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The Kyoto Protocol's Clean Development Mechanism (CDM) is a system by which a developed country can earn carbon emission reduction (ER) credits through an emission-mitigating project undertaken in a developing country. While allowing developed countries to meet their Kyoto Protocol commitments at less cost, CDM benefits the host developing countries with new capital investments and the transfer of clean technologies. In view of the potential supply of ERs on the Philippine side and a pressing demand on Japan's side, this article explores the relatively low level of CDM cooperation between the Philippines and Japan, and suggests ways of moving forward.

KEYWORDS: Climate change, clean development mechanism, renewable energy, Philippines-Japan relations, investments

Economic and Social Implications of Climate Change

Greenhouse gasses (GHGs), namely, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6), are naturally found in the atmosphere to trap heat into the earth. Too much of these gasses, however, thickens the earth's "greenhouse blanket," shuts in too much heat into the earth, and causes global temperature to rise. Human activities—the burning of fossil fuels to produce the energy used for vehicles, household appliances, office and factory machines; agricultural production and consumption that produce waste; and deforestation—result in excessive emissions of GHGs. Because GHGs are stock pollutants,

increased emissions translate to increased concentration of GHGs and, hence, global warming.[1] The main GHG that causes global warming is CO2, which makes up 64 percent of emissions. Global temperature is found to be closely correlated with CO2 concentration. From 1860 to 2000, CO2 concentration increased more than 25 percent from 280 ppm (parts per million) to 360 ppm, while average surface temperature had risen by 0.5°C to 0.7°C (IPCC WG I 2001).

Many of the studies on the scientific basis and natural consequences of global warming are cited in the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports (1990, 1997, 2001) and Cline (1992). Sea levels rise as water expands and land-based glaciers and ice sheets melt with the rise in temperature. It has been estimated that an increase in global temperature of 4.2°C by 2100 will raise sea level by 66 centimeters (IPCC WG III 1990). Coastal erosion and coastal flooding raise water tables and cause saltwater intrusion in rivers, bays, and aquifer (Titus et al. 1992, as cited in Cline 1992). Further, the incidence, intensity, and duration of droughts are expected to increase. It is projected that the incidence of severe droughts will increase from 5 percent of the time to 50 percent by the 2050s (Rind et al. 1990, as cited in Cline 1992). Several studies (Emanuel 1987; Hansen et al. 1989; Wendland 1977, as cited in Cline 1992) have also shown that higher surface temperature increases wind velocity and pressure and thus increases the severity of typhoons. Climate change also alters habitat and predator-prey relationships that can lead to major reductions in specie population or even species extinction. For instance, coral reefs die and some coral species are lost completely with higher sea water temperature, as witnessed in recent episodes of El Niño (Glynn and de Weerdt 1991, as cited in Cline 1992).

Ecological systems, human health, and important socioeconomic sectors such as agricultural production, water resources, coastal systems, and human settlements are all sensitive to climate change (IPCC WG I 2001). Even a small reduction in agricultural output induced by global warming will intensify difficulties in coping with rapid population growth (IPCC WG III 1990). As sea levels rise, saltwater enters and floods wetlands, destroying habitat of juvenile fish and causing major reductions in fish, shellfish, and waterfowl populations, which diminish fisheries output (EPA 1989, as cited in Cline 1992). Tourism income also falls with

the bleaching and destruction of coral reefs. Construction business shrinks with greater precipitation (IPCC WG III 1990). Furthermore, the increased occurrence and intensity of storms increase damages to existing physical infrastructure and private property; land loss with receding shorelines may displace communities and produce unwanted migration impacts; the leisure of some outdoor activities may have to be foregone; air pollution intensifies as ozone concentration rises (IPCC WG III 1990); heat waves will increase the incidence of strokes and heart attacks, air pollution will increase the occurrence of respiratory diseases (EPA 1989, cited in Cline 1992), and changed rainfall patterns will increase the incidence of vector-borne diseases, such as malaria and dengue (IPCC WG II 1997); expenditures on electricity for cooling will increase; and saltwater intrusion in groundwater aquifers and increased surface water run-off (when longer periods of droughts are interrupted by heavy precipitation) may further stress prevailing water shortages.

Valuations of the socioeconomic impacts of global warming are extensive as well as intensely disputed. For one, in the case of agriculture, global warming may have offsetting effects (Cline 1992). Heat stress and reduced soil moisture, coastal inundation of farmlands, and changes in diseases, pests, and weeds negatively affect agricultural productivity, while a positive impact can be realized from CO2 fertilization, particularly for crops with inefficient photosynthesis.[2] Bazzaz and Fajer (1992, as cited in Cline 1992) argue that ample water is needed for CO2 fertilization to take effect and, hence, as global warming is associated with growing water scarcity, the positive CO2 fertilization effect may not be significant. The effects on forests are also mixed. While a contraction in boreal and temperate forests is expected, tropical forests are expected to expand in biomass and area. However, in general, forest losses may be incurred as a result of increased incidence of fires, pests, disease outbreaks, wind damage, and air pollution (Cline 1992).

Philippine Vulnerability to Climate Change

Many of the effects of climate change vary across the regions of the globe. While there are areas that are badly hurt, some sectors in some areas may even benefit from global warming. These differences are due primarily (but not limited) to variance in initial temperatures and precipi-

tation levels. In the case of agricultural production, areas with cold climates may benefit from shorter winters, while tropical and subtropical regions lose as extreme weather disturbances happen too often and either too early or too late to be prevented in the planting season.

The IPCC reports that developing countries are especially vulnerable to the negative impacts of climate change because many of these countries are in the tropical, subtropical, and arid regions and, unlike developed countries, they do not have sufficient markets and institutions that can make adaptation easy. Although in theory all countries and societies can adapt to the effects of climate change, the response of developing countries may be restricted by factors such as widespread poverty, inequitable land distribution systems, and other infrastructural and economic limitations (IPCC WG II 1997). For instance, inadequate sanitation and health services combined with an environment conducive to the spread of certain diseases will make the health impacts of climate change in developing countries comparatively greater than in developed countries.

The topography and socioeconomic structure of the Philippines would put the country in the highly vulnerable group. Its more than 7,000 small islands and long coastline expose much of its land and people to the dangers of stronger tropical storms and flooding. The pollution problems and water shortages the country is now struggling to overcome can only worsen. Majority of its people are poor and depend on agriculture and fisheries for livelihood. Lower productivity in these sectors means less income, less supply of food for the growing population, and higher food prices. Depletion and deterioration of its marine resources, a major tourism attraction, will further depress national income. Thus, global warming may make it more difficult for the Philippines to get out of poverty. The incidence of below-subsistence living may increase and gaps among socioeconomic classes may widen as those in the lower strata are more susceptible to the damages that climate change can bring and are less able to cope with it than those in the upper strata. The Philippines can only score poorly in terms of social vulnerability, defined as vulnerability enhanced by institutional and politico-economic factors (Adger 1999). Perceptions of continuing government corruption lead to widespread discontent and mistrust of

government; hence, government leadership and collective effort on actions to address climate change are deemed weak.

Combining climate projections from climate models and climate response functions, Mendelsohn (2003) estimates country- and sector-specific impacts of climate change for Southeast Asia. He concludes that the effects of global warming will not be uniform for all countries, and tropical countries are likely to suffer large damages. He estimates that in 2100 the Philippines may lose some US$0.7 billion to US$7.1 billion (in constant 1990 U.S. dollar), with the greatest chunk (more than three-fourths) of the loss accruing to agriculture and the remainder to the energy and coastal sectors.

The Kyoto Protocol

The first World Climate Conference was organized by the World Meteorological Organization (WMO) in 1979, after which scientific evidence linking GHG emissions from human activities with global climate change led to calls for a global treaty to address the problem. In 1988 the WMO and the United Nations Environment Programme (UNEP) established the IPCC, which in 1990 came up with its First Scientific Assessment. As a result, the United Nations General Assembly established the Intergovernmental Negotiating Committee (INC) for a Framework Convention on Climate Change. The INC drafted the United Nations Framework Convention on Climate Change (UNFCCC), which was adopted in 1992 and came into force in 1994. Its supreme body, the Conference of the Parties (COP), held its first session (COP1) in 1995. At its third session (COP3) in 1997, the COP adopted the Kyoto Protocol.

The Kyoto Protocol stipulates that industrialized countries (which include developed countries and some countries in transition referred to as Annex 1 countries in the protocol documentation) commit to reduce their GHG emissions in 2008–2012 by an average of 5 percent of their 1990 emission levels. This commitment—as opposed to the earlier UNFCCC commitment by developed countries to return their emissions to 1990 levels by the year 2000, which was decided to be inadequate at COP1—is supposed to reverse the upward trend in emissions that started in these industrialized countries some 150 years ago.

While developed and industrialized countries are required to commit to reduce emissions, developing countries are not. This principle of differentiated responsibilities to which the UNFCCC adheres is justified on equity grounds:

> Noting that the largest share of historical and current global emissions of greenhouse gasses has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs. . . . Climate change calls for . . . cooperation by all countries . . . in accordance with their respective capabilities and social and economic conditions. . . . Responses to climate change should be coordinated with social and economic development . . . taking into full account the legitimate priority needs of developing countries for the achievement of sustained economic growth and the eradication of poverty. (UNFCCC 2002)

Clearly, the UNFCCC acknowledges that the present build-up of GHGs in the atmosphere is the result of the rapid and continuing economic expansion of developed countries since the industrial revolution, that these countries must take responsibility, and that they are financially and technologically capable of undertaking projects that can reduce emissions. The principle of differentiated responsibilities also echoes the cries of developing countries during the negotiations—if, in the past, present-day industrial countries were able to pursue economic growth without constraints, and even at the expense of the global environment, why should developing countries now be prevented from doing the same? The principle likewise recognizes that developing countries today need much more economic growth to get their people out of poverty than developed countries at a comparable stage in the past, and those economic activities translate to more emissions given the developing countries' limited clean technology know-how and financial capital.[3]

Clean Development Mechanism

Because GHGs mix uniformly in the atmosphere, it does not matter where the GHG emission-reducing projects are undertaken. The Kyoto Protocol offers three ways by which Annex 1 countries, to meet their

commitments, can obtain emission reduction (ER) credits through projects undertaken elsewhere in the world where it is least costly. These so-called flexibility mechanisms include emissions trading (ET), joint implementation (JI), and clean development mechanism (CDM). Emissions trading allows Annex 1 countries to trade ER credits among themselves, while JI allows two Annex 1 countries to jointly undertake an emission-reducing project and share ER credits from the project. The CDM allows an Annex 1 country to invest in and/or undertake a project in a developing country to earn ER credits. These market-based mechanisms put into place an appropriate incentives scheme—providing incentives to intensify efforts to reduce emissions so as to avoid the cost of purchasing ER credits and rewarding those that have successfully met their targets by allowing them to sell their extra credits to the highest bidder.[4]

Standard economic theory predicts increasing marginal cost: the cost to reduce emission by one more unit increases with the total amount of emissions avoided. Hence, ER costs are expected to be higher in developed countries, where the more advanced clean technologies are already in use, and lower in less developed countries that are less energy-efficient. The World Bank (2001) estimates that the cost to reduce GHG emissions within the developed industrial countries' economic sphere hover around US$15 per ton of CO2e (carbon dioxide equivalent),[5] way above the costs in developing countries that range between US$1 and US$4 only. This efficiency consideration, combined with the Brazilian proposal to establish a Clean Development Fund in which penalties for noncompliance with commitments will be used to support climate change projects in developing countries, led to the inclusion of CDM in the Kyoto Protocol.

The CDM provides a way for developing countries to participate in efforts to mitigate global warming without compromising their own development goals. Stated in Article 12 of the Kyoto Protocol are the two-fold objectives of the CDM: "to assist Parties not included in Annex 1 in achieving sustainable development . . ., and to assist Parties included in Annex 1 in achieving compliance with their quantified emission limitation and reduction commitments." With the CDM, the investing Annex 1 country may obtain more ER credits for a given amount of investment,

thus resulting in global cost-effectiveness. At the same time, the CDM brings clean technology and investment to the host developing country.

The benefits that a host developing country like the Philippines may realize from the CDM are manifold: new capital investments and income growth prospects, transfer of environment-friendly technologies, solutions to pollution problems, and a better quality of life. A wind power generating facility will provide a cleaner source of electricity to meet the increasing requirements of the Philippine economy. Small-scale hydropower systems will provide the Philippine rural population with electricity, create new income opportunities, and raise living standards. The utilization of solid waste dumped at Smokey Mountain to generate electricity can turn a nuisance into an advantage, improve the surrounding environment, and provide cleaner and safer means of livelihood for its urban poor community. And with the debates on carbon sinks[6] settled with the decision to include reforestation (replanting of denuded forests) and afforestation (planting of new forests) projects, the CDM may also contribute to the financing requirements of the much needed forestry programs of the country.[7]

In Japan's case the Kyoto Protocol requires it to reduce its GHG emissions by 6 percent of its 1990 level, a rate higher than the average for Annex 1 countries. Considering the sheer size of the Japanese economy and its relatively advanced stage, in terms of clean technologies there is little room left for emission reduction measures. A huge demand for ER credits from the CDM by Japan is therefore anticipated. In the latest World Bank update on the state and trends in the global carbon market (Lecocq 2004), transactions made in connection with the Kyoto Protocol's CDM and JI are reported to dominate the market; Japanese companies appear to be the single largest group of buyers, accounting for 41 percent of ER purchases in 2003–2004.

The Philippines, on the other hand, offers several options for CDM projects: it has a rich endowment of geothermal, wind, hydro, and natural gas resources that produce cleaner energy; a vast area of land that needs to be reforested; and biomass and waste that can and must be recycled into energy. With a potential supply of ER credits on the Philippine side and a pressing demand on Japan's side, this article aims to look into the prospects of cooperation between the Philippines and

Japan on the CDM. The remainder of this article discusses CDM-related climate change initiatives in Japan and in the Philippines separately. It then looks closely at the intersection of these initiatives by examining Japan's CDM projects and plans in the Philippines. In conclusion the article assesses the prospects and issues concerning those projects, it examines the barriers to Japan-Philippines CDM cooperation, and it identifies factors crucial to the realization of projects that are consistent with and relevant to developmental concerns of both countries.

Japan's Initiatives on Climate Change and CDM

With the rules for the application of the Kyoto Protocol and its flexibility mechanisms discussed at the sixth session of the COP (COP6) in July 2001 and finalized at the seventh session (COP7) in October-November 2001, Japan ratified the protocol on 4 June 2004. This section looks at the different public and private Japanese agencies involved in global warming and CDM concerns; the policies and measures of the Japanese government related to the Kyoto Protocol, particularly those that are CDM-related; and Japanese participation in the global carbon market.

Lead Government Agencies on Climate Change

In Japan, the tasks of assisting the central government and policy makers in addressing climate change issues, fulfilling Japan's commitments to the Kyoto Protocol, formulating international and domestic rules on the flexibility mechanisms, and exploring viable CDM and JI projects are delegated to three government agencies, namely, the Institute for Global Environmental Studies (IGES); the Global Environment Centre (GEC) Foundation, which is attached to the Ministry of Environment (MOE); and the New Energy and Industrial Technology Development Organization (NEDO), under the umbrella of the Ministry of Economy, Trade and Industry (METI). The first two, namely, IGES and GEC, were established primarily in response to global environmental challenges that emerged in the 1990s.

Institute for Global Environmental Studies (IGES). Established in 1998, the IGES is mandated to formulate Japan's climate change strategies. Apart from being Japan's technical support unit for the IPCC

National Greenhouse Gas Inventories Programme, the IGES is tasked to conduct research to promote sustainable development and global environmental conservation, in general, and to design domestic and international climate change policy measures within the framework of the Kyoto Protocol flexibility mechanisms, in particular. Its core research project, initially called "Climate Change Project," was later renamed "Climate Policy Project" to emphasize the policy proposal component of its research.

Presentations and discussion materials made by the IGES's Climate Policy Project in 1998–2000 were mostly on the principle, design, and operational issues of the CDM, JI, and ET. In 1998, of the five IGES materials, three were on ET/JI and two on the CDM. The two studies produced in 1999 were both on the collaboration of the public and private sectors in financing CDM and JI projects. In 2000, two of three IGES studies were on CDM baseline setting, while the third tackled the administrative issues of international emissions trading. From 2001, the research topics in IGES have become more varied, ranging from technical papers such as evaluation models of climate change and air pollution, energy demand forecasting, urban planning models, and energy savings technologies, to policy debates on climate change mitigation and adaptation measures, and financing mechanisms for CDM/JI.

To promote cooperation between Japan and developing countries in climate change mitigation and adaptation efforts, the IGES organizes international workshops inside and outside Japan. Within Japan, the IGES has conducted several workshops on energy modeling, climate policy, GHG inventories, and the CDM. Outside Japan, it has held climate policy dialogues, three in 2002 in Thailand, China, and Vietnam, and one in 2003 in Korea.

Global Environment Centre Foundation (GEC). The then Environment Planning Agency (now restructured as the Ministry of Environment) created the GEC in 1992 to promote Japan's partnership with developing countries in addressing global environmental concerns through survey and research, collection and dissemination of information, and training programs and seminars. The GEC undertakes climate change research projects, such as feasibility studies for CDM/JI-eligible

climate change mitigation projects; assessment and verification of GHG emissions; and development of new energy systems. It also provides technical, implementation, and monitoring support for environmental projects funded by the Japan International Cooperation Agency (JICA) and the Japan Bank for International Cooperation (JBIC). Among the GEC's "international environmental cooperation projects" are the energy utilization project in Chongqing and the air pollution reduction project for Henan, both in China.

The GEC likewise serves as secretariat for the MOE's feasibility study grants for CDM and JI projects and, as such, it invites applications from business entities, nongovernment organizations, and local government units; reviews and screens proposals; monitors the progress of investigations; and evaluates the feasibility of projects. In addition to identifying viable CDM and JI projects and host developing countries for Japan, feasibility studies are expected to provide inputs to assist the Japanese government in formulating international and domestic rules to implement the CDM/JI mechanisms. For this purpose, the GEC organizes an annual CDM forum at which results of the commissioned CDM feasibility projects are presented and reports on the latest developments and issues on global warming in relation to CDM/JI in Japan and other countries are discussed.

New Energy and Industrial Technology Development Organization (NEDO). Years before the urgency of global climate change was widely recognized and accepted and the Kyoto Protocol was adopted, METI (then the Ministry of International Trade and Industry-MITI) established the NEDO in October 1980, immediately after the second oil crisis, as a semigovernment organization to develop and promote alternative energy technologies. The scope of its responsibilities was expanded to include industrial technology research and development in 1988; with the emergence of the global climate change agenda, the NEDO commenced its environmental technology research and development projects in 1990. At present, the NEDO is the core government organization in charge of policies related to energy conservation and development, and the development and promotion of industrial and environmental technologies that are aimed to meet three objectives, namely, energy security, industrial

competitiveness, and global environmental preservation. The NEDO utilizes and coordinates resources—funds, manpower, and technological expertise—of both the public and private sectors.

The NEDO's global climate change-related activities include global environment industrial technology research and development, renewable energy technology development, and energy- and environment-related international cooperation activities. One specific NEDO undertaking related to the Kyoto Protocol is the "Basic Survey Project for JI and CDM," which was started in 1988 to fund feasibility studies for CDM and JI projects by private enterprises. The program's primary objective is to promote the application of Japan's technologies on renewable energy and energy conservation in other countries, particularly, developing countries, to reduce GHG emissions.

Japan's CDM Support Policy Measures

Funding of Feasibility Studies

The Kyoto Protocol stipulates that funds for CDM/JI projects should be treated as additions to funds for official development assistance (ODA), so as to ensure that ODA funds are not diverted away from economic and other social development concerns of developing countries. Maruyama (2001, 1999) argues that, in view of the current fiscal difficulties of Japan and the "additionality" condition of CDM projects, the public financing of CDM/JI projects may be constrained and may limit significantly Japan's involvement. Hence, there is a need to mobilize private capital for CDM projects. Inasmuch as the Kyoto Protocol mechanisms also require that a CDM project should involve the transfer of technology from developed to host developing country, where the private sector owns most of the relevant climate-friendly technologies, the developed country's private sector may be most effective in undertaking CDM projects. However, Maruyama also points out that business investments involving environment-friendly technologies, especially CDM projects, are generally more costly and are riskier than the usual private investment projects. In addition to all other existing requirements for foreign direct investments, CDM projects involve much higher transaction costs as they require host country government certification that the

project is in line with its sustainable development plan; third party certification of the ER credits; and compliance with the host country's regulations on investments and import of unfamiliar and nonconventional climate-friendly technologies. CDM projects are riskier due to uncertainties in the host developing countries' energy and CDM-related policies; in CDM rules and implementation (e.g., CDM certification risk and baseline risk); and in the global emissions market (e.g., fluctuations in the price of the ER credit). To attract private capital to invest in climate-friendly technologies in developing countries, particularly CDM projects, therefore necessitates some public sector intervention to offset the additional costs and risk barriers.

In Japan, the first assistance extended to encourage private CDM projects is the funding of feasibility studies, which the Japanese government provides through the GEC/MOE and the NEDO/METI. The NEDO's grants are concentrated in new and renewable energy technologies, and energy conservation and efficiency enhancement technologies in industries, while GEC grants appear to be aimed at afforestation/reforestation, waste management, and renewable energy types of projects.

The NEDO started giving the CDM/JI feasibility study grants in 1998 during which forty proposals were chosen from 104 applications.[8] Since then and up until 2004, a total of 258 CDM/JI feasibility studies were undertaken by Japanese corporations, with funding from NEDO/METI. This number represented a fraction (41 percent) of the corporate sector's interests in CDM/JI as revealed by the total number of applications received by NEDO (which summed to 636 from 1998 to 2004). Up to 2002, forty or more projects were given funding for feasibility studies every year. Since then, however, the number of approved project proposals had dropped significantly. In 2003, only twenty out of eighty-one applications were approved; in 2004, only fourteen out of forty. The studies proposed to look into the possibility of applying Japanese technology in energy-intensive sectors such as steel, petrochemicals, power generation, and cement. Table 1 shows the number of NEDO-commissioned CDM/JI feasibility studies.

Table 2 shows the host country distribution of the projects. More than a third of the proposed CDM/JI projects were to be undertaken in Russia and other former Soviet Union countries. Southeast Asian coun-

Table 1. Number of NEDO-commissioned CDM/JI feasibility studies, 1998–2004

Year	Applications	Approved	Approval Rate (%)
1998	104	40	38.5
1999	131	46	35.1
2000	91	49	53.8
2001	77	45	58.4
2002	112	44	39.3
2003	81	20	24.7
2004	40	14	35.0
Total	636	258	40.6

Source: NEDO website

tries captured almost one-fourth of the projects. Countries in the Middles East had less than half of the Southeast Asian share, while the Latin American and South Asian shares were 7.3 percent and 5.5 percent, respectively. China was the country with the biggest number of proposed CDM projects (36). Among Southeast Asian countries, Indonesia topped the list with 12 projects, followed closely by Thailand (10), Vietnam (10), and Malaysia (9). Remarkably, even Myanmar obtained a substantial number of projects (5) when compared with the Philippines, considered to have relatively closer relations with Japan, which accounted for only the same number of projects (5). Moreover, the geographically farther countries of Bangladesh, India, Iran, Egypt, and Brazil had more or at least the same number of CDM projects as the Philippines. Other countries with which Japan planned to implement one or two CDM projects (considering only NEDO-commissioned CDM feasibility studies) were Oman, Pakistan, Argentina, Venezuela (2 each), and Singapore, Cambodia, Kuwait, Saudi Arabia, Morocco, Syria, Costa Rica, Colombia, Mauritius, Laos, Chile, South Africa, Tonga, and Mongolia (1 each).

The number of GEC-commissioned CDM projects is much less than the NEDO's. The GEC started giving out feasibility grants in 1999, one year later than NEDO. From then up until 2003, the GEC had funded 51 feasibility studies, 19 of which were afforestation/reforestation projects, 13 were concerned with biomass-use, and 10 were waste management

projects. The remaining 9 were combined afforestation/reforestation and biomass-use projects (3), wind power generation projects (2), geothermal power (1), photovoltaic solar generation (1), and CDM capacity building (1). Indonesia again topped Southeast Asian countries as well as all other countries with 10 projects, a substantial one-fifth of the total number of feasibility studies. Next was Malaysia (7 projects), followed by China and Thailand (5 each). The Philippines had 3. Other potential host countries explored in GEC-commissioned CDM studies were Vietnam, Cambodia,

Table 2. Number of NEDO-commissioned CDM/JI feasibility studies, by host region/country, 1999–2004

Region/Country	Number of Studies		Region as % of Total	Country as % of	
	Region	Country		Region	Total
Russia & other former Soviet Union countries	75		34.4		
Romania		7		9.3	3.2
Others		68		90.6	31.2
China and Mongolia	37	–	17.0		
Southeast Asia	53		24.3		
Indonesia		12		22.6	5.5
Thailand		10		18.9	4.6
Vietnam		10		18.9	4.6
Malaysia		9		17.0	4.1
Myanmar		5		9.4	2.2
Philippines		5		9.4	2.2
Others		2		3.8	0.9
South Asia	12		5.5		
Bangladesh		6		50.0	2.8
India		6		50.0	2.8
Middle East	23		10.6		
Iran		8		34.8	3.7
Egypt		5		21.7	2.2
Others		10		43.5	4.6
Latin America	16		7.3		
Brazil		6		37.5	2.8
Others		10		62.5	4.6
Africa	2	–	0.9		
Total	218		100.0		

Source: NEDO website

Mongolia, Russia, Brazil, Samoa (2 each), and Madagascar, Myanmar, Samoa, India, Tanzania, Ukraine, Estonia, Bulgaria, Poland, and Hungary (1 each). See tables 3 and 4.

Project Implementation Support Programs

The drop in the number of NEDO-commissioned CDM/JI feasibility studies in 2003 and 2004 may be signaling a new phase of government support for CDM activities and projects, a transition from finding suitable and viable projects to establishing project implementation support mechanisms. Research institutes and universities are now requested to conduct studies to help government decide on the optimum basket of CDM projects for Japan as well as formulate policy measures and tools that will minimize the risks involved in CDM projects. A research team at the Institute of Environmental Studies of the Faculty of Frontier Sciences of Tokyo University, for instance, is undertaking a number of projects along these lines. One of these projects, commissioned by JBIC, is an assessment of risk-reducing policy instruments such as ER credit price floor (in the form of an insured ER credit), CDM bonds, and CDM funds (for a portfolio of CDM projects). The study uses the project financial projections of forty-two NEDO feasibility studies to analyze

Table 3. Number of GEC-Commissioned feasibility studies, by type of project, 1999–2003

Year	Afforestation/ Reforestation	Biomass	Waste Management	Others	Total
1999	6	0	2	0	8
2000	7	1	0	0	8
2001	1	4	0	2	7
2002	2	4	1	1	8
2003	3	4	7	6	20
Total	19	13	10	9	51
% Share in Total	37.3	25.5	19.6	17.6	100.0

Source: GEC website

Table 4. Number of GEC-commissioned CDM feasibility studies, by country, by type of project, 1999–2003

Country/ Region	Afforestation/ Reforestation	Biomass	Waste Management	Others	Total	% Share
Indonesia	8	1	0	1	10	19.6
Malaysia	2	4	1	0	7	13.7
China	2	0	2	1	5	9.8
Thailand	0	3	2	0	5	9.8
Philippines	1	0	2	0	3	5.9
Cambodia	1	0	1	0	2	3.9
Vietnam	1	1	0	0	2	3.9
Mongolia	2	0	0	0	2	3.9
Madagascar	0	0	0	1	1	2.0
Myanmar	1	0	0	0	1	2.0
Brazil	0	1	1	0	2	3.9
India	0	1	0	0	1	2.0
Former Soviet Union	0	2	1	4	7	13.7
Others	1	0	0	2	3	5.9
Total	19	13	10	9	51	100.0

Source: GEC website

variations of profitability (in terms of the internal rate of return) among the different projects and to propose ways to minimize the variations and accompanying risks (Matsuhashi et al. 2004).

The GEC, for its part, is looking at some concrete CDM implementation requirements. It undertakes a CDM certification model project for the Ministry of Environment. The methane reduction and solid waste utilization at Malaysian palm oil mills project proposed by Ex Corporation serves as a pilot test. In this connection, the GEC attended a CDM steering committee in Malaysia in February 2003. As a first step toward the approval of the project by the Malaysian Designated National Authority (DNA), industry representatives, academics, and policy makers from both Malaysia and Japan were invited to the meeting to discuss the results of the feasibility study on the palm mill project as well as to introduce the CDM procedural approach of Japan's MOE and to request Malaysia's cooperation for CDM certification of Japan's projects (*GEC Newsletter*, Sept. 2003, 2).

There are many other indications that Japan is bent on taking an active part in the Kyoto Protocol's CDM and JI mechanisms. By mid-2003, JBIC and eight Japanese companies had subscribed to the World Bank's Prototype Carbon Fund, which was established in April 2002 to pioneer the market for ER credits. This particular fund accepts financial contributions from governments as well as private entities, which is used to purchase ER credits from projects complying with the Kyoto Protocol's CDM/JI requirements. Each subscriber receives a share of the fund's purchased ERs in proportion to its financial contribution.

Within Japan, plans to establish emissions right funds were first revealed in 2003. Initially, JBIC and the Development Bank of Japan were to set up two separate funds. A government press release dated 11 May 2004, however, announced that these two banks will jointly establish Japan's first Carbon Fund in the summer of 2004 with the participation of twenty Japanese companies from the oil, power, trade, and other sectors.[9] Through this Carbon Fund, JBIC and participating companies will provide financial resources and technology to energy-saving projects in developing countries and, in return, they will receive GHG ER credits as dividends for use in achieving their Kyoto Protocol reduction targets.

Furthermore, in 2003, low-interest financial packages and subsidies were set up specifically for CDM projects. Starting in October 2003, JBIC has granted lower interest rates for CDM projects. For yen-based loans, CDM projects are given special rates of 0.7 percent to 1.1 percent, instead of 1.4 percent for ordinary overseas investment projects. For foreign currency-based loans (loans that are denominated in U.S. dollars or currencies other than the Japanese yen), the special CDM rates range from Libor to Libor+0.25 percent, instead of the ordinary loan rate of Libor+0.4375 percent (Tokyo Electric Power Corp., 2003).

Both the METI and MOE likewise started offering in October 2003 equipment investment subsidies for CDM projects undertaken and financed by Japanese companies. The METI's subsidy amounts to one-fourth of the investment made by the Japanese partner on the CO2 reducing equipment. A total amount of ¥1.9 billion is allocated by METI for this CDM equipment investment subsidy.[10] The MOE's CDM subsidy, for its part, covers one-third of the costs of the emission reducing equipment, and it has a total budget allocation of ¥300 million.[11]

Finally, as of March 2003, the UNFCCC's CDM Committee had accepted eleven applications for Operating Entity (OE) status, five of which are by Japanese companies (SMC, 2003).

Nevertheless, Japan may be considered slow and sluggish relative to European countries and international organizations in terms of involvement in international CDM-support programs. Unlike the Netherlands, Switzerland, Finland, Australia, and Italy, Japan has not engaged in full-scale CDM capacity-building programs in developing countries.

Japan's Participation in the Global Carbon Market

Domestic abatement opportunities for Japan are very few and costly. Hence, even taking into account proposed and potential domestic mitigation measures, projected GHG emissions still exceed its Kyoto Protocol commitment by 4 percent to 11 percent (see table 5). The required additional ER credits of about 50–145 million tons CO2e, therefore, may have to be realized largely by means of the flexibility mechanisms.

The recent World Bank report on the carbon market (Lecocq 2004) reveals the prevalence of CDM/JI-related transactions and Japan as a major buyer of ER credits. Table 6 summarizes the project-based transactions in the carbon market. During 1998–2004 there were 348 counts of project-based transactions amounting to 293.6 million tons CO2e. Project-based transactions are defined as those in which buyers participate in financing a project that reduces GHG emissions and, in return,

Table 5. Japan's projected GHG emissions

	GHG Emissions Million tons (mt) CO2e	Difference from Kyoto Protocol Commitment MtCO2e	Percent
1990 Actual	1246.73	-74.80	-6.0
Kyoto Protocol Commitment	1171.93	0.00	0.0
2010 Projected (with measures)[a]	1317.40	-145.47	-11.0
2010 Projected (with additional measures)[b]	1221.40	-49.47	-4.1

Source: UNFCCC (2003, 11, table 4)

Notes: a. Proposed or potential measures for mitigating emissions considered.
b. Additional measures for mitigating emissions considered.

gets ER credits. The amount that was specifically intended for compliance with the Kyoto Protocol's CDM and JI was 151.9 million tons CO2e, or 52 percent of the total amount of project-based transactions. The second category, voluntary project-based transactions, refer to a wide range of transactions, such as those carried by non-Kyoto Protocol emission reduction regimes (e.g., the Chicago Climate Exchange, the UK Emission Trading Scheme, the European Union Emission Trading Scheme [EUETS], and the New South Wales GHG Abatement Scheme) and firms with voluntary emissions targets for strategic reasons.[12] This second category accounted for 47 percent of the project-based transactions. The remaining 1 percent was referred to as "retail" transactions—small volume[13] purchases by companies and individual entities without significant emissions and, hence, unlikely to be covered by any emission reduction regime, whether domestic or regional.[14]

A rapid expansion of the carbon market, specifically of project-based transactions, from 2003 is noted in the World Bank report. From only 30 million tons CO2e in 2002, the volume of project-based transactions increased 2.5 times to 78 million tons CO2e in 2003. From January to May 2004, the volume of transactions reached almost 65 million tons CO2e and another doubling of the market was anticipated for the year. Transactions in 2003–2004 were predominantly intended for compliance with the Kyoto Protocol. In 2004, 96 percent of the transactions were for CDI/JI projects.

The World Bank survey also shows that Japanese entities, mostly Japanese private firms, comprised the single largest group of buyers. The

Table 6. Carbon market project-based transactions, 1998–2004 (vintages up to 2012)

Type	Number of Transactions	Volume (tons CO2e)	Average Size of Transactions
Kyoto Protocol Compliance	126	151,890,882	1,234,885
Voluntary	124	139,148,129	1,209,984
Retail	108	1,493,870	14,093
Total Project-Based Transactions	358	293,611,881	848,589

Source: Lecocq (2004, 17, table 2)

growing significance of Japan as a buyer of ER credits became evident in 2002–2003, during which Japan accounted for a fifth of the transactions. This share rapidly doubled to 41 percent in 2003–2004. Japan took over the top rank from the Netherlands. While remaining to be an important market player, the Netherland's share in the carbon market transactions declined from 32 percent in 2002–2003 to 23 percent in 2003–2004.

The fast growing dominance of project-based transactions for Kyoto Protocol compliance (CDM/JI) and of Japanese buyers in the carbon market from 2002 may be indicative of the fruition of the Japanese government-sponsored (NEDO and GEC) CDM/JI feasibility studies. Presumably, a number of the 309 CDM/JI project proposals were materializing and were entered as project-based transactions in the carbon market.

This hypothesis is further supported by data on the host country or location of the ER projects. In 2003–2004, the majority—51 percent of the transacted ER credit—came from projects in Asia, the region where many of the NEDO- and GEC-sponsored project feasibility studies were to be located. The top five suppliers of ER credits since 2001 were India, Brazil, Chile, Romania, and Indonesia. Except for Chile, which appeared in only one NEDO-commissioned feasibility study, all four top grossing CDM/JI host countries figured in several NEDO and GEC-funded studies. As seen earlier, Indonesia had 10 of the 51 GEC project studies and 12 of 258 NEDO studies; India had 1 GEC and 6 NEDO; Brazil had 2 GEC and 6 NEDO; and Romania had 7 NEDO projects.

From the summary carbon market values and shares given in the World Bank report and the GHG ER projections of Japan in the UNFCCC 2003 compilation (table 5), this article roughly estimates the volume of Kyoto Protocol compliance transactions made by Japanese entities to be 46.6 million tons CO2e. This amount is just about a portion (5 percent to 20 percent)[15] of the excess of Japan's projected emissions over its Kyoto Protocol commitment for the period 2008–2012. Between 180 and 680[16] million tons CO2e of CDM/JI ER credits, therefore, may still be transacted by Japan for the first commitment period 2008–2012.

Philippine Potential as CDM Host Country

Institution and Capacity Building for CDM

In 1991 Administrative Decree 220 established the Philippine Inter-Agency Committee on Climate Change (IACCC), which is tasked to lead and coordinate all initiatives in addressing climate change issues and to formulate climate change policies and Philippine positions in UNFCCC negotiations. It is made up of ten government agencies and the Philippine Network on Climate Change, which represents different nongovernment organizations.[17] It is cochaired by the secretaries of the Department of Environment and Natural Resources (DENR) and the Department of Science and Technology (DOST), with the DENR's Environment Management Bureau (EMB) serving as its secretariat.

As a country that is highly vulnerable to climate change, the Philippines is enthusiastic about taking part in efforts to mitigate global climate change. The Philippine government ratified the UNFCCC in August 1994 and signed the Kyoto Protocol in 1998. Plans to implement CDM projects are included in the Philippine Agenda 21.

As a non-Annex 1 country, the Philippines is not obliged to reduce GHG emissions but is required to work out policies and measures to reduce emissions as well as to measure, monitor, and regularly report its emissions inventory to the UNFCCC. In compliance with this, the IACCC's National Climate Change Information Center (CCIC) published in 1999 the first Philippine National GHG Inventory.[18] In addition, the ALGAS (Asia Least-cost Greenhouse Gas Abatement Strategy)—a project executed by the Asian Development Bank (ADB) with funding from the Global Environmental Fund-United Nations Development Programme (GEF-UNDP), ADB, and the government of Norway—identified and assessed alternative climate change mitigation measures and projects in different economic sectors in the Philippines.[19]

In preparation for Philippine participation in the Kyoto Protocol's mechanism, several CDM capacity-building programs have been carried out. A program funded by the United Nations Industrial Development Organization (UNIDO) focused on industrial mitigation opportunities and identified potential CDM projects in cement, iron, and steel indus-

tries in the Philippines. A UNDP capacity-building project, implemented in cooperation with the DENR, was aimed at formulating evaluation criteria for CDM projects in accordance with the Philippine Agenda 21; as CDM priority areas for the Philippines, it identified renewable energy, energy efficiency, transportation, and energy generation from waste. The Netherland's PREGA (Promotion of Renewable Energy, Efficiency and GHG Abatement), through the ADB, funded a capacity-building program for renewable energy and energy efficiency in fifteen countries including the Philippines.

Currently, the UNEP's Riso Center on Energy, Climate and Sustainable Development is coordinating the Capacity Development for CDM (CD4CDM) project in the Philippines and eleven other countries worldwide, with funds from the Netherland's Ministry of Foreign Affairs. In the Philippines, the CD4CDM is implemented by Klima, the Ateneo de Manila University's Climate Change Center, in cooperation with IACCC-CCIC. This three-year program seeks to strengthen the capacity of public and private CDM project participants and stakeholders—policy makers, project developers, project financiers, NGOs, local communities, and research and academic institutions—through briefings and training courses on the various aspects of the CDM cycle (e.g., conducting feasibility studies and writing the Project Design Document (PDD) as well as developing a portfolio of CDM projects for the Philippines). The CD4CDM Philippines also conducts information and awareness raising campaigns among the general public and assists the government in establishing the institutional framework for CDM (Yap 2005).

Capacity building for the setting up of the Designated National Authority (DNA), a prerequisite for implementing CDM projects in the host country, is a component of most of the programs mentioned above; financial assistance from the Netherlands government is earmarked specifically for this purpose. Apart from the DNA, there is a plan to establish a permanent entity to promote CDM project development, a task presently assumed by the CD4CDM project. This proposed office is envisioned to link and match project developers and CDM investors, and to facilitate partnership among public and private entities in conceptualizing, financing, and implementing CDM projects.

Philippine Portfolio of CDM Projects

The Philippines' rich endowment of renewable energy sources includes geothermal reserves of at least 4,339 megawatts, water resources capable of generating 1,135 megawatts power, and 16 wind power sites with potential capacity of 160,340 kilowatts. Installed geothermal capacity is still only 44 percent of potential reserves, while existing minihydro plants represent only 7 percent of identified minihydro resources potential. Wind power utilization is just about to begin with the ongoing construction of the first wind power facility in Bangui, Ilocos Norte (Messe 2004).

Further, carbon emissions from municipal solid waste dumped in 14 landfill sites, covering a total area of 278 hectares, are projected to reach 15 million tons of CO2e. The use of methane generated in these landfill sites to generate power will have far-ranging health and environmental impacts, apart from global climate change mitigation. The same can be said of biomass generated by the country's agricultural and food sectors (e.g., livestock, sugar mills, and distilleries).

Cognizant of this potential, the Philippine government ranks renewable energy as first among priority climate change mitigation measures. As per the Philippine National Plan, the share of renewable energy in total energy use will be increased from 17 percent in 2002 to 25 percent in 2012. As a step toward this objective, the DOE, together with the World Wildlife Fund (WWF) and private sector representatives, conducted investment missions in the Netherlands and the United Kingdom to promote investments in renewable energy in the Philippines. The DOE plans to continue promoting vigorously specific CDM-eligible projects.

Opportunities for forest carbon sequestration are likewise enormous. Forest land cover in the Philippines has a total area of 16 million hectares, with grasslands accounting for 13 percent, brushlands 15 percent, and upland farms 34 percent, or almost 10 million hectares of land eligible for CDM afforestation and reforestation projects. The benefits that can be derived from forest restoration and preservation projects are manifold: climate change mitigation, water supply stabilization, flood prevention, biodiversity conservation, and local air pollution mitigation, among others. Public funds available for forestry projects in the Philip-

pines, however, are very limited. Further, institutional frameworks for forest management are still being worked out. There is yet no operational system for collecting payments from those who benefit from the services of the forests in order to generate the funds needed to compensate those who undertake forest preservation activities or forego forest-depleting means of livelihood. This makes CDM ER credits for forestry projects truly necessary. The CDM revenues from carbon sequestration by forest sinks can be used to start and institute a system of sustainable forest management.

As of June 2004, at least 17 CDM projects were being considered in the Philippines. This number combined the database of the Philippine CD4CDM (9 projects) and the NEDO and GEC lists (7 projects). The CD4CDM records included projects developed in close consultation and cooperation with government and private organizations involved in the various CDM capacity-building programs funded mainly by European governments. A year later, the CD4CDM lists grew five times longer. By October 2005, there were a total of 46 projects—29 waste management projects, 14 renewable energy projects, and 3 afforestation and reforestation projects. One of the 46 projects is now in the implementation stage, 11 are seeking ER validation, and 28 are awaiting approval by the Philippine DNA (Mallare 2005).

Financing and Other Constraints

The biggest impediment to CDM project implementation in the Philippines is the lack of upfront financing. Although many have expressed interest in buying ER credits from the Philippine CDM project pipelines, many projects could not take off due to lack of funds. Most foreign entities that need ER credits from CDM projects are not ready to provide equity and extend advances. Philippine CDM project implementers have to rely mainly on government banks. The Development Bank of the Philippines (DBP) has recently created a new office especially for CDM projects, and has also started accepting ER credits purchase agreements as collateral. However, private banks are still to be convinced of the viability of CDM projects in general. There has not been any private bank participation in CDM projects and it is yet highly unlikely that private banks will consider ER forward contracts as collateral in their

loan portfolio. Foreign governments' financial institutions such as JBIC and Denmark's Danida are the alternative sources of funds. But it remains unresolved if CDM funds from these foreign governments' lending institutions will be considered as ODA funds, which are not supposed to be used for CDM projects. If the CDM project funds from JBIC and Danida are to be designated as ODA, it may be that the projects will be disqualified from generating and selling ER credits.

Compounding the shortage of investment funds is the high transaction costs of CDM projects, arising from the preparation of the PDD and other CDM documentation, and the ER credit validation and certification procedures. These are particularly restraining for small CDM projects. Thus, to bring down costs, there have been proposals to reduce application fees, to "bundle" small-scale CDM projects, and to accredit local validators.

Japan's CDM Projects and Plans in the Philippines

Compared with its neighboring Southeast Asian countries, the Philippines appears to be less attractive as a host country for Japan's CDM projects. Of the 258 NEDO-commissioned feasibility studies, only 5—a measly 2.2 percent of the total—are to be hosted in the Philippines. As discussed in an earlier section, this share of projects is a far cry from the shares of its closest Southeast Asian competitors, and pales in comparison to more distant countries, such as Bangladesh, India, Brazil (with 6 projects each) and Iran (8). The same pattern is observed in the case of GEC-commissioned feasibility studies—the Philippine share lags far behind the shares of Indonesia, Malaysia, and Thailand, is just comparable to Vietnam and even Cambodia, and not any different from Madagascar and Myanmar.

The NEDO-funded and GEC-funded CDM studies in the Philippines are listed in tables 7 and 8, respectively. Where available, the results of feasibility studies are discussed briefly in the following paragraphs.

Utilization of Residual Oil at Petron Corporation's Bataan Refinery. This CDM project shall replace the current system of boilers and steam turbine power generation that uses heavy oil carbon as fuel with a system of dual-purpose electricity and steam generation by low-speed diesel

engine using the residue in the refinery's vacuum distillation. The final report of the feasibility study shows an annual internal rate of return (IRR) on the initial investment after tax of 5.2 percent, excluding revenues from sale of ER credits. If ER credits are included, the IRR will improve to 9.7 percent.

At the time the feasibility study for the project was undertaken, only the short-term (10 years), high interest (2.7 percent) JBIC Buyer's Credit

Table 7. NEDO-commissioned CDM feasibility studies in the Philippines, 1999–2004

Year	Japanese Proponent	Project Site	Project Description
1999	Mitsubishi Research Institute, Inc.	Trust Int'l Paper Corp. (TIPCO), United Pulp & Paper Co. Inc. (UPPC), and Container Corp. of the Phil. (CCP)	Introduction of energy-saving platetype evaporators, high-efficiency extended nip presses and efficient drier hoods in three major pulp and paper mills
2000	Mitsui Eng'g and Shipbuilding Co., Ltd.	Petron Corp. Bataan Refinery	Installation of a high-efficiency, low-speed, two-stroke cycle diesel engine using residual oil as fuel
2002	Mitsubishi Securities Co., Ltd.	San Miguel Corp. Brewery and Feed Mill Plant in San Fernando	Replacement of energy-intensive aerobic wastewater treatment facility by inground upflow anaerobic sludge blanket (iUASB) system and use of captured methane (instead of bunker fuel oil) for drying in the feed mill
2002	Tokyo Electric Power Co., Inc.	Filinvest Alabang IT Park and Commercial Complex	On-site natural gas-based power supply project (introduction of cogeneration system and NAS cells)
2004	Zousui Sokushin Center	NA	Use of methane gas from a paper manufacturing company's wastewater to generate electricity for the plant's boiler (cogeneration system)

Source: Summarized from various NEDO documents

Table 8. GEC-commissioned CDM feasibility studies in the Philippines, 1999–2003

Year	Japanese Proponent	Project Site	Project Description
1999	OISCA-Int'l	Metro Manila	Charcoal production by combustion of methane gas generated at solid waste landfill sites; use of charcoal for leachate treatment
2003	Mitsubishi Securities Co., Ltd.	Smokey Mountain	Landfill gas recovery and gas to power plant project
2003	OISCA-International	OISCA's Children's Forest Program sites (972 elementary and high schools) in the Philippines	NGO participatory forestation project

Source: Summarized from various GEC documents.

and the long-term (50 years), low interest (0.75 percent to 1.7 percent) Special Yen Loan for the Environment were available. With the not so high projected return, especially without ER credits, it will be quite difficult to push through with the project with only JBIC financing. The yen loan recourse, it must be pointed out, has a maturity of 50 years (principal repayment of 40 years plus a grace period of 10 years), much longer than the project's lifetime of only 20 years.[20] The project proponent has called for the Japanese government to offer special loan packages specifically for CDM projects.[21]

Wastewater Treatment Facility with Biogas Collection at San Miguel Corporation's (SMC) Beer Brewery and Feed Mill Factory in San Fernando City. The project aims to reduce the use of both fuel oil and electric power by replacing the current energy-intensive aerobic treatment of wastewater from the brewery and feed mill plants with the inground Upflow Anaerobic Sludge Blanket (iUASB) system. The iUASB system captures biogas from the wastewater before treatment, thus reducing energy use of the treatment facility. Collected methane replaces bunker fuel oil used for drying grains in the feed mill. The annual IRR is estimated to be 12.59 percent without ER credits, and from 14.75 percent to 16.86 percent with ER credits.[22] Capital investments will be

recovered in a period of six years without ER credits and only five years with ER credits. The proponent argues that the project's financial viability is good and CDM is an added incentive for the management of San Miguel Corporation not to be complacent with its present wastewater treatment system and to undertake this climate change friendly project. The above IRR estimates assume a project financing that combines equity (35 percent) and commercial loans (65 percent); hence, the project will not require any public financing support. The project falls under the small-size CDM category and the Project Design Document has been prepared in accordance with the simplified modalities and procedures for small-size CDM.

On-site Energy Supply System in Filinvest Corporate City in Alabang. The project will provide a stable supply of electricity in this Information Technology (IT) Park through in-house natural gas-based power generation facilities and NaS (sodium sulfur) cells developed by the Tokyo Electric Power Corporation. Because the pipeline of the newly discovered Philippine Malampaya Gasfield passes through the project site, the project intends to utilize natural gas from the Malampaya reservoir; it can then serve as a pilot project for the utilization of natural gas in the Philippines. The utilization of exhaust heat for cooling (co-generation system) will enhance energy efficiency. With the increased efficiency in energy use and the avoidance of energy loss from transmission, power cost in the area is expected to be reduced. As a private infrastructure project with capital to be sourced mainly from the Japanese partner, the project would qualify for JBIC's overseas investment loans. The project proponent intends to tap JBIC's low interest loan for CDM investments as well as CDM subsidies for equipment from METI and MOE.

OISCA's Children's Forest Program. Carried out by Organization for Industrial, Spiritual and Cultural Advancement (OISCA)-International in the Philippines since 1991, the Children's Forest Program involves the planting of trees, specifically mahogany and gmelina, in yards and reforestation areas adjacent to elementary and high schools in the Philippines. As of 2002, there were 972 school participants in the program. The GEC CDM feasibility study grant was used to estimate the GHG reduction potential of the program as well as the require-

ments and costs of monitoring activities essential for CDM certification. The program was estimated to generate ER credits of 3,356.5 tCO2 from 1991 to 2009 from a total reforestation area of 1,198.3 hectares. As the program involves several small-scale reforestation projects with nonprofessionals in the field—namely, students, teachers, parents, and occasionally Japanese volunteers—as main participants, the total cost of implementing the program as a CDM project (monitoring costs for CDM credits included) would amount to US$1.3 million or US$390/tCO2 of emission reduction. Although this figure is way above the prevailing ER credit market price of US$5 to US$10, the OISCA intends to continue to develop the Project Design Document to obtain CDM certification. The plan is to distribute the ER credits to the program donors as a symbol of their contribution to global warming efforts.

The above sample of details of the proposed Japan CDM projects in the Philippines reveals the priorities and concerns of the Japanese investors and illustrates some of the issues that will be discussed in the next section.

Japan-Philippines CDM Collaboration: Issues and Problems

Japan Investment Model-Oriented CDM Policies

There are two models of CDM involvement by Annex 1 countries, the investment model and the commodity model. In the investment model, the entity which requires ER credits takes part in the CDM project in the developing country as an investor, a provider of capital. The Annex 1 country entity develops and undertakes the project and earns ER credits as part of the returns to its investments. In the commodity model, the Annex 1 country entity in need of ER credits buys them from CDM project developers and implementers without taking part in the project. In the investment model the recipients of ER credits provide upfront financing for the project, while in the commodity model payments for ER credits only add to the project's cash flow.

Japan appears to be following the investment approach, and public support mechanisms to encourage private investments in CDM projects are already in place. There are three main reasons why Japan's private sector should take the lead role in meeting the country's Kyoto Proto-

col commitments. One, the protocol requires that funds to be used for CDM projects should be treated as additional to ODA so as to avoid the crowding out of other development programs in the host developing countries by CDM projects. Two, Japan's current critical fiscal position limits the government's capacity to provide funds in excess of existing ODA commitments, and CDM projects will therefore need to rely on private funds. And, three, clean and efficient technologies that are required in CDM projects are largely owned by the private sector.

As a first step to motivate the private sector to take on the role, the Japanese government, through METI's NEDO and MOE's GEC, started in 1999 to provide funds for private entities to undertake CDM feasibility studies. The CDM projects involve higher transaction costs and risks. The preparation of the Project Design Document and the setting up of ER monitoring systems alone involve substantial additional costs that can easily discourage private companies. The feasibility study grants were expected not only to produce the Project Design Document and a portfolio of potential CDM projects; the Japanese government also intended to draw from the study reports the necessary and appropriate policy instruments to support comparatively less lucrative projects.

The JBIC's special CDM loan packages, and METI's and MOE's CDM equipment subsidies offered since 2003 appear to have stemmed from the findings and recommendations of completed feasibility studies. Remarkably, these CDM investment incentives were put in place ahead of other climate change policy frameworks. Until August 2004, for instance, the Japanese government is yet to finalize plans for its emissions trading system. Presumably, Japan is banking on the private sector voluntarily generating ER credits through CDM projects subsidized by the government to meet its Kyoto Protocol commitments.

CDM Investment Approach and the Philippine Setting

There are several advantages in having an Annex 1 country entity involved in the CDM project as an investor. One, it provides upfront financing for CDM projects. Two, the dependence of the project survival on the carbon market, the so-called ER certification risk, is reduced. The project also becomes less sensitive to fluctuations in the ER credit price. Three, the experience, financial capacity, and credit worthiness of the

Annex 1 country investor raises the viability of the project and the potential for ER certification. Four, the transfer of not only clean technologies but management systems as well can take place. Furthermore, in the specific case of a Japanese investor, access to Japan's special CDM loans and equipment subsidies can greatly enhance the financial viability of the project.

Despite its merits, Japan's investment approach to CDM raises concerns for the Philippines.[23] Promoted as a foreign direct investment vehicle, CDM projects, especially in energy-related sectors, are governed by the same pull factors involved in any foreign direct investment. Tecson (2003) suggests that the relatively low position of the Philippines in the list of Japanese investors' preferred investment sites in Asia is due to concerns about government policies on foreign direct investments, sociopolitical uncertainties, and currency instability. The study on Philippines-Japan economic relations by Palanca-Tan (2003) likewise reveals trends and patterns close to those discussed in the section on Japan's CDM Projects and Plans in the Philippines. As in the usual case of direct investment projects, the Philippines lags behind its neighboring Southeast Asian competitors—Indonesia, Thailand, and Malaysia—in attracting CDM projects. The weak enthusiasm and interest of Japanese CDM project proponents and Japanese businesses in general in the Philippines may be attributed primarily to the country risk factor: the country's political and economic uncertainties, peace-and-order situation, and bureaucratic red tape. The extensive host country situationer covering history, sociocultural data, economic indicators, peace and order conditions, terrorism, economic policies, environmental conditions and policies, foreign relations, and so on in the CDM feasibility studies is notable. The completed CDM studies for the Philippines, for instance, report details on such matters as the resources of the Philippine military force, U.S. military support to the Philippines, military attacks on Muslim terrorists, and meetings of key government figures. In view of the country risk factor, Thailand and Malaysia may always come before the Philippines in Japan's list of country partners. Despite political and economic crises in Indonesia similar to those in the Philippines, Indonesia remains a priority investment partner for

Japan as a strong postwar trade and investment relations between the two had long been established with Japan's dependence on Indonesia's oil, forest, and other resources. These Southeast Asian competitors of the Philippines have also been more responsive to the requirements of Japanese investors. For instance, they have developed a bigger pool of Japanese language proficient workforce and they allow some forms of landownership by foreigners.[24] The military regime in Myanmar and the communist government of Vietnam are also perceived by Japanese investors to be more business-friendly than the never-ending power struggle among political parties and personalities in the Philippines. It may be expected, therefore, that with Japan's investment-style CDM projects global warming collaborative efforts between Japan and the Philippines may be substantially limited.

A more pressing issue with investment-style CDM is the emphasis on the profit motive that can dislodge equity considerations—an important component of a country's sustainable development to which CDM adheres. The four NEDO-funded CDM feasibility studies for the Philippines all involve the biggest and most established corporations in the Philippines, half of them being multinationals. The gross emphasis and extensive discussion on the capital base and the political clout of the hosting Philippine corporations only underscore the absence of consideration for the equity criterion. A number of equity questions can be raised on the proposed projects. Does the global climate-friendly nature of the capital expenditure of a multinational corporation justify the use of infrastructure development funds? Must providing cheaper and more stable energy supply to an area occupied by the most affluent in the country be prioritized?

Conclusion

Japan's investment-style CDM offers a solution to the financing problems of Philippine CDM projects. However, it will require some effort on the part of the Philippines to attract these CDM investments and to give the appropriate signals on the kinds of CDM projects that are most in line with its sustainable development path. This entails three tasks.

First, apart from the longstanding need to address its problems of political and economic instability, poor peace and order condition, bureaucratic red tape, and insufficient infrastructure, the Philippines must be able to demonstrate that it is ready to accommodate and facilitate the added procedural requirements of CDM projects. Hence, the setting-up of the Philippine DNA and CDM approval process must be finalized and pilot projects started soonest.

Second, afforestation and reforestation projects, waste-to-energy projects, and development of renewable energy infrastructure for the still unlighted rural areas in the country must be prioritized.[25] The very weak or even absent "trickle-down" effect in the Philippine economy necessitates that projects target the majority poor as direct beneficiaries. Use of ODA funds for these types of CDM projects that are consistent with the equity objective may even be justified.

And, third, the readiness of the Philippines to host CDM projects and its priorities must be communicated well to the concerned parties in Japan—the supporting government agencies of MOE-GEC and METI-NEDO, and the private Japanese CDM investors specifically. The Philippines must be proactive in presenting potential projects to Japan. The DOE and DENR can send CDM missions to Japan as they have done in Europe. An easier route is to coordinate with the Philippine diplomatic mission in Japan, the economic section of which can help provide information and introductions, promote the Philippine portfolio of projects, and link and facilitate negotiations between interested Japanese entities and qualified Philippine CDM project proponents.

Collaboration and reinforcement from the side of Japan are as important. The Japanese government must see to it that Japan remains faithful to the spirit and one of the two basic objectives of CDM—to assist developing countries in achieving sustainable development. Thus, it must make sure that CDM endeavors of its private sector are not confined to purely business considerations. To do so, it must intensify efforts to promote less profitable CDM projects by means of direct incentives, such as subsidies and loans, and market-based instruments such as ER credit insurance. Particularly for the Philippine CDM, Japan may also be requested to undertake promotion programs where Japan and its private sector can communicate their sectoral and technological priorities. Fur-

ther, as Japanese CDM players will also benefit from well-established CDM institutions and structures in the Philippines, a more active Japanese participation and assistance in CDM capacity building in developing countries, particularly the Philippines, may be desired.

Notes

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Abbreviations of specialist terms

ALGAS	Asia Least-cost Greenhouse Gas Abatement Strategy
CCIC	National Climate Change Information Center, IACCC
CER	carbon emission reduction
CDM	Clean Development Mechanism in the Kyoto Protocol
CD4CDM	Capacity Development for CDM, Philippines
COP	Conference of the Parties, UNFCCC
CO2e	Carbon dioxide equivalent
DENR	Department of Environment and Natural Resources, Philippines
DNA	Designated National Authority
DOE	Department of Energy, Philippines
EMB	Environment Management Bureau, DENR
ET	Emissions Trading, in the Kyoto Protocol
EUETS	European Union Emissions Trading Scheme
GEC	Global Environment Centre, MOE
GHGs	Greenhouse gasses
IACCC	Inter-Agency Committee on Climate Change, Philippines
IGES	Institute for Global Environmental Studies, Japan
INC	Intergovernmental Negotiating Committee
IPCC	Intergovernmental Panel on Climate Change
IRR	internal rate of return
JBIC	Japan Bank for International Cooperation
JI	Joint Implementation, in the Kyoto Protocol
METI	Ministry of Economy, Trade and Industry, Japan
MOE	Ministry of Environment, Japan
NEDO	New Energy and Industrial Technology Development Organization, Japan
OISCA	Organization for Industrial, Spiritual and Cultural Advancement
PDD	Project Design Document
PREGA	Promotion of Renewable Energy, Efficiency and GHG Abatement, Netherlands

UNEP United Nations Environment Programme
UNFCCC United Nations Framework Convention on Climate Change
WMO World Meteorological Organization

1. Stock pollutants accumulate as opposed to flow pollutants that come and go.

2. Photosynthesis is the transformation of CO2 and water into plant matter (carbohydrates) and oxygen.

3. The United States, however, disagrees with exempting developing countries from ER requirements and maintains the position that "meaningful participation" of developing giants like China and India is critical to achieving the goals of the Kyoto Protocol. Nordhaus and Boyer (1999) estimate the net global cost of the Kyoto Protocol at US$716 billion and indicate that, should the U.S. ratify the treaty, it would bear two-thirds of this cost. The authors argue that, while Annex 1 countries carry the full burden of emission reduction, non-Annex 1 countries reap undeserved benefits. They estimate the value of these benefits relative to costs at 1:7, concluding that the emission strategy prescribed by the Kyoto Protocol (as of the fourth session of the COP in 1998) is highly inefficient. Global temperature reduction will be achieved at a cost almost eight times the cost of a more efficient strategy of allowing free emission trading among all countries, all legally bound to reduce emissions. The U.S. Senate passed a resolution that the U.S. would not be a party to any agreement on ER unless developing countries are also subject to binding targets. Although the U.S. under the Clinton administration signed the Kyoto Protocol in 1998, it had not ratified the protocol and is unlikely to do so.

4. There was much debate among key players about the flexibility mechanisms. The Kyoto Protocol stipulates that ER trading be supplemental to domestic actions to ensure that countries emitting high levels of GHGs actually take steps to curb emissions from their "dirty" industries and not simply purchase credits from "cleaner" countries to meet their protocol commitments. However, the question as to what extent an Annex 1 country can use the flexibility mechanisms to meet its target became a major issue. Led by the European Union, some countries insisted that there should be quantitative limits, which was opposed by the U.S. as well as New Zealand, Japan, Canada, and Australia. In the second meeting of the sixth session of the COP (COP6) in 2001, where the flexibility mechanisms were finally accepted, it was agreed that no quantitative limits would be set to the amount of credits a country could claim through the flexibility mechanisms. In spite of this agreement, the U.S. opted to completely turn its back on the Kyoto Protocol and pursue an independent course of action.

5. To aggregate emissions from the six greenhouse gasses (CO2, CH4, N2O, HFCs, PFCs, SF6), CO2e (carbon dioxide equivalent) is used as the common unit.

6. There was likewise much disagreement over how forest management and

land use could be counted in meeting Kyoto Protocol obligations. In principle, the protocol accepts that a nation's forest, its management under the status quo as well as all reforestation and afforestation may be included in GHG emissions accounting and reduction. During the COP6, the U.S. proposed to also include soil carbon sequestration and vegetation. Opposition to the U.S. proposal highlighted the difficulty of accurately measuring the absorption and release of carbon from these sinks. The U.S. made a series of measurement proposals, which the European Union vehemently opposed due to the fear that countries with extensive forest cover like the U.S. would receive too many carbon credits without effort to reduce actual emissions. As expected, estimates made by the U.S. show that, should the U.S. proposal be accepted, U.S. credits from forest as carbon sinks would amount to a substantial one-fifth of its supposed Kyoto Protocol obligations for 2008–2012 (Fletcher 2004).

7. The relevance of CDM funds in forestry projects of developing countries has also been contested as it may have a number of drawbacks—the neglect of social concerns and the full range of goods and services of the forest, the cost of subsidizing unprofitable forestry activities, and the risk of "leakage" of ER to areas outside project boundaries (moving deforestation to other areas). Smith et al. (2000) conclude that, as cost-effectiveness of forestry projects relative to energy sector projects are turning out to be overestimated and as forests are unlikely to be conserved for periods as long as the residency time of carbon in the atmosphere and considering political realities and investor priorities, CDM funding for tropical forests is likely to be only an intermediate climate change mitigation strategy for buying time, until more permanent options become available.

8. In Maruyama (1999), 37 feasibility studies were reported to be adopted out of 104 applications, with a grant amount of less than ¥80 million per study and a total budget of ¥2.9 billion. This meant an average grant amount of ¥78 million, roughly equivalent to US$709 thousand or P40 million.

9. A total amount of ¥10 billion (about US$96 million) is expected to be raised.

10. Equivalent to US$17.27 million or P950 million.

11. Equivalent to US$2.73 million or P150 million.

12. On 20 April 2004, the European Parliament approved a directive that allows entities under EUETS to use ER credits from CDM and JI projects against their targets under certain conditions. As the older United Kingdom (UK) Trading System shall have merged with EUETS when EUETS starts operating on 1 January 2005, the directive also covers those in the UK System from 2005.

13. Less than 50,000 tons of CO_2e.

14. Product brand promotion and sense of social responsibility are some objectives for participation in the carbon market by these companies.

15. The lower bound of the range, 5 percent, corresponds to the "with measures" projection, while the upper bound 20 percent corresponds to the "with additional measures" projection.

16. In this case, the lower bound, 180 million tons CO2e corresponds to the "with additional measures" projection, while the upper bound 680 million tons CO2e corresponds to the "with measures" projection.

17. These government agencies are the DENR, DOST, DOE, the Department of Foreign Affairs (DFA), Department of Trade-Board of Investments (DOT-BOI), Department of Transport and Communications (DOTC), National Economic and Development Authority (NEDA), Department of Public Works and Highways (DPWH), the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA), and DENR's Forest Management Bureau (FMB).

18. Inventory of 1994 GHG emission levels.

19. The ALGAS project was executed in eleven other Asian countries: Bangladesh, China, India, Indonesia, Mongolia, Myanmar, North Korea, Pakistan, South Korea, Thailand, and Vietnam.

20. This is a potential problem for all combustion system technologies and most other energy saving technologies in which depreciation and obsolescence limit the project life to 15 to 20 years.

21. As discussed earlier, JBIC started to offer lower interest rates for overseas investment loans to Japanese companies undertaking CDM projects.

22. The lower rate corresponds to an ER credit price of US$5/tCO2 and the higher rate, US$10/tCO2.

23. These concerns may appear in other developing CDM host countries as well.

24. Landownership by foreigners is generally unlimited in Malaysia, limited to industrial land in Thailand, and limited to buildings in Indonesia (Tecson 2003, 453, table 1). In the ongoing negotiations for the Japan-Philippines Economic Partnership Agreement, landownership by foreigners tops the "wish list" of the Japanese government for the Philippines government (Palanca-Tan 2004).

25. Quite a number of these types of projects were also proposed by Japanese entities for other host countries such as Indonesia.

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