Report Number : ICRR0020583

1. Project Data

Project ID	Project Name
P119357	CN-GEF Egy Efficiency Promotion in Ind
Country	**Practice Area(Lead)**
China	Energy & Extractives

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
TF-99860	30-Jun-2015	24,110,000.00
Bank Approval Date	**Closing Date (Actual)**	
31-May-2011	30-Jun-2016	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	4,000,000.00	4,000,000.00
Revised Commitment	4,000,000.00	3,810,552.11
Actual	4,000,000.00	3,810,552.11

Prepared by	Reviewed by	ICR Review Coordinator	Group
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2. Project Objectives and Components

a. Objectives

The Project Development Objective (PDO) in the GEF Grant Agreement is to strengthen the institutional capacity for both the management and technical aspects of rational energy use in key industrial sectors in China, thereby contributing to improvements in energy efficiency and the reduction of greenhouse gas emissions. (page 5)

The Appraisal document has the identical PDO .(Page 4)

The Global Environment Objective: Essentially the same as the PDO: Improve energy efficiency and reduce greenhouse gas (GHG) emissions in key industrial sectors in China by addressing both the management and technical aspects of rational use of energy. (ICR page ii)

b. Were the project objectives/key associated outcome targets revised during implementation?
No

c. Will a split evaluation be undertaken?
No

d. Components

Component 1: Policy Support - [Appraisal Estimate GEF US$345,000, Gov. US$210,000; **Actual** GEF US$345,000, Gov. US$210,000]: This component supported studies that address challenges faced during the implementation of the revised Energy Conservation (EC) Law as related to regulations and energy standards. The studies were to involve (a) domestic and foreign industrial energy efficiency policies; (b) energy management institutions of key energy consuming industrial enterprises; and (c) the industrial energy performance evaluation system.

Component 2 - : Capacity Building for Responsible Energy Managers - [Appraisal Estimate: GEF US$1.7 million, Gov US$1.7 million; **Actual** GEF US$1.7 million, Gov. US$1.7 million] This component was to develop a series of training materials for standardized training programs and to provide sub-grants to four training centers for the effective delivery of training programs to energy managerial personnel.

Component 3: Demonstration Project Scheme - [Appraisal Estimate: GEF US$1.6 million, Gov. US$1.6 million, Industry US$16.0 million; **Actual** GEF US$1.6 million, Gov. US$1.6 million, Industry US$16.0 million]**:** This component was to: (a) provide grants to four training centers for setting up and implementing enterprise energy management programs, and further advancing the implementation of such energy management programs by selected enterprises, including, inter alia, the development of comprehensive manuals, policies, procedures, and/or action plans for establishing an —umbrella framework for the enterprise energy management programs in the selected enterprises; and (b) provide TA to strengthen the capacity of the training centers referred to in the first part of this component, and develop advanced training materials.

Component 4: Information Dissemination - [Appraisal Estimate GEF US$248,000 Gov. US$200,000; Actual GEF US$248,000 Gov. US$200,000]: This component was to: (a) support the design of promotion and awareness building program to disseminate energy conservation information and relevant government policies to enterprises with the aim to support efficient energy use; (b) organize workshops or annual forums for government officials, energy managers, and technical staff from selected industries to promote these training programs.

Management of Project - Appraisal Estimate GEF US$307,000, Gov. US$400,000; Actual GEF US$307,000, Gov. 400,000]

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The ICR states that total actual project cost was US$24.11 million, exactly what was estimated at Appraisal.

Financing: The Industrial Sector provided US$16.0 million for energy saving investments, exactly as

estimated at Appraisal. GEF provided US$4.0 million, of which about 5% (US$188,844) was cancelled at project closing.
Borrower Contribution: The Government, as Borrower, provided US$4.11 million, as estimated at Appraisal.
Dates: The project was effective in January 2012. Closing was scheduled for the end of June 2015, but was extended by one year to the end of June 2016, to enable the investment component to be completed.

3. Relevance of Objectives & Design

a. Relevance of Objectives

The project supported China's effort to meet its ambitious goals for creating a more resource-efficient and less polluting society under its 11th (2005-2011) and 12th (2011-2015) Five year Plans (FYP), in line with its undertaking to improve energy efficiency, expand use of renewable energy, and address climate change. The 11th FYP had established a wide range of regulations and basic enterprise energy conservation targeting, but many enterprises had not been carrying out energy efficiency and conservation projects, or just did the bare minimum to comply with Government targets. The 12th FYP had identified the need for greater participation of enterprises in the adoption of energy management framework, and for an increased use of market-based tools in delivery of the energy conservation program overall. Existing training programs provided by different agencies were highly fragmented, with diverse focus and uneven methodology. There was a clear need to improve management of energy efficiency programs throughout China's industrial sector so as to encourage the implementation of energy efficiency projects. The objectives of GEF's Focal Area Strategies and Strategic programming focuses on promoting energy-efficient technologies and practices in industrial production and manufacturing processes, which is fully consistent with the project's objectives.

Rating
Substantial

b. Relevance of Design

Project design built upon the lessons learned and recommendations from an AusAID/World Bank technical assistance report on, 'Accelerating Energy Efficiency in China's Provinces', which had emphasized the need to strengthen the capacity of the staff responsible for rolling out of integrative energy management systems among key enterprises. There was a clear causal chain between the project's components, which included studies of energy efficiency policies, training programs for energy conservation managers, and energy saving demonstration projects and the ability of these enterprise to adopt further energy efficiency investments. The project component that focused on the dissemination of project results emphasized the need for the project's energy efficiency results to gain national recognition and for the strengthening of institutional structure needed to support expanded energy efficiency investment to be copied more widely.
The project design considered the risk that enterprises participating in demonstration schemes could fail to

originate appropriate energy efficiency investment projects, undermining the project sustainability. This risk was expected to be mitigated by a training program for responsible energy managers which was expected to strengthen the capabilities of enterprises. This problem was only partially mitigated as discussed in Section 6, on Outcome.
During the project preparation stage, the Ministry of Industry and Information Technology (MIIT) initially proposed a three-year implementation period. The project team explaining that since this was the first international cooperation project implemented by the MIIT and given the potential limited capacity of the implementing agency, it would be best to establish a four-year implementation schedule. MIIT agreed.

Rating
Substantial

4. Achievement of Objectives (Efficacy)

Objective 1

Objective
To strengthen the institutional capacity for both the management and technical aspects of rational energy use in key industrial sectors in China, thereby contributing to improvements in energy efficiency and the reduction of greenhouse gas emissions. (GEF Grant Agreement, Schedule 1, p.5)

Rationale
First PDO Indicator: Increase in responsible energy managers with strengthened capacity in energy management (GEF-GA, Annex 1, Schedule2, p.14)
1. **Policy support studies:** The target was for three studies and seven were completed.
1.1. Output: A study to evaluate domestic and foreign energy conservation policy summarized the energy conservation experience of developed countries related to constructing management systems, establishing legal systems, etc. According to the ICR, the main findings of this work was provided in the following reports: (i) A Collection of Industrial Energy Conservation Policies; (ii) The Effect of Industrial Energy Conservation Policies in Eleventh Five-Year Plan; (iii) A Summary Report on Advanced Countries' Management Experience in Industrial Energy Conservation and Suggestions on Improving Current China's Industrial Energy Conservation Policies.
Outcome: The ICR states that "these studies provided some suggestions for improving China's current industrial energy conservation system based on the existing problems." (ICR page 30)
1.2 Output: A study to establish a 2020 Industrial Energy Efficiency Improvement Roadmap, including a systematic survey of the current status of China's industrial energy efficiency activities and problems, and an analysis of the potential and approaches to improve the energy efficiency in key energy intensive industrial sectors. According to the ICR, the main findings are provided in the "Approach Research Report covering China's Industrial Energy Conservation Potential for 2020", and the "Improvement Roadmap Report for improving China's Industrial Energy Efficiency".

Outcome: The ICR states that, although these studies were accepted by MIIT only in April 2016, they did provide support for the development of an industrial energy conservation plan that was to be implemented during the 13th Five-Year Plan period (2016-2020), which was presented to the public by President Xi Jinping in November 2015.
1.3. Output: An energy consumption allowance baseline study covering key energy-consuming enterprises. According to the ICR, the main findings of this research were provided in two reports: (i) Technical Guide for Key Energy-Consuming Enterprises' Energy Consumption Allowance Determination report; and (ii) Implementation Suggestions on Key Energy-Consuming Enterprises' Energy Consumption Allowance Determination.
Outcome: This work proposed basic principles and relevant guidelines for determining these baseline values, and provides guidance for the construction of an energy conservation market system.
1.4. Output: A study to develop specifications for industrial energy conservation supervision. The main findings of this research were provided in the report on Industrial Energy Conservation Supervision Specifications, which, at the time of the ICR mission, was still in draft status awaiting MIIT approval.
Outcome: This study is to provide support for the National Industrial Energy Conservation Special Supervision Campaign, whose aim is to guide supervision efforts for all energy efficiency activities in China.
1.5. Output: A study on innovation mechanisms for implementation of a program of industrial energy conservation supervision for Hunan Provence.
1.6. Output: An industrial enterprise energy efficiency standard evaluation guide, along with a rapid evaluation tool, and relevant user manuals and training materials. . According to the ICR, its main findings are provided in (i) A guide on energy efficiency evaluation methods; (ii) Energy efficiency evaluation tools (application software); and (iii) A user manual and training materials.
Outcome: According to the ICR these tools could "help enterprises identify the gaps between their performance and those of advanced enterprises, and energy efficiency improvement opportunities." (Page 34)
1. 7. Output: An evaluation index system for "green factories" in the metallurgical industry, which combined Suggestions on Excess Capacity Resolution and Difficulty Relief in Iron and Steel Industry and the requirements proposed in the 2016 Industrial Energy Efficiency and Resources Utilization program. The main findings of this research were presented in the following reports: (i) an Evaluation Index System for Green Factories in Metallurgical Industry; (ii) a Guideline on Evaluation of Green Factories in Iron and Steel Industry (draft industry standard); and (iii) a Guideline on Energy Efficiency Evaluation of Iron and Steel Enterprises (draft industry standard).
Outcome: According to the ICR, this research will provide technical support for accelerating the "green transformation" of iron and steel enterprises, and for guiding the establishment of "green factories" in the metallurgical industry.

Other Outputs

2. Key training modules developed: The target of developing two training modules was achieved. One covered general training materials and the other covered Industry-specific training materials for four basic industries (iron and steel, petrochemicals, nonferrous metals and building materials).
3. Industrial energy management best practice cases disseminated: The target was achieved. A summary of industrial energy best practices was produced and disseminated for each of the eight enterprises that participated in the demonstration projects.
4. Responsible energy managers trained in energy management: The number of managers trained was 3278, exceeding the target of 2000 by 62%

Overall Outcome: Institutional capacity was improved, and several of the studies provided direct feedback into the development of national policies and campaigns that intended to advance China's efforts on energy efficiency and the reduction of GHGs. Technical capacity was also improved overall, as the technical materials began to be distributed to other manufacturers in the relevant sectors. However, as noted under the outcome discussion for Objective 2, below, application of this technical capacity, in terms of its utilization in the selection process for the demonstration projects, demonstrated a wide variance in both the efficacy and the efficiency of these investment, projects which suggests that there were still some significant weaknesses in the application of this technical knowledge.

Rating
Substantial

Objective 2
Objective
To improve energy efficiency and reduce greenhouse gas (GHG) emissions in key industrial sectors, specifically - energy savings achieved through capacity building for responsible energy managers and demonstration projects and CO2 emission reductions associated with energy savings achieved, as specified in Annex 2 of Schedule 1 of the GEF Grant Agreement.

Rationale
PDO Indicator: The value of and success of energy efficiency investments facilitated by demonstration projects and training programs
Output: The target of US$16 million for energy efficiency demonstration investments facilitated by the project and training programs was exceeded. The project supported 42 energy efficiency investments, costing US$17.4 million, of which Industry contributed US$16 million. They were implemented in the four key industries and achieved a savings of 785 tons coal equivalent (TCE), which was 47% above the appraisal target of 533 TCE. The reduction in CO2 emissions was 1,963,000 Tons CO2, 62% above the appraisal target of 1,214,000 Tons CO2. However, the ICR doesn't provide any evidence that the success of these demonstration projects has led to further investments in these sectors. The size of these subprojects investments ranged from US$3,000 and US$8,800 at the lower end to US$2.4 million and US$2.8 million at the upper end.
Outcome: The overall energy saving targets were significantly over achieved. However, the effectiveness of the individual investments varied widely. The average outcome for all the subprojects (weighted by the amount of investment) was US$90.5 per annual tCO2 conserved. Four of the most effective demonstration projects had an average cost of US$8 per annual tCO2 conserved, while six of the least effective demonstration projects had an average cost of US$823 per annual tCO2 conserved. These widely varying results among the chosen demonstration projects leads this review to conclude that many of the demonstration investments in this project were made for reasons other than energy efficiency.

Rating
Substantial

5. Efficiency

On implementation the project got off to a slow start, with the initial disbursement starting one year after that proposed in the original disbursement schedule, and continued to experience substantial delays due to changes in personnel (see Borrower Performance-section 9). It required a one year extension to utilize all its funding.
The project failed to separate supervision and consulting services in training centers, which was a Government regulation passed in 2009 (but not fully implemented). In 2015 the Government insisted on separating the training centers' functions related to government supervision from their market related functions. In two of the four centers this had been incorporated in the original design, so there were no problems. However, in the other two centers most of the staff chose to work in government supervision. As a result there were not enough staff to support the energy efficiency saving consultancy services, greatly limiting their effectiveness.
On the energy efficiency investments, the total tCO2 saved was 47% above the target in the appraisal. However, as detailed in the section above, the costs for these savings varied greatly among the demonstration projects. Four had a cost of under US$15 per annual tCO2 savings, but seven had costs of several hundred dollars per tCO2 saved per year. And one, for a servo motor system control upgrade with a cost of US$2.7 million (17% of the total US$16 million invested in demonstration projects), had a savings of only 600 tCO2 per year, for a cost of about $4500 per tCO2 annual savings. These latter demonstration project failed to demonstrate the economic attractiveness of their energy saving investments, which suggests that several of the investments in this project have been made for reasons other than energy efficiency.

Efficiency Rating
Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal		0	0 ☐Not Applicable
ICR Estimate		0	0 ☐Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The objective of promoting energy-efficient industrial technologies and practices is highly relevant for China as it works towards meeting its environmental goals. The design of the project components for studies and training, followed by the implementation of subprojects that demonstrate the viability of energy efficiency industrial investments fully supported these objectives. The achievements of the project's First Development Objective, to strengthen institutional capacity, were judged substantial. The achievements of the Second Development Objective, to improve energy efficiency and reduce GHG emissions in key industrial sectors through capacity building and efficient demonstration projects, were judged satisfactory because the output targets for training of staff in four regional energy offices and the overall outcome targets for reduction in GHG were achieved. This outcome, however, was somewhat tempered by the wide variance of the economic viable of the energy saving outcomes of the demonstration projects. Efficiency was judged only modest. Government, GEF and Industry each met their spending targets for demonstration projects with remarkable precision. However, a large number of these demonstration projects had high cost per unit CO2 saved, indicating that the training programs have been unable, to date, to achieve their goal of enabling industry to choose appropriate energy efficiency projects. Based on these ratings, the overall project outcome is rated as Moderately Satisfactory.

a. Outcome Rating

Moderately Satisfactory

7. Rationale for Risk to Development Outcome Rating

There is a high likelihood that the project development outcomes will be maintained and project activities will continue. China is committed to increasing its energy efficiency. It has signed the Paris agreement on climate change and pledged to peak CO2 emissions by 2030. In the 13th Five-Year Plan, green development has been adopted as one of the five major development principles, and the promotion of energy efficiency has been widely endorsed by local governments. But progress in many heavy industries, where the process involves closing down the least efficient plants, is likely to continue to be slow.
In the later stages of the project, the former DDG within the Government returned to be in charge of the energy efficiency division. Given his previous commitment and knowledge of the project, he was able to quickly take over and help bring the project up to speed in terms of implementation. If he again gets transferred, the energy efficiency division could easily loose its momentum, and along with it the programs it has supported.

a. Risk to Development Outcome Rating

Modest

8. Assessment of Bank Performance

a. Quality-at-Entry

The GEO/PDO's were simple and realistic and the M&E design included appropriate Indicators. A realistic time frame was established for project implementation. Project design did, however, suffer from one issue that later had a significant impact on the ability to fully implement the project's objectives, in that it failed to take into account the 2009 Government's decision to have separate institutions responsible for the government's supervision functions and the commercial functions that were to be supervised. This legislation had not been enforced when the project was under preparation, and the project supported provincial training centers that had both functions of energy efficiency supervision and energy saving consultancy services (market function) with the commercial consultancy part intended to enable the centers to become self-sustaining through fees for services. In 2015 the Government finally made this separation mandatory. In two of the training centers most of the staff chose to work in government supervision. This left the institution insufficiently staffed to provide the energy efficiency saving consultancy services. In these training centers third-party consulting firms were contracted to accomplish the project activities, but this delayed full project implementation.

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The ICR states that the World Bank team conducted regular supervision missions and provided implementation support and guidance on a regular basis. Because they had recognized the problems that could arise when working for the first time with a new government ministry, project managers had convinced the Government that a four year implementation period was more appropriate than the three year period initially suggested by the Ministry (See section 3b). However, even with this foreknowledge, they were unable to overcome initial implementation problems. Procurement was slow to get off the ground: disbursement did not begin until the second year of implementation, and continued to lag a year behind schedule. The ICR reports that QAG (the bank's internal quality assessment group) had identified this issue in their review of the project's quality of supervision. The four year implementation period did, however, provide the time needed to convince the Government to take appropriate action, including bringing back the original implementation director. He brought project implementation to a successful conclusion after the closing date had was extended by one year.

Quality of Supervision Rating

Moderately Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. Assessment of Borrower Performance

a. Government Performance

The Ministry of Industry and Information Technology (MIIT) and the Department of Energy Conservation and Resource Utilization (DECRU) were the Government entities responsible for the project. The ICR states that "MIIT was strongly committed to the project and effectively cooperated with the World Bank team to jointly address issues in project preparation and implementation." Shortly after the project became effective, the management of DECRU changed, with the major promoter of the project being assigned to another division. This was followed by three changes of the PMO director during project implementation. Eventually the Government brought back the original manager who effectively resolved the implementation problems and brought project implementation back on track, thus insuring the full utilization of the agreed funding. The ICR states that "Although project officials have changed several times, they all actively promoted the project implementation."

Government Performance Rating

Moderately Satisfactory

b. Implementing Agency Performance

Management changes in DECRU and the PMO delayed the advancement of the demonstration projects under Component 3 as the PMOs and the new key management in the Energy Saving Department of DECRU had not received proper communication on project implementation. The problems were eventually resolved when the original manager was reassigned to the project, and ensured that the project met all its objectives. In other aspects, PMO's performance was satisfactory. It conducted financial and procurement management strictly according to the World Bank's and China's national rules, and it provided proactive technical guidance to subcontractors and centers, regularly supervised their implementation, and monitored achievements.

Implementing Agency Performance Rating

Moderately Satisfactory

Overall Borrower Performance Rating

Moderately Satisfactory

10. M&E Design, Implementation, & Utilization

a. M&E Design

The PDO indicators were straightforward, appropriate, and simple to monitor. The first two, managers trained and energy efficiency investments directly measured the achievement of the PDO, as were the GEO indicators, energy savings and CO2 emission reductions from demonstration energy savings projects.
The achievements of the intermediate indicators [policy support studies completed, training modules developed, industrial energy management best practice cases disseminated, and number of demonstration projects implemented] all fed directly into the likelihood of achieving the PDO and GEO.

b. M&E Implementation

The project used surveys to assess implementation progress. Trainees were asked to assess their opinion of the training material. Enterprises were asked their views on the implementation of the demonstration projects.

c. M&E Utilization

The M&E indicator results were assessed each semester and reported to the World Bank annually, during each World Bank mission. The PMO used the results to adjust its implementation plan to ensure the achievement of objectives.
The feedback from the surveys was to be used for the design of other similar capacity-building activities.

M&E Quality Rating

Substantial

11. Other Issues

a. Safeguards

. **No safeguards were triggered at project appraisal.** The project was classified as Category C. As explained in the PAD (para 39), it was expected to have minimal or no adverse environmental impacts because it did not include any feasibility studies for downstream physical investments. The demonstration energy efficiency investment projects resulting from of the training programs were to be totally financed by the industries themselves, not by the project. As such, no environmental assessment instrument was required for this project.
The project team did, however, consider potential safeguards issues related to demonstration project energy efficiency investments that the industries would be making, and therefore made suggestions to integrate relevant safeguards policy considerations and good practices into the training programs so as to contribute to the capacity building of industries and help improve the environmental performance of their energy management systems and future action plans.

b. Fiduciary Compliance

The ICR states that fiduciary aspects, financial management, and disbursement were supervised closely. All TA procurement documents were reviewed, and potential procurement issues were duly identified and resolved. The results of the one Financial Audit for the years 2012, 2013, 2014 and 2015) were clean, with no exceptions.

c. Unintended impacts (Positive or Negative)

Energy efficiency assessments were duplicated and promoted in Zhangjiagang, a medium sized city with a population of 1.2 million (2010 census). Their promotion activities started in early 2013.

d. Other

None

12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Moderately Satisfactory	There were efficiency shortcomings that detracted from the overall project performance.
Risk to Development Outcome	Negligible	Modest	There are significant risks to the continuation of strong management for the efficiency centers.
Bank Performance	Satisfactory	Moderately Satisfactory	The project fell a year behind schedule during early implementation and QAG reported weak supervision.
Borrower Performance	Satisfactory	Moderately Satisfactory	The Governnment was unable to provide continued strong management support for the project.
Quality of ICR		Modest	---

Note
When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.
The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

13. Lessons

- **Technical Assistance programs that include in depth policy studies need strong Government**

commitment beyond the support of a singular champion. In this project momentum was lost during the period that the primary supporter was transferred to another department.

- **Training programs should be designed to provide sufficient time to allow participants to absorb the presented material.** In this project, training program participants thought that five days was too short a time to allow for full absorption of the large volume of material presented.

14. Assessment Recommended?

No

15. Comments on Quality of ICR

The ICR provided an excellent summary of the project's output achievements, and its lessons were well presented and fully based in the information presented earlier. However, it did little to analyze this information, in terms of outcomes, particularly in relation to the outcomes of the demonstration projects. While presenting at great length the positive side of the project, it brushed very lightly over its failings.

a. Quality of ICR Rating

Modest