Wojciech Jaworski, Director, Ms. Agnieszka Galan, Senior Inspector, and Ms. Agnieszka Janowska, Department of Environmental Policy Instruments, Ministry of Environment, Warsaw, Poland, by Rie Watanabe and Jusen Asuka, November 5, 2004.

Kozakiewicz, J. G. 2004. Interview by telephone with Ms. Galon Kozakiewicz, Expert, Department of Structural Projects, Air Protection Unit, JI Secretariat, NFOSGW, Warsaw, Poland, by Rie Watanabe, November 5, 2004.

Meadows, D. 2004. The EU Emission Trading Scheme and linking greenhouse gas markets. Presentation given at the COP 10 side event "Linking GHG Markets" on December 15, 2004. Available on the Internet at http://www.ieta.org/ieta/www/pages/getfile.php?docID=699 (July 15, 2005).

Ministry of Economy, Trade and Industry (METI). 2005. Draft summary to develop the Kyoto Target Achievement Plan: Future measures for global warming. Global Environmental Subcommittee, Environment Committee, Industrial Structure Council, METI, Japan, March 1, 2005.

Ministry of Environment (MoE). 2005a. The effect of budget for measures to cope with global warming in FY 2005. MoE Japan.

———. 2005b. The second draft on future measures for global warming based on the review of the Fundamental Guideline to Promote Measures to Cope with Global Warming. Central Environmental Council, MoE Japan, March 2005.

Mojeek, I. 2004. Interview with Mr. Ivan Mojeek, Director of Menerek Engineering and Former Officer, Air Protection Department, Ministry of Environment, Blatislava, Slovakia, by Rie Watanabe and Jusen Asuka, November 2, 2004.

Organisation for Economic Cooperation and Development (OECD). 2005. Environmental Management in Eastern Europe, Caucasus and Central Asia. OECD.

Philibert, C., and J. Reinaud. 2004. Emissions trading: Taking stock and looking forward. COM/ENV/EPOC/IEA/SLT(2004)3, OECD/IEA.

Sterk, W., et al. 2005. Demand and supply on the global market for emission certificates. Paper 3 for the project *Option Survey for Japan to Acquire Credits from Abroad*.

———. 2005. The EU Linking Directive and its impact on the potential for JI projects in the EU accession countries. Paper 2 of the project *Option Survey for Japan to Acquire Credits from Abroad*.

Tangen, K., A. Korppoo, V. Berdin, T. Sugiyama, C. Egenhofer, J. Drexhage, O. Pluzhnikov, M. Grubb, T. Legge, A. Moe, S. Jonathan, and K. Yamaguchi. 2002. *A Russian green investment scheme securing environmental benefits from international emissions trading, climate strategies*. Brussels: Climate Strategies (coordinated from the Centre for European Policy Studies).

Trusca, V. 2004. Interview with Mr. Vlad Trusca, Ministry of Environment and Water Management, Romania, by Rie Watanabe and Jusen Asuka, November 4, 2004.

United States Environmental Protection Agency (US EPA). 2003. Tools of the trade: A guide to designing and operating a cap and trade program for pollution control. www.epa.gov/airmarkets/international/tools.pdf.

Watanabe, R. 2005. Japanese climate policy development, 2005. Paper 1 for the project *Option Survey for Japan to Acquire Credits from Abroad*.

World Bank. 2004. Options for designing a green investment scheme for Bulgaria. Report no. 29998. October 4, 2004.

Yamagata, H. 2005. Japan's policies and measures for promoting CDM/JI projects. Japan Carbon Investors Forum, March 24, 2005, at Tokyo.