Chapter 4 China-Japan CDM: Realizing Regional Environmental Benefit?

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Summary

Recently, the Japanese government and entities have become more active in locating profitable CDM projects all over the world. China has revised its skeptical attitude toward the CDM and has become more active. This change has prompted Japanese entities to invest in several CDM projects in China.

However, few CDM projects have been implemented at thermal power plants in China despite the large mitigation potential for local and transboundary environmental damage. This chapter explores how financial aspects discourage investment in such CDM projects. The main findings are as follows: (a) Japanese entities exclusively pursue the cost-effective acquisition of certified emission reductions (CERs) through the CDM, and they take sustainable development impacts into consideration only as far as to get local people to accept the project; (b) CDM-specific risks, additionality and non-commercialized requirements, and China's CDM rules raise perceived credit risks to lenders which makes it difficult for project developers to secure a financial package for large-scale, long-term CDM projects such as thermal power CDM projects; (c) China's restrictive foreign direct investment (FDI) policy in the power sector, coupled with a less transparent approval process for project finance, forces foreign developers to finance by equity or private commercial loans with less favorable terms of conditions, which leads to investment in small-scale coal-fired thermal power plants that are banned under the recent SO2 emissions control policy in China; and (d) recent SO2 emissions control policy on flue-gas desulfurization (FGD) installation discourages energy-efficiency and fuel conversion at coal-fired power plants, which have large mitigation impacts on transboundary acid rain.

Key words

Investment decision, Financing, CDM risk, CDM policy, Guideline

4-1 Introduction

Previous research has found that the Kyoto mechanisms significantly lower the costs of achieving Kyoto Protocol commitments. Among the Kyoto mechanisms, CDM is estimated to generate the largest emission reduction traded in the market: estimates range from a 55% to 77% share and between US$3,212 and US$21,208 in value (Janssen, 2003).

As seen later in Chapter 5, a huge difference in marginal abatement cost of GHGs exists between China and Japan. This implies that Japanese entities can potentially save on GHG reduction costs by implementing CDM projects in China. In addition, China became less skeptical and more receptive as the structure of the mechanisms evolved, and its understanding of the mechanisms and their potential benefits to China became clear (Zhang, 2003). It perceives the CDM as a means for attaining economic and diplomatic goals. With technical assistance from aid donors, China has developed capacity to manage the CDM[1]. It officially published "Measures for Operation and Management of Clean Development Mechanism Projects in China" in 2005, and held international seminars to attract foreign investors and purchasers of certified emissions reductions (CERs). This measure makes transparent the procedure for foreign firms to enter into CDM projects in China.

These advances create latitude for designing CDM projects that can reduce not only GHG emissions but also acid deposition, thus reducing damage to local and regional environments and health. In fact, several GHG reduction projects have accorded health benefits in China (Aunan et al., 2004; Wang and Smith, 1999). This ancillary benefit will materialize as long as both the Chinese government and Japanese entities have a strong incentive to choose CDM projects in the project selection and approval process.

In reality, however, both the Chinese government and Japanese entities have taken little, if any, notice of the impacts on transboundary air pollution and acid rain problems when deciding the type and location of CDM projects. Up to November 2008, the CDM Executive Board (CDM-EB) had approved 53 CDM projects that Japanese entities have committed to in China. Small hydropower has the highest number (22 projects), followed by wind power (10), and waste gas/heat utilization (7) (Table 4-1). By contrast, there are only 3 projects that target coal-fired thermal power plants: 2 for waste gas/heat utilization and 1 fuel switching project, which are implemented in Shangxi, Inner-Mongolia and Anfui provinces. Other waste gas/heat utilization projects are implemented at iron and steel, and chemical plants, but are located in Chongqing, Shaanxi and Hunan provinces and have little impact on region-wide acid rain. The amount of CERs increased rapidly in 2005 because several HFC-23 reduction projects were approved (Figure 4-1).

Another 111 CDM projects that Japanese entities have committed to in China, and which the Chinese government has approved, are waiting for the approval of the CDM-EB. Only 4 among them, however, are projects to be implemented at thermal power plants: 3 for fuel switching and 1 for waste gas/heat utilization. Other waste gas/heat utilization projects are implemented at iron and steel and cement plants, but they are mostly located in coastal areas in Shanxi, Shandong, Jinagsu, Hebei, and Zhengjiang provinces.

Why have Japanese entities committed to, and the Chinese government approved, so few CDM projects that will reduce transboundary air pollution and acid rain problems? This chapter explores the institutional and economic factors involved.

4-2 Incentives for Japanese entities

Japanese entities have had little incentive to implement CDM projects for three main reasons: (1) perceived higher risk and lower returns, (2) no legally binding targets for GHG emissions reductions to Japanese entities, and (3) China's rejection of the idea of Joint Implementation (JI) and skepticism about Activities Jointly Implemented (AIJ).

Since 2005, these reasons have been mitigated or eliminated. Firstly, the Kyoto Protocol came into effect in February 2005, and Japan could no longer make excuses for non-compliance. Assuming that GHG emissions from the transport and household sectors continue to increase, the Japanese government and Japanese entities will be hard pressed to reach their own GHG reduction targets, even though the targets are not legally binding. In addition, the risk that CERs the investors obtained would be of little value after 2012 when the Kyoto Protocol is terminated. Secondly, despite NGO criticisms of high profitability without substantial contribution to sustainable development in host countries, the CDM-EB approved HFC-23 reduction and N_2O decomposition projects. This allows project developers to easily find CDM projects with a high rate of return. Thirdly, the international emission trading market has developed well, and CER prices have increased in response to the rising international crude oil price. This offers firms an opportunity to earn profits by selling CERs gained through CDM projects on the international market. Fourthly, China has become active in CDM projects, especially after unilateral CDM was approved at the Conference of Parties (COP).

These changes have persuaded Japanese entities to commit to CDM projects, but only in so far as they are a cheaper way to attain targets. Therefore, they pursue CDM projects that offer a higher rate of return with lower risk.

4-3 Barriers inherent to the CDM institution

CDM projects entail initial costs for developers, and even low-cost activities may not be paid back within a year. This is because CERs from JI and CDM projects, which adopt the baseline-and-credit or post-verification emission trading systems, may only be issued after emissions reductions have actually occurred and have been verified and certified (Janssen, 2000). Due to this time lag between cash outflow and cash inflow, it is necessary to finance GHG emission reduction activities from sources other than receipts from those activities. Projects with investments in latest technologies (that satisfy technological additionality) often generate less cash inflow than outflow for several years, thus requiring long-term financing.

To finance CDM projects from sources other than retained earnings, the financial structure should be arranged in such a way that downward risk is minimized. According to the UNEP Risoe Center on Energy, Climate and Sustainable Development (2004), the major risks that CDM projects present for stakeholders can be categorized as follows.

(1) Special risks due to the fact that a revenue stream from a CDM project relies upon a new and developing international legal framework

(2) Risks due to the fact that the project is incorporated in a developing country with certain political and regulatory uncertainties

(3) General project risks, which are common to all projects in developing and industrialized countries

4-3-1 CDM-specific risks

CDM-specific risks include the following.

(a) Kyoto Protocol regulatory risks, such as the risk that the Kyoto Protocol does not enter into force, or that a CDM project may be rejected by the CDM-EB on the basis that the project baseline does not comply with the Kyoto Protocol rules

(b) Risks derived from inaccurate carbon accounting that will result in the generation of less CERs than expected

(c) Uncertainty of CER market price that makes contracts entered into, to sell or purchase, no longer economically beneficial

(d) Community or NGO opposition risk, based on differing perspectives of the fluid concepts of "additionality" and "sustainable development"

(e) Legal title risk, that parties may not be able to establish legal title to the emission reduction on which CERs are based

To mitigate these risks, the World Bank's Prototype Carbon Fund (PCF) and the Government of the Netherlands fund entitled Certified Emission Reduction Unit Procurement Tender (CERUPT) offer a kind of grant to CDM project developers, such as a fixed unit price for a minimum amount of emission reduction that is stable for the life of the emission reduction purchase agreement (ERPA), and advance payment and purchase of a certain amount of additional emission reductions earned by a project.

These risk mitigation measures are not offered without costs. Both the PCF and CERUPT assign severe penalties if project developers fail to deliver CERs for any reason other than *force majeure*. Such stringent penalties prevent project developers from breaching the ERPA when the market price for CERs becomes much higher than the price under the existing contract. Thus, project developers cannot escape from uncertainty over the quantity of CERs and regulatory risks.

In China, three projects were developed or were in preparation under the PCF and CERUPT by May 2004. The Inner Mongolia Huitengxile Wind Farm Development Project was awarded a CDM project contract by the Netherlands. The Coal-bed Methane Project and the Xiaogushan Run-of-river Hydropower Project were in preparation with investment from the PCF (Zhang, 2004). Among them, the later project was partly financed by the Asian Development Bank (ADB) (Table 4-2). The ADB provided US$35 million of concessional loans for the purpose of rural electrification through clean energy[2]. Although the ADB did not intend to finance the CDM project at the outset, it helped to secure a financial package for it. In other words, the project may not have obtained sufficient financial resources without the ADB's assistance.

The Japanese government also set up several measures for helping Japanese project developers to prepare and implement CDM projects. The Japanese government provides two risk mitigation measures as indicated above: a fixed unit price under ERPA, and advance payment for feasibility studies and validation. Instead of purchase assurance of additional emission reductions, the Japan Carbon Fund (JCF) provides technical support in preparing project design documents (PDDs) and upfront payment of CERs, even before project developers finish validation registration. In addition, the Japan Bank for International Cooperation (JBIC) offers export credit, and Nippon Export and Investment Insurance (NEXI) provides export insurance. The motives behind these actions are the increasing demands for CERs on the part of the Japanese government and firms who want to purchase CERs at cheaper prices. Because all but the JCF are government institutions, and the JCF was sponsored by government financial institutions and major Japanese entities, the Japan Kyoto Mechanisms Acceleration Program, which is composed of all of these institutions, has a mission to purchase as many CERs, and as cheaply, as possible.

In sum, carbon investment funds have the potential to diversify away some risks, such as CER price risk, associated with investments in activities that aim to result in marketable emission permits. However, they cannot cover the risk of actual quantity of emissions reductions or regulatory risks. This remains a barrier to the financing of CDM projects by private financial institutions. Financial support from international development institutions such as the ADB, export credit agencies, and export insurance agencies will also mitigate risks and financial constraints on CDM projects, and improve the chances for project developers to secure financing. However, project developers do not always obtain finance from such large institutions.

4-3-2 Additionality and non-commercialized requirements

Additionality requirements of the CDM forces projects to take place in situations where there are legal and regulatory restrictions and low internal rates of return, or where the technology adopted is not yet commercialized or has not been applied in the region. Thermal power is one of the hardest subsectors to prove additionality and commercial unviability, both of which are basic requirement to be approved at the CDM Executive Board. As in the OECD's Helsinki package that harmonizes terms of conditions of export credit, thermal power is regarded as commercially viable, and tied aid is therefore banned, even for FGD installation, while renewable and hydropower plants are regarded as commercially unviable (Shiroyama, 2007). Partly reflecting this decision, and alongside an international anti-coal movement, it was not until 2007 that the CDM Executive Board approved a methodology for energy efficiency.

This requirement, together with new and complex procedures, increases the risk profile for undertaking CDM projects in comparison to other types of projects. This makes it difficult to obtain sufficient financial resources from investors and financial institutions. It may also deter investment in CDM projects that require a large amount of investment and long payoff period, including construction and operation of infrastructure projects related to energy, transportation, or urban utilities sectors.

Such projects incur huge initial investment costs while returns depend on profitability over the long run. As project size increases, and as host country governments endeavor to develop many projects at one time, project developers cannot secure financing solely by means of retained earnings and/or corporate finance. Accordingly, they finance it through equity and a significant share of debt. On average, debt accounts for 60-70% of financing (Bellier and Zhou, 2002). However, most projects have suffered from insufficient financing because domestic financial systems are not well developed and are not credible enough to provide long-term project-based loans. This experience implies that project developers of infrastructure CDM projects are likely to face the same, or more, difficulties in securing a financial package, as not much progress has been seen in the availability and credibility of long-term financing. In addition, financial institutions will not receive CERs generated from the CDM; their sources of profits come solely from loan repayment.

Insufficient availability of long-term debt financing has driven project developers into projects that can recover costs within a short period of time, such as HFC-23 reduction and N_2O decomposition. These types of projects have an advantage in fund raising in that they employ proven technologies, emission reductions are easy to verify, and they attract huge amounts of CERs, and thus are expected to generate substantial profits with low risks. Financial institutions do not perceive these projects as high risk and are prepared to provide long-term corporate finance to project developers. By contrast, financial institutions are unwilling to provide long-term finance on the same favorable terms of conditions to developers of CDM projects where profits can only be expected after a long generation period and/or while utilizing latest technologies, unless governments are willing to offer measures that mitigate the risks and/or provide preferential treatment specific to these types of CDM projects.

4-4 Barriers accrue to policies in China

4-4-1 CDM policy

The Chinese government stipulated “Measures for Operation and Management of Clean Development Mechanism Projects in China” so that it can retain effective control over CDM projects. Thus, it has many provisions that are unfavorable to foreign entities. It requires that a project developer shall be a wholly China-owned or China-controlled enterprise, and that a foreign entity join a CDM project as a minor partner of the project developer and should transfer environmentally sound technology, bring up-front investment to overcome credit constraints in China, and purchase CERs to secure returns from the investment.

This measure also has a sectoral bias. It imposes a special levy of 65% of the CER transfer benefit from CDM projects involving emissions reductions of HFC-23, SF_6 and perfluorocarbons (PFCs), and 30% from those of N_2O decomposition. On the other hand, a 2% levy is applied to projects in four priority areas—energy efficiency, renewable energy, methane capture and energy utilization, and coal-bed methane—as well as forestry and small-scale projects.

Nonetheless, China accepted eighteen N_2O decomposition projects and 10 HFC-23 reduction projects and will generate 4.4 million tons of CERs by 2012 (Table 4-3). Japanese entities committed to two N_2O decomposition projects and eight HFC-23 reduction projects. This implies higher levies cannot completely offset the rate of return on these projects and has not discouraged foreign investors.

Among the priority areas, a large number of CDM projects are implemented except in energy efficiency. The CDM-EB has approved a hundred twenty-eight small hydropower, eighty-seven renewable energy, thirty-three waste gas and heat recovery, and twenty four methane recovery, while only nine fuel conversion projects. Considering that the Chinese government regards small hydropower as renewable energy, this measure resulted in directing CDM projects toward renewable energy[3].

It should be noted, however, that the Chinese government is cautious about large-scale CDM projects that connect to the main transmission lines to sell generated power to the grid, including wind power. The Trial Measures for Renewable Energy Power Generation Pricing and Cost Sharing of 2006 stipulate that the power-purchasing price of wind power is to be determined by competitive bidding, while that of biomass and solar power is set by the government. This implies that the government guarantees a certain rate of return to biomass and solar power generators, while the internal rate of return of wind power generation is shrinking. Recent bidding results show the power purchasing price of wind power has dropped from RMB 0.7-0.8/ kWh to 0.563 kWh on average, which turned profit from wind power generators negative (Wang, 2006). This will discourage project developers from investing in wind power generation. In addition, it is quite uncertain whether local electric power companies will allow non-local power generators to connect to the local grid at the price that the central government determines. From this it can be inferred why most renewable energy CDM projects that have been registered are concentrated on wind power and small hydropower, which do not have to sell their power to the grid, or methane capture at solid waste landfill sites and coal mining, which do not require transforming into electric power.

In sum, China's CDM policy has directed investment towards the types of CDM projects that can gain large amount of CERs with low commercial risks (N_2O decomposition, HFC-23 reduction and coal-bed methane), that employ conventional or proven technology to develop energy supply capacity (small hydropower and cement), and that reduce energy poverty and accelerate coal substitution and reduction (wind power).

4-4-2 Policy on foreign participation in the power sector

In China, most power plant investment was traditionally financed by the government, state-owned banks, and by the power plants themselves. Under the planned economy (before 1978), financing for the development of the power industry came mostly from allocation of government funds. The share of central government expenditure was the largest (55%), followed by state-owned banks (25%) and self-finance (10%) (Murray, Reinhardt, and Vietor, 1998). There were no conditions for repayment of capital or interest, but the Ministry of Electric Power collected all profits from the power plants. Because depreciation for accounting purposes was ignored and electricity prices remained low, the Ministry of Electric Power recovered only a part of the operational costs.

During the period of transformation (1979-1997), financing sources were diversified so that the capacity of power generation capacity was rapidly increased. The share of central government expenditure dropped and that of self-finance rose in the 1980s (Murray, Reinhardt and Vietor, 1998). The share of state-owned banks increased because the government replaced grants with loans for financing electric power projects, and implemented a policy that sought external funds for power plant development (Figure 4-2). This implies that the power industry took advantage of bank loans to develop generation capacity. However, their share did not increase much because the Ministry of Electric Power intervened in the allocation of capital, and no policy existed for repayment of loans provided by banks and investors (Yao, Li and Jiang, 2003)[4].

In order to reduce chronic electricity shortages, enhance productivity of Chinese power plants, and supplement the required financial resources, the Chinese government decided to open up power generation to foreign direct investment (FDI) in the early 1990s. It has succeeded in developing 77 projects worth US$27 billion in the power sector during 1990-2000 (Bellier and Zhou, 2002). The projects are concentrated mostly in Guandong, Jiangsu and Anhui, but some are implemented in regions other than the Northeast and Southwest.

Most of China's power projects involving private participation have been carried out through joint ventures between foreign investors and power companies owned by local governments. Recently, some of the largest projects have been implemented using the Build-Operate-Transfer (BOT) model, with the project company being either a joint venture or wholly foreign-owned enterprise.

There are two reasons foreign investors have preferred joint ventures over other types of investment. First, joint ventures enable the Chinese government to retain significant control over projects. Due to fears of foreign exchange outflow and inflation, by 1995 the Chinese government had not approved any foreign direct investments in the power sector where the foreign share exceeded 50%. Second, foreign investors could expect their Chinese partners to help build consensus on projects among local and state organizations, reducing legal and regulatory risks. The local partner was often seen as a safeguard against unfavorable price reviews, dispatch risk, or both. Foreign investors generally facilitated intangible but critical political alliances as well as more secure access to scarce inputs like fuel, foreign exchange and expertise. Foreign firms undertaking cooperative joint ventures usually did so with local power bureaus or other local governmental authorities. It enabled them to obtain favorable contract terms but to limit legal recourse in cases of contract breach such as purchase contracts and fuel supply contracts with Chinese counterparts (Blackman and Wu, 1999).

Foreign lenders, on the other hand, perceived excessive credit risk among their Chinese counterparts, many of them being quasi-government entities or recent corporate spin-offs of government entities, of which there was almost no information regarding financial viability. As a substitute, support letters were sought from governments to ensure that the counterparts would meet their contract obligations. These support letters were not legally enforceable and became of little value when the International Trust and Investment Corporations (ITICs) went bankrupt. At that time, the government refused bail out requests from international lenders. With a lack of creditworthy counterparts, foreign lenders will impose more stringent requirements for security on a project, including securities on project assets and contract rights. However, creating and enforcing such securities is not easy for lenders (Bellier and Zhou, 2002).

Furthermore, foreign lenders have no way to counter their perceived higher credit risks. The government has no well-defined policy towards foreign investments. The complicated approval process is not transparent; investors have to negotiate with various levels and sectors of the government which takes a long time and increases project risks. The State Planning Commission stopped approving projects with rates of return in excess of 12% in 1993, and later 15%, so that foreign investors would not make what the government saw as unwarranted gains from China's need for energy (Murray, Reinhardt and Vietor, 1998). Foreign lenders, especially those that provided loans for project finance, considered the profit caps to be inconsistent with their perceived higher risks, and lost interest in the projects. Instead they had incentive to invest in small-scale projects that did not need government approval, most of which were less energy efficient (Blackman and Wu, 1999).

As a result, even joint ventures had to finance power projects through equity or less favorable private commercial loans. Recently, a growing number of investors have applied the BOT model to project finance. However, most of them have relied heavily either on international public debt financing or on export credits from the investors' countries. The number of projects that have obtained export credits is quite limited since export credit is accessible only by large-size well-established foreign firms in industrialized countries.

The Chinese government modified the regulations relating to the foreign financing of infrastructure development in the latter half of the 1990s. The Project Financing Measures issued in 1997 aimed at standardizing the approach to international project financing. However, the approval process was still not transparent, reflecting government concerns about important issues typically involved in large-scale infrastructure projects, such as large capital investments, foreign exchange obligations, potential impact on domestic inflation, and possible exposure of state entities to risks through foreign debt guarantees. Although several municipalities published bylaws regarding the framework, way of participation, selection process and cost burden rules for foreign investors in infrastructure projects in an attempt to attract foreign investment in urban infrastructure projects, still the number of BOT type large thermal power generation projects decreased in the 2000s.

An exception is renewable energy. To combat serious power shortages, improve energy infrastructure, diversify energy supplies, safeguard energy security, and protect the environment, the government enacted "The Renewable Energy Law of People's Republic of China" in 2006. This act requires the energy authorities of State Councils to set mid- and long-term targets for the development and utilization, and total volume of renewable energy at the national level, and to make their opinions public before approval by the State Council. It also describes several measures by the government to support and encourage renewable energy, including development guidance catalogs, publication of technical standards, announcement of conditions for entry into grid-connected power network, gas and heat pipeline networks, establishment of a renewable energy development fund to provide financial support for scientific and technological research, and renewable energy use projects in rural and remote areas. Financial institutions may offer preferential loans for renewable energy development and utilization projects that are listed in the national renewable energy industrial development guidance catalog and conform to the conditions for granting loans.

In response, the State Development and Reform Committee (SDRC) made a draft "Mid- and Long-term Renewable Energy Development Plan" in 2005, and set a target share for renewable energy of 30% by 2020, up from 7% in 2004. To achieve this target, the government will invest RMB 1.5 trillion in development and utilization of renewable energy over the next 15 years. In addition, it will invest RMB 1 billion every year to replace the use of crude oil with methane gas in rural areas, expanding methane gas use to 24 cubic meters by 2020, from 5 cubic meters in 2004[5].

This plan served to accelerate plant construction for renewable energy that had already started, as well as scientific and technological research. Foreign and domestic firms actively invested in wind power generation from 2004, when China faced serious power shortages. To meet the goals described in the Tenth Five-year Development Plan (2002-2007), various scientific and technological research projects have been instigated and several biomass power plant projects launched.

Thus, strict government control of foreign participation in thermal power generation makes foreign lenders perceive a high credit risk among their Chinese counterparts while expecting a lower rate of return, which inhibits project developers in obtaining long-term, project-based commercial loans. As a result, project developers have to finance most of the investment from equity, export credit from the investor's own government, and short-term loans at unfavorable terms of conditions. This financial structure results in a higher weighted average cost of capital that will ultimately lead to higher tariffs.

4-4-3 SO_2 control policy

Assuming that the power sector would become the largest source of SO_2 emissions (Figure 1-3), the Chinese government adopted a new SO_2 emission regulation for thermal power plants in 2003. It required that (a) construction and expansion of coal-fired thermal power plants basically be banned in construction areas of large and medium scale cities, (b) fuel-gas desulphurization (FGD) equipment be installed when construction or expansion of coal-fired thermal power plants located in the SO_2 and acid rain control areas occurs, and (c) coal use be prohibited for small boilers in the two control zones and the use of high sulfur coal be banned in all areas. To enforce power plant compliance with this regulation, the central government, through the China Development Bank, increased subsidized loans to support construction of FGD-equipped large-size coal-fired power plants. This mandate, together with market-based FGD diffusion strategies in Germany and Austria, enabled Chinese manufacturers to mass produce cheaper but lower efficiency FGD systems, which was acceptable because the efficacy of installed FGD systems to remove SO_2 emissions was not stipulated (Horii, 2006). In this sense, this regulation is regarded as the most effective driving force for SO_2 emissions reductions in China.

However, this regulation discourages foreign participation in CDM projects at thermal power plants. Firstly, it places more severe financial constraints on foreign project developers. As examined in the previous section, China's restrictive FDI policy in the power sector, coupled with a less than transparent approval process for project finance, forces foreign developers to finance via equity or private commercial loans with less favorable terms of conditions. These financing constraints induce developers to invest in small-scale coal-fired thermal power plants, but since the new SO_2 regulation banned construction of this type of plant, less and less room remains for foreign developers to take part in thermal power plant projects.

Secondly, it in effect discriminates against thermal power plant projects that switch to low sulfur fuel, raise energy efficiency and recover and use waste gas and heat, which can reduce SO_2 and GHG emissions at the same time, and have local and regional ancillary benefits. These projects offer the Chinese government a cost-effective way of mitigating both air pollution and climate change. Nevertheless, the Chinese government has yet to take actions to correct the bias.

4-5 Conclusion

This chapter clarifies why thermal power CDM projects have been so few while N_2O decomposition and renewable energy projects are increasing in China. The main findings are as follows.

(a) Japanese entities exclusively pursue the cost-effective acquisition of CERs through the CDM. They take sustainable development impacts into consideration only as a means to get local people to accept a project.

(b) CDM specific risks, additionality and non-commercialized requirements, and China's CDM rules increase perceived credit risks to lenders making it difficult for project developers to secure a financial package for large-scale, long-term CDM projects such as thermal power CDM projects. Risk mitigation measures, such as advance payment and upfront payment through ERPA, have encouraged project developers to enter into CDM projects, but they cannot replace insufficient long-term loans.

(c) China's restrictive FDI policy in the power sector, coupled with a less than transparent approval process for project finance, forces foreign developers to finance by equity or private commercial loans with less favorable terms of conditions. This financing condition leads to investment in small-scale coal-fired thermal power plants, but these types of plants are banned under China's recent SO_2 emissions control policy. This narrows the opportunity for foreign developers to implement CDM projects at thermal power plants.

(d) Recent SO_2 emissions control policy on FGD installation discourages energy-efficiency and fuel conversion at coal-fired power plants, which can have large mitigation impacts on transboundary acid rain.

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1 Four large assistance projects focusing on capacity building for CDM projects were carried out during 2002-2004. World Bank et al., (2004) is one of the outputs of this technical assistance.

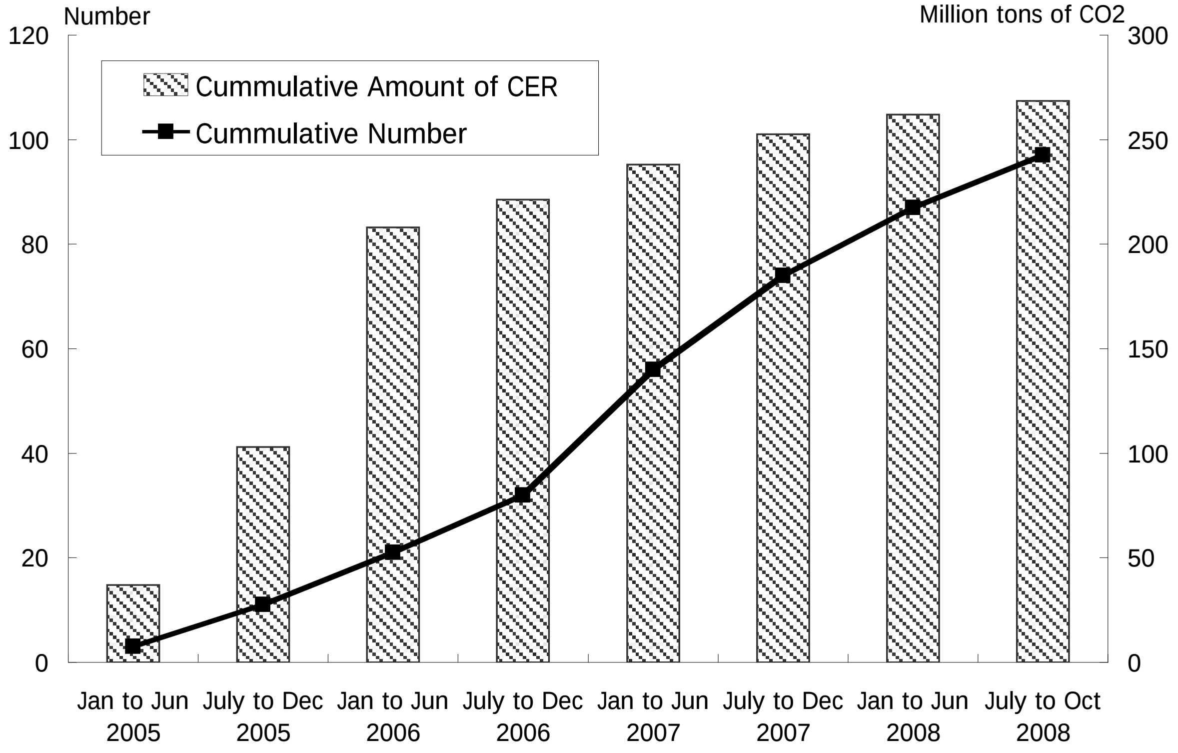
2 The terms of condition of the ADB's loan is at floating rate of 2.15% (in accordance with ADB's LIBOR-based loan facility) plus other fees, with a 24 year lending period and a 20 year of repayment period.

3 The SDRC defines "small" hydropower as having less than 50,000 kW generation capacity, as well as wind, solar, biomass, geothermal and tidal power as "renewable" energy. Behind this inclusion lies the Chinese government's expectation that small hydropower will be a prominent instrument for rural areas to utilize their own energy resources for development, thus solving serious problems in rural areas: agricultural development, rural economic development and income increase, and burden reduction for farmers. Small hydropower, so far, has provided electricity for 300 million people, especially to those who live in remote areas and rural minorities (Japan Electric Power Information Center, 2006).

4 State-owned commercial banks were reorganized as one central bank (People's Bank of China) and four state-owned commercial banks: the Industrial and Commercial Bank of China, Bank of China, People's Construction Bank of China, and Agricultural Bank of China. Even reorganized into commercial banks, the four state-owned banks have provided significant funding to government-led projects, and participated in only a few private projects (Lardy, 1998; Chen and Shih, 2004). They debited state-owned enterprises over 80% of all the outstanding loans (He, 2002).

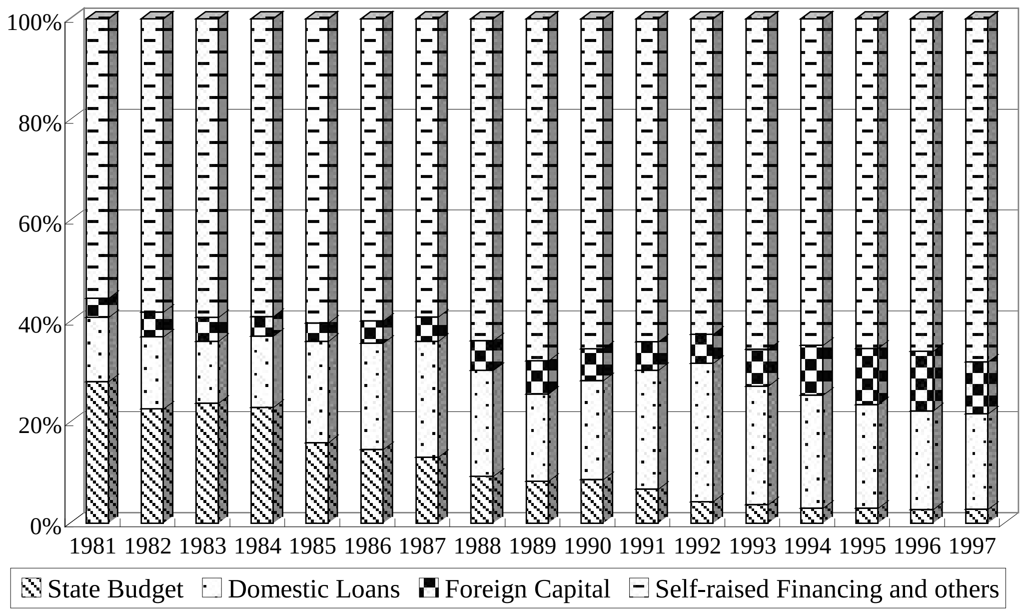
5 *Economic Times China*, November 8, 2005.

Figure 4-1 Cumulative number and amount of CER of CDM projects in Japan



Source of data: IGES (2008).

Figure 4-2 Share of Major Financing Source for Fixed Asset Investment in the Electric Power Industry in the Transformation Period



Source: Yao, Li and Jiang (2003).

Table 4-1 Number of projects and amount of CER of Japanese entities invested in CDM projects in China registered to UNFCCC (as of November 2008)

	Number of project	Amount of CER	%
HFC reduction (1)	2	90,348,135	74.7
N_2O decomposition	2	6,282,962	5.2
Biogas	1	570,715	0.5
Biomass	0	0	0.0
Methane recovery	1	580,617	0.5
Methane avoidance	0	0	0.0
Afforestation	0	0	0.0
Hydropower	19	10,064,364	8.3
Fuel conversion	1	2,642,079	2.2
Waste gas and heat	7	6,316,116	5.2
Wind power (2)	7	4,214,531	3.5
Total	40	121,019,520	100.0

Note 1: Includes joint CDM project with the UK.

Note 2: Includes joint CDM project with Sweden.

Source of data: IGES (2008).

Table 4-2 Financing structure of China's Xiaogushan Run-of-river Hydropower Project

Financing Sources	US$ million
Equity	14.0
Gansu Heihe Hydropower Development Shareholder Company Ltd.	7.0
Zhangye Water and Power Bureau	4.2
Gansu Silver Dragon Construction Company Ltd. (private)	2.8
Asian Development Bank Loan	35.0
Local Commercial Long-term Loans	36.8
Bank of China Short-term Loan	1.2
Total	87.0
Project revenues	
Sale of CO_2 emission reductions (ERs) to the PCF	11.1

Note 1: ERPA value at US$3 per CO2 equivalent tons for 10 years even though it is estimated to rise to US$6 per CO2 equivalent tons.

Note 2: Terms of conditions of local commercial bank's loan is 5.76%, with a repayment period of 15 years.

Source: Prototype Carbon Fund, 2003; ADB, 2003.

Table 4-3 Number and Amount of CER in CDM Projects in China (as of November 2008)

	Number of project	Amount of CER	%
HFC reduction	10	345,166,475	50.0
N_2O decomposition	18	94,968,670	13.8
Biogas	1	570,715	0.1
Biomass	11	8,656,464	1.3
Methane recovery	24	49,097,391	7.1
Methane avoidance	1	204,795	0.0
Afforestation	1	340,223	0.0
Hydropower	128	56,889,939	8.2
Fuel conversion	9	37,162,963	5.4
Waste gas and heat	33	45,689,230	6.6
Wind power	75	51,856,076	7.5
Total	311	690,602,942	100.0

Source of Data: IGES (2008).