Document of
The World Bank

Report No: ICR00003878

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(TF-99860)

ON A

GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$4.0 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

CHINA ENERGY EFFICIENCY PROMOTION IN INDUSTRY PROJECT

December 15, 2016

Energy and Extractives Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective: June 30, 2016)

Currency Unit = Chinese Yuan (CNY)
US$1.00 = CNY 6.89

FISCAL YEAR
July 1–June 30

ACRONYMS AND ABBREVIATIONS

CEEPI	China Energy Efficiency Promotion in Industry
CECA	China Energy Conservation Association
CNY	Chinese Yuan
CPS	Country Partnership Strategy
DDG	Deputy Director General
DECRU	Department of Energy Conservation and Resource Utilization
EC Law	Energy Conservation Law
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEO	Global Environment Objectives
GHG	Greenhouse Gas
ICR	Implementation Completion and Results Report
ISO	International Organization for Standardization
ISRs	Implementation Status and Results Reports
M&E	Monitoring and Evaluation
MIIT	Ministry of Industry and Information Technology
PDO	Project Development Objective
PMO	Project Management Office
TA	Technical Assistance
TCE	Tons of Coal Equivalent
TORs	Terms of References

Practice Manager: Jie Tang
Project Team Leader: Yanqin Song
ICR Team Leader: Rutu Dave

People's Republic of China
Energy Efficiency Promotion in Energy Project

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Data Sheet

A. Basic Information			
Country:	**China**	**Project Name:**	**China Energy Efficiency Promotion in Industry**
Project ID:	P119357	L/C/TF Number(s):	TF-99860
ICR Date:	12/20/2016	ICR Type:	Core ICR
Lending Instrument:	GEF Grant	Borrower:	PEOPLE'S REPUBLIC OF CHINA
Original Total Commitment:	US$4.00 million	Disbursed Amount:	US$4.00 million
Revised Amount:	US$4.00 million		
Environmental Category: C		**Global Focal Area: C**	
Implementing Agencies: Department of Energy Conservation and Resource Utilization (DECRU) Ministry of Industry and Information Technology (MIIT)			
Cofinanciers and Other External Partners: n/a			

B. Key Dates				
Process	**Date**	**Process**	**Original Date**	**Revised / Actual Date(s)**
Concept Review:	05/11/2010	Effectiveness:	01/05/2012	01/05/2012
Appraisal:	03/17/2011	Restructuring(s):	04/17/2015	04/17/2015
Approval:	05/31/2011	Midterm Review:	n.a.	n.a.
		Closing:	06/30/2015	06/30/2016

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Satisfactory
Risk to Global Environment Outcome:	Low
Bank Performance:	Satisfactory
Borrower Performance:	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance			
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			
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):	Yes	Quality of Supervision (QSA):	None
GEO rating before Closing/Inactive status	Satisfactory		

D. Sector and Theme Codes		
	Original	**Actual**
Sector Code (as % of total Bank financing)		
Energy efficiency in Heat and Power	84	84
Public administration - Energy and mining	16	16
Theme Code (as % of total Bank financing)		
Climate change	100	100

E. Bank Staff		
Positions	**At ICR**	**At Approval**
Vice President:	Victoria Kwakwa	James W Adams
Country Director:	Bert Hofmann	Klaus Rohland
Practice Manager/Manager:	Jie Tang	Ede Jorge Ijjasz-Vasquez, Vijay Jagannathan
Project Team Leader:	Yanqin Song	Alberto U. Ang Co
ICR Team Leader and Primary Author:	Rutu Dave	n.a.

F. Results Framework Analysis

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

Project Development Objective. 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.

Global Environment Objective. 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.

Revised Global Environment Objectives (as approved by original approving authority) and Key Indicators and reasons/justifications

Not applicable

(a) PDO/GEO Indicators

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
PDO Indicator 1: Responsible energy manager trained in energy management				
Value (quantitative or number)	0	2,000		3,238
Date Achieved		31 October, 2015		30 June, 2016
Comments	Target substantially exceeded. It surpassed its initial goal by 62%.			
PDO Indicator 2: Energy efficiency investments facilitated by demonstration projects and training programs (US$, million)				
Value (US$, millions)	0	16		17
Date Achieved		31 May, 2016		31 May, 2016
Comments	Target exceeded. The final demonstration projects were completed in May 2016 and the total investment of these projects exceeded the initial target by 6%.			
GEO Indicator 1: Energy savings through capacity building for responsible energy managers and demonstration projects				
Value (thousand TCE	0	533		785
Date Achieved		30 June, 2016		30 June, 2016
Comments	Target substantially exceeded. The indicator could not be measured until all demonstration activities had been completed. The target was exceed by a large margin of 62%.			
GEO Indicator 2: CO_2 emission reductions associated with energy savings achieved				
Value (thousand tCO_2)	0	1,214		1,963
Date Achieved		30 June, 2016		30 June, 2016
Comments	Target exceeded. The indicator could not be measured until all demonstration activities had been completed. The target was achieved by a margin of 47%.			

(b) 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: Policy support studies completed				
Value (quantitative or number)	0	3		7
Date Achieved		June 30, 2016		June 30, 2016
Comments	Target exceeded. One of the initially planned studies was cancelled as the industry had already completed this study between appraisal and project commencement. The additional funding was used to complete five other studies agreed upon between the Government and the World Bank.			
Indicator 2: Key training modules developed				
Value (quantitative or number)	0	2		2
Date Achieved		21 November, 2014		30 June, 2016
Comments	Target achieved. Two training modules were developed. One covering 'General training materials for responsible energy managers' and one that covered 'Industry-specific responsible energy manager training materials' in four industries: iron and steel industry, petrochemical industry, nonferrous metal industry and building material industry.			
Indicator 3: Demonstration projects implemented				
Value (quantitative or number)	0	28		28
Date Achieved		31 May, 2016		30 June, 2016
Comments (including %)	Target achieved. 20 demonstration projects were carried out in phase 1, in phase 2 of the project.			
Indicator 4: Project website developed and maintained				
Value (quantitative or number)	0	1		1
Date Achieved		7 September, 2012		30 June, 2016
Comments)	Target achieved. A website was created and maintained at www.ceepi.org.cn			
Indicator 5: Industrial energy management best practice cases disseminated				
Value (quantitative or number)	0	8		8
Date Achieved		31 May, 2016		30 June, 2016
Comments	Target achieved. The project summarized 1 industrial energy management best practice for each of the enterprises that participated in the second phase of the demonstration activity.			

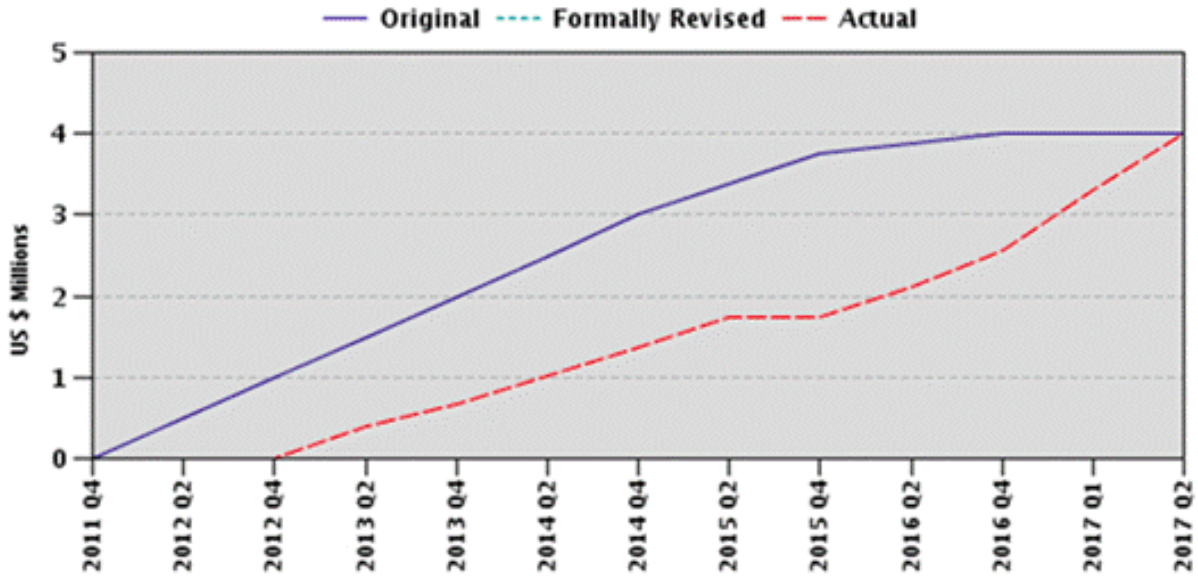
G. Ratings of Project Performance in ISRs				
No.	**Date ISR Archived**	**GEO**	**IP**	**Actual Disbursements (US$, millions)**
1	09/22/2011	Satisfactory	Satisfactory	0.00
2	10/24/2012	Satisfactory	Moderately Satisfactory	0.40
3	06/24/2013	Satisfactory	Moderately Satisfactory	0.67
4	12/22/2013	Moderately Satisfactory	Moderately Unsatisfactory	1.03
5	06/04/2014	Moderately Satisfactory	Moderately Satisfactory	1.36
6	12/05/2014	Moderately Satisfactory	Moderately Satisfactory	1.72
7	06/08/2015	Moderately Satisfactory	Moderately Satisfactory	1.72
8	12/09/2015	Moderately Satisfactory	Moderately Unsatisfactory	2.11
9	06/27/2016	Satisfactory	Moderately Satisfactory	2.56

Note: All funding was disbursed on October 26, 2016.

H. Restructuring (if any)

Not Applicable

I. Disbursement Profile



1. Project Context, Global Environment Objectives and Design

1.1 Context at Appraisal

Country Context

1. China grew rapidly in the period from 1980 to 2010, shifting away from a centrally planned economy to a more market-oriented one. With a population of 1.3 billion, China was the second largest economy and the third largest trading nation in the world. From 2000 to 2010, gross domestic product (GDP) grew by an average of about 10 percent per year. With a strong record of macroeconomic management, inflation was kept under control, volatility was managed, and external competitiveness was preserved. The resulting low levels of public and external debt and large stocks of foreign exchange reserves gave China the space to pursue significant macroeconomic stimulus in the face of the global financial crisis. Nevertheless, China faced daunting challenges in maintaining rapid growth and managing the resource demands and environmental consequences of growth.

2. The efficient use of energy resources became one of the most important elements of China's overall resource conservation goals. Without significant gains in energy efficiency, China would have required even greater use of energy—especially coal—to maintain the high rates of economic growth. Even so, coal became and remains China's dominant energy source. In 2008, it comprised 70 percent of total primary energy consumption.

Sectoral and Institutional Context

3. China has been integrating energy efficiency into policy legislation since 1990. At project appraisal, China was the world's second largest energy consumer and one of the large emitters of energy-related carbon dioxide (CO_2); during implementation, it became the largest energy consumer in the world. Between 1978 and 2008 the country's total energy consumption increased fivefold from 0.57 billion tons of coal equivalent (TCE) to 2.91 billion TCE. Simultaneously, China's energy consumption increased by around 5.6 percent annually, which was almost three times as fast as the world average. The energy intensity of China's economy—the measure of energy input per unit of GDP—after about 25 years of steady decline, showed signs of stagnation, and even a slight increase at the outset of the decade. The industrial sector received priority attention in the Government's energy efficiency drive, as industry was the main force of economic growth and energy consumption. Overall, it accounted for 41.5 percent of GDP and more than 70 percent of energy consumption in 2008.

4. Under the 11th Five-Year Plan (2006–2010), China had pledged to reduce energy consumption per unit of GDP by 20 percent. The 11th Five-Year Plan established a wide range of regulations, codes, standards, and basic enterprise energy efficiency targeting. It emphasized the development of policies to promote energy saving and efficient energy utilization. The 11th Five-Year Plan incorporated major objectives for energy efficiency, including (a) increase overall energy efficiency in major industries for which the unit

output of energy use was to reach, or be close to, the leading level in the world by the early 21st century; (b) build robust energy efficiency systems, including supportive laws and standards, policies, technical service, inspection, and management, which were to be are compatible and consistent with the socialist market economy; and (c) emphasize a new market-oriented growth model that was to be more energy efficient and environmentally friendly.

5. Responsibility contracts for achieving specific quantified energy savings, monitored annually, had been established top to bottom through China's government hierarchy and with all major energy consumers. Prominent and complementary energy efficiency programs included (a) the 1,000 Large Industrial Enterprises Energy Conservation Action Plan, to develop and implement specific energy efficient programs in the top 1,008 largest industrial energy consumers, accounting for about 33 percent of China's total primary energy consumption; (b) a set of programs to encourage a structural shift in industry away from energy intensity, including efforts to adjust fiscal policy toward export-oriented energy-intensive industry, and major programs to restructure or close backward energy-intensive plants; (c) establishment of special energy efficiency funds to provide additional incentives for energy efficiency investment; and (d) 10 key energy conservation projects, covering major energy efficiency technologies in manufacturing, transportation, commercial and residential buildings, and public facilities.

6. In support of the energy efficiency policy and program implementation, the Energy Conservation Law (EC Law) was revised on October 28, 2007, and enforced as of April 1, 2008, to officially establish an energy efficiency policy, law, and regulation system. The initial EC Law was first adopted on November 1, 1997, and enforced as of January 1, 1998. The revised law aimed to (a) promote energy efficiency in society; (b) enhance energy utilization efficiency; (c) protect and improve the environment; and (d) promote comprehensive, coordinated, and sustainable economic and social development. It also emphasized implementation of energy conservation targets and responsibility, and assessment system for key industrial enterprises.

7. In March 2009, the General Administration of Quality Supervision, Inspection, and Quarantine issued China's new national standard for Energy Management System Requirements (GB/T23331-2009) for voluntary implementation, beginning November 2009. At the provincial level, Shandong Province was at the forefront of developing an energy management system. The province prepared its own energy management system standard (Shandong Province Industrial Enterprise Energy Management System Standard-DB37/T1013-2009) and implementation guidance during 2007 to 2010. Energy management system—based on the Plan-Do-Check-Act [1]—is a management system approach, which enterprises can adopt to assess energy consumption, identify opportunities to use energy more efficiently, establish energy efficiency goals, and monitor and measure progress toward these goals on a continual basis.

[1] Plan-Do-Check-Act, also known as Deming Cycle, is an iterative four-step problem-solving process typically used in continual process improvement for businesses. It is also widely used in quality, environmental, energy management, and other standards developed by the International Organization for Standardization (ISO).

8. As the 11th Five-Year Plan ended, the key challenges were identified in two priority areas: (a) improved, even-handed, and consistent enforcement of the many existing important regulations, codes, and standards and (b) increased use of market-based tools in delivery of the energy efficiency program overall. The trend of increasing energy intensity driven by industrial growth needed to be addressed through the application of a wide variety of integrated policy and regulatory measures for industries, as well as massive technical assistance (TA) for enterprises.

9. During the 12th Five-Year Plan, larger participation of enterprises in the adoption of the energy management framework, and continuous identification and delivery of energy efficiency were needed so that the government and enterprises cooperate and function jointly. At appraisal, it was assessed that many enterprises still did not carry out energy efficiency and conservation projects or just did the bare minimum to comply with targets. This was mainly due to inadequate knowledge and skills, or greater interest in expanding production lines. Many domestic and international institutions, local government agencies, and educational facilities were delivering energy management, and energy efficiency and conservation training to raise awareness of enterprises and their energy management personnel. However, these training programs provided by different agencies were highly fragmented, with diverse focus and uneven methodology. There was a clear need to mainstream training on energy efficiency management in China.

Rationale for Bank Assistance

10. The World Bank was well positioned to support the proposed project given its long-standing assistance for energy efficiency investments in China and its ability to package activities for design improvements and effective implementation of a series of energy efficiency programs. Both the Government and the World Bank had already supported a number of projects aimed at developing the nascent energy service industry in China by developing and engaging energy service companies, guarantee companies, and financial institutions. Ultimately, however, the key to realizing energy savings in line with cost-effective potential rested upon the efforts of enterprises themselves. As observed in other countries with market economies, industrial enterprises tend to have in-house expertise with regard to internal process optimization technologies and potential energy efficiency measures. This was not the case in China.

11. The China Energy Efficiency Promotion in Industry (CEEPI) project was therefore well positioned to help strengthen the 'human infrastructure' by developing in-house expertise of industrial enterprises to plan, implement, manage, and monitor energy efficiency measures themselves on a continual basis. This culture of continuous improvement in energy efficiency of industrial enterprises remains highly relevant to the sector strategy at global and regional levels, that is, China's efforts to build a resource-saving society.

Rationale for Selection of the Government Counterpart

12. The Ministry of Industry and Information Technology (MIIT), through its Department of Energy Conservation and Resource Utilization (DECRU) was chosen as

the executing agency of the project. The MIIT established a Project Management Office (PMO) that undertook day-to-day and overall coordination.

13. The MIIT was well positioned to execute the project as it is responsible for promoting industrial energy conservation and efficiency in China. While the rational use of energy is universal, sets no boundaries, and applies to any organization, the scope of this project covered industries only—ranging from small and medium enterprises to large and medium enterprises, which is why the MIIT was selected as the government counterpart.

1.2 Original Project Development Objective (PDO), Global Environment Objective (GEO), and Key Indicators

14. The PDO was 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."

PDO-level Indicators:

(a) Increase in responsible energy managers with strengthened capacity in energy management

(b) Energy efficiency investments facilitated by demonstration projects and training programs

Intermediate Results Indicators:

(a) Policy support studies completed

(b) Key training modules developed

(c) Demonstration projects implemented (Phase 1 and Phase 2)

(d) Project website developed and maintained

(e) Industrial energy management best practices cases disseminated

15. The GEO was to "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."

GEO Level Results Indicators

(a) Energy savings achieved through capacity building for responsible energy managers and demonstration projects

(b) CO_2 emission reductions associated with energy savings achieved

Table 1. PDO and GEO Indicators, Targets and Project Outputs

Indicators	Baseline	Indicator values*				Frequency	Data Source/Methodology
		YR1	YR2	YR3	YR4		
PDO-LEVEL RESULTS							
PDO: 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.							
PDO Level Indicator 1: Responsible energy manager trained in energy management (number)							
Approved Target	0	200	800	1,400	2,000	Annual	Project Report Statistical Analysis
Actual Target Achieved	0	np	1,700	2,200	3,238		
Target exceeded by					**62%**		
PDO Level Indicator 2: Energy efficiency investments facilitated by demonstration projects and training programs (US$ million)							
Approved Target	0	0	0	8	16	Annual	Energy Survey
Actual Target Achieved	0	0	0	0	17		
Target exceeded by					**6%**		
INTERMEDIATE RESULTS							
Component 1							
Intermediate Indicator 1: Policy support studies completed toward Component 1 (number)**							
Approved Target	0	3	2	2	3	Annual	Project Report
Actual Target Achieved	0	0	1	2	7		
Target exceeded					**4**		
Component 2							
Intermediate Indicator 2: Key training modules developed (number)							
Approved Target	0	2	2	2	2	Annual	Project Report
Actual Target Achieved	0	1	2	2	2		
Target exceeded by					**0**		
Component 3							
Intermediate Indicator 3: Demonstration projects implemented (number)							
Approved Target	0	0	20	24	28	Annual	Site Visit Project Report
Actual Target Achieved	0	0	0	20	28		
Target exceeded by					**0**		
Component 4							
Intermediate Indicator 4: Project website developed and maintained (number)							
Approved Target	0	1	1	1	1	Annual	Website
Actual Target Achieved	0	1	1	1	1		
Target exceeded by					**0**		
Intermediate Indicator 5: Industrial energy management best practice cases disseminated (number)							
Approved Target	0	0	0	4	8	Annual	Project Report
Actual Target Achieved	0	0	0	0	8		
Target exceeded by					**0**		
GEO-LEVEL RESULTS							
GEO: 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.							
GEO Indicator 1: Energy savings through capacity building for responsible energy managers and demonstration projects (thousand TCE)							
Approved Target	0	0	0	167	533	Annual	Calculation
Actual Target Achieved	0	0	0	0	785		
Target exceeded by					**47%**		
GEO Indicator 2: CO_2 emission reductions associated with energy savings achieved (thousand tCO_2)							
Approved Target	0	0	0	380	1,214	Annual	Calculation
Actual Target Achieved	0	0	0	0	1,963		
Target exceeded by					**62%**		

Note: * Each indicator value is recorded at the end of each year starting at the end of 2013 given the project extension. Except for YR4, which was assessed at FY-end in June 2016.

** The number of policy studies to be completed was decreased from 3 to 2 in 2014. The additional funding was decided to be spent on 5 smaller policy studies that all satisfied the PDO. As a result, 7 studies were completed by project closure.

1.3 Revised GEO and Key Indicators, and reasons/justification

16. Neither the PDO nor the GEO was revised during project implementation.

1.4 Main Beneficiaries

17. The primary project beneficiaries were the industrial enterprises that would adopt: (a) systematic energy management approaches to conform with statutory and regulatory standards, and other requirements; (b) methodologies to plan, implement, evaluate, and control all energy aspects in enterprises' process, products, and services on a continual improvement basis; and (c) training programs for energy managerial personnel as key people (of both genders) to achieve coordination and improvement throughout the organization.

1.5 Original Project Components

18. The project consisted of four components:

- **Component 1: Policy Support.** This component supported studies that address challenges faced during the implementation of the revised EC Law as related to regulations and energy standards within the mandate of the MIIT. 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) industrial energy performance evaluation system. The outputs of this component was also aimed at providing input to the development of training materials for capacity building of responsible energy managers (Component 2). This would foster 'institutionalization' of a culture of energy management and sustainable practices in industrial enterprises.

- **Component 2: Capacity Building for Responsible Energy Managers.** This component was to (a) support the development of a series of training materials to meet the different needs of energy managerial personnel in major energy-consuming enterprises, develop standardized training programs, and recommend certification scheme for responsible energy managers in industries and (b) provide sub-grants to four training centers for the effective delivery of training programs to energy managerial personnel. The component also aimed to train the trainers of preselected training centers with regard to training course design, delivery, evaluation, and assessment (including case studies). A capacity-building process that encourages learning by doing would enhance the in-house expertise of responsible energy managers as the focal point for all activities pertaining to rational energy use in enterprises down to the factory floor.

- **Component 3: Demonstration Project Scheme.** This component was to provide sub-grants to four training centers for setting up and implementing enterprise energy management programs as well as advance the

implementation of such energy management programs by selected enterprises. This included, among others, 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. The component also aimed to provide TA to strengthen the capacity of the training centers referred to in the first part of this component and develop advanced training materials. The component was implemented in two phases: The first phase was to select energy-intensive industry sectors such as iron and steel, cement/building materials, petrochemical, and nonferrous metal industries. Twenty enterprises were recruited by the training centers to voluntarily participate in setting up and implementing enterprise energy management programs. The training centers were to provide initial guidance to the participating enterprises, and brief them on the objectives and methodologies of the energy management program. During this phase, participating enterprises were to be encouraged to sustain the energy management program and eventually implement energy efficiency projects. The first phase would focus on gauging the energy management needs of enterprises, demonstrating implementation issues, and assessing the strategies for success. The second phase of the demonstration project further advanced the implementation of the energy management program in eight selected enterprises. For these enterprises, the training centers provided specialized TA, such as development of comprehensive manuals, policies, procedures, and action plans or energy efficiency road maps for establishing an umbrella framework for industrial energy management and energy efficiency and conservation programs that are customized to the needs of the participating enterprises. The demonstration projects aimed to assist the selected enterprises with establishing the energy management program framework and procedures that may include management and technical aspects of rational energy use. The second phase of the demonstration project was to result in a well-established framework in the participating enterprises that could be used as an innovative approach for continual improvement to energy efficiency and increase compliance with the EC Law.

- **Component 4: Information Dissemination.** This component aimed to (a) support the design of a promotion and awareness-building program to disseminate energy efficiency information and relevant government policies to enterprises with the aim to support rational energy use; (b) organize workshops or annual forums for government officials, energy managers, and technical staff from selected industries to promote training programs under Component 2 and discuss the results of the demonstration projects under Component 3 and the next steps for follow-on projects; and (c) support the creation and maintenance of a project website as a platform for all relevant stakeholders to share and communicate information. The information and dissemination activities of the project were to assist in increasing awareness of industries with practical approaches to improve energy performance and incorporate a culture of energy management into day-to-day business

operations.

1.6 Revised Components

19. None of the components were revised during project implementation.

1.7 Other significant changes

20. **Project restructuring and extension.** The project was restructured in 2015, extending the grant closing date by a year from June 30, 2015 to June 30, 2016. The rationale for the extension was the following:

(a) The Chinese government continued to rank energy efficiency promotion in the industry as highly important and capacity building to play an important role for achieving the Government's energy saving target.

(b) All other activities designed in this project were on track to be completed by the end of June 30, 2015, except the implementation of Component 3—the demonstration activities.

(c) The Government requested a 12-month extension of the closing date through a letter dated February 21, 2015.

(d) The ministry developed an action plan, satisfactory to the World Bank, to ensure that the demonstration activities could be completed by early 2016 and the PDO could be achieved.

(e) The extension would support the World Bank's continued engagement with the Government of China on energy efficiency promotion in industry.

21. These changes were approved by the country director.

22. **Additional policy studies to inform national objectives**. In 2014, the MIIT decided to cancel the initially scheduled third study: 'Industry energy performance evaluation system research.' The study had been completed by the industry before the project implementation commenced. In its place, they proposed to use the funding to support five additional policy studies:

(a) Key energy-using enterprises energy consumption allowance determination study

(b) Development of industrial energy conservation supervision norms

(c) Study on Industrial Energy Conservation Supervision Innovative Mechanisms and Promotion Plan during the 13th Five-Year Plan

(d) Industrial enterprises energy efficiency evaluation tool development

(e) Metallurgical industrial energy conservation and green development standard study

23. These five studies were consistent with the objectives of the project and provided more extensive and in-depth analysis. They added significantly to the national impact (paragraph 54) of the project by informing national policy objectives on energy efficiency and green growth. The World Bank team was closely involved in the decisions on the topics and reviewed the Terms of References (TORs) of each of the five studies. The contractors were selected through a competitive bidding process and successfully completed the studies on time (by June 2016).

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design, and Quality at Entry

Assessment of Project Design and Quality at Entry

24. From the Global Environment Facility (GEF) endorsement (2009) through concept review (2010) and approval (2011), the project components were adequately designed to address the key barriers to achieving the PDO/GEO. It reinforced the capabilities of enterprises to identify, finance, implement, and monitor energy efficiency projects through rational use of energy in industry. The project team successfully obtained the Project Preparation Grant from the GEF in the amount of US$80,000 to help prepare the project to conduct some activities associated with the baseline analysis, carrying out local consultation and workshops, and preparing feasibility studies for component design, and so on.

25. The project design directly supported the World Bank's Country Partnership Strategy (CPS) for 2006–2010 and was designed to be consistent with the CPS for 2011 – 2015. The project objectives were also fully aligned with GEF's Focal Area Strategies and Strategic programming for GEF 4 (2007–2010), which included long-term objectives of promoting energy-efficient technologies and practices in industrial production and manufacturing processes.

26. The project design team emphasized allocating adequate time for project implementation. During the project preparation stage, the ministry initially proposed a three-year implementation period closing the project by June 30, 2014. However, given inexperience and the potential lack of institutional capacity, the World Bank team convinced the ministry to set the closing date as June 30, 2015. This also considered potential project delays and previous experience from GEF project implementation.

27. The project design suffered from one issue that later came to impact implementation. It was common practice when the project was under preparation that provincial training centers had both functions of (a) energy efficiency supervision (government function) and (b) energy saving consultancy services (market function). Though the Government had made a mandate of separating this function back in 2009, it was not enforced until 2015. The PMO and the World Bank team were informed after receiving the auditing report for 2015 when the Central Government reinforced this

requirement (paragraph 32). As a result, the project was designed with the provincial agencies performing this dual role, and targeted the consultancy part, aiming for the centers to become self-sustaining through fees for services.

Soundness of Background Analysis

28. The World Bank carried out an in-depth background analysis and successfully integrated past experiences in the project design to ensure smooth implementation. The World Bank had extensive experience with the development of TA work aimed at building capacity to advance energy efficiency measures. The design of the CEEPI project built on the results of past and on-going GEF initiatives by strengthening the capabilities of enterprises, on the national level, to scale up the adoption of energy efficiency projects through industrial energy management, namely the two GEF-supported projects China Energy Conservation Project Phase I and II and the China Energy Efficiency Financing Project. The CEEPI project also built upon the lessons learned and recommendations from an AusAID/World Bank TA report, 'Accelerating Energy Efficiency in China's Provinces', specifically emphasizing the needs to strengthen human capacity (staffing and improving staff qualifications) and rollout of integrative energy management systems among key enterprises in China.

Assessment of Risk:

29. The risk rating during project preparation was Low (low impact/low likelihood), and the overall project risk during implementation was rated as Medium-I (low likelihood/high impact). The CEEPI project was the first international cooperation project implemented by the MIIT, and the capacity of the implementing agency as well as their lack of knowledge of World Bank procedures was considered one of the main challenges and risks for successful completion of the project.

30. The risk was mitigated mainly by contracting a procurement/financial management specialist with experience in World Bank procedures. Further mitigation measures included (a) the preparation of a detailed procurement procedures manual, (b) targeted training of key staff responsible for processing and approving procurement and payments, and (c) contracting expertise to prepare TORs for consulting assignments.

31. Project designers were also concerned that the training program for responsible energy managers would not gain national recognition and that enterprises participating in demonstration schemes could fail to originate energy efficiency investment projects, undermining the project sustainability especially once the GEF grant ended. The project designers integrated past experience that specifically focused on strengthening the capabilities of enterprises at the national level to mitigate this risk.

2.2 Implementation

32. The project commenced in October 2011 with an initial implementation period of four years. It was extended by a year in 2015 (paragraph 18), due to a few issues that caused delays in project implementation (paragraphs 31 and 32). The decision to extend the project closing date was suitable as it allowed for Component 3 to catch up to the project deadline and ensured more solid implementation and successful outcomes.

Following the extension, the project team and the PMO took significant steps to ensure the project was successfully completed, staying within the budget, by June 2016. Despite encountering a few obstacles, all components satisfied or overachieved on their targets (Table 1).

33. The main factors that affected implementation are described in the following paragraphs.

34. **Personnel changes.** Personnel changes within the implementing agency delayed implementation of Component 3. Shortly after the project became effective, management changed at the deputy director general (DDG) level within the DECRU; the champion leading the project was put in charge of another division. This was followed by further changes at the director level during project implementation. Overall the project experienced three PMO directors. These management changes delayed the advancement of the demonstration projects under Component 3 as the PMO and the new key management in the Energy Saving Department of the ministry had not received proper communication on project implementation.

35. **Institutional status change.** In 2015, the Government reinforced its anticorruption movement, and the Auditing Department of the National Auditing Office requested that the training centers separate the government and market functions of the training centers. The training centers in Jiangsu[2] and Xi'an were not affected by the change as they retained the human resources to carry out the necessary energy saving consultancy services (market function) to continue the demonstration activities. However, in Inner Mongolia and Sichuan most of the staff chose to work in supervision (government function), which meant that there was not enough human capacity in energy efficiency saving consultancy services; thus, the two centers could not provide paid consultancy services. Once notified of the renewed request, the PMO immediately adopted measures to request the training centers in Sichuan and Inner Mongolia to select third-party consulting firms to accomplish the project activities. The selection of the consulting firms followed the World Bank's procurement procedures. In the end, all four training centers successfully provided training to various industries and government organizations with enhanced capacity, and final results were achieved within the project implementation period. Inner Mongolia and Sichuan Centers enhanced their capacity through policy and training components of this project, which will benefit their energy supervision work after this project.

36. **Increased project ownership and a detailed action plan.** 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. Under his guidance, the PMO—at the request of the World Bank—submitted an action plan in early April 2015. This time-bound action plan detailed the steps necessary to complete the project on time, and required that the PMO reported weekly on the progress of the project. With strong support from the MIIT, the DDG

[2] Jiangsu center only had the market function when the project was under preparation.

monitored implementation progress every two weeks. With this strong Government support and intervention, this project moved forward at full speed during the final stage of implementation and successfully completed all the designed activities and reached the development objectives.

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

Assessment of M&E Design

37. The MIIT through the PMO—and with support from government agencies, training centers, industrial enterprises, and energy efficiency institutions—were responsible for the overall M&E system, including regular data collection to assess progress toward achieving results.

38. The PDO and GEO were very similar in scope but were measured by different indicators. As indicated in section 1.2 and Table 1, they both sought to "address management and technical aspects of rational use of energy to contribute to GHG reductions." All the designed project activities were completed by the extended closing date, and the PDO and GEO indicators have either been met or surpassed.

39. The PDO indicators were straightforward, appropriate, and simple to monitor. Both Indicator 1 'responsible energy managers trained in energy management' and Indicator 2 'energy efficiency investments facilitated by demonstration projects and training programs' directly measured the achievement of the PDO.

40. The GEO indicators were more complicated to monitor and yielded results at the final stages of the project as these two indicators were highly dependent on the successful implementation of Components 3 and 4. Hence, estimation of these indicators was not available until May 2016. The initial estimations and final results are presented in Table 1.

41. The achievements of the intermediate indicators all fed directly into the achievements of the PDO and GEO. The five intermediate indicators were designed to explore a combination of administrative and market-oriented approaches to promote energy conservation in China. All five indicators met or surpassed their initially established targets Table 1.

Implementation of M&E

42. M&E was conducted on a regular basis. The PMO worked with the four training centers to collect data on the project indicators. The centers carried out data compilation while the PMO supervised the quality of the statistical data collection and maintained a reliable database to track performance at the PDO level and intermediate results indicators.

43. The calculations of the GEO indicators for energy efficiency savings and CO_2 emission reductions were in line with the Project Appraisal Document. The energy savings (TCE) achieved through capacity building for responsible energy managers and demonstration projects was calculated on the basis of energy savings achieved through energy efficiency projects implemented in demonstration projects and based on a 10-year project life cycle. The CO_2 emission reductions were calculated based on these energy savings with an emission factor of 2.5 tCO_2/TCE. The energy efficiency investments were calculated based on the energy efficiency projects implemented with a total

investment of CNY 110,967,800, which was converted to US$17 million (exchange rate of 6.5:1).

44. The project also used surveys to assess implementation progress. At the end of each training course, trainees were asked to fill out a survey that assessed their acceptance and opinion on the courses and training material. Each industry enterprise also received a survey to gauge their opinion on the implementation of the demonstration projects. This feedback will be used for the design of other similar capacity-building activities.

Utilization of M&E

45. The indicators were assessed each semester and reported to the World Bank annually, during each World Bank mission. The M&E results showed the gaps between the actual and the end target, and the PMO used the M&E results to feed into its annual work plan and to adjust its implementation plan to ensure the achievement of objectives. See Table 1 for an overview of collection methods and responsibilities as well as indicator results.

2.4 Safeguard and Fiduciary Compliance

Safeguards

46. **No safeguards were triggered at project appraisal.** With regard to environment (including social safeguards), there were no adverse environmental, safeguard, and social issues that may affect the project. Neither OP 4.12 (Involuntary Resettlement) nor OP 4.10 (Indigenous Peoples) was triggered. No resettlement and no social hardships were experienced during the project implementation. With regard to the environment, the project is classified as Category C; it was expected to have minimal or no adverse environmental impacts as it only supported consultancy services and capacity building.

47. The project did not require feasibility studies for downstream physical investments. No energy efficiency investments resulting from the training programs and demonstration projects were financed by the project, and as such, no environmental assessment instruments were required.

48. As a matter of good practice, the project integrated into its training program relevant safeguards policy considerations and good practices that can contribute to the capacity building of industries and/or improve the environmental performance of their energy management systems and future action plans.

Financial Management and Procurement

49. The project has an adequate project financial management system that provided—with reasonable assurance—accurate and timely information that the grant is being used for the intended purposes. The project accounting and financial reporting are in line with the regulations issued by the Ministry of Finance and the requirements specified in grant agreement. No significant FM issues were noted throughout the project implementation

and the FM-related weaknesses raised during FM supervision and by the auditor were all resolved on time. In addition, the withdrawal procedure and funds flow arrangement are appropriate, and the loan proceeds were disbursed to the project on time.

50. The PMO noted that the management mode of reimbursement affected the project implementation efficiency. The reason that this occurred was due to the difference between the World Bank's practices and new requirements from the Government. According to the project design, the training centers had to carry out the training activities with their own budget and then claim the expenses reimbursed from a 'special account'. However, on many occasions, the training centers do not have the budget to cover the expenses for the training activities, and according to national law (the Civil Service Law), training centers are not permitted to appropriate other funds to pay for project activities and then be reimbursed later by the World Bank. As a result, they carried out the training program, but they did not pay the trainer and other expenses until they were reimbursed from the special account. This resulted in a significant time difference between the actual training and the reimbursement, which showed borrowing, book-keeping, and paying problems and was thus flagged in the auditing report. Unfortunately, this issue is a systematic issue. Several endeavors were made at the senior level of the government to try to solve the coordination between the World Bank and the domestic auditing office as well as working through the PMO, but no solution was found.

2.5 Post-completion Operation/Next Phase

51. Based on the experience from this project, the MIIT applied for another GEF project executed by the United Nations Industrial Development Organization; that is, the 'China Energy Efficiency Mechanism and Performance Promotion in Industry' to enhance its efforts in energy efficiency promotion in industry. As part of this new project, lessons and experiences from CEEPI will be distributed within the industry in China. Two training centers will continue to provide business-oriented consulting services to the industry to scale up the energy efficiency promotion efforts. With enhanced capacity, the four centers will also continue to deliver training activities regarding energy efficiency and supervision. For example, during November 2016 new training activities regarding energy efficiency supervision are being delivered in the four centers in Jiangsu, Sichuan, Inner Mongolia, and Xi'an supported by the DECRU of MIIT.

52. The outputs of policy studies will also continue to be used to improve industrial energy efficiency policy making, and the best practices and case studies will be further disseminated in relevant activities.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

Relevance of Objectives - High

53. The objectives of the PDO and GEO remained highly relevant and consistent with the Government's priorities set out in the 13th Five-Year Plan as well as the World Bank's current CPS (2013–2016). The objectives are also supported by the GEF-5

strategy in the climate change focal area objective 2 (promote market transformation for energy efficiency in industry and the building sector) and objective 4 (promote energy efficient, low-carbon transport and urban systems). Finally, the objectives also contribute to China's Intended Nationally Determined Contributions as submitted to the Conference of the Parties on June 30, 2015, which include goals to (a) lower carbon intensity of GDP by 60 percent to 65 percent below the 2005 levels by 2030 and (b) reduce CO_2 emissions per unit of GDP by 40 percent to 45 percent below the 2005 levels by 2020.

54. In particular, the policy studies conducted in the later period were closely integrated with the urgent needs of industrial energy conservation work in the beginning of the 13th Five-Year Plan period and provided timely and significant support for promoting the implementation of the excess productivity capacity resolution policy in iron and steel sectors, key energy conservation supervision tasks, trans-provincial energy conservation supervision and inspection tasks, and so on. It also helped promote the implementation of industrial energy conservations tasks and key projects in the 13th Five-Year Plan and strengthen the improvement of energy conservation and green development policies and measures, thereby providing as a valuable reference for government departments.

55. Through the implementation of the project, the institutional capacity for both the management and technical aspects of rational energy use in key industrial sectors in China has been strengthened. The industry is now better equipped to contribute to improvements in energy efficiency and the reduction of GHG emissions, which is important to ensure that the energy efficiency and green development goals of the 13th Five-Year Plan are implemented. This is aligned with the CPS for 2013–2016 (Report No. 67566-CN), approved by the Board on October 11, 2012. One of the strategic themes of the CPS 2013–2016 are to support greener growth and shift to a sustainable energy path.

Relevance of Design and Implementation – Substantial

56. The project design was straightforward and targeted key issues that prevented energy efficiency from scaling up in the industry sector and the performance indicators were well-defined to cover output and outcomes. The main issues encountered in the project that caused delays were the personnel changes that happened earlier in the project implementation, as well as the due to the linkages between component 3 and 4, which was delayed due to the institutional changes (see section 2). The project design could be replicated and scaled up with minor adjustments and offer opportunities to be expanded and built upon. Even though the issue pertaining to the change in the institutional structure of the training centers was not considered at design stage, it was dealt with promptly as soon as the World Bank and the PMO were made aware and will be considered in any scale-up of the project.

3.2 Achievement of Project Development Objective and Global Environmental Objectives

57. **Project Development Objective.** 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.

58. **Global Environment Objective.** 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.

59. The achievement of the PDO and GEO is rated High. All project activities have been completed and targets have been either met or surpassed (Table 1 and Annex 2). The project has already yielded and exceeded results and wider impacts at both Central Government and provincial levels that will ensure the continued capacity development of energy managers, improved energy efficiency, and the reduction of GHGs.

Strengthened Institutional Capacity for management and technical aspects of rational energy use in key industrial sectors in China

60. The training activities carried out achieved significant wider effects. They improved the overall energy conservation management level of enterprises and normalized industrial energy conservation supervision. They also enhanced the society's awareness of the importance of energy conservation supervision and enforcement personnel and increased the enthusiasm of energy conservation supervisory personnel. Finally, they were instrumental in enhancing the communication between the MIIT, the local industrial energy conservation administrations, and the energy conservation supervision organizations. This created desirable conditions for implementation of national key industrial energy conservation supervision tasks. With the training experience and capacity accumulated in this project, the training centers are all well positioned to continue the activities undertaken during project implementation. The centers in Inner Mongolia and Sichuan will continue to provide training activities without charging a fee from the trainees.

61. It is also important to note, that the dissemination activities carried out and the continued dissemination of the project results, lessons learned, and outputs will foster increased capacity development and build knowledge, thereby feeding into the main objective established by the PDO and GEO.

Support to the development and enhancement of national policies

62. Several of the studies provided direct feedback into the development of national policies and campaigns that will advance China's efforts on energy efficiency and the reduction of GHGs. The development of the Industrial Energy Conservation Supervision Specification—one of the five studies added during project implementation—provided support for the National Industrial Energy Conservation Special Supervision Campaign. This campaign aims to guide and normalize the industrial energy conservation special supervision efforts for all of China. As part of the campaign, the MIIT, in 2016 issued the 'National Key Industrial Energy Conservation Special Supervision Handbook', which was directly based on the outputs of the aforementioned study. In addition, the Domestic

and Foreign Industrial Energy Conservation Policy Study worked as a reference for the development of the Industrial Energy Conservation Management Measures.

63. The studies also supported the industrial energy conservation planning work during the 13th Five-Year Plan period. The study Industrial Energy Conservation Supervision Innovation Mechanism and Implementation Plan provides a cross-regional energy conservation supervision scheme, which will support the MIIT in implementing industrial energy conservation supervision work during the 13th Five-Year Plan period. Finally, the 2020 Industrial Energy Efficiency Improvement Roadmap Research provided support for the development of an industrial energy conservation plan implemented during the 13th Five-Year Plan period.

64. This can be seen as a significant step toward helping China continue to establish solid energy efficiency policies, legislation, and action plans to achieve its GHG reduction goals and energy efficiency investments as stated by the PDO and GEO – thereby satisfying the objectives set therein.

Improved connection between the Central Government and local administrations and industry associations

65. During the implementation of the project, special attention was paid to building improved coordination and collaboration between the Central Government, MIIT, and local administrations as well as industry associations. This helped engage the technical resources and strengths of the industry associations and has built a closer relationship between the Government and the industries that will need to implement current and future policies and energy efficiency activities.

66. This improved link between national and local institutions will be beneficial for any future energy efficiency activities and policies implemented in the industry sector investments as stated by the PDO and GEO – thereby satisfying the objectives set therein.

Achievement of GEO

67. The GEO was fully achieved. Both indicator targets for the GEO were exceeded as shown in Table 2.

Table 2. GEO Indicator 1: Energy savings through capacity building for responsible energy managers and demonstration projects

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Value (thousand TCE	0	533		785
Date Achieved		30 June, 2016		30 June, 2016
Comments	Target substantially exceeded. The target was exceed by a large margin of 62%.			
GEO Indicator 2: CO_2 emission reductions associated with energy savings achieved				

Value (thousand tCO_2)	0	1,214		1,963
Date Achieved		30 June, 2016		30 June, 2016
Comments	Target exceeded. The indicator could not be measured until all demonstration activities had been completed. The target was achieved by a margin of 47%.			

68. With the GEO indicators overachieved, this helps towards the overall achievement of the reduction of GHG emissions of China, which is one aims of this project.

3.3 Efficiency

69. **Efficiency is considered High.** All project activities have been fully completed and the designed performance indicators are either fully met or over-fulfilled, staying within the project grant of US$4 million.

Economic and Financial Analysis

70. Given that the project financed a series of TA activities, financial analysis and assessments of Net Present Value, Economic Rate of Return, and Financial Rate of Return were not carried out at appraisal. The assessment of the project's economic performance follows the 'Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Projects'.

71. The energy savings achieved through capacity building for responsible energy managers and demonstration projects is calculated on the basis of energy savings achieved through energy efficiency projects implemented in demonstration projects and based on a 10-year project life cycle. This came to 785,000 TCE saved and CO_2 emissions were reduced by 1,963,000 tCO2. The CO_2 emission reductions associated with energy savings achieved are calculated based on energy savings achieved with an emission factor of 2.5 tCO_2/TCE.

72. The energy efficiency investments facilitated by demonstration projects and training program are calculated based on the energy efficiency projects implemented in the demonstration projects with a total investment of CNY 110,967,800, which was converted to US$17 million with an exchange rate of 6.5:1. This is 6 percent higher than the original target of US$16 million.

Administrative Efficiency

73. As mentioned earlier, the project required one extension to ensure all components were implemented. The delays slowed disbursement early in the project, but as issues were resolved, disbursement subsequently picked up. At project completion, 64 percent of the grant was disbursed. However, at the time of the Implementation Completion and Results Report (ICR), all funds have been disbursed.

3.4 Justification of Overall Outcome Rating

Rating: Satisfactory

74. In summary, the overall outcome rating is Satisfactory. This is based on the fact all objectives were fulfilled, and both the relevance of the objectives and the design and implementation are rated High. The PDO and the GEO were substantially achieved and several indicators were surpassed within the project grant parameters. Extending the project was a good decision made by the World Bank team and the PMO given the levels at which this project achieved its objectives in the end. The combination of project relevance, achievement of PDO/GEO, and efficiency justify an overall outcome rating of Satisfactory.

3.5 Overarching Themes, Other Outcomes and Impacts

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

75. Gender, poverty, and ethnic minorities were not identified as a specific concern in the Project Appraisal Document. However, the benefits of energy efficiency go well beyond simply scaling back energy demand. Co-benefits for energy efficiency measures include increasing economic growth, enhancing social development, advancing environmental sustainability, and ensuring energy-system security. For example, by making homes warmer and drier, energy efficiency can substantially contribute to the health and well-being of people.

76. The project also effectively included the training of women. Women participation was around 20 percent.

(b) Institutional Change/Strengthening

77. With its primary goal of building capacity, the project contributed significantly to institutional change and strengthening. The following three outcomes that advanced overall institutional capacity are noteworthy:

(a) **Strengthened management teams.** All centers established project leading teams and assigned leaders of the centers to take care of the general planning of the demonstration activities. The center staff implemented specific demonstration activities with the support of third-party organizations or experts. They continuously strengthened the team and improved the internal and external expert teams, which played an important role in the implementation of the demonstration project.

(b) **Strengthened communication between organizations and institutions**. A launch ceremony was prepared before commencing the training activities. This helped establish improved communications between the PMO and the training facilities as well as among the training facilities to share experience.

(c) **Prevented system inconsistencies and improved ease of use.** The phenomenon where a system is established according to one document and operated according to another document is very common in system construction and operation. In demonstration activities, most enterprises chose to integrate the energy management system with the original management system. They made amendments and improvement in the management system

according to the requirements of the energy management system, which effectively prevented system inconsistencies and ensured the uniform and effective operations of the company management system and improved understanding, and ease of use of the system among users.

(c) Other Unintended Outcomes and Impacts

78. Energy efficiency assessments were effectively duplicated and promoted in Zhangjiagang. The Jiangsu center drew lessons from the CEEPI project and applied these lessons to the Zhangjiagang Municipal Commission of Economy and Information Technology to develop the industrial enterprise energy efficiency promotion activity in Zhangjiagang City. This application was approved by the mayor of the city, and the Zhangjiagang Municipal Finance Bureau was delegated as the granting agency. The Zhangjiagang Municipal Commission of Economy and Information Technology was delegated as the management organization, and the Jiangsu center was delegated as the project executing institution to work together to implement the activity in Zhangjiagang City and provide free energy conservation service for enterprises.

79. The Zhangjiagang industrial enterprise energy efficiency promotion activity was started in March 2013 and included six topics: (a) customized training, (b) electronic accounting of energy-consuming equipment, (c) electricity balance test, (d) energy efficiency assessments, (e) energy efficiency benchmarking, and (f) energy conservation project evaluation.

80. The implementation of the Zhangjiagang activities went far beyond the project scope. The project covers only four major industries at different levels: (a) training, (b) first stage demonstration, and (c) second stage demonstration. It did not include an administrative regional wide initiative. However, the municipal government of Zhangjiagang learned from the CEEPI project and felt it was useful to invite the Jiangsu center to provide consultancy services to all the major energy consuming industries in Zhangjiagang.

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

81. According to the training summary and evaluation forms completed by trainees under Component 2, it was revealed that 96 percent of the trainees took and passed the examination and obtained training certificates. About 98 percent of the trainees were satisfied with the training activity, and the activity was evaluated as overall being effective. However, based on the feedback from the trainees, some improvements could be made:

(a) **Increase in on-site observation teaching.** Trainees suggested that more on-site observation, investigations, and communications should be organized in enterprises or law enforcement sites.

(b) **Increase the communication between trainees and specialists.** Since time was limited, some content was not explained in depth and the communication time between trainees and specialists was too short. Thus,

trainees suggested that more time should be provided for communication with the specialists.

(c) **Provide more practical case studies.** Trainees suggested that more practical case studies should be provided, and analysis and discussions should be organized for the practical-use case studies to provide better practical work.

(d) **Refine the training content.** The training content covers a wide range of topics but needs to be more detailed. Hence, some trainees suggested refining the training content by increasing its depth.

(e) **Develop policy information mobile application.** Trainees suggested that a mobile phone application for energy conservation supervision should be designed and developed by national-level organizations to provide policy, standards, laws and regulations, and specialized knowledge support.

4. Assessment of Risk to Development Outcome

Rating: Negligible to Low

82. There is a high likelihood that the project development outcomes will be maintained and project activities will continue. Current government ownership of the project is High, and the champion of the project, who earlier left, returned to the project, thereby ensuring the successful finalization of PDOs. The PMO will continue to seek financial support to scale up and deliver training activities regarding energy efficiency as appropriate.

83. China's continued dedication to improving energy efficiency also remains. The promotion of energy efficiency has been widely endorsed by local governments, and the rules and regulations on energy efficiency management within enterprises continue to be strengthened and improved.

84. In the 13th Five-Year Plan, green development has been adopted as one of the five major development principles. In the context of industry transformation, upgrading, quality, and performance improvement, energy efficiency becomes a more fundamental factor supporting the green develop agenda in China. Meanwhile, China has signed the Paris agreement on climate change and pledged to peak emissions by around 2030, which will further push energy efficiency.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry
Rating: Satisfactory

85. The World Bank developed the project concept jointly with the Government based on a sound background analysis (paragraph 25) and assessed risks realistically (paragraph

26). The GEO/PDO were simple and realistic, and the M&E design included appropriate indicators that not only achieved, but in several instances surpassed goals within the budget parameters (section 3.2). The World Bank team also adequately considered capacity and knowledge within the implementing agency in undertaking this work and ensured that a realistic time frame was set for the project (paragraph 22). However, although the four training centers were selected and recommended by the ministries, the request on behalf of the Government from 2009 to separate supervision and consulting services in training centers could have been considered and integrated into the design of the project (paragraph 24).

(b) Quality of Supervision
Rating: Satisfactory

86. The World Bank team conducted regular supervision missions, continuously engaged in ongoing dialogues with the PMO and provided implementation support and guidance on a regular basis. The team responded swiftly to PMO concerns and worked closely with them to find solutions to the issues that caused delays. Implementation Status and Results Reports (ISRs) were completed on time on a six-month basis throughout the duration of the project and were candid and fair in their ratings.

87. Fiduciary aspects, financial management, and disbursement were supervised closely. All TA procurement documents were reviewed, and potential procurement issues were duly identified and resolved. There were no safeguards triggered for the project (paragraph 42). Yet, the project team still considered potential impacts on safeguards and made suggestions to integrate relevant safeguards policy considerations and good practices into its training that would contribute to the capacity building of industries and help improve the environmental performance of their energy management systems and future action plans.

88. Overall, few shortcomings were identified in the World Bank's supervision. When the project started to experience delays, the World Bank paid close attention and worked with the PMO to ensure that the project was able to complete all the components on time. In particular, when the management changes took place within the DECRU, the World Bank had several meetings and discussions with the PMO to identify a clear plan of action and ensure sufficient communication between the PMO and the new key management was established.

89. The PMO reported that the World Bank team had rich experience and were highly professional with regard to project management. Their multifaceted support, valuable advice, patient guidance, and laudable efforts played a very critical role in guaranteeing the successful implementation of the project.

(c) Justification of Rating for Overall Bank Performance
Rating: Satisfactory

90. The World Bank's overall performance is considered Satisfactory given that the issues that affected quality at entry were minor and the project only experienced a one-

year delay in implementation with all components achieved despite the issues encountered throughout implementation. The World Bank also did well in communicating with and guiding the Government and the PMO to ensure smooth problem-solving and moving the project forward. The PMO reported that in the project preparation process, the World Bank team effectively coordinated with the implementing entity and local stakeholders to appropriately set PDOs and activities. By focusing on capacity building, the sub-grant was designed to implement training and demonstration activities and strengthen the capacity of four local centers in the meantime. All these guaranteed the rationality, feasibility, and sustainability of project activities.

5.2 Borrower Performance
Rating: Satisfactory

91. **National Implementing Agency.** Performance of the MIIT was Satisfactory. As the MIIT's first GEF project, the CEEPI project has acquired considerable importance and great support. Although project officials have changed several times, they all actively promoted the project implementation. The MIIT was strongly committed to the project and effectively cooperated with the World Bank team to jointly address issues in project preparation and implementation. Monitoring was conducted and reported to the World Bank regularly.

92. **PMO.** The performance of the PMO was satisfactory. The PMO was established and functional before project initiation. A sound management system was established to standardize the project management process. The PMO also developed a good working relationship with relevant stakeholders, including the World Bank team, the Ministry of Finance, the China National Audit Office, subcontractors, training centers, demonstration enterprises, relevant experts, and so on, and earned their high appreciation. 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. It coordinated with five subcontractors and innovatively developed a series of training materials for responsible energy managers specified by the EC Law of China. It collaborated with four centers to successfully deliver training activities with over 3,200 responsible energy managers, which was significantly beyond the project target and got fairly good feedback from trainees. Through periodic newsletters, a website, and numerous workshops, project outputs were disseminated and shared.

93. The subcontractors, four centers, and demonstration enterprises all actively collaborated and earnestly implemented project activities. Especially, the four centers spent considerable resources to facilitate training and demonstration activities implementation. Their performance was Satisfactory.

Justification of Rating for Executing Agency Performance

94. The overall performance of the executing agencies is considered Satisfactory. Although this was the first World Bank project for the MIIT, they managed the learning curve well and worked closely with the World Bank and DECRU to ensure successful

implementation. Despite the delays, both the DECRU and MIIT shared ownership of the project and worked together to ensure objectives were met on time.

6. Lessons Learned

95. The project yielded the following lessons:

(a) **TA programs like this one (which is very upstream) depends on strong government commitment.** This will make projects more resilient to changes in project management and other unexpected events that may delay/derail a project when it depends solely on one champion. It is an important lesson for other countries, which plan to replicate the success of this project.

(b) **Training material should be adjusted to better suit the trainees' needs.** Even though the trainees found the training satisfactory, and the majority completed the training, they noted a few flaws with the project material and structure of the program. Training time was too short (five days), which resulted in too much information being compressed into a short time and did not allow for in-depth learning and too little one-to-one time with the trainers (paragraph 7781). To ensure a much better program, any scale-up should consider increasing the time set aside for training, integrate more focus groups, and set aside time where trainees can interact more with trainers and ask questions. It is also suggested that two different modes of training modules could be developed: one for those who have no or little experience and one that offers a refresher on key issues and themes for those who have previous training and experience.

(c) **Using the strength of industry associations promoted energy conservation in key industries.** As mentioned in paragraph 62, attention was paid to effective connection between the Central Government and relevant local administrations, as well as effective cooperation between the MIIT and industry associations. The industry associations had the technical qualifications to effectively assist with

- developing the responsible energy manager training materials;
- recommending the trainers who should conduct the training; and
- promoting the implementation of policies regarding outdated productivity resolution in the iron and steel sector.

In any follow-up projects, making full use of the strength of the relevant local departments and industry associations and motivating their initiative in task design may achieve the effect of getting twofold results with half the effort.

(d) **Coordination between the World Bank project and the domestic auditing office is important.** As noted by the PMO, the World Bank's method or reimbursement caused auditing issues for the PMO (paragraph 46)

and a mismatch in how funding was spent and reimbursed. It is important that in future projects, such as this one—or in any scale-up—early involvement from the auditing department of the National Auditing Office is requested during the project preparation period.

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

(a) Borrower/implementing agencies

96. The PMO made several comments in the ICR that were incorporated in the final version. In addition, a few comments were made on specific issues:

- **Separation on services.** During project preparation and implementation, relevant government policy changes should be periodically predicted and alerted so as to proactively take measures and better address the resultant risks.

- **Mode of reimbursement.** The project agreement provided a training subsidy of US$500 per trainee, but the auditing office insisted on a subsidy of CNY 450 per day per trainee based on new regulations issued by the Chinese Government. This had resulted in a controversy but finally the subsidy level recommended by the auditing office was adopted although the Government's standard came later than that in the Grant Agreement. This meant that implementation of the training activity had to be adjusted, which to some extent affected the advancement of training activities. Therefore, it is suggested that before activity implementation, the auditing office representatives should be involved and provide suggestions in advance regarding reimbursement.

- **Training activities.** For future training activities, various types of training programs may be developed. For those who have little background knowledge, longer training programs may be designed, while for those with comparatively strong background knowledge, fundamental knowledge may be skipped and only key points and updated information may be highlighted. In any case, more time may be planned for the trainee to discuss and interact with the trainer.

(b) Co-financiers

Not applicable.

(c) Other partners and stakeholder

Not applicable.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in US$, million equivalent)

Components	Appraisal Estimate (US$,)	Actual/Latest Estimate (US$,)	Percentage of Appraisal
Component 1			
GEF Grant	345,000	345,000	100
Government Contribution	210,000	210,000	100
Industrial Companies	0.00	0.00	0
Component 2			
GEF Grant	1,600,000	1,600,000	100
Government Contribution	1,600,000	1,600,000	100
Industrial Companies	0.00	0.00	0
Component 3			
GEF Grant	1,500,000	1,500,000	100
Government Contribution	1,700,000	1,700,000	100
Industrial Companies	16,000,000	16,000,000	100
Component 4			
GEF Grant	248,000	248,000	100
Government Contribution	200,000	200,000	100
Industrial Companies	0.00	0.00	0
Project Management			
GEF Grant	307,000	307,000	100
Government Contribution	400,000	400,000	100
Industrial Companies	0.00	0.00	0
Total Financing Required	**24,110,000**	**24,110,000**	**100**

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (US$, millions)	Actual/Latest Estimate (US$, millions)	Percentage of Appraisal
Government Contributions		4.11	4.11	100.00
Borrower		0.00	0.00	00.00
GEF		4.00	4.00	100.00
Local Sources of Borrowing Country: Industrial Companies		16.00	16.00	100.00
Total		**24.11**	**24.11**	**100.00**

Annex 2. Outputs by Component

Component 1: Policy Support

1. While government regulations and enforcement abilities were relatively strong in China, there were still many challenges in the implementation of the EC Law because of weak industrial institutions and insufficient long-term strategies for energy management. This component will basically support studies to strengthen implementation of the revised EC Law, as well as related regulations and energy standards within the mandate of the MIIT.

2. The completion of seven policy studies (Intermediate Indicator 1) on energy conservation far surpassed the initial target of three and effectively helped advance industrial energy conservation, which will result in energy savings and decreased CO_2.

Task 1A: Conduct domestic and foreign industrial efficiency policies

3. To systematically review China's industrial energy conservation policy system, the China Energy Conservation Association (CECA) was appointed to undertake domestic and foreign energy conservation policy research through an open bid in October 2012. The research outputs were accepted by the experts organized by the MIIT in October 2013.

4. For this research, CECA systematically identified the department rules, international policies, and ministry and commission-level industrial policies relevant to industrial energy conservation after 2006, evaluated the important industrial energy conservation measures in the 11th Five-Year Plan including eliminating outdated capacity, 10 key energy conservation projects, the top-1000 enterprise energy conservation action, and energy performance contract promotion.

5. CECA researchers summarized the energy conservation experience of developed countries and found valuable experience related to constructing management systems, establishing legal systems, establishing promotion and incentive measures, and building market mechanisms. CECA researchers also provided some suggestions for improving China's current industrial energy conservation system based on the existing problems.

6. The main findings of this research are provided in the following reports:

   (a) Collection of Industrial Energy Conservation Policies

   (b) Effect Appraisal Report of Industrial Energy Conservation Policies in 'Eleventh Five-Year Plan'

   (c) Summary Report on Advanced Countries' Management Experience in Industrial Energy Conservation and Suggestions on Improving Current China's Industrial Energy Conservation Policies

7. For this research, CECA conducted basic research on industrial energy conservation policy orientation, mechanism innovation, key actions and strengthening of

policies and measures, and provided support and references for industrial energy conservation administration in policy making.

Task 1B: Carry out study on Industrial Energy Efficiency Promotion Road Map

8. In October 2013, to ensure that the industrial energy conservation work within or after the 12th Five-Year Plan period could be developed to promote the continuous improvement of industrial energy efficiency, the Energy Research Institute (ERI) of China's National Development and Reform Commission (NDRC) was appointed to undertake the 2020 Industrial Energy Efficiency Improvement Roadmap research after an open bidding process was completed.

9. The research outputs were accepted by the experts organized by the MIIT in April 2016.

10. This research included a systematic survey of the current status of China's industrial energy efficiency and the existing problems, an analysis of the potential and approaches to improve the energy efficiency in key energy intensive industrial sectors, development of an industrial energy efficiency improvement road map for China, policy suggestions for promoting China's industrial energy efficiency improvement, and support for the design of the second phase of this project.

11. The main findings of this research are provided in the following reports:

(a) 2020 China's Industrial Energy Conservation Potential and Approach Research Report

(b) China's Industrial Energy Efficiency Improvement Roadmap Research Report

(c) Logical Analysis Framework Report of the Second-Phase of the CEEPI Project

12. This research provided significant support for promoting the implementation of the industrial energy conservation-related tasks and key projects in the 13th Five-Year Plan and strengthening the improvement of energy conservation and green development policies and measures, providing a valuable reference for government departments, and promoting the design of the second phase of the CEEPI project.

Task 1C: Industrial energy performance evaluation system

13. With the changing energy efficiency situation in the industry sector, the MIIT decided to cancel the initially scheduled third study: 'industry energy performance evaluation system research'. Instead they proposed to use the funding to support five additional policy studies. These five studies were in line with original project design. They were designed to explore a combination of administrative and market-oriented approaches to promote energy conservation in China.

Subtask 1C-a: Key energy-consuming enterprises energy consumption allowance baseline

14. In February 2016, to support construction of a sound energy consumption allowance initial allocation system (proposed in the Fifth Plenum of the 18th Central Committee of the Communist Party of China), the China Energy Conservation Association (CECA was selected to undertake an energy consumption allowance baseline study for key energy-consuming enterprises.

15. The research results were accepted by the experts organized by the MIIT in June 2016.

16. Based on the current status of China's key energy-consuming enterprises related to energy management, industrial energy conservation management, carbon emission rights transaction pilots, and relevant international experience, CECA researchers proposed basic principles for enterprise energy consumption allowance baseline determination and developed relevant guidelines. CECA researchers also proposed suggestions regarding the implementation of energy consumption allowance baseline determination based on industrial energy conservation supervision, target responsibility assessment, and third-party verification.

17. The main findings of this research are provided in the following reports:

(a) Technical Guide for Key Energy-Consuming Enterprises' Energy Consumption Allowance Determination

(b) Implementation Suggestions on Key Energy-Consuming Enterprises' Energy Consumption Allowance Determination

18. The effort provided basic research and technical support for the construction of an energy consumption allowance initial allocation system and transaction market and provided guidance for the construction of an energy conservation market system.

Subtask 1C-b: Development of industrial energy conservation supervision specification

19. In February 2016, to standardize industrial energy conservation supervision, improve industrial energy conservation supervision efficiency, and promote the use of energy in industrial enterprises in a reasonable and scientific way according to the law, Shandong Energy Conservation Association and Shandong Zhengxiang International Low-carbon Technology Co., Ltd. were selected through an open bidding process to jointly undertake the development of an industrial energy conservation supervision specification.

20. The study outputs were accepted by the experts organized by the MIIT in June 2016. Based on relevant laws, regulations, policies, standards and related regulations, including the EC Law of the People's Republic of China and the Administrative Measures on Industrial Energy Conservation, combined with industrial energy

conservation practices, the study developed an industrial energy conservation supervision specification and clarified the content and implementation methods for industrial energy conservation supervision. The main findings of this research are provided in the report: Industrial Energy Conservation Supervision Specification (draft for approval).

21. The study provided support for guiding, standardizing, and defining the role of industrial energy supervision work in overall energy conservation efforts. The strengthening of the process and supervision also helps promote energy efficiency improvement, industrial upgrading, and green development in industrial enterprises.

Subtask 1C-c: Industrial energy conservation supervision innovation mechanism and implementation plan

22. In February 2016, to further improve the energy conservation supervision mechanism, create new energy conservation supervision methods, and facilitate industrial energy conservation supervision work in the 13th Five-Year Plan, the Hunan Provincial Energy Conservation Supervision Center for Industry and Communication and the China Central South University were chosen through open bidding to undertake research on innovation mechanisms and implementation for industrial energy conservation supervision during the 13th Five-Year Plan period.

23. The research outputs were accepted by the experts organized by the MIIT in June 2016. For this work, researchers investigated the current situation of China's energy conservation supervision system and regulations, summarized the implementation of industrial energy conservation supervision work during the 12th Five-year Plan period, and suggested ideas for energy conservation supervision innovation mechanisms and implementation of energy conservation supervision during the 13th Five-Year Plan period. The main findings of this research are provided in the following report: Industrial Energy Conservation Supervision Innovation Mechanism and Implementation Plan during the "13th Five-Year Plan period.

Subtask 1C-d: Industrial enterprise energy efficiency evaluation tool development

24. In February 2016, to support energy efficiency benchmarking and evaluation by industrial enterprises and to promote the development of energy conservation at industrial enterprises, the China Center for Information Industry Development was chosen through open bidding to undertake research on an industrial enterprise energy efficiency evaluation tool.

25. The research outputs were accepted by the specialists organized by the MIIT in June 2016.

26. For this work, researchers developed an industrial enterprise energy efficiency standard evaluation technical guide, and developed an industrial enterprise energy efficiency rapid evaluation tool, and relevant user manuals and training materials. These resources are based on lessons from the energy efficiency benchmarking practices and

evaluation tools used in domestic and international industrial enterprises based on existing energy conservation standards, specifications, and measures.

27. The main findings of this research are provided in the following reports:

(a) Guide on energy efficiency evaluation methods

(b) Energy efficiency evaluation tools (application software)

(c) User manual and training materials

28. This research can help enterprises identify the gap between their performance and that of advanced enterprises, identify energy efficiency improvement opportunities, and support efforts to scientifically evaluate and continuously improve their energy efficiency performance.

Subtask 1C-e: Metallurgical industry energy conservation and green development standard development

29. In February 2016, to promote continuous improvement of energy efficiency in the metallurgical industry, the Metallurgical Industry Planning and Research Institute and the China Metallurgical Information and Standardization Institute were chosen through open bidding to jointly undertake research related to metallurgical industry energy conservation and green development standards.

30. The research outputs were accepted by specialists organized by the MIIT in June 2016.

31. For this effort, researchers investigated advanced domestic iron and steel enterprises and developed an evaluation index system for green factories in the metallurgical industry by combining the requirements of Suggestions on Excess Capacity Resolution and Difficulty Relief in Iron and Steel Industry and the 2016 Industrial Energy Efficiency and Resources Utilization Key Work. They also formulated a Guideline on Evaluation of Green Factories in Iron and Steel Industry and a Guideline on Energy Efficiency Evaluation of Iron and Steel Enterprises. The main findings of this research are provided in the following reports:

(a) Evaluation Index System for Green Factories in Metallurgical Industry

(b) Guideline on Evaluation of Green Factories in Iron and Steel Industry (draft industry standard)

(c) Guideline on Energy Efficiency Evaluation of Iron and Steel Enterprises (draft industry standard)

32. This research provides technical support for accelerating the green transformation of iron and steel enterprises, guiding the establishment of green factories in the

metallurgical industry, and encouraging continuous improvement of the energy efficiency level of metallurgical enterprises.

Component 2: Capacity Building for Responsible Energy Managers

33. As prescribed in the revised EC Law of 2008, a key energy consuming entity shall set up energy management posts and hire energy managerial personnel among those persons who have practical experience; energy managerial personnel (or responsible energy managers) shall have training in energy conservation.

34. The target for capacity building and training of responsible energy managers (PDO Indicator 1) has not only been achieved but exceeded by a large margin—still staying within the allocated budget. At project completion, two responsible energy manager training material modules (Intermediate Indicator 3) had been developed, training activities were organized, and 3,238 responsible energy managers and energy conservation supervisory personnel were trained in these activities. This surpasses the initial goal by roughly 60 percent.

Task 2A: Energy Management Training program

35. Four training centers were established in Jiangsu, Sichuan, Inner Mongolia, and Xi'an. Since the training activity was initiated in January 2014, nine phases of training activities comprising 29 training classes were organized in total, including four phases of responsible energy manager training and five phases of energy conservation supervision training. Overall, 3,238 persons were trained in these four centers, exceeding the project target of training 2,000 persons.

36. Table 2.1 shows that of the 29 training classes, 9 were conducted for 1,064 trainees at the Jiangsu center, which is the largest of the four centers, while 8 were conducted for 855 trainees at the Xi'an center, 6 were conducted for 692 trainees at the Sichuan center, and 6 were conducted for 627 trainees at the Inner Mongolia center.

Table 2.1. Training Center Classes and Trainees

	Jiangsu	Xi'an	Sichuan	Inner Mongolia	Total
Training Classes	9	8	6	6	29
Trainees	1,064	855	692	627	3,238

37. For this activity, there were two kinds of trainees:

(a) Responsible energy managers from industrial enterprises in the iron and steel industry, petrochemical industry, building material industry, and nonferrous metal industry
(b) Energy conservation supervisory personnel of government energy conservation management departments and energy conservation supervision organizations

Task 2B: Training Center Capacity Building

Training Materials

38. To support the implementation of energy management training activities, the DECRU of the MIIT organized the development of responsible energy manager training materials, including the following:

- General training materials for responsible energy managers
- Industry-specific responsible energy manager training materials
  - Iron and steel industry
  - Petrochemical industry
  - Nonferrous metal industry
  - Building material industry

39. The general training materials were developed by the Sustainable Development Research Center of Shandong University and the Shandong Energy Conservation Association which were chosen through open bidding in November 2012. The four industry-specific industrial training materials were respectively developed by the China Iron and Steel Association, the China Petroleum and Chemical Industry Federation, the China Nonferrous Metal Industry Association, and the China Building Material Federation, which were chosen by through a single-source selection process. The suggested training materials were accepted by the specialists organized by the MIIT in October 2013. More than 3,000 training materials were disseminated in 13 enterprise responsible energy manager training classes.

Training of the Trainers

40. To ensure training quality, a training session was organized for the trainers in Beijing from October 22, 2013 to October 26, 2013. Seventy-five specialists from the four training centers, relevant industrial associations, enterprises, universities, and research institutes were employed as trainers after passing the trial teaching examination.

41. In the training activity, all training centers took full advantage of their own and local trainer resources to strengthen the capacity building and control training activity cost. Senior specialists in the fields of energy conservation; energy management system; energy management and control center construction; and motor, boiler, and transformer energy conservation as well as specialists with rich energy conservation supervision experience were invited to the training activity to ensure training quality and effectiveness.

Employing Innovative Training Features

42. All of the training centers continuously improved the training content to ensure that the training activities were distinctive and effective. The innovative training features included taking energy conservation supervision trainees to enterprises to conduct on-site law enforcement observation teaching and ‘simulating law enforcement’ in class, which

greatly increased the motivation of the trainees, showing energy conservation supervision and law enforcement films to demonstrate the energy conservation supervision and law enforcement work process, inviting international specialists (that is, professor Lorenzoni, an Italian expert) to introduce the European industrial energy conservation situation and experience, and inviting energy-consuming equipment research organizations and manufacturers to introduce the energy conservation features of key energy-consuming equipment (boilers, furnaces and motors, and so on). These activities were designed to improve the professional competence of energy conservation supervision personnel.

Component 3: Demonstration Projects

43. The main task of the demonstration projects component was to guide enterprises in the establishment of an energy management system and the measurement of energy performance.

44. Combined, 28 demonstration projects (Indicator 3) were completed: 20 from Phase I and 8 from Phase II. The total investment of these activities came to CNY 114.75 million, or about US$17 million, thereby surpassing the goal of US$16 million (PDO Indicator 2) by 6 percent. These investments were spread across four sectors:

- Eleven projects in the chemical industry with CNY 18.75 million investment
- Six projects in iron and steel industrial sector with CNY 37.88 million investment
- Eight projects in nonferrous industry with CNY 46.44 million investment
- Four projects in construction material industry with CNY 11.68 million investment

***Task 3A: Each center conducts energy efficiency assessment activities of 5 enterprises, with the participation of a total of 20 enterprises*.**

45. From November 2014 to April 2016, energy efficiency assessment demonstration activities for 20 enterprises were organized in the four centers. The main activities included the following:

(a) Training enterprise energy conservation management personnel training

(b) Implementing on-site energy assessment

(c) Performing data collection and analysis

(d) Conducting on-site energy efficiency testing

(e) Proposing energy conservation improvement measures and technical reform schemes

(f) Preparing an energy assessment report

46. The training centers conducted energy assessments for 20 enterprises based on their industrial characteristics and key areas of energy utilization. They presented a customized energy conservation assessment report for each enterprise after assessing the energy conservation potential. It was estimated that the investment for the proposed energy conservation improvement suggestions would be CNY 1,342,000,000, the annual energy saving would reach 642,512 TCE, and the carbon dioxide emission reduction would be 1,606,280 tCO_2.

Task 3B: Each center conducts demonstration activities at 2 enterprises with the participation of 8 enterprises in total.

47. From June 2015 to April 2016, the four training centers organized energy management system construction and implementation demonstration activities for eight enterprises. The main activity content included the following:

(a) Energy management investigation and initial evaluation

(b) Energy management system planning

(c) Energy management system operation and inspection

(d) Energy management system internal evaluation and management evaluation

(e) Energy management system improvement

(f) Energy management system demonstration report development

(g) Energy management system construction best practices refining

48. The training centers conducted energy management system construction and implementation work for eight enterprises in accordance with the national standard on energy management system requirements. The training centers integrated and refined the current quality, environment, and safety management system of each enterprise based on its industrial characteristics and instructed the enterprises to implement an energy management system. These activities promoted enterprise production management refinement, energy management standardization and performance evaluation normalization, improved the economic operation of enterprises, realized system optimization, and laid a foundation for continuously encouraging the implementation of energy conservation measures.

Overall Output of Component 3

(a) **Established management teams and ensured smooth implementation of the project.** All centers established lead teams and assigned leaders to take charge of the general planning of the demonstration activities. The center staff implemented specific demonstration activities with the support of third-party organizations or experts. This continuously strengthened the team and improved the internal as well as external expert teams.

(b) **Developed a training course 'menu' and improved training relevance.** The training course lists were prepared according to the industrial characteristics of each enterprise, covering both management and technology. Each industry has 20–30 courses, which can be freely chosen by the demonstration enterprises in the form of a training course 'menu.' This approach helps improve the relevance and effectiveness of the training.

(c) **Organized a launch ceremony and strengthened communications.** All centers worked together to organize a launch ceremony before commencing the training activity. In the launch ceremony, leaders from local energy conservation management departments were invited to participate and make speeches. The leaders of training centers also introduced the project background and significance to increase the impact of the demonstration activity.

(d) **Conducted system evaluation.** During the second phase, all centers conducted an energy management system evaluation or an energy management system certification according to the willingness of the enterprise and the requirements of local government regarding energy management system construction. Adopting different requirements can help centers learn from the effective experience of others to offset their weaknesses and fully understand the difference between energy management system evaluation and certification. This will help promote the establishment of improved local energy management systems.

(e) **Organized expert teams and strengthened the effectiveness of the project.** All centers have the capacity to develop energy assessments and construct energy management systems. However, considering the importance of the project, they engaged some external authoritative experts based on the actual needs of the enterprises, in an effort to make outstanding achievements through using outside intellectual resources.

(f) **Developed an enterprise-based system.** Although expert teams were engaged to support the demonstration activity, the demonstration activity working teams in the training centers also insisted on requesting enterprises to independently conduct energy conservation assessments and energy management system construction work. The experts only provided guidance and assistance. This approach was taken to improve the participation and awareness of the enterprises, improve the capacity of the enterprise teams, and ensure that the established energy management system truly belongs to the enterprises, thus improving the value of system.

(g) **Adopted testing methods and made decisions based on data.** The training centers fully exploited the advantages of energy efficiency testing. They insisted on conducting energy efficiency testing in the demonstration enterprises and ensuring that decisions were made based on data. These data provided the basis for energy conservation assessments, energy evaluation,

identification of controllable variables influencing energy consumption, energy management implementation scheme development, energy performance indicators, baseline determination, and energy objective and target setting.

(h) **Integrated systems to prevent system inconsistency.** The phenomenon where a system is established according to one document and operated according to another document is very common in system construction and operation, not only for energy management systems but also for ISO 9000 and ISO 14000 systems. In the demonstration activity, most enterprises chose to integrate the energy management system with the original management system. They made amendments and improvements in the management system according to the requirements of the energy management system, which effectively prevented system inconsistency and ensured the uniform and effective operation of the company management system.

(i) **Identified controllable variables and conducted independent innovation.** Under the guidance of experts, the demonstration energy management system working group and production personnel identified the equipment, facilities, systems, processes, and persons that may affect energy consumption and listed the controllable and uncontrollable variables of each type of key energy-consuming equipment. The identification of controllable variables provided a sound technical basis for developing the energy management implementation scheme. The enterprise technicians obtained significant experience in identifying controllable variables. For example, one of the demonstration enterprises independently proposed an anode furnace pure oxygen combustion reconstruction scheme through research and development cooperation, applied for a patent, and obtained independent intellectual property.

(j) **Combined with the key work of the MIIT.** Some demonstration enterprises developed detailed motor/transformer energy efficiency promotion schemes to establish a link with the key work regarding the Motor Energy Efficiency Improvement Plan, the Transformer Energy Efficiency Improvement Plan, and Green Manufacturing.

(k) **Established energy management typical examples.** After implementing the traditional energy conservation technical transformation scheme, training centers made full use of energy conservation management methods to develop energy management system construction. They carried out a series of management measures (that is, preventive maintenance and three types of unplanned accidents management), realized the energy conservation goal, and provided a demonstration effect for energy conservation management. Meanwhile, the model efforts of Anhui Sheng'ao Chemical Technology Co., Ltd by the Jiangsu center was reported in the CCTV Focus Report.

Component 4: Information Dissemination

49. The information dissemination component supported the design of the promotion and awareness building mechanism, as well as to begin the process of influencing government policy support to rational energy use.

Task 4A: Support the design of a promotion and awareness building program to disseminate energy conservation information, and relevant government policies for enterprises with the aim to support the national use of energy.

50. For the project demonstration activity, the training centers summarized three energy conservation best practices from each of the enterprises that participated in the first stage of the demonstration activity and one energy management system construction and implementation best practice from each of the enterprises that participated in the second stage of demonstration activity. The training centers disseminated these best practices in relevant activities.

Task 4B: Organize workshops or annual forums for government officials, energy managers, and technical staff from selected industries to promote training programs under Component 2, and discuss the results of the demonstration projects under Component 3.

51. The DECRU continuously hosted annual meetings to disseminate industrial energy conservation policies.

(a) In October 2012, the DECRU, Personnel Department and Personnel Exchange Center of the MIIT jointly organized a senior training class for key energy-consuming enterprise responsible energy manager expertise improvement and capacity building.

(b) In October 2013, an industrial enterprise energy conservation management conference along with the training of trainers activity was organized. For the annual forum, several famous experts were invited to make speeches and conduct discussions on industrial energy conservation policies, standards, technologies, plans, and evaluations.

(c) In November 2014, an annual conference was held for the project along with the national industrial energy conservation supervision symposium by the DECRU of MIIT. The officials of the MIIT and local energy conservation supervision organizations in 37 regions (provinces, autonomous regions, municipalities, cities specifically designated in the state plan, and Xinjiang Production and Construction Corps) participated in the symposium.

(d) In May and June 2016, two phases of the ‘key industrial energy efficiency standard and policy training class’ were organized focusing on the work of the DECRU of MIIT with the aim of continuously improving the understanding of policy and increasing the practical operating capacity of energy conservation management and supervision personnel. The systematic

training and energy conservation supervision on-site teaching for industrial energy conservation management personnel was organized to ensure the effective implementation of EC Laws and regulations, promote improved energy saving in industrial enterprises, improve energy utilization efficiency of the enterprises, and achieve energy conservation goals.

(e) The final project workshop was held on June 29, 2016. It aimed to enhance sharing of project outputs amongst participants, and included representatives from subcontractors, training centers, enterprises and other institutions relevant to the project.

Task 4C: Support the creation and maintenance of a project website as a platform for all relevant stakeholders to share and communicate information.

52. In October 2011, Beijing Hangtiansichuang Software Technology Co., Ltd. was chosen through an open bidding process to undertake the project website construction and maintenance tasks. The project website (www.ceepi.org.cn) was accepted and operationalized in February 2013. One of the functions of the website (Component 4 was to disseminate the experience and achievements of Component 3). Due to the delay of the implementation of Components 3, the timeliness and effectiveness of experience and information sharing (Component 4) was affected. However, the quality of Component 4 had not been significantly affected, and the demonstration materials were shared in the project workshop in June 2016.

Annex 3: Investments and Performance of Demonstration Projects

Center	Enterprises	Energy Efficiency Measures	Investment (CNY 10,000)	Energy Saving per year (TCE)	Emission Reduction per year (tCO_2)
Xi'an	Shaanxi Shaanhua Coal Chemical Co., Ltd.	Fan energy efficiency technical transformation	25	300	750
		Transformation of water distributor in cooling towers	20	2,060	5,150
	Yongping Refinery of Shaanxi Yanchang Petroleum (Group) Co., Ltd.	—	0	0	0
	Shaanxi Longmen Iron and Steel Co., Ltd.	TRT capacity expansion transformation and optimization	812	3,515.87	8,789.675
		Heating furnace black body energy efficiency transformation	860	2,632.7	6,581.75
		Frequency conversion renovation of dust-removing fan	200	1,567.01	3,917.525
		Water pump electricity saving transformation	680	6,625.23	16,563.075
	Yuzhong Iron and Steel Co., Ltd. of Jiuquan Iron and Steel Group	TRT power generation project for blast furnace	920	10,544.2	26,360.5
	Shaanxi Shifeng Cement Co., Ltd.	Steel ball ratio adjustment in cement mill	65	202.67	506.675
		Cement grinding process adjustment	125	2,035.73	5,089.325
Sichuan	Sichuan Zhongteng Energy Technology Co. Ltd.	—	0	0	0
	Sichuan Jiuda Penglai Salt Chemical Co. Ltd.	Waste heat recovery in salt-making process	50	2,350	5,875
	Sichuan Sanxing New Material Technolog Co. Ltd.	Melting furnace energy efficiency technical transformation	52	719	1,797.5
		Servo motor system PLC control upgrading	1,854	240	600
		Aluminum bar heating furnace transformation	602	1,101	2,752.5
		Vertical spray workshop curing furnace waste hear recovery	285	319	797.5
	Sichuan Xinchuancheng Cement Co. Ltd.	Waste heat power generation grate cooler air outlets transformation	50	586	1,465
		Circulating water system energy efficiency transformation	40	50	125
		Major dust collectors seal transformation	2.1	9.7	24.25
		Semi-finishing grinding transformation	10	990	2,475
	Aba Xilong industrial silicon Co. Ltd.	—	0	0	0
Jiangsu	Anhui Shengao Chemical Technology Co. Ltd.	Boiler waste heat recovery transformation	30	200	500
		Energy submeters installation	30	200	500
		Condenser replacement	72.5	300	750
		Circulating water pipe network transformation	25	50	125

Center	Enterprises	Energy Efficiency Measures	Investment (CNY 10,000)	Energy Saving per year (TCE)	Emission Reduction per year (tCO_2)
	Yixing Tianshan Cement Co. Ltd.	Pulverized coal burner transformation	206	3,624	9,060
		Waste heat power generation AQC boiler pipeline reconstruction	178	3,057	7,642.5
		Air compressor transformation	26	163	407.5
		Air fan frequency converting reconstruction	466	1,280	3,200
	Dalian Chemical Engineering (Jiangsu) Co. Ltd.	Pump transformation	17	88.5	221.25
		Steam heat recovery	5.8	794	1,985
		Operation optimization by reducing water content	0	1,754	4,385
	Hangzhou Iron and Steel Group Co. Ltd.	Heating furnace transformation in hot strip mill	110.68	2,370	5,925
		Electrode regulator transformation in refining furnace	70	1,000	2,500
	Zhangjiagang United Copper Co. Ltd.	Central heating system transformation	220	1,300	3,250
		Oxy-fuel combustion transformation after merging anode furnaces	700	5,500	13,750
		Energy efficient lamps transformation in workshops	64	172	430
		Elimination of Y series electric motors	82	100	250
Inner Mongolia	Baotou Aluminum Industry Co., Ltd.	Steam heating transformation in electrolysis plant and carbon plant	160	2,880	7,200
		Feeding system transformation in carbon plant	145	2,610	6,525
		Heat network transformation in electrolysis plant	180	3,240	8,100
	Inner Mongolia Donghua Energy Co. Ltd.	—	0	0	0
	Huading Copper Co. Ltd.	Frequency conversion fan transformation	300	284	710
	Chifeng Yuanlian Iron and Steel Co. Ltd.	Blast furnace air distributing system optimization	15	410	1,025
		Hot blast stove intelligent combustion transformation	120	2,315.3	5,788.25
	Wuhai Guangna Coal Coking Co. Ltd.	Coke oven flue gas heat recovery	1,600	9,000	22,500
Total	–	–	11,475.08	78,539.91	1,96,349.775

Note: (a) The energy efficiency investments facilitated by demonstration projects and training program is calculated based on energy efficiency projects implemented in demonstration projects with a total investment of CNY 114,750,800, which is converted to US$17 million with an exchange rate of 6.6:1. (b). The energy savings achieved through capacity building for responsible energy managers and demonstration projects is calculated on the basis of energy savings achieved through energy efficiency projects implemented in demonstration projects. The CO_2 emission reductions associated with energy savings achieved are calculated based on energy savings achieved with an emission factor of 2.5 tCO_2/TCE.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Alberto Ugalde Ang Co	Senior Energy Specialist	EASIN - HIS	TTL
Hong Chen	Operations Officer	GTI02	Quality Enhancement
Gailius J. Draugelis	Lead Energy Specialist	GEE02	Unit Coordinator
Xiaowei Guo	Senior Procurement Specialist	GGO08	Procurement
Cristina Hernandez	Program Assistant	GEE02	Assistant
Feng Ji	Senior Environmental Specialist	GEN02	Environment
Xin Ren	Senior Environmental Specialist	GEN02	Environment
Yanqin Song	Senior Energy Specialist	GEE09	Technical
Mei Wang	Senior Counsel	LEGAM	Lawyer
Fang Zhang	Financial Management Specialist	GGO20	Financial Management
Lijun Zhang	Program Assistant	EACCF	Assistant
Supervision/ICR			
Yanqin Song	Senior Energy Specialist	GEE09	TTL
Rutu Dave	Energy Specialist	GEESO	TTL/ICR Author
Sara Trab Nielsen	Consultant	GEESO	Consultant
Fowzia Hassan	Senior Operations Officer	GEE02	Quality Enhancement
Jingrong He	Procurement Specialist	GGO08	Procurement
Cristina Hernandez	Program Assistant	GEE02	Assistant
Feng Ji	Senior Environmental Specialist	GEN02	Environment
Aristeidis I. Panou	Counsel	LEGAM	Lawyer
Fang Zhang	Financial Management Specialist	GGO20	Financial Management
Shanshan Ye	Program Assistant	EACCF	Assistant

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	US$, Thousands (including travel and consultant costs)
Lending		
Total:	0	0.00
Supervision/ICR		
Total:	16.075	55.50

Annex 5. Stakeholder Workshop Agenda

Experience Sharing Workshop, June 29, 2016, Beijing

Time	Activities	Speakers
June 29 (Wednesday)		
08:00–08:15	Deputy Director of DECRU, MIIT	Yang Tiesheng
08:15–08:30	World Bank Officer	Gevorg Sargsyan
08:30–09:10	Achievements of the Project	Li Tienan
09:10–09:30	Break	
09:30–09:45	Jiansu Training Center Presentation	Jiangsu
09:45–10:00	Inner Mongolia Training Center Presentation	Inner Mongolia
10:00–10:15	Sichuan Training Center Presentation	Sichuan
10:15–10:30	Xi'an Training Center Presentation	Xi'an
10:30–10:50	International Experience on Energy Management System and Energy	Shen Bo (LBL)
10:50–12:00	Demonstration Enterprises Experience Sharing	Representatives from Demonstration Enterprises
12:00–13:30	Lunch	
14:00–14:20	Domestic and International Energy Saving Policy Study	CECA
14:20–14:40	Roadmap Study on Energy Efficiency Improvement in China's Industrial Sectors by 2020	Energy Research Institute of National Development and Reform Commission
14:40–15:00	Industrial Energy Conservation Supervision Code Compilation Project	Shandong Energy Conservation Association
15:00–15:20	Research of the innovation mechanism and propulsion plan for industrial energy saving supervision during the period of the 13th Five-Year plan	Hunan Industry and Telecom Energy Conservation Supervision Center
15:20–15:40	Introduction of Industry Energy Efficiency Promotion Activity in Zhangjiagang	Economy and Information Technology Commission of Zhangjiagang
15:40–16:30	Wrap up	MIIT and the World Bank

Annex 6. Borrower's Comments on Draft ICR

1. The draft World Bank ICR was shared with the PMO before finalizing the ICR. The PMO made several comments in the ICR that was incorporated in the final version. In addition, a few comments were made on specific issues:

- **Separation on services.** During project preparation and implementation, relevant government policy changes should be periodically predicted and alerted so as to proactively take measures and better address risks resulting from things of this kind.

- **Mode of reimbursement.** The project agreement provided a training subsidy of 500USD per trainee, but auditing office insisted a subsidy of 450RMB per day per trainee based on new regulations issued by Chinese government. This had brought controversy but finally the subsidy level argued by auditing office was adopted although the government's standard came later than that in the Grant Agreement. This had entailed that training activity implementation had to be adjusted, which to some extent affected the advancement of training activities. So it is suggested that before activity implementation, auditing office representatives should be involved and provide suggestion in advance.

- **Training activities.** In future training activities, various types of training programs may be developed. For those who have little background knowledge, longer time training programs may be designed, while for those with comparatively strong background knowledge, fundamental knowledge may be skipped and only key points and updated information may be highlighted. In any case, more time may be left for trainee to discuss and interact with trainer.

Annex 7. List of Supporting Documents

- Project Appraisal Document, 2011
- Implementation Status and Results Reports, Sequence 1–9, 2011–2016
- GEF Project Identification Form, 2009
- Aide Memoire: Implementation Support mission, May 10, 2016
- Aide Memoire: Implementation Support mission, October 2015
- China Energy Efficiency Promotion in Industry project: Summary Report, June 2016

Note: In addition, the ICR team consulted the portal for information and held multiple discussions with the project task team leader and executing agencies.