

Document of
The World Bank

Report No: ICR0000701

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-43040 MULT-28323 EECT-20949)

ON A LOAN

IN THE AMOUNT OF US\$ 60.5 MILLION

AND A

GLOBAL ENVIRONMENTAL FACILITY GRANT

IN THE AMOUNT OF US\$ 22.0 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR AN

ENERGY CONSERVATION PROJECT

December 19, 2007

Transport, Energy and Mining Unit
Sustainable Development Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective August 14, 2007)

Currency Unit = Renminbi (Yuan)

RMB 1.00 = US\$ 0.128

US\$ 1.00 = RMB7.80

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

CAS	Country Assistance Strategy
CPS	Country Partnership Strategy
EC	European Commission
EMCA	Energy Management Company Association
EMCs	Energy Management Companies
EPC	Energy Performance Contract
ESCOS	Energy Service Companies
I&G	China National Investment and Guarantee Company Ltd.
MOF	Ministry of Finance
NDRC	National Development and Reform Commission
NECIDC	National Development & Reform Commission Energy Conservation Information Dissemination Center
PMO	Project Management Office
QEA	Quality at Entry Assessment
SECIDC	State Economic & Trade Commission Energy Conservation Information Dissemination Center
SETC	State Economic and Trade Commission

Vice President: James W. Adams

Country Director: David R. Dollar

Sector Manager: Junhui Wu

Project Team Leader: Robert P. Taylor

ICR Team Leader: Robert P. Taylor

CHINA
ENERGY CONSERVATION PROJECT

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Note: The following Annexes are not applicable to this project:
Beneficiary Survey Results
Stakeholder Workshop Report and Results
Comments of Cofinanciers and Other Partners/Stakeholders

A. Basic Information			
Country:	China	Project Name:	CN-Energy Conservation
Project ID:	P003606,P037859	L/C/TF Number(s):	IBRD-43040,EECT-20949,MULT-28323
ICR Date:	12/25/2007	ICR Type:	Core ICR
Lending Instrument:	SIL,SIL	Borrower:	GOC
Original Total Commitment:	USD 63.0M,USD 22.0M	Disbursed Amount:	USD 60.5M,USD 22.0M
Environmental Category: B,B		Focal Area: C	
Implementing Agencies:			
National Development and Reform Commission			
National Development and Reform Commission - Energy Conservation Information Dissemination Center			
Beijing Yuanshen Energy Conservation Technology Co., Ltd.			
Liaoning Energy Conservation Technology Development Company Ltd.			
Shandong Energy Conservation Engineering Company Ltd.			
Cofinanciers and Other External Partners:			
European Commission			

B. Key Dates				
CN-Energy Conservation - P003606				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/12/1997	Effectiveness:	12/16/1998	12/16/1998
Appraisal:	10/22/1997	Restructuring(s):		
Approval:	03/26/1998	Mid-term Review:	11/30/2002	11/30/2002
		Closing:	06/30/2006	06/30/2006
CN-GEF Energy Conservation - P037859				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/08/1996	Effectiveness:		12/22/1998
Appraisal:	10/22/1997	Restructuring(s):		
Approval:	03/26/1998	Mid-term Review:		11/30/2002
		Closing:	06/30/2006	06/30/2007

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes	Satisfactory
GEO Outcomes	Satisfactory
Risk to Development Outcome	Low or Negligible
Risk to GEO Outcome	Low or Negligible
Bank Performance	Satisfactory
Borrower Performance	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)			
Bank	Ratings	Borrower	Ratings
Quality at Entry	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance	Satisfactory	Overall Borrower Performance	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
CN-Energy Conservation - P003606			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	Satisfactory
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
DO rating before Closing/Inactive status	Satisfactory		

CN-GEF Energy Conservation - P037859			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
GEO rating before Closing/Inactive Status	Satisfactory		

D. Sector and Theme Codes		
CN-Energy Conservation - P003606		
	Original	Actual
Sector Code (as % of total Bank financing)		
Central government administration	8	8
District heating and energy efficiency services	92	92
Theme Code (Primary/Secondary)		
Climate change	Primary	Primary
Environmental policies and institutions	Primary	Primary
Pollution management and environmental health	Primary	Primary
State enterprise/bank restructuring and privatization	Secondary	Secondary

CN-GEF Energy Conservation - P037859		
	Original	Actual
Sector Code (as % of total Bank financing)		
Central government administration	8	8
District heating and energy efficiency services	92	92
Theme Code (Primary/Secondary)		
Climate change	Primary	Primary
Environmental policies and institutions	Primary	Primary
Pollution management and environmental health	Primary	Primary
State enterprise/bank restructuring and privatization	Secondary	Secondary

E. Bank Staff		
CN-Energy Conservation - P003606		
Positions	At ICR	At Approval
Vice President:	James W. Adams	Jean-Michel Severino
Country Director:	David R. Dollar	Yukon Huang
Sector Manager:	Junhui Wu	Yoshihiko Sumi
Project Team Leader:	Robert P. Taylor	Robert P. Taylor
ICR Team Leader:	Robert P. Taylor	
ICR Primary Author:	Hong Chen	

CN-GEF Energy Conservation - P037859		
Positions	At ICR	At Approval
Vice President:	James W. Adams	Jean-Michel Severino
Country Director:	David R. Dollar	Yukon Huang
Sector Manager:	Junhui Wu	Yoshihiko Sumi
Project Team Leader:	Robert P. Taylor	Robert P. Taylor
ICR Team Leader:	Robert P. Taylor	
ICR Primary Author:	Hong Chen	

F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

To achieve large, sustained and growing increases in energy efficiency and associated reductions in growth of carbon dioxide emissions and other pollutants by: (a) introducing, demonstrating and disseminating new project financing concepts and market-oriented institutions to promote and implement energy efficiency measures in China; and (b) developing a more efficient national energy conservation information dissemination program.

Revised Project Development Objectives (as approved by original approving authority)

None.

Global Environment Objectives (from Project Appraisal Document)

Same as project development objectives.

Revised Global Environment Objectives (as approved by original approving authority)

None.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Energy savings per year directly resulting from project investments			
Value (quantitative or Qualitative)		13.0 million tce total project period. Per year: 1998- 0.04 1999- 0.2 2000- 0.5 2001- 0.8 2002- 1.3 2003- 1.7 2004- 2.1	5.22 million tce total project period. Per year: Yr 1 to 4- 1.16 Yr 5- 0.71 Yr 6- 0.91 Yr 7- 1.12 Yr 8- 1.32	5.92 million tce total project period. Per year: Yr 1 to 4-1.35 Yr 5- 0.85 Yr 6- 0.94 Yr 7- 1.23 Yr 8- 1.55

		2005- 2.8 2006- 3.6		
Date achieved		12/31/2006	12/31/2006	12/31/2006
Comments (incl. % achievement)	The targets for the key performance indicators were changed during the second mid-term review in 2002. See details for reasons of change in section 1.4 of the main text).			
Indicator 2 :	Carbon dioxide emissions reductions directly resulting from project investment			
Value (quantitative or Qualitative)		9.2 million t-c total project period. Per year: 1998- 0.03 1999- 0.1 2000- 0.3 2001- 0.5 2002- 0.5 2003- 1.2 2004- 1.5 2005- 1.9 2006- 2.5	3.77 million t-c total project period. Per year: Yr 1 to 4- 0.77 Yr 5- 0.49 Yr 6- 0.65 Yr 7- 0.87 Yr 8- 0.99	5.06 million t-c total project period. Per year: Yr 1 to 4- 0.98 Yr 5- 0.56 Yr 6- 0.72 Yr 7- 1.25 Yr 8-1.55
Date achieved		12/31/2006	12/31/2006	12/31/2006
Comments (incl. % achievement)	The targets for the key performance indicators were changed during the second mid-term review in 2002. See details for reasons of change in section 1.4 of the main text).			

(b) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Energy savings per year directly resulting from project investments			
Value (quantitative or Qualitative)		13.0 million tce total project period. Per year: 1998- 0.04 1999- 0.2 2000- 0.5 2001- 0.8 2002- 1.3 2003- 1.7 2004- 2.1 2005- 2.8 2006- 3.6	5.22 million tce total project period. Per year: Yr 1 to 4- 1.16 Yr 5- 0.71 Yr 6- 0.91 Yr 7- 1.12 Yr 8- 1.32	5.92 million tce total project period. Per year: Yr 1 to 4 # 1.35 Yr 5- 0.85 Yr 6- 0.94 Yr 7- 1.23 Yr 8- 1.55
Date achieved		12/31/2006	12/31/2006	12/31/2006
Comments (incl. % achievement)	The targets for the key performance indicators were changed during the second mid-term review in 2002. See details for reasons of change in section 1.4 of the main text).			
Indicator 2 :	Carbon dioxide emissions reductions directly resulting from project investment			

Value (quantitative or Qualitative)		9.2 million t-c total project period. 1998- 0.03 1999- 0.1 2000- 0.3 2001- 0.5 2002- 0.5 2003- 1.2 2004- 1.5 2005- 1.9 2006- 2.5	3.77 million t-c total project period. Per year: Yr 1 to 4- 0.77 Yr 5- 0.49 Yr 6- 0.65 Yr 7- 0.87 Yr 8- 0.99	5.06 million t-c total project period. Per year: Yr 1 to 4- 0.98 Yr 5- 0.56 Yr 6- 0.72 Yr 7- 1.25 Yr 8-1.55
Date achieved		12/31/2006	12/31/2006	12/31/2006
Comments (incl. % achievement)	The targets for the key performance indicators were changed during the second mid-term review in 2002. See details for reasons of change in section 1.4 of the main text).			

(c) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Quantified energy savings and CO2 reduction from projects of the three EMCs.			
Value (quantitative or Qualitative)		See above PDO indicators	See above revised outcome target values.	See above actual achievements.
Date achieved		12/31/2006	12/31/2006	12/31/2006
Comments (incl. % achievement)	These intermediate outcome indicators overlap with the PDO indicators, and they are reflected in the PDO indicators.			
Indicator 2 :	Listing of firms engaged in energy performance continuity in China and estimated energy savings and CO2 reductions from their activities.			
Value (quantitative or Qualitative)				A total of 63 firms confirmed undertaking of some 419 energy performance contracting investment projects during 2006. Total E PC project investment amounted to \$279.9 million, energy savings reached

				21.1 million tce, and carbon emissions reductions were 15
Date achieved				12/31/2006
Comments (incl. % achievement)	These are estimates based on a survey of EMCA members.			
Indicator 3 :	Energy savings and CO2 reductions from energy efficiency measures of enterprises as a result of specific information disseminated by the energy efficiency information center supported by the project.			
Value (quantitative or Qualitative)		24 Mtce in energy savings, 63 Mt in carbon dioxide emissions reduction.		From 1999 to 2006, energy savings resulting from energy conservation measures promoted through the project's information dissemination reached 26.01 Mtce, and carbon dioxide emissions reduction reached 67.89 Mt of CO2.
Date achieved		12/31/2006		12/31/2006
Comments (incl. % achievement)	Targets were agreed between SECIDC and the Gov't at the start of project. Three third party surveys were completed to verify the energy savings & CO2 reductions resulting from energy information dissemination. The last survey was in June 07. Details in Se			

G. Ratings of Project Performance in ISRs

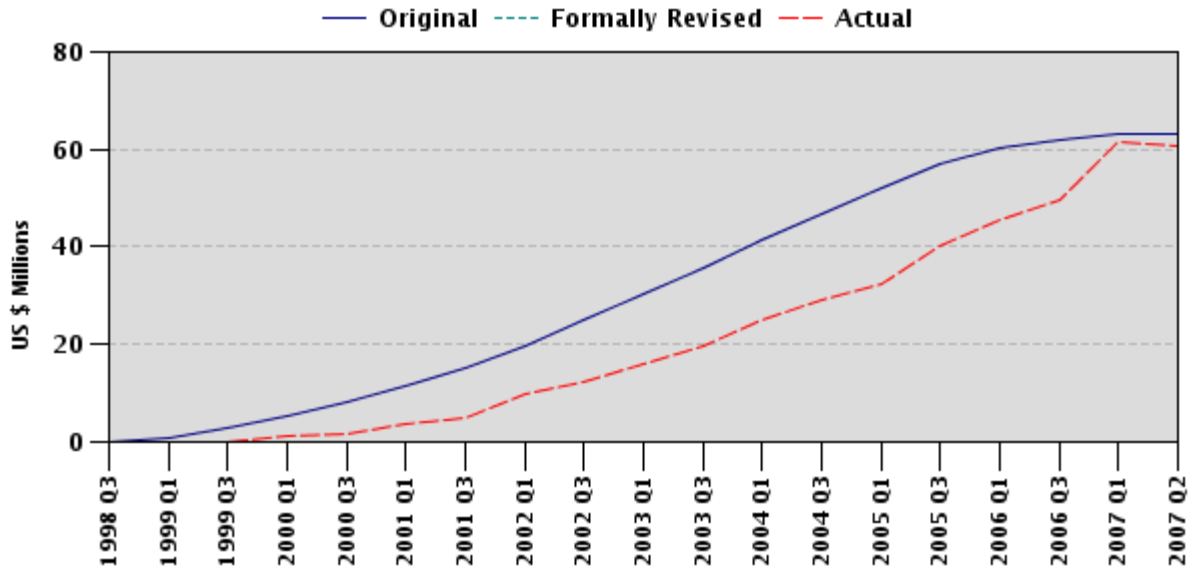
-						
No.	Date ISR Archived	DO	GEO	IP	Actual Disbursements (USD millions)	
					Project 1	Project 2
1	06/24/1998	S	S	S	0.00	0.00
2	06/29/1998	S	S	S	0.00	0.00
3	02/10/1999	S	S	S	0.00	0.00
4	06/15/1999	S	S	S	0.00	2.00
5	12/21/1999	S	S	S	1.20	3.93
6	06/27/2000	S	S	S	2.62	6.39
7	12/22/2000	S	S	S	4.01	9.04
8	06/14/2001	S	S	S	6.75	10.16
9	12/21/2001	S	S	S	10.44	13.43
10	06/27/2002	S	S	S	13.80	16.30
11	12/27/2002	S	S	S	18.02	17.40
12	06/27/2003	S	S	S	23.61	19.12
13	12/24/2003	S	S	S	26.23	19.12
14	06/29/2004	S	S	S	31.33	21.29
15	12/28/2004	S	S	S	35.73	21.29
16	06/20/2005	S	S	S	43.35	21.29
17	03/02/2006	S	S	S	49.26	22.00

H. Restructuring (if any)

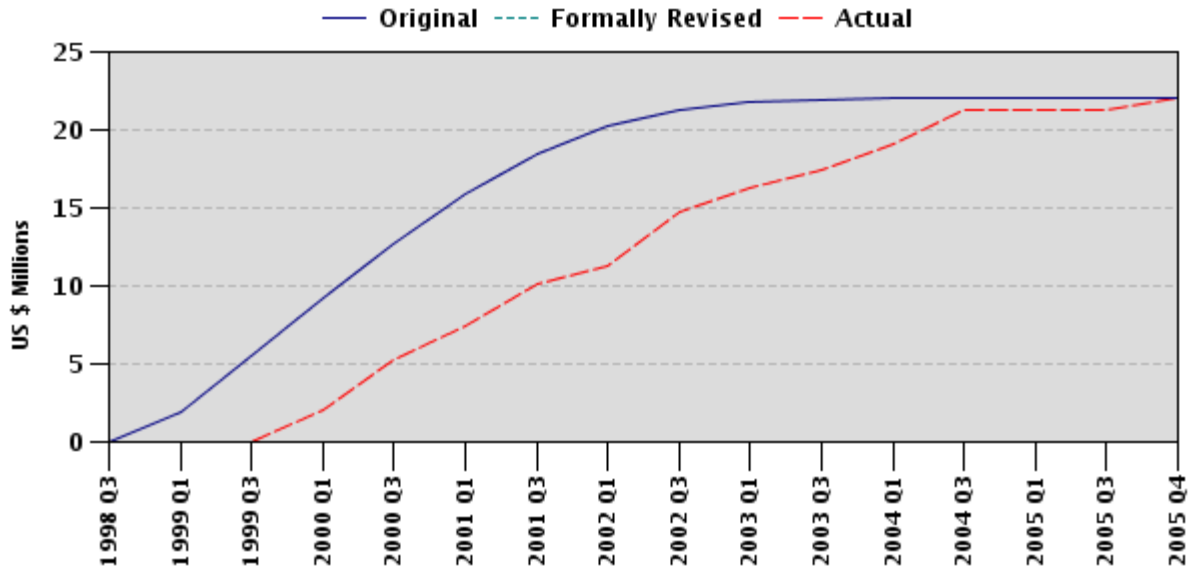
Not Applicable

I. Disbursement Profile

P003606



P037859



1. Project Context, Development and Global Environment Objectives Design *(this section is descriptive, taken from other documents, e.g., PAD/ISR, not evaluative)*

1.1 Context at Appraisal

(brief summary of country and sector background, rationale for Bank assistance)

China's energy policy has long included efforts to improve energy efficiency. China developed a comprehensive energy conservation program during the 1980s, with policy directives, procedures, regulations, technical assistance programs, and project financing initiatives. These efforts had a certain degree of success, but the system was geared to the centrally planned economic system of that time. As China entered the 1990s, needs for further improving energy efficiency were becoming yet more urgent if the country was to meet its economic development objectives. However, the systems in place were out of line with the emerging new market economy and insufficient to meet the depth of the challenge.

Studies completed by the Bank and counterparts in China's State Planning Commission during 1992-94¹ shed further light on scale and nature of an enormous potential for cost-effective improvements in energy efficiency which remained untapped, especially in the industry sector. As in most countries, but not necessarily on the scale existing in China, uptake of financially attractive energy efficiency investments was stymied by lack of information on these opportunities, with attention of factory managers on perhaps more pressing priorities, and a lack of mechanisms to develop and deliver the dispersed, often small projects. There was a general lack of awareness of the potential profitability of many energy conservation investments, and how these financial returns could be captured. As the Bank and government counterparts began to discuss potential World Bank and GEF support for energy conservation, following completion of the joint studies, both sides rejected traditional project models in favor of a more ambitious agenda to develop new approaches to use forces of the market economy emerging in China which could deliver investments for commercial profits of enterprises, but at the same time yield environmental and energy security benefits to the country.

The project developed as a result aimed to introduce, demonstrate and disseminate new project financing concepts and market-oriented institutions as a means to achieve large, sustained and growing increases in energy efficiency. The project was a response to needs to balance strong and successful work in the Bank program on energy supply improvements with demand-side investment measures. With its aim to increase the supply of useful energy to industrial and commercial users through environmentally benign increases in efficiency, the project supported the objectives of the Country Assistance Strategy (CAS) for China, dated 1997, to alleviate infrastructure constraints and safeguard the environment. The project was fully consistent with Operational Program Number 5 of the GEF Operational Strategy for mitigating growth in greenhouse gases contributing to climate change. That Program centers on implementation of measures to remove barriers to cost-effective, "win-win" energy efficiency investment.

¹ See the China Energy Conservation Study (1993), and China: Issues and Options in Greenhouse Gas Emissions Reduction (in 12 volumes, 1994).

1.2 Original Project Development Objectives (PDO) and Key Indicators (as approved)

The objective of the project was to achieve large, sustained and growing increases in energy efficiency and associated reductions in growth of carbon dioxide emissions and other pollutants by: (a) introducing, demonstrating and disseminating new project financing concepts and market-oriented institutions to promote and implement energy efficiency measures in China; and (b) developing a more efficient national energy conservation information dissemination program.

Key performance indicators were the energy savings achieved per year from project investments and associated reductions in the growth of carbon dioxide emissions. (The detailed indicators are shown in the Data Sheet). For the core component of the project on development of new Energy Management Companies (EMCs), key performance indicators were defined particularly narrowly to include only the direct energy savings achieved prior to the project closing date resulting from investments by the three demonstration companies who were direct beneficiaries of the project. However, data on the energy savings achieved from the broad development of EMCs in China stemming from the project also was collected and reported.

1.3 Original Global Environment Objectives (GEO) and Key Indicators (as approved)

Same as project development objectives.

The original global environmental objectives and key indicators were the same as those of the IBRD-financed project.

1.4 Revised PDO (as approved by original approving authority) and Key Indicators, and Reasons/Justification

The PDOs remained the same throughout the project. The year-by-year energy savings and carbon emissions reduction were revised at the first project mid-term review in 2000 to reflect the one year delay in project start-up. Final arrangements for company counter-guarantees and establishment of project disbursement systems caused this delay. The original indicators set forth in the PAD Annex 1 for calendar years were re-calibrated according to 'project implementation years', with the first year beginning at project effectiveness.

The levels of key performance indicators for the EMC Component for energy and carbon savings were then revised downwards at the second mid-term review for the remainder of the project. The original targets for the three demonstration companies were based on the investment plans prepared by each company for these untried businesses at project appraisal. These investment plans proved overly enthusiastic, with annual growth rates in investment of 32%, 35% and 47% over the full nine-year period. The project team was aware that these plans were most likely far too optimistic, but consciously decided to accept them at project appraisal as stretch-targets prepared by the beneficiaries, especially as there was no experience in these types of businesses in China before the project. As the company development patterns emerged, the targets were then reduced substantially, as shown in the Data Sheet. As described later, the overall project objectives were still fully achieved.

1.5 Revised GEO (as approved by original approving authority) and Key Indicators, and Reasons/Justification

Same as the above section (1.4).

1.6 Main Beneficiaries

(original and revised briefly describe the "primary target group" identified in the PAD and as captured in the PDO/GEO, as well as any other individuals and organizations expected to benefit from the project)

The primary target group remained the same through project implementation as at appraisal. Direct beneficiaries from the project included the three new EMCs especially established for the project and the National Reform and Development Commission's Energy Conservation Information Dissemination Center (NECIDC), also established under the project. As hoped at appraisal, many Chinese enterprises benefited from adoption of energy efficiency measures developed and financed by the three EMCs through energy performance contracts (EPCs), or promoted by NECIDC. A far greater number of energy consumers, however, are realizing energy savings and environmental benefits from the broad overall influence the project, through further development of the EPC concept by a growing number of new EMCs and through continuing dissemination of information on profitable energy efficiency investments. Benefits include health benefits in the general population from reductions in local air pollutants, especially fine particulates, as well as the benefits of less acid deposition due to reductions in sulfur dioxide emissions.

1.7 Original Components (as approved)

The project components included the following:

- (a) EMC Demonstration Component. Three newly established demonstration EMCs were asked to develop energy performance contracting as a business mechanism, adapting principles developed by Energy Service Companies (ESCOs) in other countries, for the first time in China. Under the full-service energy performance contracting business model, EMCs design, develop, finance, implement and supervise initial operations of energy efficiency investments in other, "host enterprises." The EMCs are compensated for this with a share of the energy savings achieved from the investment, according to an energy performance contract executed between the two parties. Once the EMC has been fully compensated, the assets from the investment are retained by the host enterprise, which continues to reap the full benefits through the remaining life of the assets.

The three demonstration EMCs were specially formed for the project by Chinese shareholders. The companies were developed to adapt energy performance contracting to the Chinese market, pilot a variety of investments using this mechanism, and expand as commercial businesses.

- (b) Information Dissemination Component. This part of the project was designed to support the development of a new system to provide practical information on energy conservation

project results to Chinese enterprise managers. New information products were to be developed with particular emphasis on financial results actually achieved by enterprises, problems and solutions occurred during implementation, and any impacts on the enterprise's main production or other key risks. Dissemination work was to focus on influencing enterprise decision makers. The component aimed to achieve increased uptake of profitable investments by enterprises which received the Center's new information products.

- (c) Program Management and Monitoring Component. A Project Management Office (PMO) was created under the State Economic and Trade Commission (SETC) to support project implementation. The component supported the activities of two units in the PMO: the EMC Development Unit and the Project Management Unit. The EMC unit was to promote and assist the creation of new EMCs in China by any interested domestic or international parties. The Project Management Unit was to provide operational support and technical assistance for the implementation of the two other project components, provide policy advice to the government, and implement a series of training activities for staff and experts nominated by the PMO.

1.8 Revised Components

The components remained the same throughout the project.

1.9 Other Significant Changes

(in design, scope and scale, implementation arrangements and schedule, and funding allocations)

In 2003, the leading government counterpart for the project, the State Economic and Trade Commission, was abolished, and relevant departments were merged into a new agency, the National Development and Reform Commission (NDRC). As a consequence, continued operation of the project beneficiary for the information dissemination component, under the original SETC, had to be reconfirmed under the new NDRC, and reconstituted. New arrangements also had to be made for counterpart financing, especially to cover staff costs. This process took over two years to fully complete. As a result, there was a big gap in the implementation of information dissemination component. Management and staffing were completely changed. The GEF Grant was extended for one year to allow for implementation of this component to be completed and to help ground the NECIDC in its new institutional setting.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

(including whether lessons of earlier operations were taken into account, risks and their mitigations identified, and adequacy of participatory processes, as applicable)

The basic design of the project stood up well to meet the challenges of implementation. Essentially, this was an institutional development project, bringing major upfront risks. The project aimed to incubate a new business model and investment delivery mechanism in the

Chinese market which had not been tried before. Indeed, the concept of seeking profit in energy efficiency projects was new to many---in the previous era, energy efficiency tended to be viewed more as a social responsibility. The project's beneficiaries were all new organizations, created under this project. The EPC business concept, developed in very different economic and legal frameworks in North America and Europe, had to be adapted to the Chinese economic, financial and legal setting, which itself was undergoing rapid change. New companies had to be registered, chartered to pilot the new concept, with shareholders willing to invest upfront capital in an untried proposition, and forward-looking and creative management. A new, national-level institution needed to be created from the ground up, with a new charter, full set of new government approvals, and new staff, to implement a new type of information development and dissemination program. Meeting these challenges required big upfront investments in collaborative discussion, hands-on adaptation of ideas, new organization building, means to test and pilot concepts, an ability to roll out implementation gradually, and needs for flexibility to make continual adjustments.

Other project efforts of the Bank and other institutions to introduce ESCOs and EPC business in other developing countries had met with some success, but many reviewed by the Bank and Chinese team during project preparation had fallen short of success on the ground. Most past Bank-financed energy conservation projects reviewed had focused on appraisal and financing of a predetermined set of specific industry energy conservation investments. Previous projects aiming to introduce ESCO concepts often focused on training alone, without the means in place to follow through with investments. Training at times also focused almost exclusively on introduction of North American and European EPC concepts, without mechanisms to then adapt and transform these into concepts which might work in entirely different settings.

The designed sequencing of implementation activities and their financing worked well. A \$4.5 million grant by the European Commission became effective in July 1997, and provided truly critical support to both the groups forming the three new EMCs and the group establishing the new information dissemination center. The grant funded major technical assistance efforts on the energy performance contracting model, allowing practitioners from other countries to work directly with the emerging EMCs to identify and develop subprojects, adapt contracts models from overseas, and develop financial management systems. The grant also financed about \$ 3 million in small pilot EPC projects, implemented primarily during 1998, allowing the EMCs to gain critically needed experience trying out the new concepts in the Chinese market before the main project commenced. This turned out to be especially important when the process of executing various subsidiary agreements and setting up disbursement accounts and procedures between the various government entities and EMCs took longer than expected, delaying disbursement of GEF and IBRD funds until 1999 and 2000, respectively.

The GEF financing provided a critical source of risk coverage to the EMC shareholders to start up untried businesses, without which it is highly doubtful that the companies could have been formed or the IBRD loan to the companies approved. GEF funds were used to partially finance pilot projects, especially projects in new subsectors or with new variations in contractual design. The IBRD loan provided a source of dedicated financing for scaling up and company growth. Finally, a Phase Two was conceived from the beginning as part of the program package, to provide for scaling up the adaptation of the EPC business in China, if successful, to other

companies and on a larger scale. The project included funds for preparation of the second phase, which were utilized to prepare the China Second Energy Conservation Project, approved in October 2002.

The three EMCs themselves conducted all subproject identification, design, and negotiation of mutually beneficial implementation arrangements with host enterprises during project preparation, through piloting and scale up. However, the Bank and Government-supported Chinese experts provided intensive, hands-on assistance during project preparation and especially the early years of implementation, with all parties learning and adapting together. Cross-exchange between the three companies was especially productive.

A Quality at Entry Assessment (QEA) was conducted for the IBRD loan. The overall assessment of quality was rated satisfactory. See section 5.1 for detailed discussion.

2.2 Implementation

(including any project changes/restructuring, mid-term review, Project at Risk status, and actions taken, as applicable)

The process of adapting the EPC model to the Chinese market through the new EMCs required intensive effort, especially by the EMCs themselves, but also by the PMO, government entities at both provincial and central levels, and by the Bank team. Project legal documents required that the Bank provide its no objection to all EMC subprojects unless or until waived by the Bank for certain categories of projects. This arrangement proved productive. Initially, subproject proposals were reviewed intensively by the Bank and PMO, and themes, problems, and various specific cases discussed at length during project supervision missions. Over time, approval requirements for various types of projects ('project lines') were waived, by product line and by EMC, as the EMCs gained experience. Eventually, Bank approval requirements for all EMC subprojects under \$ 1 million were waived.

Procurement arrangements agreed at project appraisal proved cumbersome and inappropriate for the EPC business, which required quick subproject closure and implementation. Adjustments during implementation made procurement systems functional, but still far from perfect (see Section 2.4).

Two mid-term reviews were undertaken, both of which proved productive. The November 2000 mid-term review instituted a system designed by the PMO and Bank teams to tie GEF EMC subproject approvals to progress in implementation of subprojects using financing at more commercial terms through the IBRD loan, to ensure leverage of the GEF financing as planned. As subproject implementation had begun to pick up in the later part of 1999 and first half of 2000, a series of questions were also being raised, especially at local levels, as to how the EPC business model was to be viewed by regulators, auditors and taxation authorities. Some parties even questioned the legality of the EPC concept. Following review of these issues, the central government confirmed the legality of the business, and assisted the EMCs to begin to work through their choices of corporate accounting stances, to gain acceptance from the auditing and taxation communities.

During the November 2002 mid-term review the business plans of each EMC for the future were thoroughly reviewed, based on the substantial experience which had then been gained. Performance indicators were then formally revised accordingly.

During the second mid-term review, implementation of the first three years of the five-year information dissemination component was rated as highly satisfactory. The new Information Dissemination Center had put in place a very effective system for developing short case studies of financially attractive projects, for producing more lengthy technical guides on promising areas for energy efficiency investment and for disseminating these new information products through SETC's electronic systems, using various dissemination meetings, direct mailings, and media. Progress on the Center's 2003 work program, however, suffered setbacks from first the SARs epidemic, halting domestic travel, and then from the Government's reorganization (see section 1.9). The final year of the five-year program, originally planned as 2004, was put in abeyance, pending resolution of issues surrounding the establishment of the Center under NDRC and securing counterpart financing, especially for staff costs. The final year of the program was delayed until July 2006-June 2007, when the previous basic system for case study and technical guide development and dissemination was re-energized.

During 2000 and 2001 a handful of additional companies began to pick up the EMC business concept, especially from the concept dissemination work of the PMO, and even more expressed interest in learning. With grants eventually totaling over \$2.5 million, the United Kingdom's Department for International Development (DFID) supported, through the Bank's Asia Sustainable and Alternative Energy Program (ASTAE), a comprehensive program of training and technical assistance for new, emerging EMCs, further buttressing the PMO's efforts. The highly successful ASTAE-DFID program spanned 2001-2005, laying the foundation for implementation of the longer-term Second China Energy Conservation Project.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

The design for monitoring and evaluation was simple, yet it captured the fundamental, critical aspects of the project objective. The key performance indicators were actual energy savings and carbon dioxide emissions reductions achieved through the project, targeted and then reported each year. Monitoring and evaluation reporting systems were fully implemented by the project as designed.

Monitoring and evaluation of energy savings and associated carbon dioxide emissions reductions achieved by the three EMCs were based on the actual energy savings data of all of the subprojects invested in by the EMCs during the project period. This data came directly from the feasibility studies and EPCs of the subprojects, for which the energy savings achieved was a key determinant of the remuneration of the EMCs by the host enterprises. Data from subproject investments, together with corporate financial reports and business plans for the immediate future, were reported by each EMC biannually during project supervision, reviewed by the PMO, and compiled by the PMO into project performance statistics.

The PMO's monitoring and evaluation of performance results were completed in a very satisfactory manner, developing a valuable database of EMC investment and energy savings

information. At the end of the project, the PMO organized the careful preparation a 900-page volume, “Case Studies of Energy Conservation Projects by Chinese ESCOs”, published in 2006. The volume includes hard data on 357 case studies implemented according to the EPC mechanism, reviewed, confirmed and evaluated by outside experts. The PMO also prepared many other monitoring reports and evaluations (see details in Annex 2). This information has been very helpful to others eager to learn about the business model, and also has helped to further enhance and renew the Government’s commitment to the development of the EMC industry in China.

Breaking from conventional approaches which focus only on information products produced, numbers of participants in events, quantities of mailings, website hits, etc., monitoring and evaluation of the information dissemination component included major efforts by third parties to assess the actual energy efficiency investment results achieved through SECIDC/NECIDC’s information programs. Methodologies combined concepts for information program performance monitoring used in the United Kingdom with practices used in surveys by China’s national statistical system. Three evaluation surveys were completed—the first two to provide inputs for the project’s mid-term reviews, and the third as a final survey. The energy savings results of this project component were then calculated by the third parties based on these surveys. This approach provided objective data on the benefits of the information program, which proved useful in obtaining continued government support. At least as important, the detailed surveys also provided important market feedback as to which information products and especially which dissemination methods were providing the best results. After the first survey, in particular, SECIDC made adjustments in its allocation of time and resources among different dissemination methods.

2.4 Safeguard and Fiduciary Compliance *(focusing on issues and their resolution, as applicable)*

The project complied with the Bank’s safeguard and fiduciary guidelines.

Procurement. The procurement arrangements agreed at project appraisal proved insufficiently flexible in some respects during project implementation. While it was recognized at appraisal that the EMCs were basically acting as financial intermediaries, the procurement arrangements agreed still incorporated a mixture of approaches. ICB and NCB procurement were expected to be used for over one-third of the goods procurement. This expectation proved unrealistic, as subprojects were small and the EMCs needed to move on the timetables of each subproject independently to meet the needs of their clients expeditiously. Very few business lines attracted any interest from foreign suppliers, as most projects involved customized retrofitting of existing equipment. No contracts emerged where international competitive bidding (ICB) was considered advantageous. While the project team promoted the use of NCB aggressively, only a few contracts were procured by the EMCs using NCB procedures. No contracts were executed using Bank financing that exceeded the \$2 million international shopping threshold, as the business of the EMCs focused on smaller projects. The EMCs universally judged the simpler request for quotation and comparison of up to three suppliers as the most suitable procurement method for their businesses. The EMCs found, however, that quotations from foreign suppliers could not be obtained for many types of standard equipment commonly produced in China. It was then

agreed that the EMCs should advertise for expressions of interest in the UN Development Business journal if they were not able to obtain quotations from international suppliers, and request quotations from any firms expressing interest to these advertisements. This procedure was followed strictly by the EMCs, but rarely resulted in expressions of interest from outside of China. In the end, contracts with foreign suppliers were executed for some projects, but primarily in niche technology areas, such as heat pumps and chillers.

The three EMCs proved conscientious in seeking the best value contracts in their procurement, as their revenues from EPCs depended upon equipment performance after installation, and they had strong commercial interests in minimizing cost. With hindsight, reliance upon prevailing Chinese commercial practices acceptable to the Bank for procurement up to the threshold of \$2 million would have been a more appropriate approach.

Social and Environment Aspects. At appraisal no major social or resettlement issues were expected from the implementation of the energy efficiency retrofitting subprojects. Mechanisms agreed at project appraisal to ensure that subprojects followed country-system procedures were implemented satisfactorily. The EMCs reported that none of their investment projects encountered social, land use or resettlement issues. EMC host enterprises were required under Chinese regulations to obtain approval from local Environmental Protection Bureaus for any major renovation projects or deployment of new technology with potential negative environmental impacts, and the approval process required identification of impacts and appropriate mitigation, if relevant. Bank team had reviewed relevant documentation at random, and satisfactory documentation was provided in all cases.

Financial Management Aspects. The standard financial management procedures used for this project were implemented satisfactorily. Audit reports for each of the three EMCs, SECIDC/NECIDC, and the PMO were submitted satisfactorily and without major delays. The 2002 and 2003 audit reports for SECIDC were qualified by the auditor, due to lack of certain documentation needed to substantiate financial reports, and financial management aspects were temporarily rated as unsatisfactory as a result until the matter was fully resolved to the satisfaction of all parties.

2.5 Post-completion Operation/Next Phase

(including transition arrangement to post-completion operation of investments financed by present operation, Operation & Maintenance arrangements, sustaining reforms and institutional capacity, and next phase/follow-up operation, if applicable)

The project proved very successful in achieving its aim to introduce new concepts (especially the EPC business model) and develop new institutions, providing a platform for long-term sustainable scale up and increasing energy savings.

The three pilot EMCs have developed from the ground up to become strong, growing companies. They have increased their assets by about nine-fold, on average, over the life of the project, through operation of the EPC business. Beijing EMC's assets have grown from US\$2.7 million to \$26.4 million, while Liaoning EMC's assets have grown from \$3.6 million to \$36.0 million and Shandong's from \$4.8 million to \$31.8 million. EMC investment levels in projects

increased every year over the decade of project implementation, with investments in EPC projects reaching about \$30 million in 2006, the final project year. Positive net profit ratios were realized during each of the last six years. At project closing, each of the EMCs reported their plans to continue EPC investments well into the future, as key parts of their mainstay energy efficiency investment businesses. The companies have developed relationships within the financial community to assist in providing further capital for growth.

As the EMCs matured, they each developed their own distinct characteristics, with different market concentrations and comparative advantages. Liaoning EMC has developed an alliance with a number of smaller EMC companies and formed a variety of business partnerships within China and abroad, both with financing companies and with a variety of technical groups. The overall Liaoning EMC (Liaoning Nengfa) group now also produces certain energy efficiency products itself, and maintains especially strong technical design service capacity. Beijing EMC has decided to retain its main focus for now within Beijing Municipality, and has developed business platforms specially catered to investment and performance-based asset operation for energy efficiency gains in commercial buildings. In recent years, Shandong EMC has focused primarily on medium and large-sized energy efficiency investments in industrial enterprises. The company recently became one of the few corporations nationwide to obtain a license from the central government to operate a financial leasing business, and is scaling up its operations to fully utilize the increased leveraging and new business opportunities this provides.

The success of the three pilot EMCs generated interest in many other companies in China in the possibility of developing EPC business. The China Second Energy Conservation Project, with GEF financing of \$ 26 million, was approved in 2002 with an objective to help realize this scale-up potential, and aggressively develop China's nascent EMC industry. The second project includes programs to help new EMCs to obtain local bank loans through a special loan guarantee program, and to receive hand-on technical assistance in all aspects of company and business development. This project adds further institution building, through the creation and operation of China's new EMC Association (EMCA), which provides a platform for delivery of technical assistance, mutual support and EMC industry advocacy, and through development and strengthening of ties between EMCs and local financial institutions, with the help of the China National Investment and Guaranty Co. (I&G). Grounded in the demonstrated success of the first three companies, then, the full package of effort is now yielding major energy efficiency investment and energy savings results (see section 3.2). As the EPC mechanism is catching on in the market, EMCs are becoming important parts of many new energy efficiency project delivery initiatives in China, including the IFC's China Utility-based End-Use Energy Efficiency Project and the new energy efficiency financing programs of several Chinese banks supported under the planned new IBRD China Energy Efficiency Financing Project (proposed for FY08).

The NECIDC remains a permanent institution, charged with the important work of disseminating information on energy conservation nationwide, under the supervision of NDRC. NECIDC's business plan for the future shows a combination of ambition to continue development of information products pioneered under this project, and to develop new efforts.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

(to current country and global priorities, and Bank assistance strategy)

The overall relevance of the objectives and implementation work of this project are even higher than when the project was approved. China's 2006-2010 Five-Year Plan includes a national target to reduce the energy intensity of the country's GDP by 20%. As industry continues to lead robust economic growth in China, achievement of this target is a major and difficult task. The Government has organized massive efforts to promote energy efficiency in all sectors and all regions, with determination to see the target achieved. Local governments and enterprises are being held strictly accountable for achieving energy efficiency results. Expanded use of the new EPC mechanism is explicitly highlighted as one of the measures to be supported (see Annex 6). Demand for EMC services to identify, prepare, design, implement and often finance new energy efficiency investments is high.

The project objectives are consistent with the current Country Partnership Strategy (CPS, 2006-2010). The third pillar outlined in the CPS is managing resource scarcity and environmental challenges. China is to build a resource-efficient society and promote more efficient water and energy supply systems. China has also made commitments under international environmental conventions on climate change, ozone-depleting substance, persistent organic pollutants, biodiversity, and international seas. Bank group activities are to help to mainstream environmental concerns into the development process, create a resource-saving society through better regulation, pricing and taxation of natural resource use, and meet China's commitments under international environmental conventions

The project objectives are also fully consistent with the Focal Area Strategies and Strategic Programming for GEF-4 dated October 2007. The GEF aims to promote energy-efficient technologies and practices in the appliance and building sectors, as well as industrial production and manufacturing processes.

3.2 Achievement of Project Development Objectives and Global Environment Objectives *(including brief discussion of causal linkages between outputs and outcomes, with details on outputs in Annex 4)*

The project clearly met its development objective to achieve large, sustained and growing increases in energy efficiency and associated reductions in carbon dioxide emissions and other pollutants by (a) introducing, demonstrating and disseminating the new EPC mechanism and (b) developing a more efficient energy conservation information dissemination program. In particular, the high-risk venture to attempt to adapt the EPC model to Chinese conditions has paid off well. In the year 2006 alone, total EPC project investment in China reached \$ 280 million, providing life-cycle energy savings and carbon dioxide emissions reductions of over 21 million tons of coal equivalent and 12 million tons carbon, respectively. In 2007, these figures are expected to further increase sharply.

The three pilot EMCs were each successful in their efforts to design pilot projects, learn and adjust during implementation, and eventually roll out profitable business models. By the end of 2006, the energy performance contracting investments of the three companies had reached a total of \$180.8 million, invested in 514 projects. (See details in Annex 2.)

Excluding the energy savings which will be achieved after the project implementation period, over the life of the energy savings assets created, total energy savings from these investments amounted to 5.92 million tce by the end of 2006 (versus the target of 5.22 million tce set forth in 2002).² Associated carbon dioxide emissions reductions already achieved amounted to 5.06 million t-c (versus the target of 3.77 million t-c set forth in 2002). Tables 1 and 2 provide these details.

Table 1: Energy savings achieved by pilot projects of EMCs in past years
Unit: million tons of coal equivalent

Project Year Indicators	1~4 1998~ 2002	5 2003	6 2004	7 2005	8 2006	Total
Planned	1.16	0.71	0.91	1.12	1.32	5.22
Actual	1.35	0.85	0.94	1.23	1.55	5.92

Table 2: CO₂ reduction achieved by pilot projects of EMCs in past years
Unit: million tons of carbon

Project Year Indicators	1~4 1998~ 2002	5 2003	6 2004	7 2005	8 2006	Total
Planned	0.77	0.49	0.65	0.89	0.99	3.77
Actual	0.98	0.56	0.72	1.25	1.55	5.06

The idea to work intensively with the three specially created companies to test and demonstrate the EPC model in China, and then try to replicate that later, worked well. The EPC business model was adapted through ‘learning by doing’ over a period of 3-4 years before workable business models began to solidify, and could strongly expand. The existence of a dedicated source of project finance was critical—allowing the EMCs to focus on marketing, technical aspects, contract design, methods of risk mitigation, and means to bring transaction costs under control, without having at the same time to also convince skeptical financiers to invest in the untried new business model. As focus then began to turn to how to foster further development of the EPC concept among other companies, the working and profitable demonstration examples of

² Performance monitoring indicators were defined this way for the first Energy Conservation Project. In the Second Energy Conservation Project, however, performance indicators were defined to include the total life-cycle energy savings and carbon dioxide emission reductions for the energy savings capacity created, including benefits arising after the project closed. That definition, then, is used for the calculations in Table 3. Investments in energy savings and CO₂ reductions are calculated for the entire year of 2006 although the project was closed in June 2006. While all investments were contracted and completed disbursements continued into the second half of 2006.

the three EMCs proved invaluable. Almost invariably, the first question raised by potential new investors was if they EPC concept had been shown to work under Chinese conditions. The three EMCs devoted time and energy to explain their work and results to many others, becoming natural leaders within the emerging new industry. They have played leadership role in training courses, dissemination events, and in the establishment and operation of the new EMC Association.

With the further efforts of the Government, the PMO, EMCA, I&G and scores of new companies and financiers, supported under the China Second Energy Conservation project, more than 60 companies were implementing energy performance contracting project in 2006. Based on a comprehensive survey undertaken by EMCA and the PMO, investments from EPC projects totaled about \$249 million in 2005. Estimates for 2006 show a total of about \$ 280 million, of which the three demonstration EMCs accounted only about 11%, even though they reached their highest combined investment level ever (see Table 3). A variety of business model variations have been successfully introduced, in addition to the “full-service” EPC model pioneered by the pilot EMCs, including contracts in which the EMCs guarantee energy savings but host enterprises are responsible for obtaining the primary financing themselves.

	EPC Project Investment (US\$m) ^{1/}	Project Life-cycle Energy Savings (million tce)	Carbon Dioxide Emissions Reduction (million tons C)
<u>EMCA members</u>			
Three pilot EMCs ^{2/}	30.3	2.4	1.6
Projects guaranteed by I&G	18.6	1.4	0.9
Other EMCA member projects ^{3/}	179.0	13.4	9.7
Total	227.9	17.2	12.2
<u>Non-EMCA members</u>	52.0	3.9	2.8
Total	279.9	21.1	15.0
^{1/} @ RMB 7.8/US\$1. ^{2/} Beijing, Liaoning and Shandong EMCs, supported under Phase 1, Energy and carbon saving calculations conform with Phase II methodology rather than Phase I methodology ^{3/} \$153.4 mln from data reported from EMCA members, excluding the three pilot EMCs, plus \$25.6 mln extrapolated from random sample survey results.			

While the success so far of the scale-up effort stems in large part from the second project, the successful demonstration of the first three pilot EMCs under the first project was a pre-requisite, without which the second project would not have been possible.

The project achieved satisfactory results in developing a more efficient national energy conservation information dissemination program. Prior to the reorganization of the previous SECIDC to become NECIDC, the information dissemination component was rated highly satisfactory by the Bank team. Outputs from the first four years of project implementation, especially in terms of operation of the Center and its impact in China’s energy efficiency market,

were impressive. SECIDC developed an effective platform for delivery of information on energy efficiency investment opportunities which were attractive under market conditions (see details in Annex 2). After the reorganization was finalized, NECIDC was able to continue the work. By the time the GEF part of the project closed in June 2007, the information dissemination center had prepared and disseminated 100 energy conservation investment project case studies in areas of highly replicable technology, and produced 20 energy conservation technical guides. The case studies were produced by selecting from successful energy conservation projects implemented nationwide which had demonstrated not only solid technical results but also financially attractive returns. The Center's system for careful selection, study by third parties, review and confirmation by a panel of experts, and then dissemination through a variety of channels proved effective in generating new investment, based on the monitoring and evaluation surveys completed. The technical guides were compiled by industry experts and have been used by a wide audience, including research and training staff, statisticians and monitoring personnel, as well as the main enterprise clients. Additional activities carried out by NECIDC are described in Annex 2.

The last of the three independent evaluation surveys carried out at the end of the project showed that from 1999 to 2006, energy conservation investments estimated to have resulted from the disseminated new energy conservation information reached more than 130 times the cost of the inputs for the program. Energy savings resulting from the investments realized were estimated at about 26 million tons of coal equivalent over the entire period, with carbon dioxide emissions reduction of some 68 million tons.

3.3 Efficiency

(Net Present Value/Economic Rate of Return, cost effectiveness, e.g., unit rate norms, least cost, and comparisons; and Financial Rate of Return)

Economic returns. The economic returns of this project were exceptionally high, as was forecast at appraisal. The economic internal rate of return of the subprojects to be supported by the IBRD loan were estimated in the original PAD to average about 47 percent, with a range of 30-90%. This was based on the planned product lines of the three EMCs at that time. The returns include the full life-cycle benefits of the investments, most of which accrue to the hosts of the EMCs after the standard 2-3 year energy performance contracts have been completed, and the EMCs have been repaid for their investment. The actual average economic rate of return of the subprojects of the EMCs was 78%, based on the detailed analysis of 357 subprojects completed by the PMO. Returns of different product lines ranged from 36% to 168% (see Annex 3). While the EMCs obtained only a fraction of the returns, and most host enterprises in effect heavily discount future operating costs savings, this shows both the inherent total profitability of the investments (shared by different parties) and the high return to the country and global environment of these types of investments.

Financial Performance. Audited consolidated financial results for the three EMCs combined over the period 1997-2005 and estimates for 2006 are set out in detail in Annex 3. The three EMCs grew strongly from low base points at the beginning of the project, although not as sharply as in the original, overly optimistic business plans of each company. Combined, assets grew from about RMB 86 million in 1997 to an estimated RMB 757 million by the end of 2006. The companies started slowly, and faced a sharp learning curve, with negative retained earnings

during the first six years. The EMCs then succeeded in increasing profits annually thereafter. Over the ten year period since the companies were formed in 1996, turn-over increased at an average of 37% per year, leading to a growth in net worth averaging around 5 percent per year. All three EMCs have met the agreed financial performance covenants consistently. The financial internal rate of return on investment, net of GEF and EC grants received, is estimated to be 17.6 percent in real terms.

3.4 Justification of Overall Outcome and Global Environment Outcome Rating

(combining relevance, achievement of PDO/GEOs, and efficiency)

Rating: Satisfactory.

The project was exceptionally successful in meeting its broad goals of introducing, adapting and laying a foundation for scaling up the new energy performance contracting mechanism for energy efficiency investment. This has proved especially important with China's current aggressive national agenda to further increase energy efficiency. Assessed in a somewhat narrower sense, however, considering specific operational results of the three EMCs and SECIDC/NECIDC, the overall outcome of the project is rated conservatively as "fully satisfactory." The project design proved effective, and the project met its development objectives. The three EMCs clearly fulfilled their roles as effective demonstration companies for the new business model, and overfulfilled the performance indicators officially revised during the second mid-term review. SECIDC and NECIDC successfully completed the full program of work assigned under the information dissemination component, fully meeting expectations and hoped-for energy savings results.

3.5 Overarching Themes, Other Outcomes and Impacts

(if any, where not previously covered or to amplify discussion above)

(a) Poverty Impacts, Gender Aspects, and Social Development

The project did not have direct goals for poverty reduction, gender aspects or social development. However, the general population gained from the energy savings and pollution reduction benefits of the project. These benefits certainly resulted in some health benefits from air pollution reduction, although these benefits were not specifically studied or quantified.

(b) Institutional Change/Strengthening

(particularly with reference to impacts on longer-term capacity and institutional development)

As described in sections 2.1, 2.5 and 3.2, this project was basically an institutional development project. It achieved major successes in the adaptation of a new energy efficiency investment business model to China, and the development and dissemination of new information dissemination products emphasizing the attractiveness of specific energy efficiency investments. The four new organizations created under the project to anchor these institutional innovations all became successfully established, and are virtually certain to continue operations over the long term. The three companies have grown into major enterprises, with sophisticated management, financial risk assessment, technical and marketing capacity to further pursue successful energy efficiency investment business. NECIDC also is expected to continue its role as a key institution

for energy conservation information dissemination nationwide, the importance of which is emphasized in China's new Energy Conservation Law, passed in November 2007.

(c) Other Unintended Outcomes and Impacts (positive or negative)

Chinese EMC experience has also attracted interest to others outside of China. A very active cross-country exchange between energy performance contracting practitioners in China, India and Brazil was undertaken with United Nations Foundation support during 2001-2006. The practical experience and rapid growth of China's EMC industry, led by the three demonstration companies, was one of the main areas of particular interest among foreign companies and financiers—particularly China's adaptation of the original North American concepts in a rapidly growing emerging market economy with different legal traditions and customs. Chinese EMC representatives also have been increasingly active in other international arena, and Chinese EMCs have received delegations from a variety of other developing countries, interested to learn about their operations and to exchange experiences.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

(optional for Core ICR, required for ILI, details in annexes)

A large conference was held in Beijing in November 2006 to discuss and share experiences gained from implementing this project. Officials from the central government and implementing agencies participated and spoke at the meeting. Many speakers stated that this project was very successful in introducing a new mechanism in achieving energy efficiency. The impact of this project over the sector was judged profound, with a significant number of EMCs now flourishing and a variety of forms of energy efficiency investment methods emerging. Attention was also given to discussion of the many issues which still face the industry as it seeks financing and aims to further expand. Continuing needs for government policy support and further efforts to make financing more available to new companies were emphasized. (See Annex 5.)

4. Assessment of Risk to Development Outcome and Global Environment Outcome

Rating:

Rating for Risk to Development Outcome: Negligible to Low

Rating for Risk to GEO Outcome: Negligible to Low

Section 2.5 and 3.1 indicate reasons to be fully confident that the project development and GEO outcomes will be sustained. The Second Energy Conservation Project is providing a platform for scaling up application of the EPC business model demonstrated through this project, and additional IFC and Bank projects also are involving the new EMC industry. The Government's commitment to energy conservation has increased greatly over the last several years, as it mobilizes to achieve its target of reducing energy consumption per unit GDP by 20% during the period of 11th Five-year Plan. China's Medium and Long Term Energy Conservation Plan states that energy performance contracting should be further spread and the State Council's 2007 decision on intensifying energy conservation work specifically pointed out that the work on

advancing EPC should speed up, to facilitate energy conservation technology renovations in enterprises.

5. Assessment of Bank and Borrower Performance

(relating to design, implementation and outcome issues)

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

(i.e., performance through lending phase)

Rating: Satisfactory

The Bank team worked in full partnership with the Government, stakeholders and beneficiaries. Project preparation was based on both previous sector work on energy conservation in China and extensive study of energy conservation investment mechanisms in other countries. Experiences and lessons learned from EC pilot projects in China were fully taken into account in the final project design. The project development objectives were consistent with the country's and the Bank's strategic priorities during project approval and at the time of this evaluation. Despite hurdles at the beginning of project implementation, the project design and implementation arrangements proved to be good choices. Fiduciary and safeguard arrangements followed Bank's guidelines. Monitoring and evaluation were spelled out in a systematic approach. With hindsight, however, the business plans of the EMCs confirmed at appraisal proved overly optimistic.

A Quality at Entry Assessment was conducted for the part of the project financed by the IBRD loan. The overall assessment of quality was rated satisfactory. The appropriateness of project approach and Borrower ownership were given highly satisfactory ratings. The assessment particularly noted that important lessons were incorporated in the project design. It noted, however, that there was no analysis of, and linkage to, energy prices, although all contracts include clauses for adjusting repayment due to increases/decreases in energy prices.

(b) Quality of Supervision

(including of fiduciary and safeguards policies)

Rating: Satisfactory

The Bank team effectively conducted regular supervision missions. The two mid-term reviews carried out for the project proved to be useful as the project introduced new concepts to China and needed to adapt to the country's systems. The reviews were appropriately scheduled for the second and fourth years of project implementation. The two mid-term reviews, along with the two annual supervision missions, provided opportunities for resolving various problems at the appropriate stages of project execution. The timely Bank visits were considered valuable by the EMCs.

The task team leader and team's principal financial specialist remained the same throughout the project period, enabling consistency and continuity in the dialogue with counterparts. The team provided the necessary comments on various feasibility studies, contracts, procurement documents, and project verification documents. The team and PMO worked proactively to try identify problems early on and resolve them. Marketing strategies and sound corporate financial management were common themes in the Bank team's discussions with the EMCs. The EMCs responded to steady encouragement to improve risk analysis and develop formal credit control procedures. The Bank reviewed virtually all project proposal provided by the EMCs until the EMCs gained experience and business models stabilized, after which the Bank gradually released the review requirements. As project implementation proceeded, then, the Bank team and PMO concentrated increasingly on the project's strategic directions and outcomes.

Project implementation work of SECIDC/NECIDC also was reviewed during every supervision mission. Focus was devoted initially to the establishment of the new institutional platform, design of new products, and definition of optimal dissemination channels. The Bank team worked closely with both SECIDC and the consultants they engaged at start up. As time evolved, supervision work placed increasing attention on monitoring and evaluation of results, and efforts to adjust the program accordingly.

Post reviews were conducted for all procurement in the project and found that the Bank's procurement guidelines were followed. The Bank team selected randomly and reviewed the documentation related to environmental impacts, and in all cases, suitable documentations were provided and there were no major problems recorded.

(c) Justification of Rating for Overall Bank Performance

Rating: Satisfactory

The research and consultations during project preparation yielded a sound project design. Together with the Government and company counterparts, the Bank team focused on developing an EPC model suitable for Chinese circumstances. The close collaboration with the Government was critical to the successful implementation of the project. The Bank team was proactive in working with the project to overcome implementation hurdles. Focus was place on strategic directions and performance targets, as well as the business development of the EMCs.

5.2 Borrower Performance

(a) Government Performance

Rating: Satisfactory

The Government's commitment to the project's objectives was a key factor for success. The basic project design was developed jointly by the Bank and several key working-level Government counterparts. Workshops and conferences were held to discuss ideas with a wide range of stakeholders and beneficiaries. Provincial governments, represented especially by their economic and trade commissions, showed strong support. Government approval of SECIDC as

a new institution was completed on time and at a high level, which required a major effort by the Bank’s counterparts.

After the project was approved, initial difficulties in arranging counter guarantees for the Bank loan and setting up disbursement systems caused delay. Central and provincial governments collaborated with the project beneficiary companies to resolve the issues. Relevant government agencies were instrumental in organizing a study on tax treatment of the EMCs and reaching agreements with the provincial tax bureaus. Throughout project implementation, the Government issued new policies, regulations or instructions which emphasized the importance of energy conservation. The Government also worked closely together with the Bank in the preparation of the Second Energy Conservation Project.

(b) Implementing Agency or Agencies Performance

Rating: Satisfactory

1. Beijing EMC	Highly Satisfactory
2. Liaoning EMC	Highly Satisfactory
3. Shandong EMC	Highly Satisfactory
4. Energy Conservation Information Center later transformed to NDRC Energy Conservation Information Dissemination Center (NECIDC)	Satisfactory
5. Project Management Office	Highly Satisfactory

The performance of the three EMCs was exemplary. The EMCs were partners in the preparation of the project, assessing the needs and demands of enterprises, and working with the Bank team and foreign consultants to try to adapt the new EPC mechanism to meet these needs and demands.

EMCs were proactive and creative in removing implementation barriers, without which the project could not have been successful, and project objectives would not have been achieved. Management teams in each of the EMCs were basically stable throughout the project. The EMCs worked hard to resolve initial issues surrounding the legal characteristics of EPC contracts, questions raised by domestic auditors on how to classify these businesses, their accounting stances and tax treatment. They were equally savvy in creating new business opportunities by forming alliances, extending opportunities outside of their normal territories, and forming partnerships with relevant financial and commercial entities. They developed a number of diversified business lines, and ensured that the targets for energy savings and carbon dioxide reductions were achieved each year. The EMCs also provided leadership and direction to other newly emerging EMCs, exceeding expectation as the pioneers and initial role models for the industry. All EMCs followed the Bank’s procurement guidelines, and ensured compliance with project agreements. Progress and financial reports were produced on time and of good quality.

The Energy Conservation Information Dissemination Center achieved highly satisfactory results prior to its reorganization in 2003. Its reorganization delayed completion of implementation. However, with the extension of one additional year for the GEF part of the project, NECIDC was able to continue and expand the information dissemination work, completing the final batch of the total of 100 case studies and 20 technical guides. NECIDC also published many articles in

various professional magazines, held exhibits, maintained and expanded their website and database.

The PMO under the NDRC was capable in managing and monitoring project activities. Along with the EMCs, it also monitored and reported on the key performance indicators. (See details in Annex 2.)

(c) Justification of Rating for Overall Borrower Performance

Rating: Satisfactory

Government played a key role in the successful implementation of the project. Implementing agencies' performance was exceptional and they achieved the agreed development targets.

6. Lessons Learned

(both project-specific and of wide general application)

Consistent central government support was critical for the success of the project. Without this steady support, the project would have likely floundered when faced with the many regulatory and 'system adaptation' issues that arose during the first 4-5 years. Government support provided necessary legitimacy to the emerging new businesses. Provincial government support also was important.

The GEF grants were essential for both the creation of the first pilot EMCs and their ability to accept loans on commercial terms, and the catalyzation of the establishment and initial operation of SECIDC. Even with the GEF and EC grants, the equity financing of the first EMCs to pioneer a totally new and untried business concept was a high risk proposition—without these incentives, it is difficult to imagine the creation of these companies, and particularly willingness of the Chinese shareholders to arrange the counter guarantees necessary for the IBRD loan. There also is little question that without international support and financing to match government commitments, the new SECIDC platform was unlikely to gain approval and traction.

For the EMC component, there was a joint, conscious decision to begin with pilot investment projects before all system-related issues concerning operation of the business model were resolved. The idea was to learn by doing, and to confront various issues practically, with actual cases, as they arose. This proved a good choice. Issues involving accounting for the new businesses, the legitimacy of the energy performance contracts, taxation, reporting of ownership of off-site assets, marketing strategies, measures to best ensure enterprise repayment, etc., were best understood and resolved with actual cases and emerging experience in hand. If implementation awaited attempts to resolve all of these issues upfront abstractly it was unlikely that the project could have gotten off the ground.

Flexibility and adaptability were crucial in the design of such a project that introduces new concepts and practices. Application of the basic EPC concepts evolved and changed substantially through the piloting phases, with the end results becoming unique for application in Chinese market conditions and in line with Chinese business conventions. With very little

multilateral development bank experience in developing such an investment project to use as a guide post, it also was important to have flexibility to make adjustments in the operation of the project itself.

The inherent profitability of untapped small and medium-sized energy efficiency investments has proved a key underlying reason for the eventual success of the energy performance contracting business in China, as in other countries. As a relatively complicated investment mechanism requiring multiple skills to implement effectively, the potential of this mechanism to pick up quite profitable investments which otherwise are often overlooked is what has attracted new companies and investors with strong entrepreneurial spirit.

The staging of energy performance contracting through pilots, demonstrations, operations, dissemination in this project, with a source of dedicated financing, and followed with a second project to build the necessary bridges to local financiers, and foster development of many more companies, proved practical. Energy performance contracting is a complicated business, and experiences from other countries have also shown that it is often too difficult to tackle all of the issues involved at the same time.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

The executive summary report of the Government's ICR is attached in Annex 6. The full report from the Government is in Chinese and expands to 147 pages. There are no additional issues which need to be addressed in this section and have not been discussed in other sections of the ICR. The PMO also reviewed the draft ICR in detail and provided some factual, statistical corrections, which were incorporated in the ICR.

(b) Cofinanciers

Not applicable.

(c) Other partners and stakeholders (e.g. NGOs/private sector/civil society)

None.

Annex 1. Project Costs and Financing

Project Cost and Financing by Component, (in USD Million equivalent)

Components\ Source of Financing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
EMC Demonstration			
EC Grant/a	4.5	4.5	100
GEF Project Grant	15.0	15.0	100
IBRD Loan	63.0	60.5	96
EMC Own Funds/c	54.3	100.8	186
<i>Subtotal</i>	136.8	180.8	132
Information Dissemination			
GEF Project Grant/b	5.0	5.0	100
Government	5.0	5.0	100
<i>Subtotal</i>	10.0	10.0	100
Project Management			
GEF Project Grant	2.0	2.0	100
Government	2.0	2.0	100
<i>Subtotal</i>	4.0	4.0	100
Total Project Costs	150.8	194.8	129
Total Financing Required	150.8		
Total Funds Financed by Source			
EC Grant/a	4.5	4.5	
GEF Project Grant/b	22.0	22.0	
IBRD Loan	63.0	60.5	
Government	7.0	7.0	
EMC Own Funds	54.3	100.8	

/a Effective June 1997.

/b Total GEF grants for this project was US\$22.7 million, including GEF Project Development Grants of US\$0.7 million approved in 1996.

/c EMC's own funds include the reinvestments by the EMCs throughout project implementation period.

Annex 2. Outputs by Component

(In Millions)

Component 1. Energy Management Company Demonstration Component

(Approved: \$136.8 total including contingency, \$4.5 EC grant, \$63 Bank financing, \$15 GEF financing, \$54.3 Government financing);

(Actual: \$180.84 total, \$4.5 EC grant, \$60.5 Bank financing, \$15 GEF financing, \$100.84 EMC own financing).

Objective - Three demonstration EMCs were asked to develop energy performance contracting, as developed by Energy Service Companies (ESCOs) in other countries, for the first time in China. They were to adapt, begin operation, and expand as commercial business under this core component. As the EMCs developed and began to make profit, the number of energy performance contracts was to increase, which would translate into energy savings and CO2 reduction.

The three EMCs have successfully developed and expanded their EPC business. They have established partnerships with local financial institutions. Liaoning and Shandong EMCs have also formed their own subsidiary companies. The EMCs have demonstrated that EPC is the viable way to achieve energy savings and carbon dioxide reduction in China.

The revised target set in 2002 for energy savings was 5.22 million tce, and the project achieved a total of 5.92 million tce by the end of June 2006, when the loan portion of the project was closed. The revised target for carbon dioxide reductions was 3.77 million t-c, and the project achieved a total of 5.06 million t-c.

Table 2.1: Energy savings achieved by 3 Pilot EMCs

Unit: million tce

Year Company	1999	2000	2001	2002	2003	2004	2005	2006	总计
Beijing EMC	0.05	0.05	0.06	0.11	0.16	0.18	0.24	0.32	1.17
Liaoning EMC	0.07	0.05	0.1	0.18	0.29	0.33	0.43	0.61	2.06
Shandong EMC	0.1	0.11	0.19	0.28	0.4	0.43	0.56	0.62	2.69
Total	0.22	0.21	0.35	0.57	0.85	0.94	1.23	1.55	5.92

Table 2.2: CO₂ reduction achieved by 3 Pilot EMCs**Unit: million tons of carbon**

Year Company	1999	2000	2001	2002	2003	2004	2005	2006	Total
Beijing EMC	0.03	0.03	0.04	0.07	0.11	0.17	0.22	0.28	0.95
Liaoning EMC	0.06	0.05	0.06	0.14	0.19	0.25	0.46	0.66	1.87
Shandong EMC	0.10	0.08	0.13	0.19	0.26	0.30	0.57	0.61	2.24
Total	0.19	0.16	0.23	0.40	0.56	0.72	1.25	1.55	5.06

Note: Data of Shandong EMC and Liaoning EMC includes their subsidiary companies.

The three EMCs met or surpassed their total investment targets set forth in their 2002 business plans. The following table illustrates the trends of their investments in energy conservation projects. By the end of 2006, the total EPC investments of the three pilot EMCs amounted to \$180.84 million. Total number of EPC projects implemented was 514.

Table 2.3: Actual Investment Amount of 3 Pilot EMCs**Unit: million US\$**

Year Company	1997~2001	2002	2003	2004	2005	2006	总计
Beijing EMC	12.2	6.07	6.38	7.33	7.96	2.79	42.73
Liaoning EMC	15.35	7.25	8.83	10.52	12.7	20.09	74.74
Shandong EMC	17.62	7.88	8.58	6.73	13.49	9.07	63.37
Total	45.17	21.2	23.79	24.58	34.15	31.95	180.84

Table 2.4: Projects implemented by 3 Pilot EMCs in past years**Unit: million US\$**

Year Company	1997~2001	2002	2003	2004	2005	2006	总计
Beijing EMC	60	18	7	4	6	2	97
Liaoning EMC	84	51	33	43	39	61	311
Shandong EMC	62	11	14	6	11	2	106
Total	206	80	54	53	56	65	514

Beijing EMC adjusted its targeted market according to the special characteristics of the city and its surrounding area. As industrial facilities started to relocate outside Beijing and the environmental requirements for residential and commercial building became more stringent, the EMC took a gradual turn from industrial energy conservation to building energy conservation. It focused on projects for heat supply, air conditioning, and building renovation. Beijing EMC chose to select the projects with greater potential for energy conservation, proven technology and lower risks. It increased its investments steadily, at the same time raising the technical content

and the level of complexity of projects. Throughout the years of project implementation, Beijing EMC has strengthened its risk management in fund payback and financing risk control.

Liaoning EMC established a technical network with various domestic institutes and universities to support project development and design. It secured agreements with local banks to assist in credit assessments of prospective customers and monitoring of the financial strength of host enterprises. To improve marketing prospects, Liaoning EMC implemented technical training courses and workshops on energy management for technical staff from energy intensive customers. The company maintained the principle of leaving zero risk for its clients related to financing and technology. It provided 7 in 1 service which includes energy diagnosis, subproject designing, subproject financing, equipment supply, installation and debugging, operation and maintenance, and personnel training. At the early stage of its operation, Liaoning EMC relied upon technologies developed by others. In 2000, it moved to acquire its own energy conservation technologies and related products. In 2002, Liaoning EMC was consolidated into the Liaoning Province Energy Conservation Technology Company Ltd., encompassing Liaoning Energy Conservation Planning Institute and other research entities. It also took over manufacturing companies and added shareholders who enabled the EMC to evolve into an energy conservation group with new products in the field of boilers, pumps, valves and meters. The expanded company combined the services of technology research, manufacturing and marketing. Its ability to provide technical advice was increased, reinforcing the 7 in 1 service business model. Liaoning EMC achieved a 100% success rate over the past ten years on EPC projects.

Shandong EMC charted its course of business to match the concentration of large industrial enterprises in Shandong province. The EMC focused on enterprises with high energy consumption. It selected projects that were easy to carry out technically and worthwhile to replicate. Shandong EMC aimed to cultivate “project hosts” and develop “client groups” emphasizing the long term, effective, and collaborative relationships with individual clients or client groups where mutual trust was established. Two small successful projects experienced by the Shandong EMC encouraged the company to tighten its credit assessments of enterprises and technical appraisal of proposed projects, developing a particularly effective set of risk-control mechanisms.

Component 2. Information Dissemination Component

(Approved: \$10 total including contingency, \$5 GEF financing, \$5 Government financing);

(Actual: \$10 total, \$5 GEF financing, \$5 Government financing).

Objective: This part of the project aimed to support the development of a new system to provide practical information on energy conservation project results to Chinese enterprise managers. New information products were to be developed with particular emphasis on financial results actually achieved by enterprises, problems and solutions during implementation, any impacts on main enterprise production or other key risks. Dissemination work aimed to influencing enterprise decision makers. These activities would increase the adoption of key energy efficiency measures due to improved access to high quality information on successful and financially attractive energy efficiency experiences.

The project achieved satisfactory results in developing a more efficient national energy conservation information dissemination program. SECIDC was established under the project in 1998. Prior to the transformation of the SECIDC to NECIDC, SECIDC developed an impressive platform for delivery of information on energy efficiency investment opportunities which were attractive under market conditions. This platform included a sophisticated website, an inquiry service, an expanded series of professionally developed and presented case studies and technical guides, a market-tested and sophisticated dissemination system involving many local contacts and a system of dissemination meetings, a well-developed network of energy efficiency experts, and a strong and expanding relationship with media organizations. Website visitors reached an average of 600 persons per day, and 5000 case studies were downloaded from the website during the first six months of 2002 alone. The enquiry desk handled over 10,000 requests and dissemination through magazines, newspapers and television programs expanded rapidly.

After the reorganization was finalized, NECIDC was able continue the work of information dissemination. By the time the GEF part of the project was closed in June 2007, the information dissemination center had in total prepared and disseminated 100 energy conservation case studies and 20 energy conservation technical guides. The case studies were produced based not only on the projects that demonstrated its strong technical results, but also on the effectiveness and achievement of strong economic and financial benefits. The case studies were based on third-party verification reports. Technical guides were compiled by industry experts and were judged useful for practitioners, research and teaching staff, statisticians and monitoring personnel.

The evaluation carried out by a third party agency at the end of the project showed that, from 1999 to 2006, energy savings and emission reductions gained by disseminating energy conservation information is more than 130 times than that of input for dissemination of information. Specifically, for the same period, energy savings resulting from adopting energy conservation measures which were promoted through information dissemination reached 26.01 Mtce, and carbon dioxide emissions reduction reached 67.89 Mt.

Component 3. Program Management and Monitoring Component

(Approved: \$4 total including contingency, \$2 GEF financing, \$2 Government financing);
(Actual: \$4 total, \$2 GEF financing, \$2 Government financing).

Objective. A Project Management Office (PMO) was set up under the State Economic and Trade Commission (SETC) to help supervise the implementation of the whole project. The component supported efforts to promote and assist the creation of new EMCs in China by any interested domestic or international parties. The component also provided operational support and technical assistance for the implementation of the two other project components, provided policy advice to the government, and implemented a series of training activities for staff and experts nominated by the PMO. This component was important for ensuring the achievement of project outcomes and development objectives.

During implementation, the PMO was very effective in its monitoring and management of the project. One of the impressive accomplishments carried out under this component was the 900 page “Energy Conservation Projects Case Studies of Chinese ESCO” published by the China Economic Publishing House in 2006. The selected 357 projects had these common characteristics: they were all EPC projects; all projects were under operation; both EMCs and the

host enterprises had confirmed their energy savings and economic efficiencies; and the technologies used in these projects were proven reliable and replicable to the greater public. The following lists some of the additional major achievements accomplished under this component:

- ❖ Organized and initial study on the feasibility of EPC in China.
- ❖ Conducted training for project managers from the three EMCs on business development, project management and commercial practices.
- ❖ Organized study tours for EMC and government personnel to US, Canada, England, France, etc. and visited the ESCOs and government agencies in these countries.
- ❖ Recruited consultants to design a software package for EMC management, including routine financial management, project management, financial projections and analysis.
- ❖ Held conferences with financial institutions and EMCs to mobilize financial resources. These conferences were productive, and provide valuable experience for the implementation of the Phase II project.
- ❖ Recruited experts to study the exchange rate risk that was faced by the EMCs concerning the World Bank loan.
- ❖ Organized discussion among different government agencies which led to a decision on the legal status of the EMCs.
- ❖ Selected an expert team to study and develop a guideline for the use of motor drive system in energy savings projects, as this kind of system was fairly new to practitioners but has great potential.
- ❖ Organized workshops with equipment suppliers for energy savings and encouraged the suppliers to establish their own EMCs.
- ❖ Organized conferences on strategic directions for the three EMCs. The PMO also assisted the NDRC in organizing the working meetings with the EMCs to exchange experiences.
- ❖ Conducted post evaluation of investments made by the three EMCs, three years into project implementation. The PMO selected a sample of 17 projects and provided detailed analysis and suggestions.
- ❖ Contracted third parties to evaluate the appropriateness of the investments made by the three EMCs using GEF funds. A total of 67 projects were evaluated under this arrangement. These evaluations all posted favorable results. From 2000 to 2003, PMO also organized on-site inspections by expert teams for over 50 projects implemented by the three EMCs. The clients met by the expert teams expressed their satisfaction for the service offered under the energy performance contracts.
- ❖ Compiled a collection of trends in energy savings work in China.
- ❖ Published over 2000 copies of the mid-term progress report, out of which 500 copies were in English, and 5000 pamphlets on the Phase I Energy Conservation Project. The PMO also disseminated to the public of the experiences of the three EMC using the mass media.
- ❖ Organized the evaluation of the Phase I Energy Conservation Project prior to project closure and the preparation of a series of evaluation reports.

Annex 3. Economic and Financial Analysis
(Including assumptions in the analysis)

1. Economic Analysis

The PAD stated that the potential economic benefits of the project were enormous. The economic internal rates of return of EMC investments ranged from 30-90%, with the overall EIRR of the project estimated as 47%. This was arrived based on the planned product lines which were expected during the project appraisal. The value of external benefits such as environmental benefits, were not included in this simple analysis. The actual overall EIRR calculated by the project for all of the investments made by the three EMCs over the 10 years prior to project close confirmed the very high EIRRs of the EMC's subprojects. EIRRs for each product line, such as in industrial boiler renovation and cogeneration, and steam thermal system renovation are shown in the following tables, based on the cash flows of 357 actual subprojects.

Table 3.1

Types Parameters	Industrial boiler renovation and cogeneration	Steam thermal system renovation	Electric power distribution system renovation	Motor driven system renovation	Green lights
Projects	78	25	19	60	28
Investment (10 ⁴ yuan)	60749.69	3499.27	4403.7	10690.87	2784.14
Energy saving benefit ($\frac{10^4 \text{ yuan}}{a}$)	58478.07	5884.57	3320.29	6102.91	2473.42
CO2 reduction (t/a)	266546	63370	15870	30164	7890
SO2 reduction (t/a)	7589	1520	502	917	253
IRR %	96%	168%	75%	56%	89%

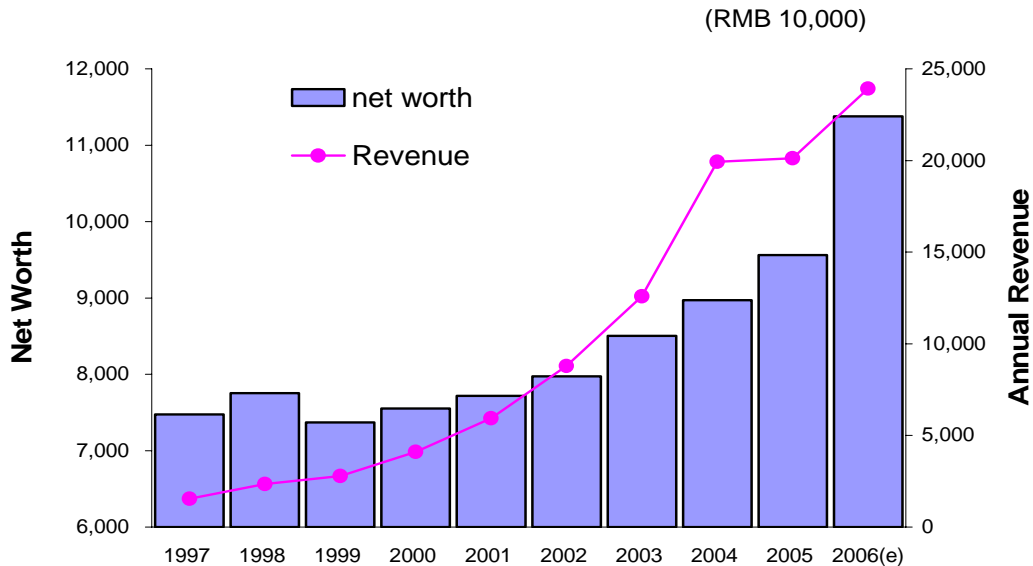
Table 3.2: Overview of Different Types of Projects II

Types Parameter	Industrial kiln and furnace renovation	Steam hammer renovation	Industrial residual energy recovery and utilization	Buildings energy conservation renovation	Other energy conservation projects	Total
Projects	45	13	17	64	8	357
Investment (10 ⁴ yuan)	23822.24	3097.55	21301.38	26284.65	17351.4	173984.89
Energy saving benefit ($\frac{10^4 \text{ yuan}}{a}$)	23014.08	2497.13	13285.25	14965.98	6588.35	136610.05
CO2 reduction (tc/a)	150532	36506	729016	87732	13939	1401565
SO2 reduction (t/a)	3901	917	3940	2077	774	22390
IRR %	96%	80%	62%	56%	36%	78%

2. Financial Analysis

Financial Performance. Audited consolidated financial results for the three EMCs over the period 1997-2005 and estimates for 2006 are set out in detail in Annex 1. While consistently below the initial and over-optimistic PAD estimates, the operating performance of the EMCs show consistent progress and robust growth in market development, turn-over and corporate net worth (excluding the EU and GEF grants). Even though the PAD estimates had been down graded during appraisal it was generally acknowledged that these were still overly optimistic and did not fully take into account the difficulty in establishing the business, adapting the ESCO model, and growing this novel market. Overall the companies performed very well, recovering from a slow start and steep learning curve and managed to reach break even some six years into the project. After that the EMCs established a sound growth path and succeeded in increasing profits annually thereafter. Over the 10 year period since the formation of the companies in 1996, turn-over was increased on average at an annual rate of 37 percent, leading to a growth in net worth, or the value of the enterprises of around 5 percent per annum.

Figure 3.1: EMC Financial Performance 1997-2006



Financial Analysis. The overall ex post financial analysis is based on the consolidated results that are summarized in Annex 1 and calculated from the net annual cash flow from operations net of all equity infusions that were received directly from the various shareholders and indirectly from grants that were received in perpetuity from the EU and GEF. On this basis the net present of the project is estimated to be RMB 92 million in real 1997 terms and the FIRR is estimated to be 17.6 percent p.a. in real terms.

Table 3.3: EMC Project Financial Summary for 1997-2006

1

EMC Project Financial Summary for 1997- 2006

Consolidated Income Statement (RMB 0 000's)										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
INVESTMENT INCOME	1553	2349	2783	4099	5940	8787	12582	19932	20119	23919
less:turnover tax & surcharges	31	11	28	12	49	59	59	77	120	382
operating costs	959	1273	672	1026	1196	1787	3417	9883	9160	8078
salary and additional	102	90	107	84	99	152	172	363	550	661
other fixed costs	359	411	420	423	319	489	705	1031	1190	2043
cost of Project		381	1164	2002	3549	5363	6942	7133	7105	9595
depreciation(Corp.assets)	54	43	71	181	200	161	182	166	185	287
OPERATING INCOME	48	140	322	369	527	776	1106	1279	1809	2873
INTEREST RECEIVED	91	96	17	40	160	196	106	86	58	89
PAY INTEREST: W.B.										
domestic-special loan(SETC)	1	45	61	71	106	136	55			
business loan			6	32	31	67	69	27		18
bank overdraft										
NET INTEREST CHARGE	(90)	(51)	56	197	173	255	215	383	881	1169
BAD DEBT LOSSES										
foreign exchange losses							(1)	15	(199)	(1092)
WB LOAN COMMITMENT FEE			440	454	318	246	224	136	135	26
OTHER INCOME			(4)	160	140	83	102	(11)	(169)	
PROFIT BEFORE TAX	139	191	(178)	(122)	176	358	770	733	822	2770
less:income taxes					8	83	149	259	225	914
NET INCOME/(LOSS)	139	191	(178)	(122)	168	275	621	475	598	1856
RETAINED EARNING at beg. of YEAR	(46)	(58)	(313)	(492)	(614)	(446)	(207)	320	787	1385
add:net income	139	191	(178)	(122)	168	275	621	475	598	1856
less:public welfare fund	38	53				34		2		129
capital public reserve	57	393				2		5		85
dividend										40
RETAINED EARNING for the YEAR	44	(255)	(178)	(122)	19	239	621	467	598	1604
CUMULATIVE RETAINED EARNINGS	(2)	(313)	(492)	(614)	(446)	(207)	414	787	1385	2989
FINANCIAL RATIOS:										
net profit margin(%)	8.9	8.1	(6.4)	(3.0)	2.8	3.1	4.9	2.4	3.0	7.8
growth in sales		51.3	18.5	47.3	44.9	47.9	43.2	58.4	0.9	18.9

Table 3.4: EMC Project Financial Summary for 2006

EMC Project Financial Summary for 2006 Cashflow Statement (RMB 0 000's)										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
<i>i) CASH FLOWS FROM OPERATIONS:</i>										
OPERATING INCOME	48	140	323	369	527	776	1208	1256	1569	2871
add: depreciation (of Corp.)	54	43	88	94	172	150	199	166	168	287
cost of Project		381	1164	2002	3549	5287	6942	7132	6846	9595
interest received			17	34	123	185	105	62	48	89
other income					92	85			71	
tax payable										
other non-cash items	13	(863)	(247)	(1658)	(707)	(301)	(1754)	698	185	556
changes in working capital	(4102)	1714	2960	(3333)	978	574	(3826)	(8337)	(2917)	(4101)
less: pay interest	(90)	(51)	73	231	296	439	321	445	940	1257
income tax payable		1			8	83	149	259	225	914
foreign exchange losses							(1)	16	(198)	(1092)
bad debt losses										9
WB loan commitment fee			440	454	318	246	224	136	136	26
transfers to public welfare fund								7		0
NET CASH PROVIDED BY OPERATIONS	(3897)	1465	3792	(3177)	4112	5987	2182	114	4865	8183
<i>ii) CASH FLOWS FROM INVESTING ACTIVITIES:</i>										
new capital expenditure (of projects)	440	1832	4258	3813	6894	9022	10763	8648	10254	14260
new capital expenditure (of Corp.)	555	704	1666	(476)	1088	(64)	322	463	119	708
other long-term assets							411	(28)		
lease investment	771									
NET CASH USED FOR INVESTING ACTIVITIES:	(1766)	(2536)	(5924)	(3337)	(7982)	(8958)	(11495)	(9084)	(10373)	(14968)
<i>iii) CASH FLOWS FROM FINANCING ACTIVITIES:</i>										
equity receipts	7440	755	214	304						4482
EC grants	699	1022	336							
GEF grants			1888	2346	2056	2005	2061	1447	507	
proceeds from long-term debt										
-world bank			995	1751	5246	5157	7643	6966	11305	12133
-unrealized foreign exchange losses		400			0		(1)	16	14	9
-domestic - special loan(SETC)	300			270	1300	685				
- business loan			600	2014	2671	2880				700
repayment of long-term debt										
-world bank			581	(581)			829	2543	2640	3555
-domestic - special loan(SETC)			200		100	100	2655			
- business loan			600	500	1914	4171				
- Other										
dividends paid										
CASH USED BY FINANCING ACTIVITIES	8439	2177	2653	6766	9259	6456	6219	5885	9185	13769
NET Inc./(Dec) IN CASH	2776	1106	521	252	5389	3486	(3094)	(2258)	3678	6984
OPENING CASH BALANCE	(52)	2724	3830	4352	4604	9992	13478	10384	7299	10977
CLOSING BALANCE OF CASH	2724	3830	4351	4604	9992	13478	10384	7299	10977	17961
<i>Financial ratio:</i>										
<i>debt Service Ratio</i>										

Table 3.5: EMC Project Financial Summary for 1997-2006

EMC Project Financial Summary for 1997-2006
Balance Sheet (RMB 0 000's)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
cash	522	1142	1741	739	4998	4950	3170	561	876	112
accounts receivable	1914	1549	1900	840	838	3003	4939	8868	8167	7775
Prepayment				3657	3919	3447	1639	1366	982	2400
inventories	2206	1845	419	714	1731	1448	866	3201	4966	11838
short-term deposits	2210	2689	2611	3867	4997	8530	7216	6739	10101	17960
other current assets	66	37	37	1732	30	(325)	2100	2865	3701	1600
TOTAL CURRENT ASSETS	6918	7262	6708	11549	16513	21053	19930	23599	28793	41685
investment (of projects)	440	2272	6530	10342	17236	26258	37021	45670	51243	65504
less:cost of investment		381	1545	3547	7096	12383	19325	26457	33303	42898
net project investment	440	1891	4986	6795	10140	13876	17696	19212	17940	22606
gross fixed assets(of Corp.)	587	1291	2957	2422	3467	3282	3604	4068	8859	9451
less:depreciation	86	128	201	267	453	521	669	873	1710	1997
net fixed assets	501	1163	2755	2155	3014	2762	2935	3195	7149	7454
construction in progress		774			246	16		10	21	
Gross intangible assets	772	772	772	772	870	991	772	1374	1381	1496
less amortization	60	80	134	214	349	343	458	539	604	669
Net Intangibles	712	692	723	613	521	648	944	834	777	712
TOTAL NET FIXED ASSETS	1653	4520	8464	9563	13921	17301	21575	23251	25888	30771
Other long term assets			750	1199	1188	2542	3892	3256	3743	3243
TOTAL ASSETS	8571	11782	15923	22311	31622	40897	45398	50106	58423	75699
Accounts Payable	123	967	2286	2176	2255	1975	1928	2021	1828	406
Advances from Customers							(175)			
Current Portion of Long Term Debt										
-World Bank					100					910
-Domestic - Special Loan(SETC)		200								
- Business Loan			600	2014	2672	3244	761	810	860	1610
Tax Payable	(70)	(137)	42	(75)	(361)	(403)	(327)	(444)	(1343)	106
Bank Overdraft						381	70			
Other Current Liability	40	14	2	69	72	1171	2257	545	184	200
TOTAL CURRENT LIABILITIES	93	1044	2929	4184	4738	6368	4514	2932	1529	3232
Long-term Loans -world bank			414	2749	8079	12782	19203	23576	32192	40749
-domestic - special loan(SETC)	300	500	500	770	1970	2655				
- business loan										700
- other	4	6	6	9	13	10	14	17	17	38
TOTAL LONG-TERM DEBT	304	506	920	3528	10061	15447	19216	23593	32210	41486
SHAREHOLDERS FUNDS										
Paid in Capital	7440	7440	7654	7958	7958	7958	7958	7958	7958	12440
EC grant	698	2476	2699	2708	2616	2737	2736	2737	2737	2737
GEF grant			2001	4338	6215	8352	10410	11856	12381	12380
Other grant					271	19	19	19	2	2
Retained Earnings	(58)	(314)	(491)	(615)	(448)	(207)	321	786	1385	2988
Capital Public Reserve	94	629	209	209	209	223	225	227	221	434
TOTAL SHAREHOLDERS FUNDS	8174	10231	12072	14598	16821	19081	21668	23582	24684	30980
TOTAL LIABILITIES & SHAREHOLDER FUNDS	8571	11781	15922	22310	31620	40896	45398	50107	58423	75699
FINANCIAL RATIOS:										
debt/capitalization (%)	4.6	13.2	24.2	34.6	46.8	53.3	52.3	52.9	57.7	59.1
current ratio	74	7	2	3	3	3	4	8	19	13

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team Members

Names	Title	Unit
Lending		
Robert Taylor	Lead Energy Specialist	EASTE
Charles Husband	Lead Mining Specialist	COCPO
Jianping Zhao	Lead Energy Specialist	EASCS
Salvador Rivera	Senior Energy Specialist	EASTE
Charles Guinn	Consultant	EASTE
Todd Johnson	Senior Energy Economist	LCSEG
Lynn Yeargin	Senior Program Assistant	EASPR
Supervision/ICR		
Robert Taylor	Lead Energy Specialist	EASTE
Charles A. Husband	Lead Mining Specialist	COCPO
Jianping Zhao	Lead Energy Specialist	EASCS
Salvador Rivera	Senior Energy Specialist	EASTE
Leiping Wang	Senior Energy Specialist	EASTE
Ximing Peng	Energy Specialist	EASCS
Mariko Ogawa	Operations Officer	EASTE
Yuling Zhou	Senior Procurement Specialist	ECSPS
Xiaowei Guo	Senior Procurement Specialist	EAPCO
Jas Singh	Consultant	EASTE
Charles Guinn	Consultant	EASTE
Xiaodong Wang	Senior Energy Specialist	AFTEG
Haixia Li	Financial Management Specialist	EAPCO
Melissa Sanchez	Procurement Assistant	EASTE
Teri Velilla	Program Assistant	EASTE
Lynn Yeargin	Senior Program Assistant	EASPR

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY98		186,102.9
Total:		186,102.9
Supervision/ICR		
FY98		30,688
FY99		56,355.00
FY00	31.90	110,731.34
FY01	31.83	122,026.70
FY02	23.08	80,638.29
FY03	24.88	103,164.34
FY04	25.44	92,619.12
FY05	22.74	88,862.96
FY06	10.19	50,625.60
FY07	12.84	57,677.03
FY08	0.25	1,470.20
TOTAL:	183.15	794,858.58

Annex 5. Stakeholder Workshop Report and Results

In November 2006, a large conference was held in Beijing to discuss and share experience gained from implementing the Energy Conservation Project. Officials from the central government and provincial governments attended the meeting. Implementing agencies (3 EMCs) reported to the meeting. Other participants included new EMCs, the China National Investment & Guarantee Co., Ltd., and the EMC Service Association.

During the meeting, the representative from the Ministry of Finance stated that the project demonstrated its success in energy savings and carbon dioxide emissions reduction. The project created good role models for the sector and provided valuable experience for the future development in energy savings in China. Energy performance contracting mechanism proved to be very feasible for the energy conservation industry in China. The impact of this project over country and the contribution made by the Bank in introducing this advanced concept to China cannot be overlooked. The second and the third Energy Conservation Projects were continuing the effort to expand the energy conservation effort in China. The project should expand this experience within the country as well as to other countries in the world.

Representatives from the NDRC told the meeting that the achievement of this project can be seen very clearly and the impact is tremendous. This project was different from others in terms introducing and exploring new ways of doing business. It was about a set of fresh mind sets, and new market mechanism. There were implementation difficulties in the beginning. Existing regulations and arrangements were not compatible with this new type of operations. The project overcame the difficulties and developed the new concept of energy performance contracting much further. The impact of this project is profound.

A former Director of Natural Resources Savings Department in SETC concluded that the project had pioneered a set of very valuable experiences. Energy performance contracting was already included in the medium and long energy conservation strategy in the country. The country had successfully introduced, piloted and dissemination this new mechanism. However, the road ahead was still long. Although energy conservation was treated as a priority, there were still issues related to financing, and scaling up of the mechanism. There were still many hurdles surrounding financing, and the country would still need the policy support from the government and international financing.

Representatives from the new EMCs also spoke at the meeting. These EMCs pointed out that the energy performance contracting added life to their companies' business. Their companies used their own energy conservation technologies, products and services, combined with EPC mechanism, and expanded their business all over the country, and they both became very well known in the energy efficiency field. The companies strengthened their capacity in implementing EPC projects, and they were making EPC type of projects their main form of business and core for being competitiveness.

**Summary of the WB/GEF China Energy Conservation Project in Phase I
(Executive Report)**

**I. To Introduce into China a New Energy Conservation Mechanism of
“Energy Performance Contacting”**

1. Origin of the project

From 1992 to 1994, under the support of the World Bank (WB) and the Global Environment Facility (GEF), China completed a study on China Issues and Options in GHG Emission Control. An important conclusion of the study is: China has huge energy conservation potential, and there are a large number of energy projects with mature technology and excellent economical and environmental benefits, but because of all kinds of market obstacles, these projects have not been implemented at large.

Therefore, the Government of China has discussed with the World Bank for many times on the issue of how to promote universal implementation of energy conservation projects. And they have agreed: with the transition of economical system, the original energy conservation management system can not adapt to the new situation, so the management means and operation system of energy conservation should be changed with it. At the same time of establishing and perfecting energy conservation laws and regulations, standards and incentive policies, there is a need to implement the WB/GEF China Energy Conservation Project for introducing, demonstrating and popularizing a new market-oriented energy conservation mechanism of “Energy Performance Contacting” in China, and to promote the formation and development of energy conservation service industry, so as to universally increase energy utilization efficiency in China, to save energy, to reduce the emission of greenhouse gases and other pollutants, to protect global and regional environment, and to make active contributions to the establishment of resource saving society in China.

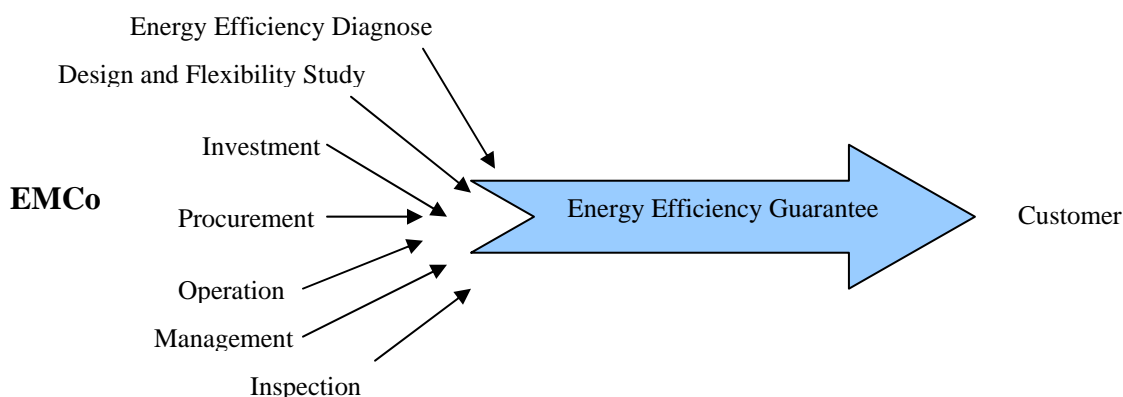
2. To introduce into a new market-based energy conservation mechanism— Energy Performance Contacting in China

The objectives of the project are to introduce into and further popularize a new market-based energy conservation mechanism – Energy Performance Contacting in China, which has achieved fine effects in developed countries, through establishing three pilot Energy Management Companies (EMCo).

Energy Performance Contacting is an energy conservation mechanism based on market. Professional Energy Management Company which operates according to “Energy Performance Contacting” mode and with a direct profit-oriented (it is called ESCO for short in the foreign countries, and EMCo in China), provides services in the complete process like energy conservation potential analysis, feasibility study of energy conservation subproject, subproject designing, subproject financing, equipment procurement, construction, measure and verification

of energy saving, personnel training and so on, through signing energy service contract with clients that have the willing to carry out energy conservation renovation. EMCo guarantees to realize energy conservation capacity and benefits promised in the contract (shown in Chart 1). During the validity period of contract, benefit of EMCo is directly connected with energy saving benefits; after the completion of contract, the client can get all the equipment and profits. In a word, profits of client and EMCo are all from energy conservation benefits of the subproject, and make investment according to future energy conservation benefits. Obviously, it is a kind of market-based mechanism beneficial to many parties, the client earns the energy benefits, EMCo gets profits and development, and at the same time obtaining social and environmental benefits.

Chart 1: “Energy Performance Contracting”Basic Concept



EMCo provides customers (host enterprises) on energy efficiency projects complete services and energy efficiency guarantee. The profit for EMCo and host enterprises comes from the benefits of energy savings.

3. Project Task

WB/GEF China Energy Conservation Project is implemented in two phases.

The first phase of the project started to implement in December 1998. Its main task is to demonstrate Energy Management Company (EMCo) (Business Plan see Table 1) and disseminating energy conservation information. In 1996, three pilot EMCos, Beijing Yuanshen Energy Conservation Technology Co., Ltd, Liaoning Energy Conservation Technology Development Co., Ltd and Shandong Energy Conservation Engineering Co., Ltd, were established successively. In their initial stages, a grant of ECU was provided to support the implementation of pilot subprojects during the initial operation stages. In December 1998, the signing of “GEF Grant Agreement” indicated the official implementation of project at phase I. Under the support of GEF grant and IBRD loan, these three pilot EMCos adopt “Energy Performance Contracting” mode to carry out energy subprojects for client according to real situation of China, and to demonstrate the feasibility of “Energy Performance Contracting” mechanism in China, and to further sum up the experience to popularize it in the whole country, so as to promote the formation and development of China energy conservation service industry.

In the mean time, in order to remove obstacles in energy conservation information dissemination, in 1998, Energy Conservation Information Dissemination Center of National Development and Reform Commission (former State Economy and Trade Commission) was established, aiming at developing and distributing free authoritative and practical energy conservation information, and popularize energy conservation technology that is technologically feasible and economic-reasonable in the whole society.

Table 6.1: Business Plan

INDEX	COMPANY	1997-2001	2002	2003	2004	2005	2006	TOTAL
Investment (ten thousand)	Beijing EMCo	9666	6267	6200	6200	6200	6200	40733
	Liaoning EMCo	15415	4200	4250	5118	5838	6360	41181
	Shandong EMCo	12041	5631	6971	7211	7633	7741	47228
	Sum total of three companies	37122	16098	17421	18529	19671	20301	129142
Energy conservation (Mtce)	Sum total of three companies	0.67	0.49	0.71	0.91	1.12	1.32	5.22
CO ₂ emission mitigation (Mtc)	Sum total of three companies	0.43	0.35	0.49	0.65	0.87	0.99	3.78

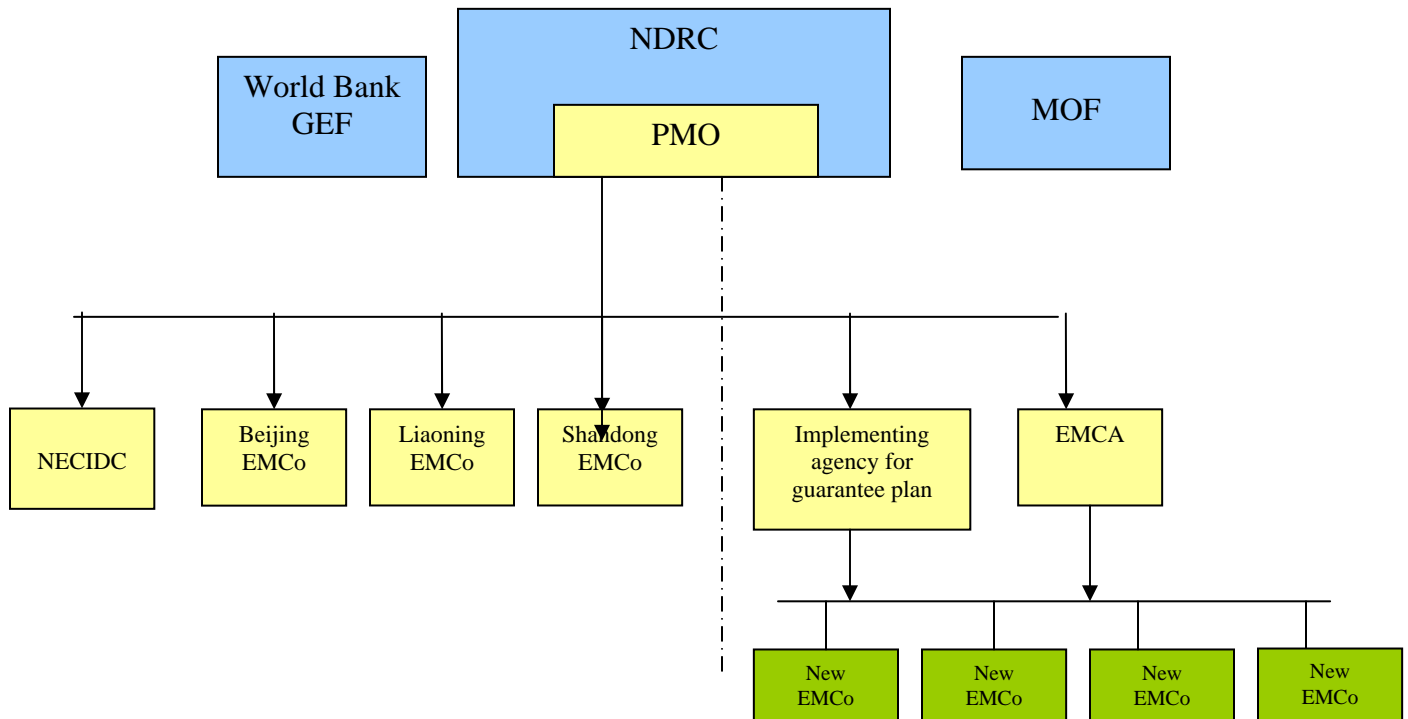
4. Capital utilization at the first phase of the project

Capital comes from international assistant capital and domestic counterpart capital, in which international assistant capital mainly includes:

- (1) **GEF Grant** : GEF provides grant of US\$ 22 million supporting the Project, among them US\$1.5 million with domestic counterpart funds is used to support three pilot EMCos to carry out energy conservation demonstration subprojects by “Energy Performance Contracting” mode; US\$5 million with domestic counterpart capital is used to support the work of NDRC Energy Conservation Information Dissemination Center (NECIDC), rest US\$2 million grant is used in technical assistance to pilot EMCos. By the end of June 30, 2006, GEF grant of US\$15 million was used up by these three pilot EMCos (US\$ 5 million for each EMCo). Partial plans of NECIDC and technical assistance will be fulfilled by the end of June 2007.
- (2) **WB IBRD loan** : WB provides loan of US\$ 63 million to support the Project. This loan with counterpart domestic capitals is used to support the three pilot EMCos to carry out energy conservation subprojects. By the end of June, 30 2006, IBRD loan of US\$21million was used up by Beijing EMCo and Shandong EMCo, and IBRD loan of US\$ 19.0827 million was used up by Liaoning EMCo.

5. Project Management Organization

Chart 2. Executive Organization of WB/GEF China Energy Conservation Project



International Department of the Ministry of Finance (MOF) is a window of cooperation among the Government of China and the World Bank (WB) and the Global Environment Facility (GEF), which represents the Government of China (GOC) to sign “Loan Agreement” and “Grant Agreement” with WB and GEF, and to implement supervision and management to the application of project capitals.

Resources Conservation and Environment Protection Department of the National Development and Reform Commission is a governing agency to the project, which implements guidance and management to this project.

Project Management Office of NDRC/WB/GEF China Energy Conservation Project (PMO) is a routine management unit of the project. To guarantee the successful implementation of the project, when PMO is carrying out overseeing and managing subprojects implemented by EMCos, it also provides a series of technical assistances for them. PMO has organized and implemented evaluation works and a large number of policy research works for many times aiming at implementation of the project, and has successively held 5 elementary training and 6 senior training courses, trainees that take part in the training are nearly 400.

Besides, the WB appraises the implementation effects of the project respectively in spring and autumn every year, and has carried out medium-term appraisal to the project in 2000 and 2002, which has promoted successful implementation of the project.

Under the great supports of the Government of China and international organizations, under the common efforts of all parties, the first fruitful phase of the project is successfully completed on 30th June, 2006, the flourishing second phase of the project is unfolding. “Energy Performance Contacting” mechanism has exhibited a vigorous life force in China. Energy service industry in China has come into initial scale, which faces a vast and beautiful development prospects.

II、 Successful Demonstration of Phase I of the Project Exhibits that “Energy Performance Contacting” has a Strong Life Force

Since its establishment in 1996, the scale of 3 pilot EMCos are continuously expanding, energy conservation subproject market is exploiting, energy investment is increasing steadily, working capital is increasing year after year, profits-earning ability is gradually strengthening, integrated operation ability is continuously improving, benefits of energy savings and emission mitigation is obvious, excellent energy service achieves highly appraise from the clients, and the fixed objectives set out in the agreement between GOC and WB have been realized. Practice of the three pilot EMCos demonstrates that “Energy Performance Contacting” mechanism in China is feasible, and phase I of the project has achieved a complete success.

Up to 30th June, 2006, the three pilot EMCos adopts “Energy Performance Contacting” mechanism to accumulatively carry out 453 energy conservation subprojects for the clients with total investment of nearly 1.3 billion RMB Yuan. Through the implementation of these subprojects, EMCos get net profits of 420 million RMB Yuan, while the net profit of the client is 8-10 times of the profits of EMCos. These subprojects have brought good energy conservation and environmental benefits: it obtains energy saving capacity of 1.37 million tons of coal equivalent (tce)/year, emission mitigation capacity of CO₂ 1.36 million tons of carbon per year. The actual energy conservation investment, the amount of energy saving and carbon emission mitigation are all exceed those established by the WB in business plan (see Table 2).

Establishment, development and continuous growth of the three pilot EMCos show out that a new energy conservation mechanism of “Energy Performance Contacting” has a strong life force in China.

Table 6.2: Completion of Business Plan

Items	Unit	1997-2001	2002	2003	2004	2005	2006	TOTAL
Investment	10 ⁴ RMB yuan	34392	17008	19654	19441	26686	27102	144283
Energy saving	Mtce	0.67	0.5	0.77	0.85	1.2	1.32	5.31
Emission mitigation	Mtc	0.48	0.35	0.5	0.65	1.22	0.99	4.19

Notes: Data in the year of 2006 is planned value. Up to 30th June 2006, the three pilot EMCos have completed energy conservation investment of 98.92 million RMB Yuan, realize energy saving of 0.67Mtce and carbon emission mitigation of 0.67Mtc.

1. Development and growth of the three pilot EMCos

A. The scale of pilot EMCos is continuously enlarging, and the scale of energy conservation investment is steadily increasing

The assets of Beijing, Liaoning, Shandong pilot EMCos has increase to present 183, 313 and 247 million RMB Yuan respectively from 20.75, 27.69 and 37.27 million RMB Yuan in 1997, with total assets sum as high as 743 million RMB Yuan. Personnel number of the company has increased to present 283 from 24 initially. And Liaoning EMCo has developed into an enterprise group with 9 members from 2002, and has carried out business cooperation with 39 regions of 9 provinces and cities and 19 countries.

From developing course of 3 pilot EMCos (see Chart 3 to Chart 6), energy conservation subprojects implemented by using a new energy conservation mechanism of “Energy Performance Contracting” have gone through three phases. The initial stage is from the year of 1997 to 2000. In this period, it is mainly to learn, make familiar with, and try to implement a mechanism of “Energy Performance Contracting”, and grope and acknowledge an energy conservation investment market, so energy saving investment during this period is comparatively small, with annual investment of only 30-50 million RMB Yuan. After the first WB Medium-Term Appraisal in November 2000, 3 pilot EMCos summarizes experience at initial stage. At this time, EMCos have been relatively familiar with the operation of “Energy Performance Contracting” mechanism, and get a basic acknowledgment to energy conservation investment market; thus EMCos have entered a growing phase. Energy saving investment starts to quickly increase, and total investment of EMCos has been over 100 million RMB yuan annually. After the second WB medium-term appraisal in November 2002, all the companies’ further sum up experience and with a comparatively profound acknowledgment to a new mechanism; energy saving targeted market is gradually formed. In this period, EMCo has stepped into a mature development phase. Energy saving investment steadily increases at high level. At present, annual energy saving investment capacity of Beijing, Liaoning, Shandong pilot EMCos reaches 65 million, 120 million and 85 million RMB Yuan respectively, with total annual energy saving investment capacity as high as 270 million RMB Yuan, which is more than 5 times of the year of 1997.

B. Targeted market of pilot EMCos is gradually forming, and expanding continuously

Energy conservation investment market developing orientation of the three pilot EMCos have experienced an exploration course, and are gradually developed to maturity and multi-direction. Beijing EMCo has located its investment market orientation on giving a priority to building energy conservation based on characteristics of market in Beijing. Investment of building energy conservation subproject accounts for more than 70% of the total investment. Beijing EMCo chooses space heating, air-conditioning energy conservation technologies as a focus to make investment such as geothermal heating pump, water storage heating, ice storage cooling, heat storage for electric space heating and so on. Beijing EMCo is now exploring its developing direction of “demand side service (on user side) taking energy station as a representation”. Liaoning EMCo is located in the old industrial base in Northeast of China. Traditional large and medium industrial enterprises spread widely in this area, with huge potential of energy savings.

In the meantime, because of cold weather, energy use by heating is very high. Liaoning EMCo decides to take boiler renovation as a prior while also giving considerations to motor driving, industrial furnace and kiln retrofits and steam heat supply system renovation. So investment of industrial energy saving project accounts for 83% of total investment. Shandong is a new and large industrial province. Energy consuming equipment in most of iron & steel, chemical industry, paper-making and petrochemical enterprises still applies a traditional technology. Therefore, investment in industrial energy saving projects by Shandong EMCo takes 83% of total investment. Shandong EMCo focuses its project line particularly on industrial boilers renovation and co-generation, at the same time, also making renovation on motor driving system and industrial furnaces and kilns. In the future, Shandong EMCo will extend into a field of power generation with discharged combustible gas.

C. Pilot companies have achieved good benefits from energy conservation investment

Because of optimization choice to energy conservation subprojects, and effective adoption of risk guarding measures, in energy conservation subprojects implemented by the three pilot EMCos, simple investment payback period with less than 3 years accounts for more than 90% of total investment, and most of which is within 1-2 years. Investment of one tce energy saving capacity is about 1000 RMB Yuan yearly/(tce/yr.), and investment of one ton carbon emission mitigation capacity is less than 1250 Yuan/(ton carbon/year)³

D. Operation ability of pilot companies is improving continuously

In the process of demonstrative operation, project investment, assets, profits of the three pilot EMCos are increasing side by side, and capital strength of them is also continuously intensifying. From 1997 to 2006, rolling investment is about 1.4 billion RMB Yuan. Total business income exceeds 1 billion RMB Yuan with profits of about 80 million RMB Yuan. Up to the end of 2006, the total assets is approaching to nearly 800 million RMB Yuan, and accumulative unallocated profit is about 40 million RMB yuan. Percentage of EMCo itself-owned capital taking in investment of energy conservation subprojects is continuously enlarged, accounting for over 60% of all the energy conservation investment after 2002.

At present, 3 pilot EMCos are all with sustainable development ability to carry out energy conservation business based on “Energy Performance Contracting” mechanism. So capital turnover of EMCos is speeded up obviously; capital operation efficiency is remarkably improved; the scale of net income and investment increases rapidly; credit reputation and financing ability in financing system has been established. All of these EMCos have the ability to expand the scale of energy subproject investment, even if WB loan has been used up, they also have the ability to raise the capital to develop energy saving business. The three pilot EMCos will make full use of its advantages in the future, stick to energy conservation cause unwaveringly, stick to “Energy Performance Contracting” mechanism unchangingly, and are confident in sustainable development to their companies in the future.

³ It is the investment of equipment. If it considers the cost of management, and calculation is based on a complete investment of contract, investment of one tce energy saving capacity is about 1300 RMB yuan/(tce/yr.), and investment of one ton carbon emission mitigation is about 1600 RMB yuan/(tc/yr.).

E. GEF grant brings a “leverage” effect into play

It is particular obvious that in the past decade, capital of GEF in the first phase of project is US\$22 million, while energy saving investment of the three pilot Companies reaches 1.3 billion RMB Yuan, which illustrates that the sustainable development ability of the three pilot EMCos are continuously improving, and in the other hand, GEF grant has brought about 8 times of amplification effect into play in the first phase of the project.

2. Accumulate valuable successful experience

In the beginning of 1996, Liaoning EMCo started its undertaking on the basis of “one room, 7 persons, 4 project line, no products of itself, no technology”, while Beijing and Shandong EMCo also faced the same situation. Because at that time, “Energy Performance Contracting” is a grand new operation mode in China, in the initial stage of the project, the three pilot EMCos are all facing the risk in company operation and market exploitation. In order to solve the coming problems, three pilot EMCos explore and make innovation in business operation, market development, risk control, and have accumulated a great deal of success experience for many years of practice.

A. Important experience of Beijing EMCo

- **In the aspect of project market**, Beijing EMCo adjusts targeted market of the company according to market changes. In view of rapidly development of the tertiary industry, continuously increase of residential buildings, stricter environmental quality requirements in Beijing, Beijing EMCo considers the situation and then gradually turns its targeted market from industrial energy conservation to building energy conservation fields. It has carried out a lot of energy saving subprojects in heat supply, air-conditioning and buildings renovation.
- Aiming at problems in client’s capital payback during the initial stage of project, Beijing EMCo strengthens risk management in two aspects: fund payback risk control and financing risk control.

Main measures adopted in the aspect of fund payback risk control includes: (1) Beijing EMCo is to base oneself upon choosing client with good products marketing and economical benefits, and adds a procedure of evaluation to nearly 3 years financing report tables, so as to judge payback ability of client and to avoid capital risk of energy renovation subproject. (2) pay attention to the choice of energy renovation subproject, equipment suppliers to avoid technology risk of energy renovation subproject. (3) when signing energy renovation service agreement, it acquires client to provide corresponding guarantee. Once there is special situation occurred, it guarantees energy renovation subproject fund to be called back. (4) the signing of energy renovation service agreement and guarantee agreement must be examined by barrister and law consultant to guarantee validity and integrality of agreement and contract. (5) implement responsibility system that subprojects manager should be responsible for fund payback.

In the aspect of financing risk control, it is mainly from the aspects of subproject developing, lowering credit reputation risk of client, strengthening capital payback management, forecast analysis of foreign exchange risk, control financing risk, lowering rate of assets liabilities to strengthen prevention and control.

B. Important experience of Liaoning EMCo

- **Always stick to “007” service mode**, that is to make client zero risk in financing and technology, to let client enjoy seven-in-one service including energy diagnosis, subproject designing, subproject financing, equipment supply, installation and debugging, running and maintenance, personnel training .
- **Set up three sets of subproject management systems**, which have become strong guarantee means of Liaoning EMCo in the past decade to realize 100% project success of “Energy Performance Contracting” subproject.

📖 **Risk control system**, core content is: one safety island, two safety lines, and four fireproof walls”

“**One safety island**” means to make an effort to choose “gold client”;

“**Two safety lines**” means pay close attention to changing trend of client satisfaction and credit reputation;

“**Four fireproof walls**” means four project operation measures that company adopts to guarantee capital payback: close running of energy expenditures, it requires client to set up special account for project capital close management; creditor’s rights close running, that is, in the situation that energy expenditures of client can not be run close, it runs its comparatively steady income origin close, and to be taken as payback capital origin. trusteeship running: company or company assigns the third party to be responsible for operation management after the implementation of the project, according to agreement, it adopts normal financing settlement with client, and takes business income of project products as capital origin for payback. mortgage guarantee, this is a kind of guarantee measure learnt from financing organizations, but EMCo has made complementation and perfection. Mortgage range is not only limited in lands, house property, equipment, securities and so on, and also adds management rights mortgage, products order mortgage and so on. In this situation, guarantee has turned from original single project guarantee into multi-project integrated guarantee, which can shorten the cycle of project establishment.

📖 Subproject quality guarantee system: in the pre-phase of subproject, “accuracy” is required to assure the veracity and authenticity of subproject information; in implementation period of the subproject, it gives prominence to “ reality”, that is, all the work should set out from fact to carry out work on schedule according to subproject fact with no hidden trouble, and to assure success of subproject; in the period of subproject benefits sharing, it is to grasp” stability”, in this period, the subproject is in the phase of ending, most of the work has been completed. If it is, in this period, too hurry for success, there will be careless mistake, which will cause serious consequence.

📖 Complete life-span post-contract service system: core content is “do a project, establish a monument, develop a market, make friends” for erecting company brand, and guaranteeing client market

C. Important experience of Shandong EMCo

- **In subproject development**, according to the characteristics of large-size industrial enterprises in Shandong province, huge energy potential of single enterprise, a large number of subprojects, subprojects can be implemented in groups and phases, so as to exert oneself to cultivate “project host”, to develop “client group”, and to establish long effective cooperation relationship with individual clients or a certain kind of client groups that have established mutual trust relations.
- **In financing system**, it sticks to industrial accounting system. Company and client can keep accounts according to equipment procurement, which solves tax and financing problems brought to company and client by keeping accounts according to energy saving benefits sharing. This can make Energy Performance Contracting mechanism basically adapt to domestic existing regulations.
- **In the course of energy saving benefits sharing**, it promises with client in advance that in the situation of enterprise under normal production, energy saving benefits should be affirmed according to promised quantity by the both sides, which can avoid possible dispute with client due to verification of energy effects, and assure harmoniously popularization of “Energy Performance Contracting” mechanism and harmoniously development of Shandong EMCo.
- It established a complete set of **risk control system** from initial evaluation of client and subproject, to implementation of subproject, at last to energy benefits sharing. Especially in the initial evaluation phase of subproject, financing department of company has the one-ticket veto to credit reputation evaluation of client.

3. Successfully develop an energy conservation information dissemination platform

Energy Conservation Information Dissemination Center set up inside of former State Economy and Trade Commission (now has transferred to National Development and Reform Commission) has successfully developed a very effective information platform after many years of operation, which develops and disseminates energy conservation investment project information with potential of popularization. Practice has proved that enterprise can save a great deal of energy and lower its cost if it adopts a similar technology renovation measure according to this information. Up to now, Information Dissemination Center has made and disseminated 73 “Energy Conservation Case Study” and 14 “Energy Conservation Technology Guidance”, and before the end of June 2007, it will continuously make and disseminate 27 “Energy Conservation Case Study” and 6 “Energy Conservation Technology Guidance”. Evaluation outcome made by the third party agency shows that energy saving and emission mitigation benefits gained by disseminating energy conservation information is over 10 times than that of input for

dissemination of information. This illustrates that energy information dissemination is a kind of effective measure to promote energy conservation of the whole society. With the expansion of center's business, it will exert fruitful promotion effect on continuous development in the aspect of China's energy conservation investment. To further strengthen position of information dissemination taking in energy conservation work, strengthen center ability building, quickly drive multi-development in business field and information products have become important guarantee in the sustainable development of NECIDC in the future.

III、China's Energy Service Industry is Developing and Expanding

Significance of successful demonstration of "Energy Performance Contracting" mechanism in phase I is profound. A new energy service industry is rapidly taking shape, developing and expanding in China.

The practice of three pilot EMCos has proved that "Energy Performance Contracting" mechanism is feasible in China. In 2000, former State Economy and Trade Commission issued "A Announcement of Further Popularization of Energy Performance Contracting Mechanism". After that, it has done a lot of dissemination and training works, and then decided to startup the second phase of the project. At present, market-based Energy Performance Contracting" mechanism has taken a deep root in China, which has demonstrated a huge vigor market, and aroused widely attentions from domestic and overseas.

Under successfully pushing forward by the first phase of the project, the second phase started to implement in 2003. Its task is mainly to provide services to EMCos, to carry out EMCo loan guarantee plan, and to promote the formation and development of a new energy conservation service industry in China. In the second phase of the project, WB has provided GEF capital of US\$ 26 million, in which US\$ 22 million is used to support EMCo loan guarantee plan, US\$4 million is used to cover incremental cost and technical assistance of project implementation unit.

Under the support of the second phase of project, EMCo industrial organization—Energy Conservation Service Industry Committee of China Energy Conservation Association (EMCA for short) was registered and established in December 2003. EMCA has provided effective technical assistance and service for new EMCo and potential EMCo, and let them develop and expand healthily and rapidly. A new energy conservation service industry comes into being rapidly in China. At present, there are more than 190 members in EMCA. Only in the two years of 2004 and 2005, total investment of energy conservation project implemented by new EMCos with Energy Performance Contracting mechanism has exceeded 1 billion RMB Yuan.

At the same time, under the support of the second phase of project, an implementation organization of EMCo loan guarantee plan—China Economy and Technology Investment Guarantee Co., Ltd (I&G for short) provides loan guarantee for new EMCos that are in lack of financing credit reputation by using quite limited guarantee capital. This can help them enhance their financing capability of energy conservation subproject and improve their credit reputation. To the end of August in 2006, 62 energy saving subprojects have received guarantee supports, and accumulative guarantee sum reaches 186.47 million RMB Yuan. Thus it obtains energy

saving capacity of 179,573 ton of coal equivalent per year, and CO₂ emission mitigation capacity of 109,352 ton of carbon per year by these subprojects implementation.

Energy conservation service industry in China is taking shape rapidly. The number of Energy Management Company increased from 3 in 1997 to 30 in 2003, at present, more than 100 EMCos have implemented energy conservation subprojects in different energy fields by using “Energy Performance Contacting” mechanism. Only in the two years of 2004 and 2005, investment of energy conservation subprojects carried out by new EMCos through adopting “Energy Performance Contacting” mechanism was over 1 billion RMB Yuan, which has achieved obvious energy saving and emission mitigation effects and good economical and social benefits. Energy conservation service industry in China is becoming more prosperous day by day. Thus EMCo has become an important new force in promoting energy conservation work in China.

While energy conservation service industry is developing and expanding, “Energy Performance Contacting” mechanism mode is developed and innovated in practice too. Besides “energy saving benefits sharing” business mode demonstrated by the three EMCos, many new EMCos start to adopt business modes of “guarantee of energy saving” and “energy expenditure trusteeship”, and gradually developing into many compound modes on this basis.

The Government of China has attached highly attention to “Energy Performance Contacting” mechanism. In many important government documents, it clearly proposes that it takes spreading “Energy Performance Contacting” mechanism as an important measure to promote energy conservation cause in China. For example, “China Medium and Long Term Energy Conservation Planning” authorized by the State Council puts forward that it should “spread Energy Performance Contacting mechanism so as to remove market barriers in promoting new energy conservation technology; facilitate energy conservation industrialization, and provide one-in-all service including diagnosis, designing, financing, renovation, operation and management for enterprise conducting energy conservation renovation activities; to establish an energy conservation investment guarantee mechanism, and promote development of the energy conservation technology service system”. “The State Council’s Decision on Intensifying Energy Conservation Work” lately publicized also definitively specifies that it should “speed up advancing Energy Performance Contacting management, promote enterprise energy conservation technology renovation”. In the meantime, the World Bank (WB) and the Global Environment Facility (GEF) appraisal missions have highly valued the outcomes of “Energy Performance Contacting” mechanism demonstration in China. Besides, press media including TV, radio, newspapers and periodicals, magazines, networks and so on have done utmost to report “Energy Performance Contacting” mechanism. Many energy consumers such as industrial enterprise, commercial building owner, logistics department in high education, hospitals and residential district property management company have shown great interest in “Energy Performance Contacting” mechanism. Moreover, a large number of domestic and overseas companies including energy saving equipment manufacturers and energy conservation consultation companies favors China—the largest energy conservation investment market in the world, and are eager to have a try to establish EMCo. In present China’s energy conservation field, “Energy Performance Contacting” has become a very fashionable noun. So energy conservation service industry is now flourishing in China.

At the moment of energy conservation service industry gradually coming into being in China, in the end of 2005, the Government of China proposed a ambition goal of energy conservation that China should “reduce energy consumption of unit GDP by 20% in the period of ‘11th Five-year Plan’”, which has given significant emphasis on energy conservation work. This offers unprecedented moment for accelerating the development of China’s energy conservation service industry.

A lot of study conclusions have shown that China has a huge potential of energy conservation. Currently, energy conservation potential that is feasible technologically and economically reasonable in the market exceeds 300 million tce. To realize a goal of energy conservation in the period of “11th Five-year Plan” and dig out energy conservation potential, governments at different levels are quickly formulating energy conservation policies in the aspect of energy conservation management system, incentives and energy conservation financing. This situation has provided a huge stage for EMCo to implement energy conservation projects.

Highly valued by the government, huge energy conservation market demand, getting better and better policy environment, and powerful international assistance have provided very favorable conditions for the development of energy conservation industry in China. Presently, an energy conservation service industry force based on the market is taking shape and developing. They will make active contributions to promotion of realizing an energy conservation goal of “11th Five-year Plan” and sustainable development of China’s economy and society in the future. New energy conservation mechanism of “Energy Performance Contracting” like a flower being in full bloom will certainly give out more plentiful and rich fruits.

Annex 7. List of Supporting Documents

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