PROJECT INFORMATION DOCUMENT

PROJECT TITLE:	**CHINA: ENERGY CONSERVATION PROJECT**
GEF FOCAL AREA:	Climate Change
GEF ELIGIBILITY:	Convention Ratified January 5, 1993
TOTAL PROJECT COSTS:	$177.7-227.7 million
GEF GRAND TOTAL:	$ 22.7 million
GEF FINANCING:	GEF grant: $ 22.0 million EC grant: $ 5.0 million Government grants: $ 7.0 million IBRD loan: $ 65.0 million Government loans: $ 37.0 million Domestic banks: $ 41-91 million
GEF OPERATIONAL FOCAL POINT:	GEF Operations Committee, Ministry of Finance
GEF IMPLEMENTING AGENCY:	The World Bank
GOVERNMENT IMPLEMENTING AGENCY:	State Economic and Trade Commission
LOCAL COUNTERPART AGENCIES:	Provincial Economic Committees; three Energy Management Companies
ESTIMATED BOARD APPROVAL DATE:	March 1998
PROJECT DURATION:	6 years
GEF PREPARATION COSTS:	GEF PDF Block C: $700,000 (approved in a Block B tranche of $350,000 in May 1996 and second (Block C) tranche of $350,000 in November 1996)

CHINA: ENERGY CONSERVATION PROJECT

SECTORAL CONTEXT

1. **Background.** The burning of fossil fuels and other human activities are changing the balance of CO_2 and other heat-trapping gases in the atmosphere. According to scientific theory, this "greenhouse effect" has the potential to dramatically alter the earth's climate in a relatively short span of time. Energy is the largest source of greenhouse gas (GHG) emissions worldwide, and China currently accounts for about 10 percent of global CO_2 emissions from energy use, behind the US (21 percent), countries of the former Soviet Union (18 percent), and Europe (21 percent). However, among countries and regions with the highest GHG emissions, only China is likely to maintain rapid rates of economic growth well into the next century and this will require a significant expansion in coal use, China's principal energy resource. An aggressive program to promote energy conservation and renewable energy will be required to limit the growth in GHG emissions between 1990 and 2020 from an otherwise threefold increase.

2. A GHG abatement strategy for China has been jointly prepared by the Bank, UNDP, China's National Environmental Protection Agency, and China's State Planning Commission (SPC), with GEF support, involving a comprehensive analysis of the full range of abatement options and their relative costs and benefits. [1] The study concluded that the top priority for specific action to mitigate GHG emissions in China over the short and medium term is to improve the technical efficiency of energy use. A second important objective, especially over the longer term, is the expanded use of less carbon-intensive alternatives to coal. Because of the huge potential, and China's continued rapid economic growth, improvements in energy efficiency in China over the next two-and-one-half decades offer the world the largest and lowest-cost means of reducing GHG emissions.

3. **China's Energy Conservation Program.** The need to improve the efficiency of energy use, in parallel with the development of additional energy supplies, has been a cornerstone of China's energy policy for over 15 years. Although substantial success has been achieved in energy efficiency, it is widely recognized both inside and outside China that far greater improvements are critical to the country's economic and environmental future. The enormous potential for cost-effective improvements in energy efficiency in China, especially in the industrial sector, is well documented in a number of detailed studies completed both in China and abroad.[2] China's industrial sector alone accounts for nearly three-quarters of China's CO_2 emissions from energy consumption. One source of major energy efficiency improvements is through further progress in overall economic reform, such as improvement in economies of scale in new plants, and large-scale industrial enterprise restructuring and renovation projects. A second important area of energy conservation potential is more narrowly focused on improving the energy efficiency of

[1] See *China: Issues and Options in Greenhouse Gas Emissions Control, Summary Report*, joint report of the Chinese Government, UNDP, and the World Bank, December 1994, p. 33.

[2] See, for example, *China: Energy Conservation Study (Bank Report No.10813, February 1, 1993)*, and *China: Issues and Options in Greenhouse Gas Emissions Control (Summary* and 4 major subreports on energy efficiency), December, 1994.

specific types of widely-used equipment, such as electric motors and drive systems, boilers and steam systems, heat recovery systems, lighting, and cooling equipment.

4. China's existing energy conservation system is among the most extensive in the world. During the 1980s, China successfully developed a comprehensive energy conservation program, including major policy directives, procedures, regulations, technical assistance programs, and project financing initiatives. The institutional framework for energy conservation in China includes a series of specialized energy conservation units within national, provincial and county/municipal government agencies, operating under the State Economic and Trade Commission (SETC) and its provincial and local affiliated commissions. The system was quite effective under the centrally planned economy, taking advantage of the well-established system of industrial enterprise energy input quotas and government investment funding mechanisms for investment in state-owned enterprises. With the ongoing conversion of China's economic system to a market economy, however, the established system for promoting energy conservation must be transformed to operate more effectively in the new environment. Without timely change, many of the critical gains in capacity building achieved during the last decade-and-a-half may be lost, especially the gains achieved in development of technical expertise in energy conservation project work.

5. The Government recognizes the need to adapt China's energy conservation system to maximize the play of market forces, and strongly supports the development of market-driven energy efficiency initiatives. In the key area of ***retail energy pricing***, major reforms pursued during the late 1980s and 1990s have brought average retail energy prices to levels at or above the cost of supply. Although problems remain in some sectors (e.g., natural gas prices for agricultural fertilizer), the prices that most Chinese consumers pay for energy no longer pose a major constraint to widespread adoption of energy conservation measures. Coal prices have been largely deregulated, and average electricity prices paid by consumers in most major load centers now approximate long-run marginal costs. As part of the China GHG Study, twenty-one industrial energy efficiency case studies, representing a wide range of industries and locations throughout China, were carried out. In all cases, the industries were found to be paying market prices for their major energy supplies (coal and electricity), and all exhibited financial rates of return of over 15 percent, with three quarters having returns of 20 percent or higher.[3]

6 Many challenges, however, are involved in moving to market-driven energy conservation. Because many of the administrative measures previously used to promote energy conservation are now becoming ineffective, promotion efforts must be build on the interest of enterprises themselves to undertake energy efficiency measures, as a means to increase enterprise profits and/or meet environmental regulations. New and different financing approaches and mechanisms are needed, and promotion activities must better focus on and utilize the direct self-interest of enterprises. Support for the introduction of market-oriented approaches is especially important at this phase, when market incentives for energy conservation are increasing, but: (i) knowledge among most enterprise managers

[3] Ward et al (eds.), "Energy Efficiency in China: Case Studies and Economic Analysis," *Issues and Options in Greenhouse Gas Emissions Control*, Subreport No. 4, December 1994.

of the most cost-effective energy efficiency options is weak, and (ii) the institutional system for promoting energy conservation has little experience with market-oriented methods and mechanisms.

7. **Barriers to Energy Conservation.** Although the analysis for the China GHG Study showed that energy efficiency projects across China have sound life-cycle financial returns, only a small portion have been implemented. Many of the barriers to the adoption of commercially available energy-efficient projects in China are similar to those found in other countries, but, in some cases, they are exacerbated under current Chinese conditions:

(a) *Inadequate information.* Enterprises and individuals lack information about energy-saving investments, especially on financial aspects and the implementation experiences of others. China has developed various mechanisms for distribution of technical information on energy efficient technologies and renovation measures within the energy conservation community and to interested factory engineers. The system falls far short of current needs, not only in terms of coverage, but particularly in terms of focus -- little information is available for the real decisionmakers (enterprise managers) concerning how specific energy conservation projects can yield direct financial benefits to enterprises, implementation measures from experience, impacts on production (if any), and other practical concerns.

(b) ***Technology transfer barriers.*** While some state-of-the-art energy efficient technologies have been introduced in China, they have not been widely distributed and the average technological level of much equipment is still quite low. Production of high-energy efficiency equipment, based on technologies developed in other countries, is just beginning in China, and has not yet significantly penetrated the domestic market.

(c) *Risk.* Perceived technical and financial risks to enterprises in adopting innovative energy saving technologies are very high in China. Fears that an untried technology may not work, could interrupt production, may take time to perfect, or will not actually result in financial savings, all inhibit enterprise management from adopting new energy-saving technologies.

(d) *Real and perceived insignificance of many energy efficiency investments.* Many worthwhile energy efficiency investments are relatively small, and while they may yield sound financial returns as measured by high rates-of-return or short payback periods, the value of the savings achieved typically is only a small percentage of enterprise operating costs. Enterprise managers are most interested in expanding production and increasing market share, and, especially if there is some perceived risk involved, they usually show little interest in these types of projects.

(e) *High transaction costs.* Much of the potential for energy savings in China is through implementation of large numbers of individually small projects. However, energy efficiency projects often carry high costs (particularly high opportunity costs of key skilled enterprise personnel) for obtaining and checking information, planning and design, arranging financing, implementation scheduling, monitoring

initial performance and implementing necessary adjustments. Especially where the benefits are relatively small, enterprises are reluctant to incur these costs.

(f) *Difficulties in arranging financing*. Most banks and other lending institutions in China are hesitant to lend for projects to reduce operating costs alone. Financial institutions in China (and elsewhere) are generally not familiar or adept at analyzing the financial aspects of these investments, and hence even less willing to extend credit for energy conservation projects.

(g) *Institutional constraints*. China's present energy conservation system, while extensive, is not geared to provide the type of support needed by enterprises under the market system. Market-based institutions, such as the Energy Service Companies (ESCOs) developed in other countries to pursue contract energy management ventures, do not exist in China. No international ESCOs are active in China, largely due to the lack of familiarity and any experience in the concept in China, and the degree of difficulty and perceived high risks of establishing and enforcing energy management contracts.

PROJECT OBJECTIVES

8. The main objective of the project is to achieve large, sustained and growing increases in energy efficiency, and associated reductions in the rate of growth in carbon dioxide emissions and other pollutants, through the introduction, demonstration, and dissemination of new project financing concepts and market-oriented institutions to promote and implement energy efficiency measures in China. The project would support the establishment, pilot testing, and commercial demonstration of Energy Management Companies (EMC) in three provinces of China, that would engage in self-sustaining energy efficiency investments through energy performance contracting. The demonstration of the ESCO concept would be followed in a second phase by a program to expand the energy performance contracting concept to other parts of China and through more varied applications (e.g., leasing, Chinese-foreign joint ventures). In addition, the project seeks to achieve increases in energy efficiency by strengthening China's national efforts to provide access to information concerning successful domestic experiences in energy efficiency measures and projects, geared in particular to financial decisionmakers in enterprises.

PROJECT DESCRIPTION

9. **Energy Management Company Demonstration (US$163-213 million).** Under this core component, three demonstration Energy Management Companies (EMCs) will be developed, begin operation, and expand as commercial businesses. The three EMCs will adapt, operationalize, and develop energy performance contracting, as developed by ESCOs in other countries, for the first time in China. The EMCs will undertake investment projects in other "host" enterprises. Although additional financing mechanisms may be developed over time, in this demonstration phase the EMCs will finance the investment, shoulder most of the technical and financial risk, and initially own the equipment installed in the host enterprises. The EMCs will be paid by the host enterprises from a share of the energy savings actually achieved, according to a contract, until the EMC is fully

compensated for the investment, operating costs, risks undertaken, and a reasonable profit. Thereafter, the equipment ownership would be transferred to the enterprise, with the enterprise receiving all of the further financial benefits of the energy savings. As shown through North American experience, if the EMC selects good projects and manages them well, it should earn profits for steady growth. The host enterprise faces minor risk, provides no investment capital, and eventually owns more efficient equipment and enjoys accompanying reduced energy costs.

10. In anticipation of this project, three EMCs were established following a competitive selection process undertaken by the SETC, in Shandong Province, Liaoning Province and Beijing Municipality in mid-1996 as publicly-owned, provincial-level companies. Through the pilot projects, the EMCs will develop and implement the contract energy management concept in the three Chinese Provinces, with different technologies, consumer types, and contract variations. *GEF funding of US$15 million for the incremental costs of demonstrating the EMC concept is proposed.*

11. **Information Dissemination Component (US$10 million).** This component will strengthen China's programs to collect information relevant to enterprise managers on the results of previous energy conservation projects and especially their profitability, and to disseminate this information more effectively. The component would be supported with GEF and Government funds. An improved information development and dissemination program will be implemented through a new national-level energy efficiency information dissemination center, developed within an existing institution. Information will be provided by the Center free of charge, and the Center's regular operations will be financially supported by the Government under a performance contract. Key outputs of the Center will include Best Practice Energy Conservation Project Case Studies and Technical Guides, based in part on a successful UK Government program. The Best Practice Case Studies to be developed and disseminated by the Center must be based on projects where investment is already arranged from domestic or international sources. Dissemination will be conducted through existing government, industry, and professional networks, using: newsletters, expert presentations at existing training forums, site visits, workshops, government work conferences, and published professional articles. *GEF funding of US$5 million is proposed to cover the incremental costs of establishing a new national energy information program.*

12. **Program Management and Monitoring (US$4 million).** Support will be provided for: (a) training of Project Management Office (PMO) staff and the PMO's engagement of experts to assist in project management, monitoring and evaluation, development of policy recommendations on the new energy conservation investment mechanisms, and dissemination of lessons learned; (b) a program to support the development of proposals for the establishment of new EMCs, and introduction of these proposals to potential domestic financiers or foreign joint-venture partners; (c) a conference to introduce the initial results of the three demonstration EMCs and EMC concepts to the domestic financial and banking community; and (d) preparation of the Phase II EMC expansion component. *GEF funding of US$2 million is proposed to cover the incremental costs of managing and monitoring the above two components and preparing the following component.*

13. **Phase II EMC Expansion Component.** While Phase I will demonstrate the EMC concept in three provinces of China, full success (and greatest cost-effectiveness) of the project requires the expansion and dissemination of the concept to other EMCs throughout China. Under Phase II, support would be provided for the implementation of proposals for developing a variety of different types of EMCs, including joint-ventures with foreign companies, selected through an open and competitive process. An important criteria for judging Phase II proposals will be, building on the experience in Phase I, movement toward full cost-recovery and higher levels of profitability. The final design of this component will be completed during implementation of the other project components, based on the emerging experience of the three demonstration EMCs, and definition of specific barriers to further development of EMCs in China and the actions required to overcome them.

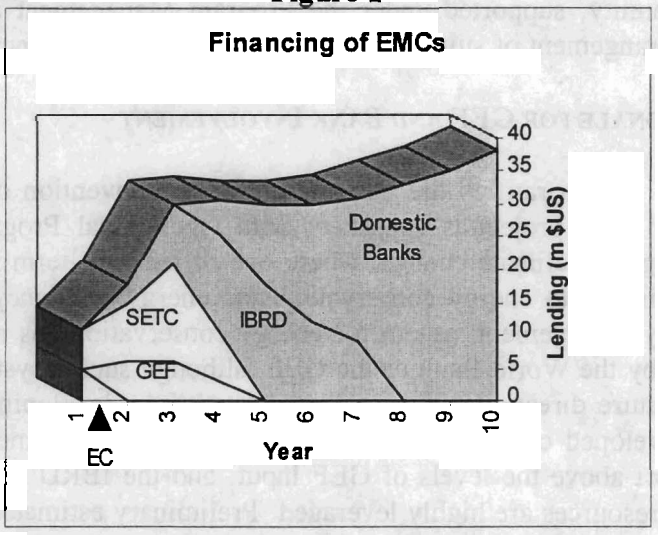
PROJECT COST AND FINANCING

14. As shown in Table 1 at the end of this brief, total project costs and financing requirements from all sources (other than equity contributions), are estimated at about US$178-228 million, with the range depending upon the rate of successful growth of the three demonstration EMCs. The incremental cost of Phase I program components is estimated at $27 million of which, the EC would provide $5 million. GEF financial support for the project would total US$ 22.7 million, of which US$ 0.7 million represents PDF preparation grants, and US$ 22 million the incremental costs of Phase I. More information on the incremental cost analysis is presented in Annex 1. GEF funding for Phase II, as well as additional counterpart financing and cofinancing will be sought by the Chinese and Bank teams as part of the future preparation of Phase II.

15. The proposed financing plan for the demonstration EMC component includes about $122 million in targeted grant and loan funds, and $41-91 million of domestic commercial bank financing in the later years of implementation. EC grant funding of about $5 million has been approved, and GEF funding of about $15 million is proposed, together with concessional loan financing allocated by the SETC ($37 million), to support the first demonstration projects of the three EMCs. Based on the commitment of EC/GEF/SETC funds, the three EMCs have contributed a total of RMB 75 million ($9 million) of equity capital.

16. Following completion of a major technical assistance effort, EMC operations will begin with implementation of a series of pilot projects. A first set of pilot projects will begin implementation in June 1997, prior to Board approval of the GEF and IBRD project, financed by the European Commission (EC) and SETC. Pilot project implementation will then continue and expand with GEF and SETC financing during the first 2-3 years of the project. IBRD funds will support replication of successful EC/GEF/SETC pilot projects and EMC growth. Domestic commercial banks would gradually become the dominant source of financing for EMC operations. Figure 1 illustrates the proposed sequencing of financing for the three EMCs.

Figure 1



17. The cost and financing requirement of the information dissemination component is estimated at about $10 million equivalent over five years. The costs for the regular operation of the Center and the information dissemination program, provisionally estimated at about $1 million equivalent per year ($5 million total), would be supported with Government grants. GEF financing of about $5 million would support incremental costs associated with the establishment of the program, the building of institutional capacity at the new Center and among subcontractors, and the development and dissemination of some of the initial outputs, on a demonstration basis. Bilateral donor assistance for project financing of some of the case study investments would improve the early operation and results of the program, and will be sought by the Chinese and Bank teams.

18. The program management and monitoring component is estimated to cost about $4 million, with financing proposed of up to $2 million of GEF funds and $2 million equivalent of government counterpart funds.

19. **Phasing of the Proposed GEF Grant.** GEF financing for the project will be sought in two tranches. The first tranche includes GEF financing support for Phase I components (EMC Demonstration, Information Dissemination, and Program Management and Monitoring), totaling $22 million. A second tranche of GEF financing, the size of which will be determined during implementation of Phase I, will be sought for the Phase II Expansion Component. GEF Council approval for Phase II will be sought 12-18 months after Bank management approval of the Phase I project. Preparation and implementation of the Phase II Component is scheduled behind the other components so that its detailed design can build upon the implementation experience of the initial EMC pilot projects. Support for Phase II preparation is included in the Program Management and Monitoring Component. Conditions for submission of the Phase II request to the GEF Council include: (a) completion of an evaluation of implementation results of the initial pilot projects in the EMC Demonstration Component, including technical and financial performance against indicators agreed at project appraisal; (b) assessment of lessons learned, identification of issues requiring resolution, and proposed solutions; (c)

performance contracting as a new financing mechanism, geared specifically to alleviate barriers of perceived risk, low financial significance of small projects, high transaction costs, and enterprise financing constraints. The Government views this project as a national priority in its climate change mitigation program, and the national GEF focal point endorsement letter is attached as Annex 2.

24. GEF and EC support are essential for the implementation of the first phases of the project, focusing on the introduction, adaptation and demonstration of the concepts in the Chinese economy. The lack of actual, on-the-ground experience with the concept, requiring adaptation to Chinese legal, taxation, financial and institutional systems, is the major barrier which has arrested development of this concept in China so far, by either domestic or joint-venture firms. No commercial entity is willing or able to incur these upfront development costs. While the Chinese Government has expressed a strong commitment to the project, evident in its financial support, the Government also has been clear that it cannot sanction borrowing of IBRD or commercial bank funds for the initial development and demonstration of the energy performance contracting concept, which is commercially unproven in China. GEF PDF support already has played a role in the necessary upfront technical assistance. The support approved by the EC is important in that it allows some initial experience to be gained in implementation of a small number of pilot projects prior to GEF and IBRD project approval. GEF support, blended with Government counterpart financing, is critical for the demonstration of the energy performance contracting concept in the three EMCs, development and adaptation of the new information dissemination methods and practices, and the institution building necessary to sustain these activities. The IBRD loan is an essential part of the package, as it provides the loan capital for the EMCs to develop and grow as commercial businesses. The IBRD loan will be onlent to the EMCs on commercial terms, and successful EMC growth under market conditions will provide the best demonstration of the concept's viability to domestic commercial banks.

IMPLEMENTATION ARRANGEMENTS

25. The SETC will be responsible for coordination of project implementation, assisted by other agencies and research units. The SETC, and the affiliated Economic and Trade Commissions at provincial, prefecture and county levels, is responsible for implementation of the country's energy conservation policies and organization of the government's efforts to renovate existing enterprises, and it manages and allocates state funds provided in the national economic plans for this purpose. The SETC has established a Project Management Office (PMO) to oversee project preparation and implementation, chaired and partially staffed by the Department of Resource Savings and Comprehensive Utilization, with additional expert staff from the Energy Research Institute of the SPC, the Beijing Energy Efficiency Center, and other units. The PMO also is assisted by a variety of domestic and international consultants. In addition to coordinating the implementation of the EMC Demonstration Component, SETC's PMO will directly implement, as project beneficiary, the GEF-financed Information Dissemination, Program Management and Monitoring, and Phase II EMC Expansion components. The three provincial-level EMCs will be the project beneficiaries for the EMC Demonstration component, financed by the EC and GEF and all of the IBRD loan. While the Bank will appraise the business and financing plans of each EMC as a whole, the Bank and PMO, assisted in particular by its international consultants,

will also review the demonstration projects to be undertaken by each EMC prior to implementation. Government coordination in the provinces is managed by the provincial Economic and Trade Commissions at a high level. IBRD loan funds will be provided under subsidiary loan agreements between the Ministry of Finance and each EMC, with provincial government repayment guarantee.

ENVIRONMENT AND RESETTLEMENT

26. No significant negative environmental effects of the project are expected. In accordance with the World Bank requirements of O.D. 4.01 (Environmental Assessment), this project has been assigned an environmental category of "B". During project appraisal and negotiations, criteria and procedures will be agreed to require the EMCs to identify and resolve any possible environmental or safety issues associated with sub-project implementation. The project will provide major environmental benefits in terms of CO_2, TSP, and SO_2 emission reductions. The project involves no population resettlement.

PROJECT PREPARATION

27. The PMO, chaired by SETC, has been in operation since late 1995 and has been effectively guiding and coordinating all project preparation activities, and day-to-day interactions with other central government agencies and with the World Bank. Project preparation includes the following phases of activities: (a) definition of project objectives, technical assistance in energy service company (ESCO) concepts, and establishment of the three Energy Management Companies (EMCs); (b) initial preparation of EC and GEF demonstration projects in each EMC and of other GEF-financed components, IBRD loan identification; (c) launching implementation of EC-financed pilot demonstration projects in each EMC, finalization of preparation of GEF aspects and submission to the GEF Council, IBRD loan preparation; (d) GEF and IBRD project appraisal, negotiations and Board approval; (e) evaluation of EC demonstration project experience, and implementation of GEF and IBRD aspects (with primary emphasis on GEF demonstration aspects initially, and gradual phase-in of IBRD financing). Phases (a) and (b) have been completed as of January 31, 1997.

28. Chinese project preparation costs are expected to total about $1.5 million, which has been financed primarily by the Government and two Government-executed $350,000 GEF project preparation advances. The EC funds, approved in December 1996, will help to fund the incremental costs of the EMC pilot projects during calendar 1997, prior to final GEF and World Bank project approval.

PARTICIPATION AND SUSTAINABILITY

29. **Participation.** Major stakeholders and beneficiaries of the project have been involved from the beginning in the design and preparation of the EMC component and will be involved in implementation. Provincial governments have assigned a high priority to the EMC component, as an alternative to subsidized Government financing of energy conservation investment. Initial interest on the part of potential host enterprises in the EMC component has also been strong. Bilateral, regional, and other international donors

have been quite interested in the EMC component and have already begun to discuss and prepare parallel activities. Inputs to the Information Component have been provided by a host of stakeholders, including academic and research institutions working in the area of energy efficiency, the Beijing Energy Efficiency Center, and government energy agencies at both the central and local levels. It is planned that these institutions will also play a key role in the implementation of the Information Component.

30. **Sustainability.** Project sustainability is enhanced by a strong Government commitment to the project and strong project ownership by the beneficiaries. At least RMB 20 million (about US$ 2.4 million equivalent) in equity financing has already been invested in each EMC, while the SETC has allocated US$44 million equivalent in loan and grant financing for the project. Project preparation is well organized, and counterparts have completed a variety of complex tasks efficiently and on time. The SETC and EMCs have used international technical assistance effectively. Provincial Government support is strong and at a high level.

31. The key to long-term sustainability of the EMC component is the ability of the EMCs to proceed to commercialization using IBRD and domestic bank loans, and for the EMC concept to be disseminated and expanded in other parts of the country under Phase II. Given the importance of domestic bank loans, the three Provincial Governments have involved several domestic banks in project preparation activities, and a conference to introduce the initial results of the three demonstration EMCs and energy performance contracting concepts to the domestic financial and banking community is included as a major dissemination activity of the project.

LESSONS LEARNED AND TECHNICAL REVIEW

32. Previous Bank energy conservation projects have involved lines of credit for industrial energy conservation. The implementation record for these types of projects has been mixed -- while some success has been achieved, many have had difficulty disbursing. Problems in such projects have included institutional problems and high procedural costs to potential subborrowers, but the barriers to energy conservation investment listed previously also dampened interest of enterprises in direct borrowing for energy conservation investments. The proposed project has learned from these experiences by adopting a new market-oriented approach, widely used in developed countries, and just beginning to be introduced in developing countries.

33. **Technical Review.** The project was reviewed at the initial PDF stage by an outside technical reviewer from the STAP roster in February 1996, and a second review of the current proposal was completed in February 1997. The technical reviewer is quite knowledgeable about energy efficiency projects and ESCOs, having worked for an electric power utility with a major DSM program. The main comments of the reviewer can be summarized as follows: (i) the project has great potential for reducing CO_2 in China at low cost, however, the task of establishing new market-oriented institutions in China is a formidable one and highlights the importance of providing adequate support to institutional development; (ii) once the EMC concept has been demonstrated, greater incentives should be provided to host enterprises to make them full partners in the energy conservation

investments; (iii) domestic bank involvement will be critical to long-term success, however, convincing them may take considerable time and resources; (iv) monitoring indicators for the information component will be difficult to measure, but should not be used as the sole criteria for judging the component, especially in the short-term. The reviewer's comments from the first review have been incorporated into the current program design and the more recent comments will be considered in the next stages of project preparation. The STAP reviewer's comments are attached as Annex 3.

RISKS

34. Energy performance contracting is a new and untried concept in China. The demonstration projects could fail due to financial, technical, and contracting difficulties. These risks are being mitigated through a gradual introduction and build-up of the program, starting with technical assistance, then small pilot projects, followed by replication. Risks of individual performance contract project failure are being minimized by emphasis in project selection on (a) simple, proven technology, (b) projects where energy savings monitoring and verification are relatively simple, (c) projects with rapid payback periods, and (d) selection of host enterprises that are particularly interested and competent. The active involvement of the SETC and the provincial Economic and Trade Commissions during project preparation is critical to coordinate adaptation to China's existing legal, taxation, and institutional management framework, and to assist in minimizing the risk of contract default. One of the key risks to the EMCs is financial failure due to over-extension. This risk is being mitigated through the Bank's financial convenants on the operations of the EMCs.

35. To be successful, the EMC concept must be replicable beyond the initial pilot projects and beyond the first three EMCs. The risk that the EMC concept will not be disseminated is being reduced through extensive technical assistance during initial implementation (including conferences and workshops), and for the follow-up of a Phase II EMC Expansion Component. In the end, the best means of disseminating the EMC concept is by showing enterprises, financiers, and government the win-win nature of market-based energy conservation.

36. For the information component, there are the risks of creating a new institution (the national information center) that will not be able to work within the existing government system and whose management and staff could become preoccupied with other issues. The "new institution syndrome" is being mitigated by grafting the new Center onto existing Chinese energy information networks and institutions. In addition, the Center will be given a contract with the Government for achieving energy savings, which will provide an important incentive for operational efficiency.

MONITORING AND EVALUATION

37. Step-by-step monitoring and evaluation are critical in this project, and will be conducted by the EMCs and PMO with technical assistance supported under the project. Biannual project implementation reports from each EMC must include specified monitoring data and evaluations for each of their demonstration projects, as a basis for mid-course

correction, definition of key implementation issues requiring government attention (with support under the Program Management and Monitoring component), and for definition of the specific activities for the Phase II EMC Expansion component. Following the experience of a similar UK program, the national energy conservation center to be supported under the Information Dissemination component also must monitor and verify the effect of its information dissemination work, in terms of energy savings by affected enterprises, as specified in the performance contract between the center and the SETC.

38. **Performance Indicators.** Details on performance indicators for all components will be worked out during project appraisal, and agreed prior to final CEO endorsement and project approval. Key performance indicators will include institutional performance indicators as well as quantified energy savings and associated CO_2 emissions reduction resulting from the project. Performance of the EMCs will be evaluated on the basis of criteria such as the number of energy performance contracts signed, profitability of the EMCs, and the maintenance of agreed-upon debt-equity ratios. Regular reporting by the EMCs on energy conservation investments undertaken and the accompanying energy-related CO_2 reductions will be an integral part of project implementation and monitoring.

39. In evaluating Phase I results prior to submission of a Phase II request to the GEF Council, key indicators would include: (a) technical and financial performance of EMC pilot projects, (b) assessment of lessons learned, identification of issues requiring resolution, and proposed solutions, (c) completion and evaluation of a conference on EMC results with the domestic financing community, and (d) arrangement of suitable counterpart financing/cofinancing.

Table 1: Total Project Costs and Financing (US$ 000)

Component/Activity	IBRD	EC	Domestic Banks	SETC	GEF	TOTAL
A. EMC Demonstration						
1. Pilot Projects						
Demonstrations		**5,000**			**15,000**	**20,000**
Motor Drive Systems					3,450	4,600
Lighting					550	730
Combustion/Steam Systems					850	1,130
Industrial Process Electricity					6,950	9,270
Other					3,200	4,270
Replication				**37,000**		**37,000**
Motor Drive Systems						8,510
Lighting						1,360
Combustion/Steam Systems						2,100
Industrial Process Electricity						17,140
Other						7,890
2. Commercialization	**65,000**		**41,000-91,000**			**106,000-156,000**
Motor Drive Systems						35,880*
Lighting						5,720*
Combustion/Steam Systems						8,840*
Industrial Process Electricity						72,280*
Other						33,280*
B. Information Dissemination				**5,000**	**5,000**	**10,000**
1. Center Core Costs				2,400	--	2,400
2. TA for Program Design, Strategy				200	700	900
3. Products and Product Dissemination				2,200	2,900	5,100
4. Capacity Building and Training				--	1,000	1,000
5. Evaluation and Monitoring				200	400	600
C. Program Management and Monitoring				**2,000**	**2,000**	**4,000**
D. PDF Block B & C					**700**	**700**
TOTAL	**65,000**	**5,000**	**41,000-91,000**	**44,000**	**22,700**	**177,700-227,700**

* Assumes the higher range of the estimate for domestic bank financing.

Maria Nikolov-Fernandez
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Table 1: Total Project Costs and Financing (US$ 000)

Component/Activity	IBRD	EC	Domestic Banks	SETC	GEF	TOTAL
A. EMC Demonstration						
1. Pilot Projects						
Demonstrations		**5,000**			**15,000**	**20,000**
Motor Drive Systems					3,450	4,600
Lighting					550	730
Combustion/Steam Systems					850	1,130
Industrial Process Electricity					6,950	9,270
Other					3,200	4,270
Replication				**37,000**		**37,000**
Motor Drive Systems						8,510
Lighting						1,360
Combustion/Steam Systems						2,100
Industrial Process Electricity						17,140
Other						7,890
2. Commercialization	**65,000**		**41,000-91,000**			**106,000-156,000**
Motor Drive Systems						35,880*
Lighting						5,720*
Combustion/Steam Systems						8,840*
Industrial Process Electricity						72,280*
Other						33,280*
B. Information Dissemination				**5,000**	**5,000**	**10,000**
1. Center Core Costs				2,400	--	2,400
2. TA for Program Design, Strategy				200	700	900
3. Products and Product Dissemination				2,200	2,900	5,100
4. Capacity Building and Training				--	1,000	1,000
5. Evaluation and Monitoring				200	400	600
C. Program Management and Monitoring				**2,000**	**2,000**	**4,000**
D. PDF Block B & C					**700**	**700**
TOTAL	**65,000**	**5,000**	**41,000-91,000**	**44,000**	**22,700**	**177,700-227,700**

* Assumes the higher range of the estimate for domestic bank financing.

CALCULATION OF INCREMENTAL COST

CHINA: ENERGY CONSERVATION PROJECT

INCREMENTAL COSTS AND GLOBAL ENVIRONMENTAL BENEFITS

GLOBAL ENVIRONMENTAL CONTEXT

1. Carbon dioxide from energy consumption currently accounts for roughly four-fifths of China's total greenhouse gas emissions. Without exceptional policy measures to stem the increase, carbon dioxide emissions would increase roughly three-fold between 1990 and 2020, based on a *high-growth scenario.*[1] The increase in GHG emissions in this scenario is due primarily to a rise in coal consumption from 1.05 billion tons in 1990 to about 3.1 billion tons in 2020. In order to accommodate the three-fold increase in energy use by China, and still keep global CO_2 emissions at their 1990 levels[2], the rest of the world would need to cut its CO_2 emissions by 8 percent in the year 2000 and 40 percent by the year 2020.

BROAD DEVELOPMENTAL GOALS

2. It has been estimated that primary energy use will need to increase two- to three-fold over the coming two-and-a-half decades in order for China to achieve average GDP growth rates slightly lower than those of the past decade. Coal is the only domestic energy resource that could meet such a large increase in energy demand. In order to achieve increases in energy supply, but avoid additional pollution-related impacts from coal burning (including the threat of global climate change), China will need to improve energy efficiency in all sectors, particularly within industry, invest heavily in clean-coal technologies and pollution control equipment, and expand the use of non-coal energy sources, including renewables.

BASELINE

3. In the absence of an alternative, China's energy conservation program would likely remain in its present form for the near term. However, it would likely continue to decline in size and effectiveness as the market economy develops. ***Information*** on energy conservation is provided at both the central and local level, however, such information is disseminated irregularly, is primarily technical in nature, and does not focus on the financial returns to enterprises. ***Investments*** in energy conservation would remain primarily a government function, and would continue to entail providing subsidized loans to enterprises for qualifying energy conservation investments. China's energy conservation investment system is largely a carryover from central planning, and will continue to be reduced in effectiveness through declining central government funds and more limited influence by the government over the industrial operations.

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[1] The high-growth scenario assumes the Chinese economy grows at an average annual rate of 8.0 percent between 1990 and 2020. See *China: Issues and Options in Greenhouse Gas Emissions Control, Summary Report*, December 1994.

[2] Intergovernmental Panel on Climate Change; see Houghton, Jenkins, and Ephraum, 1990.

Under the baseline, there would be little or no private sector investment in energy conservation in China.

Global Environmental Benefits

4. Proposed project interventions would contribute to significant reductions in carbon emissions over the medium term. The EMC component will result in the reduction of more than 200 million tons (mt) of CO_2 (includes three EMCs over a ten year period), at a cost per ton of less than US15 cents. The target carbon reductions from energy savings for the energy information component is estimated at 26 mt by the end of the seventh year, and an accumulated reduction by this time of 63 mt of CO_2. The cost to the GEF for CO_2 reduction under this component is estimated to be US8 cents/ton. By the end of the tenth year, the accumulated CO_2 reductions would be 240 mt, and a cost to the GEF of US2 cents/ton.

GEF ALTERNATIVE

5. The GEF Alternative will introduce a market-based approach to financing energy conservation investments -- contract energy savings -- and thus overcome some of the major impediments to energy conservation investments in China today. Secondly, the project will introduce a nationwide energy conservation system designed to provide energy consumers with information on "best practice" in a number of industries and for various technologies. In particular, the new information system will emphasize the financial returns to energy conservation investments to make such investments attractive to enterprise management and to financiers.

6. The GEF Alternative will establish and demonstrate energy service companies in China for the first time, to allow the vast potential for energy conservation to be financed by the private sector. Because energy service companies do not currently exist in China, there is a need to demonstrate the concept to trial EMCs, host enterprises, and lenders, through on-the-ground business operations. The incremental costs of establishing EMCs are the costs associated with introducing the ESCO concept to China and, most importantly, to demonstrate that shared savings contracts can dramatically increase energy conservation investment and that such investments are financially attractive to the private sector. A small subset of possible energy conservation investments would be carried out under the pilot phase to demonstrate the shared-savings concept for different consumers, technologies, and contract types. The SETC will allocate its portion of energy conservation investment funds (US$37) to the three EMC provinces (Beijing, Shandong, Liaoning) for the establishment and demonstration of contract energy savings. The initial demonstration projects funded by the EC/GEF will be subject to project-by-project review. Thereafter, the projects would be selected based on criteria to be developed during pre-appraisal and appraisal. Although the selection of proven technologies and the rigorous appraisal of projects during the pilot phase will help to improve the success rate, as with all ESCOs, not all energy conservation investments would be suitable for follow-up commercial EMC investment, either because of marginal economics in light of large transactions costs, or difficulties in contracting or verification. EC and GEF funds would cover the incremental costs of the first pilot projects, while SETC funds would finance replication of different applications under the pilot phase. Once demonstrated, commercial funds from the World Bank and domestic banks would finance follow-up replication investments by the EMCs.

7. A second component is the establishment of a new national energy information program in China, with the intention of providing energy efficiency solutions to industrial and other energy consumers. The new information program in China would be patterned after the U.K.'s "best practices" program, and would include the preparation and dissemination of case studies and technical guides on energy conservation, and contracted energy savings performance. In contrast to the current system, the new information program would focus on providing energy efficiency information to industry managers on: (i) successful energy conservation measures undertaken in other similar enterprises ("case studies"), and (ii) detailed information on carrying out energy efficiency measures ("technical guides"). In particular, the case studies and technical guides would point out the energy and financial savings that could be gained from the specific energy conservation measures. While China currently lacks a national-level information program for promoting energy conservation, the Chinese government has committed itself to a national energy information program and has agreed to provide core support (US$5 million) for at least five years for the establishment and operation of a new National Energy Efficiency Information Center (Center). Incremental costs of the information program would be: (i) expertise required for the design of the "best practice" components of the new national energy information program; (ii) training of PMO and Center staff, and contract consultants in the establishment and operation of a "best practices" program; (iii) production of a number of technical guides and case studies in the first five years of the program; and (iv) monitoring and evaluation of the information program to assess its effectiveness.

ADDITIONAL DOMESTIC BENEFITS

8. In addition to global environmental benefits (see para. 5), the project would result in significant local environmental benefits. Energy efficiency projects have been shown to result in substantial reductions in the emissions of both particulates and sulfur, principally through the reduction in energy consumption, but also through the introduction of more sophisticated technologies which are less pollution intensive and which often embody pollution control technologies. Based on case studies of energy efficiency carried out as part of the China GHG Study, the project could reduce particulates by 2.5 mt and sulfur by 3.3 mt over the life of the project.

COSTS

9. **EMC Component.** The incremental costs of establishing EMCs are the costs associated with introducing the ESCO concept to China. Baseline expenditures on energy conservation by SETC during the 9th FYP (1996-2000) in the three provinces (Beijing, Shandong, and Liaoning) is about US$37 million. The costs of establishing and demonstrating the three EMCs over a five-year period is estimated at US$57 million. During the pilot program, the SETC will provide concessional loan capital of approximately $37 million for financing replication projects, while EC and GEF funds would be limited to new applications. Only where the ESCO concept is being demonstrated in a new application (i.e., technology, consumer, contract type) would it qualify for incremental cost financing. The incremental cost of this component is estimated at US$20 million, and would be covered by the EC ($5 million) and the GEF ($15 million). Once applications of the ESCO concept have proven successful during the pilot program, funding from the World Bank ($65 million) and domestic banks would be available for commercialization.

10. **Information Dissemination Component.** The current 9th FYP allocation and spending by SETC on energy information is in the range of US$5 million, which constitutes the Baseline.

Establishment of a new national energy information program, focusing on the dissemination of financially-attractive "best practice" investments to enterprise decisionmakers, is estimated to cost around US$10 million. The Government (through SETC) has agreed to provide its 9th FYP allocation for energy information to the Center to cover core operating costs for at least five years .

11. **Program Management and Monitoring Component.** Training programs for the PMO, dissemination activities, and preparation of the Phase II EMC Expansion are described in the text and are critical to the sustainability of the project. Currently SETC allocates about $2 million equivalent in program management and monitoring of its credit line for energy conservation, which is assumed to be the Baseline. The incremental cost of these components -- those that would not be undertaken without the project -- has been estimated at $2 million.

INCREMENTAL COSTS

12. The cost of energy conservation activities under the Baseline Scenario is estimated at US$44 million (see Table 4.1). The cost of Phase I activities aimed at removing barriers to energy conservation under the GEF Alternative is estimated at US$71 million. The incremental cost of Phase I global benefits is estimated to be US$27 million. As the EC has approved US$5 million equivalent in financial support for barrier removing activities during 1997-98, GEF funding of US$22 million is proposed to support Phase I project implementation.

Table 4.1 Incremental Cost Matrix

	Baseline	Alternative	Increment
Domestic Benefits	• A given level of energy services are provided to enterprises in each province • Current level of energy information (primarily technical) provided to enterprises • Current level of institutional support and program management provided for energy conservation	• The same level of energy services is provided in each province • Information, risk, and financing barriers are removed in 3 provinces • additional 100 mtce of energy saved • Additional energy information (primarily financial) disseminated to enterprises • Greater institutional strengthening and program management	• Barriers removed • 100 mtce of energy saved • More information disseminated • More institutional strengthening and closer program management /supervision
Global Environmental Benefits	GHG emissions associated with the provision of above level of energy services, energy information, and institutional support	GHG emissions associated with the provision of above level of energy services, less those associated with additional energy savings	263 mt of CO_2 reduced
Costs by Component (million US$)			
EMC	37	57	20
Information Dissemination	5	10	5
Program Management and Monitoring	2	4	2
Total Costs	44	71	27
EU/EC Contribution	0	5	5
GEF Incremental Costs			22

LETTER OF COUNTRY ENDORSEMENT
BY DESIGNATED OPERATIONAL FOCAL POINT

WORLD BANK DEPARTMENT
MINISTRY OF FINANCE
Sanlihe, Xicheng District
Beijing 100820 People's Republic of China

MOF

中华人民共和国财政部
世界银行业务司

Feb.27,1996

Mr.Nicholas Hope
Director, China and Mongolia Dept.
East Asia and Pacific Region
The World Bank

Dear Mr.Hope:

As you might know, the Government of China considers Engergy Conservation to be a high priority in controlling CHC Emissions. Therefore, we are planning to prepare an Energy Conservation Project with GEF fund support. In order to facilitate the preparation for this project , I request to apply Block C PDF through the Bank.

I appreciate your consistent support in dealing with the Environmental Issues of China.

Sincerely Yours

Zhu Xian
Deputy Director
World Bank Department
Ministry of Finance, P.R.China

Tel: (861)8516017 Tlx: 22486 MFPRC CN Fax: (861)8522361

TECHNICAL REVIEW
CHINA: ENERGY CONSERVATION

Updated March 3, 1997

Summary

My overall opinion of the China Energy Conservation Promotion Project is that it is an effective use of $35 million of the GEF. The purpose of the project, to create an industry in China that will provide energy efficiency services with the savings shared between the energy efficiency provider and the company that is saving the energy, is an exciting one. There is a powerful need at this time to find and support new ways to keep energy efficiency alive and well in China. This project has the potential to maximize the play of market forces and facilitate the development of market-based initiatives in China's energy conservation system, now that retail energy prices in China are at or above the cost of supply. It alleviates barriers to energy efficiency in a way which strategically complements the two UNDP projects and other World Bank project which comprise the package of GEF assistance to China.

The task is a formidable one. The establishment of an energy service industry and the institutional development of performance contracting is a challenge in any country. The progress in China over the past year in establishing three Energy Management Companies (EMCs) is encouraging and quells several major concerns that existed at the initiation of the project. Furthermore, the developers of this Project Information Document appear to have considered the important elements for the continuation of this endeavor. If the concepts and specifications stated in the Project Information Document and elaborated upon below are incorporated into the preparation of the project and subsequently into the business operations of the EMCs, the project is highly likely to achieve its stated goals. If the new National Energy Efficiency Information Center is successful in its endeavors, the likelihood is further increased. And if the project goals are achieved, the savings in greenhouse gas emissions will be enormous.

Global Environmental Benefits

The February 26 Draft GEF Project Information Document points out that the three demonstration EMCs would reduce CO_2 emissions by more than 200 million tons over a ten-year period yielding a GEF cost per ton-of-CO_2-

reduced of less than US$0.15. It claims the information component would augment these savings by a comparable amount at an even lower cost per ton-of-CO_2-reduced. I was not provided the calculations that estimated these values and have not verified them. Nor do I feel a need to do so. The expectations of emission reductions from the EMC demonstration depend primarily on estimates of energy savings which are uncertain at this time but are targeted to be as shown and will be measurable during the project. The expectations of emission reductions from the information component are much more tenuous as will be discussed below and are not necessary for the justification of this project. The goal of this project is to reduce the total industrial energy consumption in China by several percent. Knowing how many percent might be comforting, but just knowing that each percent would reduce CO_2 emissions by almost 30 million tons annually is enough to demonstrate the potentially immense benefit from this project.

One word of caution is in order. This project is primarily institution building, and little of the benefit is likely to come in the early years. It is important that the early efforts to develop capable and effectively operating EMCs not be diverted in the first few years toward targeted carbon emission reduction goals.

Scientific And Technical Soundness

There is little technical risk involved in this project, as most savings will come from application of available technology to make energy consumption more efficient, primarily in industrial applications. It is unlikely that the EMCs will offer innovative new technology or otherwise undertake technically risky projects. The innovation in this project is institutional and that is where the project risk lies as will be discussed below.

Institution Building and Stakeholder Involvement

The project deserves high marks for creating modern energy management companies. The project involves the key stakeholders in the Chinese government and economy and addresses the fundamental issues that might arise during the project. The following suggestions are provided merely for clarifying some aspects of the Project Information Document and reinforcing certain elements which are fundamental during the proposal preparation and subsequent project reviews.

1. To effectively result in energy savings, energy performance contracts need to be fair to both parties, transparent and enforceable. Fairness requires a sharing mechanism that is monitorable, verifiable, and equitable. Contract enforcement requires a dispute resolution mechanism

that is explicit and that works. Sharing formulas and dispute resolution mechanisms are to be specified in each performance contract according to bilateral negotiations between the EMC and the host industry. Assistance with their initial contract negotiations is being provided to EMCs by established energy service companies familiar with performance contracting in the U.S. and Canada as part of this project. It will be useful for the funding institutions to review the negotiated contracts of the EMCs and provide continuing technical assistance in performance contracting until the EMCs have clearly demonstrated this ability.

2. The EMCs are going to shoulder all economic risk under the terms of the planned performance contracting. This includes risks resulting from project design, financing, equipment purchase, equipment installation, facility operation, and equipment maintenance over the period of the contract. The host organization is to simply share in the success of the project. The EMC needs the active cooperation of the host organization's facility manager and staff in at least three aspects of the project: in the installation of new equipment, in implementing any changes in operational procedures, and in the continuing maintenance of the new equipment. The EMC needs both timely access and support from host personnel to achieve the expected savings. It would be useful for the risk from these three aspects of the project be shared after the performance contracting approach has been clearly demonstrated in China in order to provide a greater incentive for host organization cooperation.

3. Financing from domestic banks in China is an important elemen for the long-term success of this Project. The Project includes activities directed at these banks, including presentation of the EMC concept to the banks and a conference to introduce the results of the EMCs to financial community. It is important that the domestic banks become comfortable lending to EMCs for their performance contracting. With SETC and World Bank backing, the first EMCs should have few problems of financing, but in the longer term, EMCs are going to have to seek financial backing on their own. It is possible that technical assistance may be needed longer than is currently planned before domestic banks feel comfortable freely lending to EMCs in China.

4. The "energy savings by affected enterprises" that will result from the National Energy Efficiency Information Center are impossible to accurately determine. After all, the information disseminated is just one element of a complex array of influences that induce any person to take action to improve energy efficiency. Yet it is important for the personnel of the Center and evaluators of the Energy Conservation Project to focus as much as possible on energy savings and not on the level of Center activity as they monitor the Center's success. For example, metrics such as "client impressions determined from a survey" is an example of an indicator that

is closer to energy savings than say "number of clients contacted", although it is still far from "tonnes-of-carbon-reduced". The most useful objective of any metric used for evaluating information dissemination is to provide an appropriate incentive for the Center staff rather than an estimate of greenhouse gas emission reductions. It is important that Project evaluators focus on this goal and not subvert it with arbitrary estimates of emission reductions.

Other GEF Criteria

In general, I agree with the assessments in the Draft Project Information Document of the other aspects of the project. The project is replicable as will be demonstrated in Phase 2. It is expected to induce a sizable amount of domestic counterpart funding, is consistent with Bank policy and otherwise meets the criteria of the GEF.

TECHNICAL REVIEW

"GEF Project Information Document:
China: Energy Conservation Promotion Project
February 28, 1996 draft and verbal comments"

Summary

My overall opinion of the China Energy Conservation Promotion Project is that it is an effective use of $35 million of the GEF. The purpose of the project, to create an industry in China that will provide energy efficiency services with the savings shared between the energy efficiency provider and the company that is saving the energy, is an exciting one. There is a powerful need at this time to find and support new ways to keep energy efficiency alive and well in China. This project has the potential to stem a dilution-of-mission within the extensive network of energy efficiency service centers that exist throughout the country and refocus their attention to the mission of promoting energy efficiency

The task is a formidable one. The establishment of an energy service industry and the institutional development of performance contracting is a challenge in any country. The developers of this Project Information Document appear to have considered the important elements of such an endeavor. At the same time there are a number of concerns that need to be addressed to enhance the case for the project succeeding. If the concepts and specifications stated in the Project Information Document and elaborated upon below are incorporated into the preparation of the project and subsequently into the business plans of the Energy Management Companies, the project is likely to achieve its stated goals. If it does, the savings in greenhouse gas emissions will be significant.

Global Environmental Benefits

The February 28 Draft GEF Project Information Document points out that the three demonstration Energy Management Companies (EMCs) would reduce CO_2 emissions by 207 million tons over a ten-year period yielding a GEF cost per ton-of-CO_2-reduced of US$0.14. I was not provided the calculations that estimated these values and have not verified them. Nor do I feel a need to do so. The goal of this project is to reduce the total industrial energy consumption in China by several percent. Knowing how many percent might be comforting, but just knowing that each percent would reduce CO_2 emissions by 27 million tons annually is enough to demonstrate the potentially immense benefit from this project.

One word of caution is in order. This project is primarily institution building, and little of the benefit is likely to come in the early years, especially from the pilot phase. It is important that the early efforts to develop capable and effectively operating EMCs not be diverted in the first few years toward targeted carbon emission reduction goals.

Scientific And Technical Soundness

There is little technical risk involved in this project, as most savings will come from application of available technology to make energy consumption more efficient, primarily in industrial applications. It is unlikely that the EMCs will offer innovative new technology or otherwise undertake technically risky projects. The innovation in this project is institutional and that is where the project risk lies as will be shown below.

Institution Building and Stakeholder Involvement

The project deserves high marks for utilizing existing institutions in China -- the energy conservation service centers that the Chinese have deployed since 1981 -- and transforming them into modern energy management companies. Their continued effectiveness is threatened by the new partial "privatization" which requires they seek money from different parts of the Chinese economy to carry out their projects. If they can successfully mimic energy service companies that provide performance contracting in the industrialized nations, their financial security will be assured and their role in the Chinese economy can endure and even thrive.

The project concept to effect this conversion is well thought out. It contains the basic elements needed for such a venture, it involves the key stakeholders in the Chinese government and economy, and it addresses the fundamental issues that might arise during the project. The following suggestions are provided for clarifying some aspects of the Project Information Document and reinforcing certain elements which are fundamental during the proposal preparation.

1. Lay out a stepwise schedule of development for the EMCs (from pilot phase through IBRD funded assistance to self sufficiency) which explicitly reflects the many years it is likely to take to iron out the numerous details necessary for an EMC to become a viable, self-supporting business.

2. Give careful consideration to establishing measures by which the success of each EMC can be judged over the multi-year course of this project.

3. Address the concept and mechanism by which risk will be shared among stakeholders in the event that an energy efficiency project being performed by one of the EMCs fails technically. The intent is to demonstrate that the industrial customer is well enough protected that it will willingly contract for the services of the EMC.

4. Acknowledge the difference between what are commonly referred to as "shared-savings contracts" and "guaranteed savings contracts" and state why, in terms of balance-of-risk and credit rating requirements, you are recommending the chosen approach.

5. Consider what involvement the China Energy Conservation Investment Corporation (CECIC) might play, if any, in the proposed project.

6. State clearly that the proposal preparation will include the establishment of the EMCs; technical and managerial staffing of the EMCs; and development of at least a 2-year business plan containing identification of reasonable product lines, model contracts and a financial plan.

Other GEF Criteria

In general, I agree with the assessments in the Draft Project Information Document of the other aspects of the project. The project is replicable as will be demonstrated in Phase 2. It is expected to induce a sizable amount of domestic counterpart funding, is consistent with Bank policy and otherwise meets the criteria of the GEF.