

Document of
The World Bank

Report No: ICR00004130

IMPLEMENTATION COMPLETION AND RESULTS REPORT (IBRD-80920, IBRD-75290,
IBRD-75300 AND TF-90719)

ON A

LOAN

IN THE AMOUNT OF US\$300.00 MILLION

AND A

GLOBAL ENVIRONMENT FACILITY GRANT

IN THE AMOUNT OF US\$13.26 MILLION

TO

THE PEOPLE'S REPUBLIC OF CHINA

FOR A

CHINA ENERGY EFFICIENCY FINANCING PROJECT

June 28, 2017

Energy and Extractives Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective: December 31, 2016)

Currency Unit = Chinese Yuan (CNY)

US\$1.00 = CNY 6.94

FISCAL YEAR

July 1 – June 30

ABBREVIATIONS AND ACRONYMS

AF	Additional Financing	G20	Group of Twenty
AFD	<i>l'Agence française de développement</i> (French Development Agency)	GDP	Gross Domestic Product
APEC	Asia-Pacific Economic Cooperation	GEF	Global Environment Facility
CBRC	China Banking Regulatory Commission	GEO	Global Environment Objective
CHEEF	China Energy Efficiency Financing Project	GHG	Greenhouse Gas
CHUEE	China Utility-based Energy Efficiency Project	GoC	Government of China
CPS	Country Partnership Strategy	ICR	Implementation Completion and Results Report
DDG	Deputy Director General	IFC	International Finance Corporation
EC Law	Energy Conservation Law	KfW	<i>Kreditanstalt für Wiederaufbau</i>
EE	Energy Efficiency	M&E	Monitoring and Evaluation
EIRR	Economic Internal Rate of Return	MoF	Ministry of Finance
EMC	Energy Management Company	NDRC	National Development and Reform Commission
EMCA	Energy Management Company Association	NECC	National Energy Conservation Center
EPC	Energy Performance Contract	OM	Operational Manual
ESCO	Energy Services Company	PAD	Project Appraisal Document
EXIM	Export-Import Bank of China	PDO	Project Development Objective
FIRR	Financial Internal Rate of Return	PFI	Participating Financial Intermediary
FYP	Five-Year Plan	PMO	Project Management Office
		RE	Renewable Energy
		TA	Technical Assistance

Senior Global Practice Director: Riccardo Puliti

Sector Manager: Jie Tang

Project Team Leader: Xiaodong Wang

ICR Team Leader: Jonathan Sinton

PEOPLE’S REPUBLIC OF CHINA
China Energy Efficiency Financing Project

Table of Contents

A. Basic Information.....	v
B. Key Dates	v
C. Ratings Summary	v
D. Sector and Theme Codes.....	vi
E. Bank Staff.....	vii
F. Results Framework Analysis	vii
G. Ratings of Project Performance in ISRs	xii
1. Project Context, Development and Global Environment Objectives Design	1
1.1 Context at Appraisal	1
1.2 Original Project Development Objectives (PDO) and Key Indicators (as approved)	4
1.3 Original Global Environment Objectives (GEO) and Key Indicators (as approved)	4
1.4 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification	4
1.5 Revised GEO (as approved by original approving authority) and Key Indicators, and reasons/justification	5
1.6 Main Beneficiaries	7
1.7 Original Components (as approved).....	8
1.8 Revised Components	10
1.9 Other significant changes.....	11
2. Key Factors Affecting Implementation and Outcomes	12
2.1 Project Preparation, Design and Quality at Entry.....	12
2.2 Implementation	16
2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization.....	17
2.4 Safeguard and Fiduciary Compliance.....	19
2.5 Post-completion Operation/Next Phase	20
3. Assessment of Outcomes	21
3.1 Relevance of Objectives, Design and Implementation.....	21
3.2 Achievement of Project Development Objectives and Global Environment Objectives	22
3.3 Efficiency.....	27
3.4 Justification of Overall Outcome and Global Environment Outcome Rating	29
3.5 Overarching Themes, Other Outcomes and Impacts	30
4. Assessment of Risk to Development Outcome and Global Environment Outcome	31
5. Assessment of Bank and Borrower Performance	31
5.1 Bank Performance.....	31
5.2 Borrower Performance.....	33
6. Lessons Learned	34
7. Comments on Issues Raised by Borrower, Implementing Agencies and Cofinancier	36
Annex 1. Project Costs and Financing	37
Annex 2. Outputs by Component	39
Annex 3. Economic and Financial Analysis	53

Annex 4. Bank Lending and Implementation Support/Supervision Processes.....	59
Annex 5. Stakeholder Workshop.....	61
Annex 6. Summary of Borrower's ICR and Comments on Draft ICR.....	63
Annex 7. List of Supporting Documents.....	69
Map. China Provincial Boundaries.....	70

DATA SHEET

A. Basic Information			
Country:	China	Project Name:	China Energy Efficiency Financing
Project ID:	P084874, P098916, P123239	L/C/TF Number(s):	IBRD-75290, IBRD-75300, IBRD-80920, TF-90719
ICR Date:	06/28/2017	ICR Type:	Core ICR
Lending Instrument:	FIL	Borrower:	GOVERNMENT OF CHINA
Original Total Commitment:	IBRD US\$200.00 million, GEF US\$13.50 million	Disbursed Amount:	IBRD US\$300.00 million, GEF US\$13.40 million
Environmental Category: B		Focal Area: C	
Implementing Agencies: National Energy Conservation Center (NECC), National Development and Reform Commission (NDRC), the Export-Import Bank of China (EXIM), and the China Huaxia Bank (Huaxia)			
Cofinanciers and Other External Partners: None			

B. Key Dates				
China Energy Efficiency Financing - P084874				
Process	Date	Process	Original Date	Revised/Actual Date(s)
Concept Review:	04/04/2006	Effectiveness:	10/07/2008	10/07/2008
Appraisal:	06/25/2007	Restructuring(s):		03/12/2013
Approval:	05/27/2008	Midterm Review:	03/30/2012	03/27/2012
		Closing:	12/31/2013	12/31/2016

China Energy Efficiency Financing - P098916				
Process	Date	Process	Original Date	Revised/Actual Date(s)
Concept Review:	04/04/2006	Effectiveness:	07/11/2008	07/11/2008
Appraisal:	06/25/2007	Restructuring(s):	03/12/2013	03/12/2013
Approval:	05/27/2008	Mid-term Review:	12/31/2010	03/27/2012
		Closing:	12/31/2013	12/31/2016

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

Borrower Performance	Satisfactory
----------------------	--------------

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)

Bank	Ratings	Borrower	Ratings
Quality at Entry	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance	Satisfactory	Overall Borrower Performance	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators

China Energy Efficiency Financing - P084874

Implementation Performance	Indicators	QAG Assessments (if any)	Rating:
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA)	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA)	None
DO rating before Closing/Inactive status	Satisfactory		

China Energy Efficiency Financing - P098916

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

D. Sector and Theme Codes

China Energy Efficiency Financing - P084874

	Original	Actual
Sector Code (as % of total Bank financing)		
Energy and Extractives		
Other Energy and Extractives	100	100

Theme Code (as % of total Bank financing)		
Environment and Natural Resource Management		
Climate change	100	100
Mitigation	100	100

China Energy Efficiency Financing - P098916		
	Original	Actual
Sector Code (as % of total Bank financing)		
Energy and Extractives		
Other Energy and Extractives	100	100
Public Administration		
Central Government (Central Agencies)	27	27
Financial Sector		
Banking Institutions	55	55
Energy and Extractives		
Other Energy and Extractives	18	18

Theme Code (as % of total Bank financing)		
Environment and Natural Resource Management		
Climate change	100	67
Mitigation	100	67
Environmental policies and institutions		33

E. Bank Staff

China Energy Efficiency Financing - P084874		
Positions	At ICR	At Approval
Vice President:	Victoria Kwakwa	James W. Adams
Country Director:	Bert Hofman	David R. Dollar
Practice Manager/Manager:	Jie Tang	Junhui Wu
Project Team Leader:	Xiaodong Wang, Yun Wu	Leiping Wang
ICR Team Leader:	Jonathan Edwards Sinton	
ICR Primary Author:	Jonathan Edwards Sinton	

China Energy Efficiency Financing - P098916		
Positions	At ICR	At Approval
Vice President:	Victoria Kwakwa	James W. Adams
Country Director:	Bert Hofman	David R. Dollar
Practice Manager/Manager:	Jie Tang	Junhui Wu
Project Team Leader:	Xiaodong Wang, Yun Wu	Leiping Wang
ICR Team Leader:	Jonathan Sinton	
ICR Primary Author:	Jonathan Sinton	

F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

The original project development objective (PDO) of the project was to assist the Borrower to improve energy efficiency of selected medium and large industrial enterprises, and to reduce their adverse environmental impact on climate.

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

The revised PDO was to improve the energy efficiency of selected energy end-users in key energy-consuming sectors, thereby reducing their adverse environmental impacts on climate.

Global Environment Objectives (from Project Appraisal Document)

The global environment objective (GEO) was to assist the Borrower to improve energy efficiency of selected medium and large industrial enterprises, and to reduce their adverse environmental impact on climate.

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

The revised GEO was to improve energy efficiency of selected energy end-users in key energy-consuming sectors, thereby reducing their adverse environmental impacts on climate.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
PDO Indicator 1:	Cumulative amount of incremental EE investments supported by the project (US\$ million)			
Value (quantitative or qualitative)	0	900	1,328	1,427
Date achieved	28-May-2008	31-Dec-2013	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been exceeded. The completion value represents 107% of the target value.			
PDO Indicator 2:	Associated annual energy savings capacity (million tons of coal equivalent per year)			
Value (quantitative or qualitative)	0	2.07	2.66	2.67
Date achieved	28-May-2008	31-Dec-2013	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been exceeded. The completion value represents just over 100% of the target value. The indicator is calculated based on the original methodology, i.e. using co-efficient of 2.44 CO ₂ tons/ton of coal equivalent.			
PDO Indicator 3:	Associated CO ₂ emission reduction capacity (million tons of CO ₂ /year)			
Value (quantitative or Qualitative)	0	5.05	6.49	6.51
Date achieved	28-May-2008	31-Dec-2013	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been exceeded. The completion value represents just over 100% of the target value. The indicator is calculated based on the original methodology, that is, using co-efficient of 2.44 CO ₂ tons/ton of coal equivalent.			

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
PDO Indicator 4:	Cumulative amount of EE lending to ESCOs and building projects (US\$ million)			
Value (quantitative or Qualitative)	0	n.a.	60	105
Date achieved	28-May-2008	—	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been exceeded. The completion value represents 175% achievement of the target value.			
Beneficiaries:	Project beneficiaries (Number)			
Value (quantitative or Qualitative)	0	n.a.	50	52
Date achieved	28-May-2008	—	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been achieved. The completion value represents 104% of the target value.			

(b) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
GDO Indicator:	Associated CO ₂ emission reduction capacity (million tons of CO ₂)			
Value (quantitative or Qualitative)	0	5.05	6.49	6.51
Date achieved	28-May-2008	31-Dec-2013	31-Dec-2016	31-Dec-2016
Comments	(Same as PDO Indicator 3.) The target outcome has been exceeded. The completion value represents just over 100% of the target value. The indicator is calculated based on the original methodology, i.e. using co-efficient of 2.44 CO ₂ tons/ton of coal equivalent.			

(c) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Component A Indicator 1:	EE financing demand of projects in the project pipeline (US\$ million)			
Value (quantitative or Qualitative)	0	150	150	500
Date achieved	28-May-2008	31-Dec-2010	31-Dec-2016	31-Dec-2016

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Comments	The target outcome has been exceeded, with 330% of the target achieved.			
Component A Indicator 2:	EE investment preparation procedures and financing modalities piloted			
Value (quantitative or Qualitative)	n.a.	1-2 pilot projects completed	1-2 pilot projects completed	2 pilot projects completed
Date achieved	28-May-2008	31-Dec-2011	31-Dec-2016	31-Dec-2016
Comments	The first two pilot projects were successfully completed.			
Component A Indicator 3:	EE investment monitoring and evaluation procedures developed			
Value (quantitative or Qualitative)	n.a.	Final draft	Final draft	Final draft developed
Date achieved	28-May-2008	31-Dec-2012	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been achieved. The final draft was established during project implementation.			
Component B Indicator 1:	Cumulative amount of EE lending of PFI (US\$ million)			
Value (quantitative or qualitative)	0	400	700	721
Date achieved	28-May-2008	31-Dec-2013	31-Dec-2016	31-Dec-2016
Comments	The target outcome has been exceeded. The completion value represents 103% achievement of the target values.			
Component B Indicator 2:	Cumulative amount of EE lending to ESCOs and building projects (US\$ million)			
Comments	Same as PDO Indicator 4.			
Component B Indicator 3:	Associated annual energy savings capacity (million tons of coal equivalent per year)			
Comments	Same as PDO Indicator 2.			
Component B Indicator 4:	Associated CO ₂ emission reduction capacity (million tons of CO ₂ /year)			
Comments	Same as the PDO Indicator 3.			
Component C Indicator 1:	Establishment and functional operation of NECC			
Value (quantitative or qualitative)	none	NECC formed and staffed	NECC formed and staffed	NECC formed and staffed
Date achieved	28-May-2008	31-Dec-2011	—	31-Dec-2016
Comments	The target outcome has been achieved. NECC was formed and staffed on 30 September, 2012.			
Component C Indicator 2:	NECC business plan and initial work program developed			

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Value (quantitative or Qualitative)	none	Final	Final	Final plan and work program developed
Date achieved	28-May-2008	31-Dec-2010	—	31-Dec-2016
Comments	The target outcome has been achieved. The NECC business plan and initial work program were completed in 2010.			
Component C Indicator 3:	Mid-term review of 11th FYP programs conducted and recommendations made. Necessary actions taken to enhance results.			
Value (quantitative or Qualitative)	not done	Midterm review	Midterm review	Midterm review conducted
Date achieved	28-May-2008	31-Dec-2010	—	31-Dec-2016
Comments	The target outcome has been achieved. The midterm review was carried out in 2013.			
Component C Indicator 4:	Project targets and delivery schedule met			
Value (quantitative or Qualitative)	not done	Midterm review	Midterm review	Midterm review conducted
Date achieved	28-May-2008	31-Dec-2011	—	31-Dec-2016
Comments	The target outcome has been achieved. The midterm review was carried out in 2013.			

G. Ratings of Project Performance in ISRs

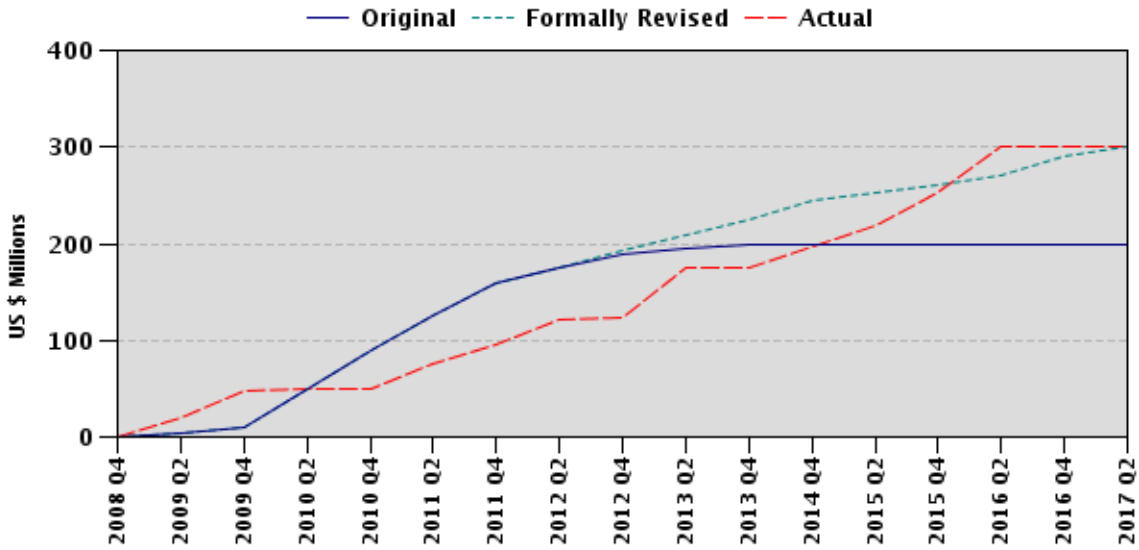
No.	Date ISR Archived	DO	GEO	IP	Actual Disbursements (US\$, millions)	
					IBRD	GEF
1	12/02/2008	S	S	S	0.00	0.00
2	06/21/2010	S	S	S	49.68	0.88
3	06/27/2011	S	HS	S	94.58	1.71
4	04/09/2012	S	S	S	121.89	2.18
5	12/23/2012	S	S	S	176.08	3.77
6	06/22/2013	S	S	S	176.08	4.06
7	12/21/2013	S	S	MS	177.79	5.14
8	06/24/2014	S	S	MS	197.79	5.95
9	12/19/2014	S	S	MS	206.84	6.25
10	06/17/2015	MS	MS	MS	233.52	7.19
11	12/16/2015	S	S	MS	286.43	8.15
12	06/26/2016	MS	MS	MS	299.75	9.71
13	12/18/2016	S	S	S	299.75	12.33

H. Restructuring (if any)

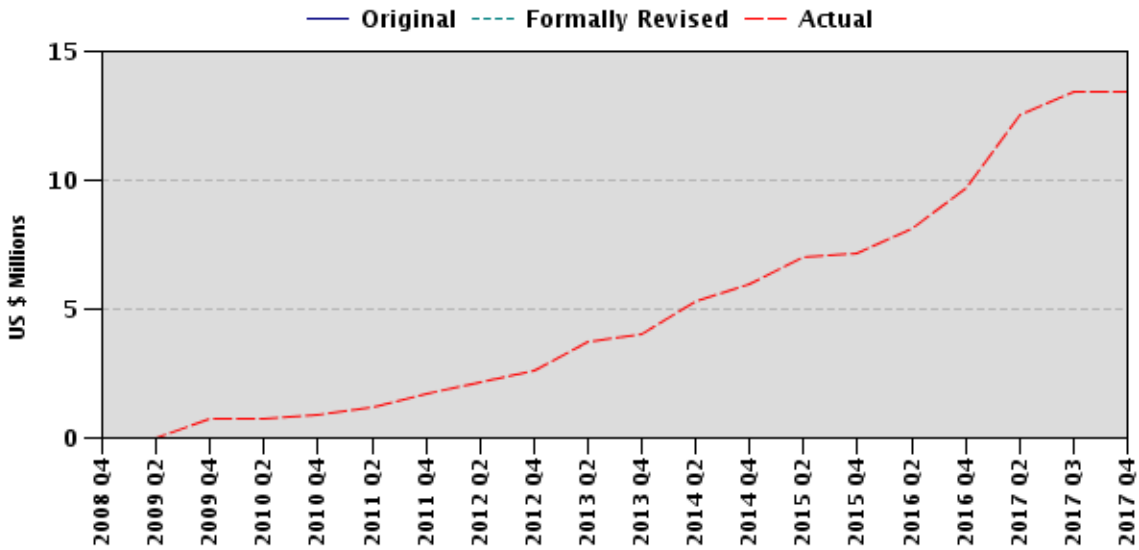
Restructuring Date(s)	Board Approved		ISR Ratings at Restructuring			Amount Disbursed at Restructuring in USD millions		Reason for Restructuring & Key Changes Made
	PDO Change	GEO Change	DO	GEO	IP	Project1	Project 2	
03/12/2013	Y		S		S	176.08		Amended to be consistent with the Additional Financing (AF) approved in October 2011. broadening scope to include building EE and ESCOs in line with government priorities), extending closing date in line with AF, as well as additional changes to ensure adequate implementation of the project.
03/12/2013		Y		S	S		4.06	Amended to be consistent with AF approved in October 2011. broadening scope to include building EE and ESCOs in line with government priorities), extending closing date in line with AF, as well as additional changes to ensure adequate implementation of the project.

I. Disbursement Profile

P084874 (IBRD Loan)



P098916 (GEF Grant)



1. Project Context, Development and Global Environment Objectives Design

1.1 Context at Appraisal

Country Context

1. At project appraisal, China was the second largest energy user and emitter of greenhouse gases (GHGs) in the world and energy demand was continuing to grow strongly. Energy consumption in China had increased 6.0 percent annually between 1990 and 2007—more than three times faster than the world’s average annual growth, rising from 990 million tons of standard coal equivalent (Mtce)¹ in 1990 to 2,650 Mtce in 2007. Despite the high growth, China’s per capita energy consumption was still less than one-fifth of the average for the member countries of the Organization for Economic Cooperation and Development. If left unchecked, China’s energy consumption, primarily met by coal, would accelerate the country’s significant deterioration of local air quality and the increase of GHG emissions. Improving energy efficiency (EE) was one of the keys to sustaining China’s economic growth with reduced energy needs and lessened local and global environmental impacts.

2. China’s EE at the time lagged far behind the world’s most efficient economies, especially in manufacturing industries. Its energy-intensive manufacturing industries accounted for about 50 percent of total final energy consumption, operated at significantly higher levels of energy intensity (energy use per unit of physical output) than international best practices. The significant potential for improving EE and reducing GHG emissions was largely untapped in these industries.

Sectoral and Institutional Context

3. **The Government of China (GoC) had stepped up its efforts to improve EE.** In November 2004, the NDRC issued the nation’s first Medium and Long Term Energy Conservation Plan (2005 to 2010 and 2020), which highlighted ten energy conservation programs targeting the country’s major energy consuming sectors. In the nation’s 11th Five-Year Plan (FYP) (2006–2010) for Economic and Social Development, endorsed by the People’s Congress in March 2006, the GoC pledged to reduce the energy intensity of gross domestic product (GDP) by 20 percent from 2005 to 2010, which was estimated to result in avoided energy consumption of over 560 Mtce annually by 2010. The NDRC launched the 1000 Large Industrial Enterprises Energy Conservation Action Plan in April 2006, targeting the top 1,008 largest industrial energy consumers, which accounted for approximately 30 percent of China’s total primary energy consumption. The Government efforts also included policy initiatives to foster technology development and deployment and various fiscal incentives to improve EE.

4. **The estimated energy conservation investments needed to achieve the 20 percent EE target of the 11th FYP surpassed US\$50 billion—most of them in industrial sectors.** Although Chinese experts agreed that the majority of the identified industrial energy conservation investments were financially viable, most of the concerned enterprises would rather have invested in business expansion than energy conservation. The domestic banking sector had not stepped in

¹ Since China’s main source of energy is coal, aggregate energy statistics are reported in terms of standard coal equivalent (tons of coal equivalent [tce]). 1 tce = 0.7 tons of oil equivalent, or 29.31 gigajoules (low heat).

to provide the required financing either, especially for medium- and large-size energy conservation investment projects. In 2006, the first year of the 11th FYP, the energy intensity of GDP did not decline as planned. This increased the urgency to accelerate Government efforts to promote industrial energy conservation investments.

5. **Existing industrial energy conservation financing mechanisms in China until then had mainly benefited relatively small projects.** The World Bank's First and Second China Energy Conservation Projects, funded by the IBRD and the Global Environment Facility (GEF), were credited for the development of China's energy services company (ESCO) industry. The energy management companies (EMCs), which are the Chinese equivalent of ESCOs, supported by these two projects made US\$280 million worth of energy conservation investments in 2006, many of them in the industrial sector. However, few of the EMC investments exceeded US\$5 million. Another ongoing project, the International Finance Corporation (IFC)/GEF China Utility-based Energy Efficiency Project (CHUEE), also supported small-scale industrial energy conservation investments. It promoted the installation of more energy-efficient equipment with commercial bank financing, backed by a guarantee facility.

6. **There was a large financing gap for medium- and large-size energy conservation investments in the industrial sector, which normally cost US\$5 million to US\$25 million per project.** Given the economic and financial attractiveness of such projects, the GoC had gradually eliminated public funds earmarked for industrial energy conservation project financing since late 1990s, expecting Chinese enterprises to invest their own resources and banks to build energy conservation lending business lines. However, this expectation did not materialize. Three key barriers impeded the development of the lending market for medium and large-size industrial energy conservation investments, despite its large potential. They included:

- (a) **Perceived high technical and financial risks of energy conservation investments among industrial enterprises.** Compared with small industrial energy conservation projects, which often involve simple replacements or upgrades of equipment and have very short payback periods (one to two years), medium- and large-size projects typically are technically more complex, require longer payback periods, and can impose costly business interruptions. These lead to the perception that efficiency projects are technically risky and financially unattractive compared to capacity expansion investments. This is compounded by a lack of familiarity with the range of efficiency technologies and processes, investment best practices, and financial benefits.
- (b) **Perceived high financial risks of industrial energy conservation lending among Chinese banks.** Interest in developing and implementing industrial energy conservation projects was further dampened by the lack of available debt financing for such projects. Chinese banks considered lending for energy conservation projects to be risky, in part for the reasons mentioned above. Additionally, compared to production expansion projects, energy conservation projects usually do not directly generate additional revenues, as typically expected by lending agencies, but rather contribute to a reduction in energy expenditures. The risk perception among Chinese banks was compounded by their unfamiliarity with industrial energy conservation practices, and their weak capacity to properly assess the risks and benefits of EE

investments. The perceived high risk along with the initial cost of developing the internal capacity for proper evaluation and processing of energy conservation lending resulted in a lack of institutional focus on developing energy conservation business lines by Chinese banks.

- (c) **Insufficient institutional capacity, especially at the national level, to address the pressing needs of scaling up EE investments.** In the wake of the rapid expansion of energy-intensive industries in the decade leading up to the project's initiation and the increased decentralization of decision making, the Government's capability to effectively implement its EE policies and programs had declined considerably. Given the size and large share of energy-intensive industries in China's economy, as well as the widespread inefficient practices in place at most industrial facilities, policy and regulatory interventions needed to be strengthened to encourage industrial enterprises to undertake EE investments.

7. **Rising energy intensity spurred the GoC to redouble its efforts to promote EE.** The sharp increase in coal consumption after 2001, driven by a surge in demand for power generation and energy-intensive commodities such as steel and cement, had increased the energy intensity of the economy, reversing the downward trend that characterized the period from 1980 to 2000. This heightened the urgency for Government intervention to scale up EE investments, and led to intensified Government focus on energy conservation during the 11th FYP (2006–2010). Tapping the EE potential in existing industrial stock was essential to meet the ambitious EE objectives of the 11th FYP and required a two-pronged approach, focusing on (a) the development and implementation of viable business models through the domestic banking sector for industrial energy conservation financing; and (b) strengthening the implementation of existing policies and regulations for promoting energy conservation investments.

Rationale for Bank Involvement

8. **The project was requested by the NDRC and the Ministry of Finance (MoF), which regarded the World Bank as an important partner in pursuing innovations in EE.** The GoC considered the project as an important follow-up to the GEF/IBRD-funded First and Second China Energy Conservation Projects which successfully introduced the energy performance contracting mechanism through EMCs to support small commercially viable energy conservation projects. The IFC/GEF CHUEE Project, then under implementation, also focused on promoting small-scale energy conservation investments through a credit-enhancing facility. This project complemented and reinforced the ongoing World Bank/IFC projects. It focused on promoting energy conservation activities in China, through development of a market for investments in medium- and large-size industrial energy conservation projects, often referred to as a 'goldmine' of energy savings by Chinese energy conservation experts because of the significant potential for energy savings.

9. **The World Bank was uniquely positioned to provide the GoC with this support,** given the its close working relationship with the GoC during the previous two decades, its successful experience in integrating technical assistance (TA) and lending operations with the GoC's policy agenda, and its successful support to innovative EE financing in several countries in the preceding several years. The project drew on the World Bank's experience in mobilizing commercial financing through onlending operations in many countries, and sought to extend this to the arena

of EE, demonstrating the potential to use public funds to mobilize much larger amounts of commercial financing—crucial to enable China to achieve its ambitious goals for clean energy.

10. **In addition, the project objectives contributed directly to the World Bank’s Country Partnership Strategy (CPS) at appraisal.** This strategy supports greener growth as one of its strategic themes, and accelerating energy conservation and investment in EE as a key outcome to pursue.

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

11. The original project development objective (PDO) of the project was to assist the borrower to improve EE of selected² medium and large industrial enterprises, and to reduce their adverse environmental impact on climate. The original key indicators for both the PDO and the Global Environment Objective (GEO) are shown in Table 1.³

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

12. The original GEO of the project was the same as the PDO, that is, to assist the Recipient to improve EE of selected medium and large industrial enterprises, and to reduce their adverse environmental impact on climate.

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

13. The revised PDO of the project, as approved by the World Bank's Board of Executive Directors on October 27, 2011 at the time that AF⁴ for the project was approved, was to improve energy efficiency of selected *energy end-users in key energy-consuming sectors*, thereby reducing their adverse environmental impacts on climate. The reason for this slight modification to the PDO was to reflect the new Government policies and priorities embodied in the borrower’s 12th FYP (2011–2015). The key indicators for both PDO and GEO were revised upwards to reflect the additional US\$428 million made available by the AF (Table 1).

14. **The revised PDO dropped the mention of ‘medium and large industrial enterprises’.** At the time of appraisal of the original loan, a priority EE program was the ‘Top 1,000 Enterprises Program’, which required the very largest energy consuming industrial and power plants to set targets for reducing energy intensity. The China Energy Efficiency Financing Project (CHEEF I) was meant to be aligned with this focus on the largest energy users, which undertook investment programs to meet their targets. At the time of approval of the AF during the 12th FYP period, the program had been expanded to become the ‘10,000 Enterprises Program’, under which more than 16,000 enterprises were covered, necessarily including smaller ones. In addition, the restructuring

² The term ‘selected’ in the original and revised PDOs and GEOs was meant to indicate enterprises that hosted subprojects that met the project’s specific eligibility criteria, as defined in the OMs, as well as the Participating Financial Intermediaries (PFIs) commercial lending criteria. The selection was based first on consideration of the merits of potential investments; there was no a priori selection of enterprises.

³ The original target values took account of the likelihood that progress in implementation would become faster as the project progressed, as the capabilities of the PFIs grew over the course of the project.

⁴ The AF for this project (P123239) augmented EXIM’s allocation by US\$100 million.

of CHEEF I was meant to also include ESCOs, many of which are small enterprises, as well as building EE projects. This change in wording of the PDO introduced the necessary flexibility for the project to finance EE projects in this wider population of potential beneficiaries.

15. **Subsequent to approval of the AF in 2011, a restructuring was approved in March 2013, with the intent to ensure consistency among all components of the fully blended project.** At that time, it was noted that the unit investment per tce/year of energy savings capacity in industrial EE projects had risen significantly above the CNY 3,000 per tce/year assumed at appraisal and CNY 4,000 per tce/year) assumed at AF. Over the course of the project, the economic slowdown and structural shifts in the economy led to shutting down of much capacity in energy-intensive industries, seriously affecting deal origination of the PFIs. In addition, much of the low-hanging fruit had been harvested, leaving only more-expensive investment projects available to the project.

16. **Moreover, it was assumed that about 20 percent of the portfolio supported by the AF would go for building EE, which tends to have much higher unit investments than industrial projects.** Thus, while the target for investment was raised by a factor of 1.48, the target for energy savings was raised by a smaller factor, 1.29. At the early stage of project implementation, subprojects did indeed have average unit investment costs of around CNY 3,000, but in the later stages of the project unit investment costs of CNY 6,000 to CNY 8,000 were more typical. This impacted project performance, but the lack of relatively more-expensive building EE projects meant that the portfolio had a higher-than-expected share of relatively less-expensive industrial EE, meaning that, other things being equal, it required less investment to meet the energy savings target. In the event, the investment objective was overfulfilled, facilitating the meeting of the energy savings target.

17. A new PDO key indicator was added to reflect the expansion of the scope by the AF to cover ESCOs and building EE.

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

1. The revised GEO of the project was the same as the revised PDO, that is, to improve energy efficiency of selected energy end-users in key energy-consuming sectors, thereby reducing their adverse environmental impacts on climate.

Table 1. Original and Revised PDO and GEO Key Indicators

Indicators	Baseline 2006	Target Values						Actual
		Year 1	Year 2	Year 3	Year 4	Year 5 (original end targets)	Year 8 (revised end targets)	
PDO Key Indicators								
Cumulative amount of EE investments supported by the project (US\$, million)	0	60	180	380	600	900	1,328	1,427
Associated annual energy savings capacity (Mtce per year)	0	0	0.21	0.62	1.31	2.07	2.66	2.67
Cumulative amount of EE lending to ESCOs and building projects (US\$, million)	0	n.a.	n.a.	n.a.	n.a.	n.a.	60	105
Project beneficiaries (Number)	0	n.a.	n.a.	n.a.	n.a.	n.a.	50	52
PDO and GEO Key Indicator								
Associated CO ₂ emission reduction capacity (Mt of CO ₂ per year)	0	0	0.51	1.52	3.20	5.05	6.49	6.51

1.6 Main Beneficiaries

18. The primary project beneficiaries, as clearly identified in the objectives and components detailed in the Project Appraisal Document (PAD),⁵ were:

- (a) The banking sector, including the two PFIs (Export-Import Bank of China [EXIM] and China Huaxia Bank [Huaxia]) that were financial intermediaries for CHEEF I and the PFI (Minsheng Bank [Minsheng]) that was the financial intermediary for CHEEF II,⁶ which would adopt new approaches and structures to open up new markets for their lending products, and which would benefit from training and capacity building programs for managers and staff (of both genders) in headquarters and local branches, as well as other banks that would participate in national workshops to learn about subprojects financed by the PFIs, EE business financing products and technologies, and guidelines for assessing and developing EE subprojects; and
- (b) The enterprises that hosted the EE projects financed by the loan.

19. Additional beneficiaries included:

- (a) Government agencies, including the NDRC, that adopted new policies and regulations concerning EE informed by or based largely on project outputs;
- (b) Technical organizations, including the National Energy Conservation Center (NECC) (which housed the Project Management Office [PMO]), which strengthened capability to design and deliver the support needed by the Government to promulgate and manage the evolution of effective EE policies, and by regulated entities to comply with them; and
- (c) The general public that would benefit from reduced pollutant emissions resulting from the investments financed by the project.

20. During project preparation, EXIM and Huaxia were selected as potential PFIs from among six Chinese banks screened. Subsequently, the World Bank performed its financial due diligence of Huaxia in accordance with the established eligibility criteria and confirmed its selection as a PFI. In the absence of financial statements prepared and audited in accordance with accounting and auditing principles acceptable to the World Bank, EXIM undertook agreed-upon interim measures to assist the World Bank in evaluating its financial performance for the year ending December 31, 2006. EXIM also developed a time-bound action plan to address accounting and management weaknesses identified by the World Bank due diligence team. This plan was reviewed by the World Bank and regarded as satisfactory, and EXIM agreed to implement the plan. Consequently, EXIM's participation in the project was confirmed during appraisal.

⁵ See pp. 4-5 of the PAD, Report No. 38641-CN, 2008.

⁶ Minsheng, as the PFI for CHEEF II (P113766), utilized a separate loan for onlending, as evaluated in a separate Implementation Completion and Results Report (ICR) (ICR4116). Minsheng benefitted from the GEF-financed TA portion of CHEEF I; see paragraph 52 below.

1.7 Original Components (as approved)

21. This was an integrated IBRD/GEF-funded project designed to help remove the three principal barriers impeding investments in medium- and large-size industrial energy conservation projects. The TA activities financed by the GEF grant were intended to address the knowledge, institutional, and capacity-building needs of the banking sector, to mitigate the risk concerns of enterprises, and to strengthen governmental supervision of industrial energy conservation. These efforts were accompanied by an energy conservation financial intermediary lending program, which was to demonstrate viable mechanisms for financing medium- and large-size industrial energy conservation investments, and to provide direct support to the Government's energy conservation priorities during the 11th FYP period.

22. Both the GoC's Medium and Long Term Energy Conservation Plan and a technical study carried out as part of project preparation identified key energy-intensive industrial subsectors and energy conservation project types with significant potential for EE improvements and attractive financial returns. Energy-intensive industrial sectors included iron and steel, chemicals and petrochemicals, and construction materials (mainly cement). The types of energy conservation projects reviewed and recommended included (a) adoption of energy-saving industrial technologies such as more efficient industrial boilers, kilns, and heat exchange systems; (b) recovery and utilization of by-product gas, waste heat, and pressure; (c) installation of highly efficient mechanical and electrical equipment, including motors, pumps, heating, and ventilation equipment; and (d) industrial system optimization. While the PFIs decided which particular energy conservation subprojects to finance, subject to the eligibility criteria detailed in the respective project OMs developed jointly with the World Bank, they were expected to focus on the industrial subsectors and energy conservation subproject types mentioned above.

Component A: Promotion of Energy Efficiency Financing (estimated total cost: US\$18.7 million, including US\$9.9 million of GEF cofinancing and remainder financed by the GoC)

23. The proposed activities were to address key barriers to developing energy conservation financing businesses in the domestic banking sector, primarily for medium- and large-size industrial energy conservation investments. The activities comprised:

- (a) **Assistance to the PFIs to support.** This included (i) business startup, including creation, organization, staffing, and initial business plan of the energy conservation lending business unit (or team); (ii) capacity building and training, including support for the development of necessary financial instruments, procedures, and the creation of an adequate knowledge base to evaluate and extend EE loans; (iii) marketing and development of an energy conservation subproject pipeline; (iv) support for due diligence of eligible EE subloans, including financial, technical, social, and environmental assessments; and (v) development of energy conservation-related financing instruments and risk management tools. Under this component, a performance-based GEF grant of US\$2.55 million was allocated to the PFIs, at 0.43 percent of the volume of their eligible energy conservation lending under the project. This grant was to finance eligible TA mentioned above.

- (b) **Assistance to other banks.** This included assistance in (i) business startup; (ii) capacity building; and (iii) due diligence on EE subprojects. This assistance was intended to be extended to two additional commercial banks, to be selected in the second year of project implementation. These two banks were to lend their own funds to eligible industrial energy conservation subprojects, amplifying the impact of the proposed project and demonstrating the commercial attractiveness of EE lending.
- (c) **Assistance to the overall banking sector.** This was to include a series of national workshops to present successful case studies of subprojects carried out by the PFIs in the first one or two years and to introduce energy conservation technologies and new financial products.
- (d) **Assistance to energy conservation investment project demonstration.** This was to support the preparation and implementation of two to three industrial energy conservation projects in sectors with large replication potential, but with significant project development difficulties. The objective was to demonstrate effective business models and institutional arrangements for the preparation and financing of energy conservation projects. It was to focus primarily on pre-investment activities, such as feasibility studies, due diligence, development of new financing mechanisms, and institutional arrangements.

Component B: Energy Conservation Investment Lending (estimated total cost: US\$571.0 million, of which US\$300 million financed by the IBRD loan, US\$100 million financed by the PFIs, and the remainder equity financing by beneficiary enterprises)

24. This component was to consist of an energy conservation lending program of US\$571 million over five years, including US\$400 million in debt financing and US\$171 of equity financing by beneficiary enterprises.

25. A US\$200 million IBRD loan was onlent by the GoC to two PFIs: US\$100 million to EXIM and US\$100 million to Huaxia. The PFIs in turn lent the funds to industrial enterprises and/or ESCOs for energy conservation investment subprojects. Their lending rates were to be determined based on market conditions and were meant to adequately cover the financial and operating costs and provide for a reasonable profit margin for the PFIs. The PFIs were to lend in the same currency denomination in which they borrowed their allocation of the IBRD loan and thus pass all the foreign exchange risk to borrowing enterprises. The PFIs also agreed to lend, from their own resources, an additional amount equivalent to their respective IBRD loan allocation for EE investments. The subproject beneficiary enterprises were expected to contribute about 30 percent of project costs, a requirement by EXIM and Huaxia, amounting to US\$171 million.

26. The staff of the PFIs' energy conservation business team/unit were to be trained to identify potential carbon financing candidates from their subproject pipelines. However, no GEF assistance was provided to support the preparation of subprojects that would benefit from the sale of CO₂ emissions reduction credits. For eligible subprojects that applied for carbon financing from carbon funds managed by the World Bank, the World Bank was to review the due diligence documentation to ensure conformity with the agreed procedures detailed in the OMs before the completion of the transaction. In the end, this was not done due to lack of demand.

Component C: National Policy Support and Capacity Building (estimated total cost: US\$2.8 million, covered by GEF financing)

27. This component was to strengthen the Government's capabilities to implement industrial EE policies and programs, through:

- (a) Assistance to ensure that the NECC became operational and fully functional, through support for organizational start-up and strategic planning—the main responsibility of NECC, approved for establishment by the State Council in August 2006, was to support the implementation of national energy conservation policies and programs; and
- (b) Support to the implementation of priority national energy conservation programs under the 11th FYP—this was to include mainly a midterm review (2008) of implementation activities to identify problems, make recommendations, and assist in implementing remedial measures.

Component D: Project Implementation Support, Monitoring and Reporting (estimated total cost: US\$1.1 million, of which US\$0.8 million of GEF cofinancing and the remainder financed by the GoC)

28. Because of the innovative character, complexity, and scale of the project, consultants were to be recruited to provide project implementation support, including:

- (a) Assistance in the coordination of TA activities to the banks and the Government, as well as organizing project monitoring, evaluation, and reporting activities; and
- (b) Assistance to support the independent verification of energy conservation lending for the allocation of the performance-based GEF grant and to monitor energy savings performance of subprojects financed by the PFIs.

1.8 Revised Components

29. The AF approved in October 2011 of US\$100 million augmented the loan to EXIM for Component B to a total of US\$200 million. At the same time, EXIM committed to raise its cofinancing of Component B by US\$200 million, and cofunding by beneficiary enterprises was correspondingly raised by US\$128 million. The overall target for EE investment for Component B thereby rose by US\$428 million, to a total of US\$999 million.

30. The AF incorporated a PDO modified from the original CHEEF loan (see section 1.4), based on the new Government policies and priorities of the 12th FYP. In addition, the project scope was expanded by:

- (a) Piloting lending to ESCOs, which would provide EE services to end-users under performance-based contracts, and broadening the range of sub-borrowers from large- and medium-size industrial enterprises to energy end-users of all sizes and to ESCOs;
- (b) Expanding the target market segments from the industrial to the building sector;

- (c) Increasing the leverage ratio of the IBRD loan to EXIM Bank contribution from 1:1 in CHEEF to 1:2 in the AF; and
 - (d) Revising existing PDO indicator targets upwards in view of the expanded investments, and adding two new PDO-level indicators to reflect the addition of ESCOs and the buildings sector and to count direct beneficiary enterprises.
31. The AF loan closing date was set as December 31, 2016.
32. Subsequently, in March 2013, the Board approved a restructuring of CHEEF I, including the two loans under CHEEF I (Loan No. 7529-CN and Loan No. 7530-CN) and the associated GEF grant (TF 090719), to be consistent with the AF in the following areas:
- (a) Revised PDO
 - (b) Expanded project scope and subloan beneficiaries
 - (c) Expanded TA activities to EXIM (Subcomponent A.1 of the project) financed by the GEF grant
 - (d) Increased procurement thresholds for the IBRD loans
 - (e) The triggering of the OP 4.12 (Involuntary Resettlement) in connection with project activities under Loan 7529-CN, related with EXIM
 - (f) Extended closing date of December 31, 2016
33. Additional changes, also instituted in March 2013 to ensure adequate implementation of the project, included:
- (a) Expanded TA activities to benefit the NDRC and the NECC (Component C of the project), financed by the GEF grant to reflect the new priorities of the Government;
 - (b) Revised time period related to the delivery of interim unaudited financial reports to be consistent with the AF;
 - (c) Revised time period related to the reporting of the performance-based grant in the GEF Grant Agreement;
 - (d) Increased operating costs for the PMO in the GEF Grant Agreement; and
 - (e) Adding a new definition covering training expenditures.

1.9 Other significant changes

34. In June 2010, the Board approved CHEEF II (IBRD79350). This US\$100 million loan financed an onlending facility, similar to that of CHEEF I, with Minsheng as the PFI, and US\$0.47 of the GEF grant was allocated to Minsheng under Component A of CHEEF I (corresponding to

Component B of CHEEF II), and thus became the beneficiary of the requirement to assist ‘other banks’ besides the two PFIs originally included in CHEEF I.⁷

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

Soundness of Background Analysis

35. **The project design was informed by a review of EE financing experience in Brazil, China, and India**, prepared under a TA project of the World Bank/United Nations Foundation-United Nations Environment Program.⁸ This identified three principal causes of operational failures in EE financing: (a) ineffective local institutional delivery mechanisms; (b) inadequate focus on building the technical capacity for assessing EE projects; and (c) lack of sustained effort and follow through, especially adjustment of institutional mechanisms in response to market changes or operational inefficiencies. Recommendations from the study were incorporated in the project through several steps. First, the PFIs and their business practices were assessed, and a comprehensive study was conducted on market potential of major EE technologies in China’s energy-intensive sectors. Second, the project included TA and knowledge management programs to strengthen the PFIs’ capacity to select and to evaluate energy conservation projects. Third, the selection of energy conservation subprojects was based on well-defined criteria to meet the PDO, while flexibility was introduced to allow the PFIs to adapt to the specific circumstances and changing needs of their clients. Finally, the project built on the over decade-long experience of the World Bank Group and the GEF working with China on EE studies and operations.

36. Project design was also informed by lessons learned from the World Bank’s lines of credit in China and other countries. These showed the following:

- (a) **Lack of borrower accountability and weak management capacity of financial intermediaries hamper project implementation and jeopardize successful achievement of PDOs.** Most previous failed financial intermediation operations in China were implemented by Government agencies that lacked institutional and operational capacity and were compensated through a management fee.
- (b) **Failure to assess demand appropriately and to develop bankable subprojects at early stages of project preparation slowed and even stalled project implementation.** A technical study carried out during CHEEF I preparation showed there to be a large and growing number of energy-intensive industrial enterprises in China, for which EE investments presented a financially viable opportunity. The surge in energy prices in prior years further improved those projects’ financial attractiveness.

⁷ The performance of Minsheng’s component of the GEF grant-funded activities is evaluated in this ICR and not in the separate ICR for CHEEF II IICR-4116).

⁸ Robert Taylor, Chandrasekar Govindarajalu, Jeremy Levin, Anke S. Meyer, and William A. Ward. 2005. *Financing Energy Efficiency: Lessons from Brazil, China, India, and Beyond*, Washington DC: The World Bank.

Assessment of Project Design

37. **The PDO and GEO were well-formulated, and in line with national development goals, including improving the EE of industrial sectors and reducing emissions of local pollutants and GHGs.** They were also in line with the CPS then in effect (Report No. 35435). The scope allowed for an appropriate level of ambition without being unrealistically broad, and is specific enough for meaningful evaluation of performance.

38. **The components of the project were appropriate, including not just financing for subproject investments themselves, but also considerable resources for the advisory and capacity-building work that has proven necessary in all countries to make effective use of available financing for EE.** The inclusion of a policy component, by which newly developed national policies and regulations for EE could be informed directly by the experience in implementation of the loan, was a well-chosen means of ensuring wider application and sustainability of the lessons generated by the project.

39. **The project design considered the lessons identified in the background analysis to create a framework that served well during project implementation.** For instance, in contrast to previous onlending projects, PFIs under CHEEF I were large, policy and commercial banks with established, and sound financial operational capacity. They bore the financial risks and benefits of lending. They established dedicated units with mandates and accountability to develop EE financing business lines. This enabled the project to draw on the extensive industrial investment financing knowledge and skills of the PFIs, complemented by GEF-financed TA to build necessary expertise and capacity for evaluation and processing of lending for EE. The organization of the project, with a focus on supporting the capacity not just of the PFIs themselves but also of an independent PMO, was a good choice to achieve the capacity and institution goals of the project.

40. **The design included incentives for good performance.** Part of the GEF support was linked to the PFIs' performance in building and developing their EE lending portfolios, to ensure that the intermediaries were held accountable and were rewarded for good performance in the form of additional support to strengthen their capacity.

41. **Another important feature of the project design was support for building up of subproject pipelines.** Experience in many countries has shown that the existence of potential EE investments with high rates of return is usually not sufficient by itself to attract commercial financing. The project design therefore included elements to help the PFIs to develop a robust pipeline of subprojects and to work with Government counterparts to launch programs to bring industry, banks, and service providers together to enhance interest in EE investments and develop bankable subprojects.

42. **At restructuring, careful attention was paid to changes in circumstances, and appropriate adjustments were made to ensure that the design continued to serve achievement of the revised PDO and GEO, and that these continued to be aligned with national development goals and the CPS then in effect (Report No. 67566-CN).** The slight broadening of the scope, beyond industrial enterprises to include buildings and ESCOs, was justified by the evolution of China's EE strategy to gradually raise the priority of activity in these sectors.

Adequacy of Government Commitment

43. **The GoC evinced strong support for this project at the time of project preparation and appraisal.** It participated in the selection of PFIs, and in establishment and strengthening of the PMO. It maintained a high level of commitment throughout the project, and was in constant communication with the World Bank team. The GoC ensured that the policy-oriented elements of the project's TA component were aligned with and contributed directly to development of national EE policies, regulations, and practices.

Assessment of Risk at Time of Appraisal

44. **At appraisal, the overall risk rating was Moderate and adequate risk mitigation measures were identified.** The most significant risks included weak implementation capability of the GoC, slow development of the subproject pipeline, and slow pace in establishing the NECC (the PMO) owing to budget and staff constraints (Table 2). These three risks were all addressed, particularly through the project's Component C, which provided TA and helped to build capacity. The project's mitigation efforts were aided by the strong Government commitment shown from the earliest stages of the project, and that continued throughout the project, driven by a strategic focus from the top leadership of the GoC.

Table 2. Assessment of Project Risks and Mitigation Measures

Risks at Appraisal	Mitigation Measures	Rating at Appraisal	Actual Risks	Adequacy of Mitigation Measures
Risks to PDO/GEO				
Weakened Government commitment to EE in industry	Commitment to improve EE was one of the highest priorities of the 11th FYP, reaffirmed by officials at the highest levels.	Low	Government commitment to EE in industry remained high; commitment to EE in other sectors increased.	As risk did not materialize, mitigation was not necessary. Project activities helped to strengthen Government to implement policy in support of its EE goals.
	The GoC set stringent technical guidelines and standards to prevent expansion of inefficient industrial facilities.	Modest		
			Weaker industrial economy reduced demand for financing of industrial EE.	TA and capacity building enabled PFIs to overcome weaker demand, and continue to find new opportunities.
Risks to components				
Slow subproject pipeline development	PFIs already developed solid subproject pipelines. TA provided to the PFIs for business development. Disbursement of part of GEF grant linked to EE onlending by PFIs.	Modest	PFIs maintained good project pipelines throughout.	The project aided PFIs to conduct assessments in EE market segments, and to develop internal incentive mechanisms to reward staff and branches that lent for EE investments.
Slow buildup of PFIs' capacity to appraise and process subproject loans	TA provided to PFIs for business startup, new product development, and capacity building early in project.	Low	PFIs quickly built up skilled focal units for EE, and steadily built up capabilities of other departments and branches.	The project aided PFIs to develop skills in appraising EE investments, to design innovative financial products, and to train relevant departments and branches.
Slow pace in establishing the NECC due to budget and staffing difficulties	Strong leadership assumed by the NDRC in creating the NECC, and pressing need of the Government to strengthen implementation capacity for EE programs under the 11th FYP.	Modest	The NECC experienced interruption in its growth, during replacement of its first head, but overall grew into a highly capable institution for technical support of EE.	Through the project, the NECC became the leading center for technical support, international exchanges, and development of EE technology platforms and software.

2.2 Implementation

Partnership Arrangements

45. **As part of the project design process, other multilateral and bilateral EE projects in China were reviewed.** In addition, the project coordinated with the IFC/GEF CHUEE Project, and projects financed by other agencies, such as *l'Agence française de développement* (French Development Agency, AFD) and *Kreditanstalt für Wiederaufbau* (KfW), which also had EE credit line projects with the PFIs. On TA and policy support, the project coordinated with the Energy Foundation, which provided complementary policy support to the NDRC. The PMO, NECC, was designated to manage all of the NDRC's EE international projects, and so became a natural point for coordination.

46. **The link to the AFD project proved fruitful.** AFD financing to Huaxia totaling EUR 60 million for the period 2008–2020 (expected to reach EUR 100 million with recycling of repaid loan funds), for instance, was quite complementary. The AFD project supported both EE subprojects and, particularly in later stages, renewable energy (RE) subprojects. The years-long, country-wide training program supported by the GEF component provided through the World Bank project greatly strengthened Huaxia's staff capability, enabling the PFI to make better use of the AFD funds than it would have otherwise. The World Bank-funded training provided a platform that fostered ongoing exchanges among Huaxia staff in different branches, helping to overcome the dispersion of institutional memory and capacity that is a normal result of regular staff reassignments within the bank.

47. **Soon after CHEEF was approved, KfW decided to also finance onlending for EE through EXIM.** The loan of EUR 41.8 million was approved at the end of 2008 and closed in 2014. Because of the preparatory work that had been done for the World Bank project, the KfW project took only three months to prepare, providing a good example of the leverage that this program has had.

Institutional and Implementation Arrangements

48. **The proposed project was originally expected to be implemented over five years.** Through the restructuring in 2013, the period of performance was extended to eight years, to give enough time to incorporate and to implement the activities expanded through the AF, which was approved in 2011. An important aspect of the restructuring was to revise the end targets, to take account of the rising unit investment required for energy savings, thus ensuring that the project design was more realistic.

49. **A Steering Committee provided overall strategic and policy guidance to the project activities, while implementation was undertaken by the PMO.** The Steering Committee was chaired by the NDRC, and comprised representatives from both the MoF (International Department) and the NDRC (Resource Conservation and Environmental Protection Department, Department of Foreign Capital Utilization and Overseas Investment). The Steering Committee's attentiveness to the project, and engagement with the PMO and PFIs, were an important element of project oversight and were an important factor in the positive outcomes of the project.

50. **The CHEEF I PMO was initially established as an expansion to the PMO for an existing project, the ongoing World Bank/GEF-funded Second China Energy Conservation Project.** That PMO had successfully coordinated activities for the World Bank-financed First China Energy Conservation Project. The PMO's technical capabilities and human resources were considerably strengthened as a result of CHEEF I project activities; not only did it provide support to the PFIs for capacity building, but the PMO undertook policy development for government, and became an important technical resource for other financial institutions in China.

51. **The PFIs responsible for the implementation of EE lending, EXIM, and Huaxia were the first financing institutions in China to collaborate with the World Bank for onlending of IBRD loan and counterpart funds to sub-borrowers for EE projects.** As the first such project in China, it took time for the banks to become familiar with the World Bank's project management requirements, including project financial management and disbursement processes. The World Bank provided training and support in this regard, and the PFIs in turn conducted internal training to larger numbers of staff. Each of the PFIs established a central unit responsible for implementation of the project. These EE units have grown and transformed, preparing both banks to expand their activities into green financing more broadly (see paragraph 70).

52. **Minsheng, the PFI of CHEEF II, participated in Subcomponent A.2 of the project.** The original design of the project envisioned that one or two other banks in China would benefit directly through assistance in (a) business startup; (b) capacity building; and (c) due diligence on EE subprojects. One such bank was selected—Minsheng. Under the terms of the US\$100 million CHEEF II loan project, Minsheng was also allocated a portion of the GEF grant (US\$0.47 million). Although Minsheng's lending was entirely separate from CHEEF I, it also benefitted from the support provided by the PMO to the CHEEF I PFIs, included under Subcomponent D.2, monitoring of energy savings performance of subprojects financed by the PFIs.

Midterm Review

53. **A midterm review was conducted during the mission of March 2012.** The mission found the loan component of the program to be progressing well, with positive development of mechanisms at EXIM and Huaxia to pursue EE lending, but implementation of the GEF-financed components to be lagging somewhat. The terms of the restructuring (which was approved in March 2013) were discussed, with a view to ensuring concordance between all elements of the project. This was needed in particular to accord with the terms of the AF, approved in 2011. A time-bound action plan was agreed on to ensure continued good implementation. These steps were subsequently carried out.

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

M&E Design

54. **The indicators identified were well suited to tracking progress toward the PDO and GEO.** One of the indicators captured not just the IBRD loan funds, but also the cofounding that went toward EE, encapsulating direct mobilization and providing an important quantitative measure of success. Alongside this, the measurement of energy savings and CO₂ reductions directly attributable to the financed projects also provided a good measure of the direct impact of

the project. For the AF, an additional indicator was added to cover lending for both ESCO and building EE projects. This gave some needed flexibility in mode of attainment, as ESCO projects can (and in the case of this project) were implemented at industrial enterprises.

55. **Capacity building is much more challenging to measure in a way that gives an objective measure of its impact, and it is only really possible to measure outputs that are aligned with outcomes.** The project had several of these focused, for instance, on establishment of the NECC, and on development of policies and procedures. Such indicators are useful alongside a narrative of how outcomes were used.

M&E Implementation

56. The NDRC, through the PMO, was responsible for the M&E system, which comprised (a) regular monitoring of performance indicators; (b) provision of annual progress reports (annually in initial stages of the project, then semiannually after approval of the AF); and (c) a midterm review of implementation progress. The PMO was responsible for overall M&E of implementation progress, including the collection of project performance information and reporting on the impact and results of the project. The PMO developed a M&E plan during the first year of implementation, and a member of the PMO was assigned to collect information and maintain databases to monitor the implementation performance of all the project components.⁹

57. **The PDO and GEO indicators were straightforward and easy to monitor.** The PFIs provided information to the PMO, which also tracked indicators relating to indicators for which it was responsible, primarily intermediate results indicators relating to capacity building.

58. **For activities implemented by the PFIs, the project team within each PFI was responsible for collecting information with the assistance and quality control of the PMO, and for reporting to the World Bank through the PMO.** The PFIs contracted independent third parties to monitor and validate their energy conservation-related lending disbursements.

59. **Indicators were calculated in line with the original project design.** The calculations of annual energy savings capacity (tce per year) resulting from EE subprojects financed by the PFIs was performed in line with the PAD. The annual CO₂ emissions reductions capacity (PDO and GEO indicator) were based on these energy savings at an emission factor of 2.44 t CO₂/tce. EE investments in subprojects were the total of debt financing from the IBRD loan and the PFIs own resources, as well as the funding provided by the host (beneficiary) enterprises.

M&E Utilization

60. **The M&E results were used by the PMOs and the PFIs to measure their progress, and provided the basis for adjustments to their respective implementation plans to achieve the project's objectives.** The PFIs and the PMO had the responsibility for collection of the data on the indicators, which were reported to the GoC and the World Bank in reports that were annual initially and semiannual for the remainder of the project. The measured progress was a focal point

⁹ The GEF requirement for tracking tools applies to projects endorsed after December 2010, and as such does not apply to project, which was approved in 2008.

of discussion during the World Bank's implementation support missions, and indicators were used as diagnostic tools for identifying areas where emerging issues might require attention. The indicators were the basis of the Satisfactory rating of the project that was important to the decision to proceed with the approval of AF for CHEEF I, as well as with approval of CHEEF II. The strong performance on the PDO indicators was also important in showing success of the onlending approach for green financing more generally, and thus for approval of the new World Bank-financed Program for Results operation, the 'Innovative Financing for Air Pollution Control in Jing-Jin-Ji' Program, which will support clean energy and environmental protection in the Beijing-Tianjin-Hebei region through lending of US\$500 million.

2.4 Safeguard and Fiduciary Compliance

Environmental Safeguards Compliance

61. **The project was classified as Category B according to OP 4.01 (Environmental Assessment), and limited adverse environmental impacts were envisaged and encountered.** Due to the nature of the subprojects, natural habitats, cultural resources, pest management, and forest safeguards policies were not triggered. The Environmental Assessment Framework was developed and incorporated into the OM of the PFIs. All the PFIs paid close attention to environmental safeguards and followed the requirements of the OM for their subprojects in terms of compliance verification during the loan appraisal stage and field supervision during the implementation stages. As a prerequisite for the loan appraisal, all subprojects under the loan were required to provide necessary environmental safeguards documents and approval from local environmental authorities according to OM requirements for full environmental compliance. The PFIs established routine site supervision practice to inspect progress of subprojects during construction and operation, in which environmental performance was part of the supervision. The overall environmental safeguards implementation is rated Satisfactory for this project.

Social Safeguards Compliance

62. **No resettlement and were expected or encountered during project implementation, therefore social safeguards policies (OP 4.12 [Involuntary Resettlement] and OP 4.10 [Indigenous Peoples]) were not triggered during the preparation of the project.** During implementation of the first phase of CHEEF I, in accordance with the PFIs' OMs, all subprojects were within the existing enterprises premises of beneficiary enterprises with no new land acquisition. When the AF was approved in 2011, a resettlement policy framework and procedures was incorporated into EXIM's OM for subprojects involving land acquisition. However, none of EXIM's subprojects required land acquisition. It was discovered, however, that one subproject financed by Huaxia had involved land acquisition. Although inspection by the World Bank revealed that local and national regulations had been complied with, the failure of the PFI to obtain prior review by the World Bank resulted in the subproject being eliminated from the project. Steps were subsequently taken to strengthen safeguards oversight by the Huaxia, including amending the OM to ensure proper oversight. Subsequently, Huaxia proposed to finance one other subproject that required land acquisition. In this case, proper oversight procedures were followed, due diligence showed compliance with applicable regulations, and the subproject was supported under the project. The overall social safeguards implementation is rated Moderately Satisfactory for this project.

Fiduciary Compliance

63. **Overall, financial management and procurement for this project are rated Moderately Satisfactory.** Minor issues were encountered and resolved in the early stages in implementation by the PFIs of the loan portion of the project. Some ineligible expenditures were found, and qualified audit opinions were issued for EXIM in 2008 and for Huaxia in 2010 and 2011 owing to a lack of supervision and guidance to the bank's branches, as well as to weakness in prior- and post-credit control. However, the two banks paid considerable attention to the issues raised. Efficient and effective remedial actions were undertaken according to the World Bank's and the auditor's recommendations, including optimizing credit control procedures, strengthening field supervision and recalling the problematic onlent funds and replacing them in the CHEEF I portfolio with other eligible expenditures.

64. **Since that time, the PFIs exhibited an adequate project financial management system that provided, with reasonable assurance, accurate and timely information that the loan was being used for the intended purposes.** The project accounting and financial reporting were in line with the relevant regulations issued by the MoF and with the requirements specified in the Loan Agreement. No further significant financial management issues were noted by the World Bank and the auditors. In addition, the withdrawal procedures and arrangements for flow of funds were appropriate, and the World Bank loans were fully disbursed.

65. **The GEF-funded portion of the project, which involved expenditures by the PMO for TA and capacity building, had an adequate project financial management system that provided, with reasonable assurance, accurate and timely information that the grant was being used for the intended purposes.** The PMO's project accounting and financial reporting were in line with the relevant regulations issued by the MoF and with the requirements specified in the Grant Agreement. No significant financial management issues were noted throughout the project implementation, and all financial management-related weaknesses raised during project supervision were resolved in a timely fashion. The project audit reports all had unqualified audit opinions. In addition, the withdrawal procedures and arrangements for flow of funds were appropriate. The grant proceeds were disbursed to the project on time.

2.5 Post-completion Operation/Next Phase

66. The subprojects financed at beneficiary enterprises (that is, the sub-borrowers of the PFIs that hosted the subprojects) have been incorporated into the enterprise's day-to-day operation, and will continue to deliver energy savings over the lifetimes of the subprojects.

67. **The participating banks have significantly increased their interest, capacity, and confidence in handling EE financing, and have mainstreamed EE financing in their business.** EXIM had no EE business line at all at the beginning of the project. Now, using an EE financing product launched in 2013 based on experience with CHEEF I, EXIM has financed CNY 19.3 billion (about US\$2.8 billion) in loans with its own funds.

68. **The EE units created by the two PFIs under this project have grown and transformed, preparing them to take advantage of opportunities in green financing more broadly.** This has been, in part, a response to changing market circumstances; the market for the large industrial EE

subprojects financed by CHEEF I has shrunk, while and the market for RE projects has grown. Instead of being solely focused on efficiency, the PFIs' EE units are now more broadly centers for green finance, that is, lending for clean energy and environmental protection projects. EXIM recently issued CNY 1 billion (US\$145 million) of green bonds. Huaxia's top management is highly committed to green financing, and the green credit business now accounts for 7 percent of its entire business. They have established a CNY 5 billion (US\$725 million) Blue Sky and Clear Water Fund in the Jing-Jin-Ji Region to provide debt and equity financing to green investment. Based on the experience of this project, Huaxia is establishing a dedicated Green Finance Center to scale up green lending business under the World Bank-financed 'Innovative Financing for Air Pollution Control in Jing-Jin-Ji' Program for Results.

69. The GEF grant portion of CHEEF produced outputs that have underpinned newly promulgated EE policies, bolstered the capacity of technical agencies to support implementation, and improved the capacity of regulated energy-using enterprises to comply. In particular, the capacity-building activities of the NECC, which hosted the PMO, has greatly contributed to improving the national and local energy conservation center system. In addition to the project's support for implementation of priority EE programs of the 12th FYP, it also made important contributions to the development of the 13th FYP. Many of the policy recommendations flowing from this project have been adopted into the policies and regulations that will provide the framework for EE investments over the medium term.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

70. The relevance of the PDO and GEO are rated High. They were consistent with the Government's priorities set out in the 12th and 13th FYPs, which set targets for improving EE by sector and region and which emphasized the need to develop market mechanisms to promote EE investment. The objectives are also consistent with the World Bank's CPS (FY13–FY16), which has supporting greener growth as one of its strategic themes, and 'accelerating energy conservation and investment in EE' as a key outcome to pursue. The objectives are also supported by the GEF 5 strategy in the climate change focal area objective 2 (promote market transformation for EE in industry and the buildings sector). The objectives also contribute to China's Intended Nationally Determined Contributions as submitted to the Conference of the Parties, which include goals to (a) lower carbon intensity of GDP by 60–65 percent below the 2005 level by 2030, and (b) reduce CO₂ emissions per unit of GDP by 40–45 percent below the 2005 level by 2020. As noted above, the project activities also had synergies with onlending projects for clean energy that were financed by AFD and KfW.

71. The relevance of project design and implementation are rated Substantial. The project design was based firmly on relevant experience up to the time of appraisal, was targeted at key barriers to scaling up debt financing of EE projects, and adopted innovative approaches to foster needed changes in organizations and institutions. The performance indicators were well-suited to measure outputs and outcomes. The implementing arrangements were appropriate and effective.

72. The main issues expected at the design stage and encountered in implementation that led to delays in implementation were related to (a) building capacity in the PFIs and the

PMO, and (b) building up a pipeline of suitable subprojects. Based on experience with previous projects, this was anticipated and addressed through the capacity-building activities of the project. This is described in Table 2.

73. **Issues encountered during the project that were not foreseen at the design stage were dealt with appropriately.** For instance, the allocation of a portion of the GEF grant for performance-based funding of TA proved difficult to execute in practice. The PFIs found that using the incentives as originally intended—to reward staff and units that contributed to achieving the EE lending goals—was worthy, but that utilizing grant funds presented administrative challenges. The PMO and PFIs resolved this by using their own funds to provide incentives, which in effect leveraged the GEF funds. The grant funds thus released were used to augment the capacity building activities that proved so important to the outcomes of the project.

74. **An important issue which affected the project was the rising unit investment cost of energy savings compared to what/when.** The higher unit investment cost of energy savings was a result of evolving market conditions, not the result of deficiency in design or execution of the project. The ability of EXIM and Huaxia to overcome this obstacle and still meet targets demonstrates a high degree of capability and persistence. EXIM and Huaxia took a long-term view, and utilized this project to develop capabilities necessary for them to undertake a broader green financing business, encompassing RE and pollution mitigation businesses as well as the EE business specifically supported by CHEEF I.

3.2 Achievement of Project Development Objectives and Global Environment Objectives

75. **The achievement of the PDO and the GEO are rated High.** The project successfully scaled up EE investments, and the targets for the PDO and GEO indicators, which were based on project-financed lending—were exceeded (Table 3). All IBRD loan funds were disbursed, and the target for both PFI financing and beneficiary funding of subprojects was slightly exceeded (Table 3), leading to a leverage ratio of IBRD loan funds of 1:3.4.

Table 3. Project Financing of EE Subprojects

Funding (US\$, millions)	EXIM	Huaxia	Actual Performance	End Targets
IBRD loan funds	200	100	300	300
PFI cofinancing	307	114	421	400
<i>Subtotal PFI EE lending</i>	<i>507</i>	<i>214</i>	<i>721</i>	<i>700</i>
Beneficiary funding	515	191	706	628
Total EE investment	1,022	405	1,427	1,328

76. **With cumulative annual energy savings of 2.67 Mtce per year and associated CO₂ emissions savings of 6.51 Mt of CO₂ per year, the project achieved just over 100 percent of its end targets for these indicators.** This is approximately equivalent to avoiding the annual emissions of nearly 2 GW of coal-fired power plants. The project met targets despite the rising cost of unit energy savings in EE investments over the course of the project. Nation-wide, as a result of the strong push for EE, investments with low costs, quick paybacks, and relatively easy technical features have mostly been harvested. As a result, the project—and the wider market—have seen a sharp rise in investment costs per tce of energy savings. At restructuring, this was considered in adjusting the targets. Unit investment costs for industrial EE projects rose more than

expected, and at the same time the anticipated investments in the more-expensive buildings sector (assumed to be 20 percent of the AF portfolio) were not made. This circumstance, combined with the exceedance of the target for overall EE investment, led to achievement of the revised PDO Targets 2 and 3.

77. **The subprojects financed ranged from small to large, and fell within the range of sectors and technologies targeted by national policies.** The subprojects were an average total investment size of US\$34 million, and ranged from US\$5 million to US\$134 million. They were for a range of heavy industrial sectors and power and heat generation and distribution. Ten of Huaxia’s 17 subprojects, and 65 percent of investments, were in the cement and power and heat sectors. For EXIM, the iron and steel industry received 63 percent of investment, and cement 15 percent, collectively representing 16 out of 41 subprojects. Technologies ranged from well-known process modifications, like capturing of waste heat and gases for power generation and other utilization, to more advanced projects like process optimization. However, the intended expansion of the scope of lending through the AF to include building EE did not materialize, despite efforts to do so. The barriers to engaging in building energy retrofits are formidable. In this sector there are, for instance, split incentives between developers, owners, operators and tenants, and the small typical size of building EE projects leads to difficulty in aggregating them into the kinds of large lending packages handled by the PFIs. Nevertheless, the PFIs were able to find sufficient volume of projects in industrial sectors to meet the project targets. More details on subprojects financed by the project are in annex 2.

78. **Other targets were exceeded.** The end target was slightly exceeded in the case of direct beneficiaries of projects (including both industrial enterprises and ESCOs), and was exceeded by 75 percent in the case of ESCO and building lending—standing at US\$105 million compared to the US\$60 million end-of-project target.

79. **The weighted rating for PDO and GEO outcomes is Satisfactory.** At the time of restructuring, achievement of both the PDO and GEO were rated Satisfactory. The same was true at the time the project closed. The weighted rating, based on project funds disbursed before and after the project restructuring, is therefore also Satisfactory (Table 4).

Table 4. Split Evaluation: Weighted PDO and GEO Outcomes of CHEEF I

	Item	Against Original PDO/GEO	Against Revised PDO/GEO	Overall
1	Rating	Satisfactory	Satisfactory	—
2	Rating value	5	5	—
	Time of rating	At restructuring (March 2013)	at project close	—
3	Weight ^a	31%	69%	—
4	Weighted value	1.55	3.45	5
5	Final rating	—	—	Satisfactory

Note: a. Percentage of project funds disbursed before or after PDO change.

80. **This achievement of the PDO was accompanied by longer-term and additional important outcomes of project.** The project substantially increased the participating PFIs’ capacity to identify and to appraise EE investments, and strengthened their commitment to mainstreaming EE lending as an important business lines through a learning-by-doing process. Since start of implementation, the project has continued to demonstrate project sustainability and

mainstreaming impacts on the participating banks. Not only the Beijing-based headquarters of the PFIs, but their provincial and municipal branches, where loans are originated, had improved markedly in capacity.

81. **This project was the first to demonstrate that commercial financing of a line of credit line through domestic banks dedicated to EE can be successful in China.** The results prove the concept, and have had impact on the GoC's policy making and on EE market development. The NDRC is considering establishing a similar credit line to leverage Government funds, replacing its past method of providing award funds to EE projects undertaken with commercial funds, an ex post subsidy model that was no longer considered sustainable or effective.

82. **Even before the end of the project, the PFIs were already using their own capital to finance more EE projects, and to enter new areas of clean energy financing.** Both banks started with no experience with EE projects. Through the project, EXIM developed EE lending as a major business line with its own funding in 2013, financing EE loans of CNY 19.3 billion (US\$2.8 billion) with its own funds. At the project's end, Huaxia was scaling up its green lending business through a dedicated Green Finance Center and implementing the Bank's new Program for Results operation to finance RE and EE investments in the Jing-Jin-Ji Region. Green credit business now accounts for 7 percent of its entire business at Huaxia, and its Blue Sky Clear Water Fund that finances green projects totals CNY 5 billion. The project thus helped the PFIs to develop capacities that give them the flexibility to take advantage of opportunities in green financing.

83. **Despite the relatively small size of the loan compared to the overall lending portfolios of the two PFIs, the project was successful in leading them to create effective units and tools and financing products to take advantage of the market for EE lending—a market that they had previously ignored.** The approach succeeded by combining a dedicated fund with a program of TA and capacity building, and by simultaneously bringing to bear the commitment of the PFIs' high-level leaders and an increasingly capable PMO that was responsive to a very motivated Government agency. The marrying of a GEF grant to the IBRD loan was essential to achieve this. Table 5 shows how the grant funds were allocated, and the end-of-project status of the intermediate results indicators linked to the grant-funded activities.¹⁰ The GEF funds were nearly all disbursed, and all targets were met.

¹⁰ The GEF grant also provided resources for Minsheng, the PFI of CHEEF II, a loan project designed along similar lines to CHEEF II, and which is the subject of a separate report, ICR-4116. The results of the GEF grant proceeds allocated to Minsheng are treated in this report.

Table 5. GEF Grant-funded Activities: Disbursements and Results

Implementation	EXIM	Huaxia	Minsheng	Performance-based grant	NDRC/NECC/PMO	Total
Allocated (US\$, millions)	1.875	1.875	0.47	2.55	6.73	13.5
Allocated performance-based grant (US\$, millions)	1.86	0.69		2.55		
Total allocated (US\$, millions)	3.735	2.565	0.47		6.73	13.5
Disbursed (US\$, millions)	3.72	2.50	0.45		6.73	13.4
Indicators	Actual			Target		
EE M&V procedures developed	Final (enterprise, project-based)			Final report		
EE demand in pipeline (US\$, millions)	500			150		
NECC established and operational	Established and staffed in 2012			Established and staffed		
NECC business plan and initial work program developed	Completed in 2010			Final		
Final evaluation of 11th FYP conducted, recommendations to the 12th FYP provided	Made important contributions to the 12th and 13th FYPs			Final evaluation of 11th FYP conducted, and recommendations to the 12th and 13th FYPs provided		

84. **The GEF funding supported the PFIs to raise their capacity and confidence to undertake EE financing and bolstered their commitment to mainstream EE lending.** These included:

- (a) Extensive training and study tours for PFI staff in headquarters and branches across the PFIs' system, particularly the staff responsible for risk assessment;
- (b) Business development to identify deals through market promotion workshops and alliance with industry associations;
- (c) Market studies in specific sectors such as the building sector and ESCO market analysis;
- (d) Creation of innovative financial products such as project-based lending and asset-based securitization; and
- (e) Capacity building for technical, environment, social, and procurement due diligence review.

85. The results of the project's investments and activities were numerous. The overall achievements are summarized in the following sections. Additional details of the activities and outputs supported are presented in annex 3.

- (a) **Supported national priority EE policies.** Project activities made significant contributions to the implementation of 12th FYP and development of 13th FYP. Outputs strongly influenced EE policies, and the recommendations made in many of the policy studies were adopted into policies and regulations promulgated by the Government. This was well beyond the scope of supporting the 11th FYP priorities, as envisioned at appraisal.
- (b) **Built capacity of the PMO (NECC) and allied organizations.** Through the project, the NECC has become a leading center for technical support. Project activities supported strengthening of capacity of the NECC and local Energy Conservation Centers, international exchanges (for example, support to Group of Twenty [G20] EE activities, Asia-Pacific Economic Cooperation [APEC] EE task force), and development of EE technology platform and software.
- (c) **Built capacity of the three PFIs (EXIM, Huaxia, and Minsheng).** The project supported building of capabilities to perform energy, environmental and social due diligence, held training courses, and supported study tours abroad and domestically.
- (d) **Helped PFIs understand new market segments and develop new products.** The project aided market (project pipeline) development, undertook EE market and financing studies in new market segments, and developed innovative financial products for these segments.
- (e) **Developed EE financing policies and mechanisms.** Methods to use NDRC/MoF funds to leverage commercial EE financing were explored, banking sector policies for

green financing were studied, enterprise green bond guidelines were developed, and an EE financing platform was established. These experiences hold valuable lessons not only for China, but also for other countries that are seeking financing models to scale-up EE investments.

- (f) **Provided assistance to the China Banking Regulatory Commission (CBRC), the banking sector regulator, to develop green financing policies that incentivize banks to mainstream EE financing.** The project also financed a series of studies, for example, how to use public funds to leverage commercial financing, green bond guidelines, and design of financing platforms, as well as workshops to provide assistance to the banking sector.

3.3 Efficiency

86. **Project efficiency is rated High overall.** All project activities have been fully completed, and the designed performance indicators are fully met.

87. **Economic and financial analysis support a rating of High.** For Component B, financing of EE subprojects, analysis of a representative sample of EE investment subprojects suggests a weighted average internal rate of return of at least 35 percent in economic terms (including the benefits of carbon dioxide emissions reductions valued according to World Bank guidelines as detailed in annex 3), and 15 percent in financial terms, with an associated payback period of 5.9 years. These estimates are conservative based on available data and associated assumptions as described in the following sections, and demonstrate that the project achieved its intended objectives at a high level of efficiency, similar to what was expected at appraisal. Indicators at appraisal and completion are summarized in Table 6. Annex 3 provides details including associated assumptions and methodology.

Table 6. Economic and Financial Analysis of CHEEF I Subprojects

Parameter	Unit	4 Sample Subprojects at Appraisal	9 Subprojects at Completion
Total lending investment in subprojects	US\$, millions	48	505
Average unit investment cost of annual energy savings	US\$/tce/year	379	792
Average emissions intensity of energy savings	tCO ₂ /tce	2.46	3.02
Financial Internal Rate of Return (FIRR) (including tax)	%/year	22	16
Payback period (including tax)	years	3.9	5.9
Economic Internal Rate of Return (EIRR) (including CO ₂ benefit, excluding local pollutants)	%/year	40	35

88. **Financial and economic analysis is not possible for the other project components, which concerned TA, training and policy support.** Review of the project makes clear that these soft components were crucial to enabling the PFIs to carry forward the subproject investments financed by this project, as well as projects financed by others (for example, AFD and KfW).

Additionally, these other components enabled the PFIs to become active in the larger arena of green financing more quickly and at larger scale than they otherwise would have done.

89. The policy support activities informed, and in some cases led directly to national and local policies and regulations that were promulgated, and helped to shape implantation of the 12th FYP and the design of the 13th FYP. The project's capacity-building activities helped to strengthen capacity to support and carry out the policy and regulatory changes. These are described in detail in the PMO's ICR, a summary of which is in annex 6. Of particular importance were the following:

- (a) For the 12th FYP, CHEEF I supported:
 - (i) Development of the priority EE retrofit program, priority EE technology demonstration program, and national action plan for implementation of the 12th FYP strategy;
 - (ii) EE assessment of greenfield investments (CHEEF-supported studies were adopted as regulations and standards);
 - (iii) Design of the online energy consumption monitoring platform that has been adopted by the Government and piloted in three provinces, and nation-wide scale up of which has been approved;
 - (iv) Development of total energy consumption cap early-warning system (now in operation), which provides alerts if and when targets are in danger of being missed;
 - (v) Incorporation of attainment of EE targets into performance evaluation system for key Government officials;
 - (vi) Developing and tightening of ten EE standards for appliances and industrial equipment, guidelines to implement Top Runner programs, and publication of Top Runner List of refrigerators, air conditioners, and televisions;
 - (vii) Design of EE trading scheme; and
 - (viii) EE measurement and verification for the Top 10,000 Enterprises Program.
- (b) For the 13th FYP, CHEEF I supported:
 - (i) The Energy Consumption Revolution study, following President Xi's call for an energy revolution through a long-term national strategy;
 - (ii) A study on the revision of the Energy Conservation Law (EC Law) (last updated in 2005), leading to change in energy appraisal procedures for EE projects;
 - (iii) Allocation of the 13th FYP national energy savings target among provinces and Top 10,000 Enterprises Program;

- (iv) Development of the 13th FYP energy conservation action plan;
 - (v) Study on alternative energy to replace decentralized coal burning for heating in rural areas; and
 - (vi) Fiscal and financial policy recommendations to use scarce public funds to leverage commercial EE financing in the 13th FYP.
- (c) The project built capacity of the NECC through the following activities:
- (i) Support for international activities, such as Chinese leadership of the G20 EE Action Plan and the APEC EE task force, and international study tours for NDRC and NECC officials and staff;
 - (ii) Development and promotion of Energy Management System approaches for enterprises, and an online EE technology platform for information dissemination;
 - (iii) Preparation of industrial EE diagnosis guidelines; and
 - (iv) Training of staff of the NECC and local Energy Conservation Centers.
- (d) To replicate the successful experience of EXIM and Huaxia in financing EE through credit lines across the banking sector, CHEEF I:
- (i) Supported the CBRC to develop and to promulgate incentive policies and guidelines to promote EE financing in the banking sector;
 - (ii) Prepared a study on options to leverage Government funds, for example, credit lines, interest rate buy-downs, and EE funds;
 - (iii) Supported establishment of an EE financing platform as a bridge between financiers and the enterprises and ESCOs; and
 - (iv) Developed enterprise Green Bond guidelines.

90. **Administrative efficiency is rated High based on timely and effective implementation.** The extension of closing date reflected AF and an expanded scope of activities, notwithstanding initial delays and ineligible expenditures that were subsequently addressed satisfactorily. The pace of disbursement varied over the course of the project, but close supervision within the PFIs and by the PMO and World Bank teams identified issues early and led to timely actions to address any delays, and full disbursement of the IBRD loan and over 99 percent disbursement of the GEF grant were achieved within the grace period following project completion.

3.4 Justification of Overall Outcome and Global Environment Outcome Rating

Rating: Satisfactory

91. **The overall outcome rating is Satisfactory, based on high relevance of the project objectives, high achievement of the project objectives (efficacy) both before and after**

restructuring, and high efficiency throughout. Although the intended expansion of lending through the AF to include EE in buildings, there was flexibility within the PDO and the GEO to achieve the end targets through EE investments in industry, and the project achieved its main intended impact of providing a platform for demonstrating the scaling up of the onlending model for financing EE. Moreover, as a result of the project, the PFIs have become prepared for and are already participating substantially in the broader green financing market that is developing in China, including RE and pollution reduction in addition to EE project financing. Thus, the rating remains Satisfactory after accounting for weighting of the rating before and after the restructuring, which took place in October 2011, when disbursement stood at 31 percent.

3.5 Overarching Themes, Other Outcomes and Impacts

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

92. **Gender, poverty, and ethnic minorities were not identified as concerns in the PAD.** The benefits of EE, however, are multiple and go beyond enhancing economic and social development, reducing pollutant emissions and improving environmental sustainability, and strengthening energy security. These can include, for instance improved comfort and health of occupants of industrial, commercial, and residential buildings.

(b) Institutional Change/Strengthening

93. **This project has made significant and specific contributions to China's current package of EE policies and programs, which has evolved over many years and is unlike any other in the world.** Over the course of the project, China has continued its aggressive and effective drive for improving EE, combining strong regulatory measures with market-based programs. Energy consumption is now regulated at national, provincial, and local government and large enterprise levels. The foundational framework for the regulatory system was established during the 11th FYP (2006–2010) with mandatory national, provincial, and local targets for energy intensity (energy used per unit GDP). Compliance with these targets is taken very seriously and reviewed every year through Government systems. Failure to achieve targets carries political and career consequences for the Government leaders involved. During the 12th FYP (2011–2015), nonbinding 'guidance' total energy consumption caps were added to new mandatory energy intensity targets. In the current 13th FYP (2016–2020), mandatory energy consumption caps at national, provincial, and local levels have been added, alongside new energy intensity targets. Provincial authorities typically place heavy emphasis on EE programs in industry as their main endeavor to ensure that targets will be met, offsetting some unpredictability in other sectors.

94. **This regulatory environment and persistent attention from the highest levels of Government has generated continued demand for the EE investments.** At the same time, however, the market has shifted, as the relatively large retrofit investments financed by CHEEF have dwindled, owing in part to the harvesting of existing, financially viable potential projects (and consequent smaller size and higher financial and transactions costs of remaining projects) and the rising relative attractiveness of RE (wind and solar photovoltaic power) projects. However, as a result of the project, the PFIs have become prepared for and are already participating substantially in the broader green financing market that is developing in China, including RE and pollution reduction in addition to EE project financing.

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

95. The economic slowdown and decelerating demand for industrial goods that occurred during the course of the project impacted implementation, as described above, reducing the scope for deal origination for the PFIs. Moreover, the average cost of EE investments rose, as less-expensive projects were done first nation-wide. The building sector remained very difficult for the PFIs to enter, despite the efforts of the PFIs, such that all subprojects remained in the industrial sector after restructuring. Even though the building sector was not entered, the impact of the project was still highly relevant in the other sectors, and the project's original and revised outcome targets were achieved or exceeded.

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

Rating: Negligible to Low

96. There is a high likelihood that the PDO and GEO outcomes will be maintained, and that investment like those financed by the project will continue utilizing domestic capital. The subprojects financed by the project will continue to generate energy savings after project closing, in general for at least the next decade. Current ownership of the project by the Government is high, and the PFIs have used it as a jumping-off point to enter into the larger arena of green financing. The PFIs are maintaining and expanding the units they set up to implement CHEEF I, and are diversifying their purview to include clean energy sectors other than industrial EE. Thus, the PFIs are able to continue to assess and to finance sound EE projects in industrial sectors going forward, and to develop pipelines of clean energy projects in response to future evolution of market conditions.

97. The policy environment is also supportive for sustainability of outcomes. China continues to be dedicated to improving EE, and the adoption of energy caps in the 13th FYP will create even more demand for doing more with less—not only ensuring that new facilities built will be more energy efficient, but also providing pressure (and perhaps even a market) for energy conservation from existing facilities. The policies and regulations developed by and with input from this project will play a part in implementation of these new and more stringent goals. China's commitment to limiting emissions of CO₂ emissions to a peak at or around 2030 reinforces the environment for continuing relevance of the project outcomes.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Satisfactory

98. The World Bank team worked closely with the Government to develop the project concept, which was founded both on many years of experience cooperating in the field of EE, and based on changing circumstances in China and considering lessons from other countries. The PDO and the GEO were well-defined, simple without being overly restrictive (particularly after AF/restructuring), and realistic. The M&E design was balanced, with indicators that were practical to measure and to verify, which was especially important given the participation of financing institutions not previously accustomed to this kind of oversight. The mix of quantitative and qualitative indicators was appropriate, given the project's ambition not only to directly support

specific investments, but to help build capacity for future investments, although the inclusion of several intermediate outcome indicators that were merely subsets of the PDO and GEO indicators (for example, energy savings and CO₂ emissions reductions from EE subprojects instead of from the whole portfolio of subprojects) was unnecessarily duplicative. The targets proved to be appropriate to the resources available for the project, and did not need to be revised, even as circumstances facing the PMO and PFIs evolved.

99. Starting a project with the intent of creating a new entity to be the PMO (NECC, an agency under the direction of the NDRC) was a risk, but one that was founded on the demonstrated long-term commitment of the GoC, and on the deep trust formed between the NDRC and the World Bank over many years of engagement.

(b) Quality of Supervision

Rating: Satisfactory

100. The World Bank team conducted regular supervision missions, initially annually, and then semiannually from about the time of approval of AF. It engaged frequently with the PMO and the Project Implementation Units to support their implementation, resolving issues as they arose, and seeking the attention and support of the Government as needed. Any delays in implementation were addressed with alacrity. Implementation Status and Results Reports were informative, fair and candid, and completed on time. The World Bank team was very flexible in designing the project to respond to the Government's needs and was proactive with restructuring to adjust the project to the new environment.

101. As this was the first onlending operation for EE, fiduciary oversight was strong. In the early stages of the project, oversight by the World Bank team and auditing found several instances of eligible expenditures. The PFIs, with guidance from the World Bank team, quickly took remedial actions and the latter stages of the project saw good performance, as they built up systems and norms for monitoring and compliance.

102. Safeguards oversight was also effective. Owing to the nature of the project, environmental impacts were expected to be minor, but the PFIs, with support from World Bank safeguards specialists, established appropriate systems for monitoring of subproject performance. When an unforeseen instance of relocation was found for a subproject of Huaxia, the team took immediate action to work with the PFI to resolve the situation, and to ensure that the OM was modified to ensure proper handling of any future instances. One such instance was encountered, and inspection by the World Bank team showed that Huaxia and the subproject were in compliance.

103. This project was a platform for the World Bank to conduct EE policy dialogue with the NDRC, including on the EE priority programs for the 12th and 13th FYPs, and just-in-time policy support as needed.

104. The project also enabled the World Bank team to provide extensive support to the PFIs, particularly during the initial and final stages of project implementation, to help them build capacity for subproject origination, to broaden their understanding of new market segments, and to develop innovative financing products.

105. The PMO and the PFIs all reported their satisfaction with the professionalism, the expertise, and the readiness and willingness to support their implementation of the project.

(c) Justification of Rating for Overall Bank Performance

Rating: Satisfactory

106. Based on satisfactory performance both during design and implementation as described above, and supported by feedback from the PMO and the PFIs, the overall rating of World Bank performance is judged to be Satisfactory.

5.2 Borrower Performance

(a) Government Performance

Rating: Satisfactory

107. The performance of the NDRC, which remained highly engaged throughout the project, was satisfactory. It provided timely guidance and support to the PMO, and cooperated with the World Bank team to address issues of project design and implementation. It provided direction to the PMO on policy development and capacity-building activities, and ensured that outputs were designed so they could make effective contributions to the national policy making process.

108. The NDRC was attentive both to the policy support components, where the recommendations made in many policy studies were adopted into policies and regulations that were promulgated during the project, and to the EE investment components. The NDRC regularly met with the PFIs, recommended potential subprojects, and took measures to urge them to accelerate project implementation. In the case of Minsheng (CHEEF II), which did not perform as well as the two PFIs of CHEEF I, the NDRC took special care to try to incentivize improvement in performance.

(b) Implementing Agency or Agencies Performance

Rating: Satisfactory

109. **PMO.** The performance of the PMO, which was newly established during the initial stages of the project, was Satisfactory. While a change in leadership of the PMO led to a short period of delay, the hiring of a highly capable new head through a competitive process led to even stronger performance later on. The PMO cooperated very well with the World Bank team, and was active in providing support to the PFIs, which was essential in assisting them to learn compliance with World Bank systems, and how to effectively utilize the resources available through the project, particularly the GEF funds.

110. **PFIs.** The performance of EXIM and Huaxia was Satisfactory overall. As is common to many projects, initial unfamiliarity with World Bank systems led to some issues that needed to be addressed. Turnover of staff in the PFIs, as is common in large commercial banks, was a constant challenge, but a number of staff, particularly at Huaxia, were allowed to remain in place and develop further expertise. Nevertheless, both EXIM and Huaxia made significant efforts to develop their dedicated teams, to provide performance incentives to staff and branches, to establish effective EE financing procedures and regulations, and to develop new financial products to implement the projects and mainstream EE financing.

111. The performance of Minsheng, which was the PFI for CHEEF II (a US\$100 million loan for EE onlending, designed after CHEEF I) was Moderately Unsatisfactory. Turnover among team members was quite high, with six distinct teams over the course of its participation in the project. While each new team demonstrated willingness and ability, none were in place long enough to become effective. Moreover, there appeared to be issues in internal organization. One team in particular was able to affect implementation of a significant set of market research activities, but by themselves these were insufficient to make a large difference. This negatively impacted both the implementation and eventual outcome of both the CHEEF II loan project, and the activities to support the CHEEF II loan that were implemented under the GEF portion of CHEEF I.

(c) Justification of Rating for Overall Borrower Performance

Rating: Satisfactory

112. **The overall rating is Satisfactory based on the overall performance of the Government, the PMO, and the two key PFIs for this project, EXIM and Huaxia, as described above.** These have shown strong ownership of the project results, and have demonstrated their intent to carry the lessons and capacities resulting from this project into their future work. The remaining PFI, Minsheng, affected a very small share of the GEF grant (just over 3 percent), and its impact on the overall rating is thus correspondingly small.

6. Lessons Learned

113. The project yielded a number of important lessons:

- (a) **PFIs' commitment and internal organization are essential factors in the success of EE lending.** There is no single ingredient to this; rather, commitment is exhibited in a number of areas, including management commitment, formation of and long-term support for dedicated teams, provision of incentives to staff, and flexibility and innovation in developing and adapting financial products.
- (b) **TA has a high payoff.** The PFIs found the TAs to be very important in several ways, from generating knowledge about unfamiliar market segments, to becoming aware of new market opportunities, to designing new products to take advantage of them. Even learning how to work with World Bank financial management and safeguards systems paid off, and helped the PFIs adapt more quickly to China's evolving banking regulatory environment. While initially seen as an onerous requirement, training in World Bank systems prepared PFI staff to handle new, more stringent national regulations in these areas. Units with staff so trained found that these staff were frequently 'poached' by other units that needed such capabilities.
- (c) **Generating sufficient deal flows has not been easy.** The economic slowdown hit energy-intensive manufacturing industries, which were the original target of the project, particularly hard. Additionally, as EE projects have been undertaken nationwide, and as the number of large industrial enterprises has shrunk owing to consolidation, low-hanging fruit, in the form of discrete, large retrofit projects affecting single processes or even single pieces of major equipment have mostly been harvested. Great potential still lies in systemic retrofits, but these tend to be technically

complex and difficult to evaluate. The PFIs, with support from the PMO and the World Bank team, continually adjusted the approach to implementation to adapt to the changing market.

- (d) **Balance sheet financing remains the preferred model for bank lending.** Encouraging participating banks to undertake project-based financing and expand support to small and medium enterprises and ESCOs, which may be technically capable and have strong projects but weak balance sheets, was and remains a major challenge. The project addressed this, particularly in training of staff in units responsible for project risk evaluation, but it remains a challenge throughout the banking system. Other aspects of the project also helped to institutionalize project-based financing as an alternative to traditional approaches, including business development to identify potential deals through market promotion workshops and alliances with industry associations, market studies of targeted sectors, and creation of new financial products such as project-based lending and asset-based securitization.
- (e) **Building EE remains an extremely tough market segment for financing institutions to lend to.** Despite allocation of significant resources after the restructuring opened up the building sector, in addition to industry, to eligibility for IBRD loan financing, the PFIs were unable to find any building EE projects suitable for financing, whether single subprojects, or packages of subprojects. The potential remains very large, and continued innovation is needed in this sector.
- (f) **Flexibility in project design is required.** This proved especially true for the GEF components. As economic and market conditions evolve over the course of a years-long project, it is important to leave room to change and to adapt capacity building and policy studies as national priorities shift. At the project design stage, it was not possible to envision all the required policy studies and TA activities. During implementation, the project team made adjustments and adaptation to meet the Government's changing priorities, which were also reflected in the World Bank's dialogue with China.
- (g) **Timing of implementation can lead to challenges, requiring flexibility to respond.** In the early years of the project, the industrial economy was quite strong, and many technically and financially EE projects were available. This was when the PMO and the PFIs were building capacity and learning to utilize the new financing instrument provided by the project. By the time that they were well-practiced in its use and ready to scale up, in the latter stages of the project, softening energy prices and demand for industrial products had reduced the pool of eligible projects, at the same time that the gradual devaluation of the CNY rendered the U.S. dollar-denominated loans offered through the project less attractive. Additionally, the market demand for financing of RE projects—which also reduce CO₂ emissions—was on the rise. Introducing flexibility in scope for implementation in future projects is needed to adapt to Government's emerging priorities and changes in the economic and technical environment. This also highlights the importance of capacity building; the skills of the EE units in the PFIs were significantly strengthened in the early years of the

project, so they were able to continue to identify and finance industrial EE investments even in the more challenging environment.

- (h) **Long-term, programmatic engagement has substantial impact.** This project was founded on long-term dialogue with government, and resulted in a program that combined multiple activities. The World Bank was able to respond with the blended resources needed (GEF grant plus IBRD lending) needed simultaneously to maintain policy dialogue, to carry out TA, and to finance investments. At the same time, the programmatic approach runs the risk of becoming a piecemeal approach; in this project, the fragmentation of policy study contracts weakened strategic focus. The programmatic approach also requires intensive supervision from the World Bank team.
- (i) **Individuals matter.** To the extent that the project was achieved its goals in a cost-effective manner, it owes much to the competent project management teams, with contributions from world-class international and Chinese experts.

7. Comments on Issues Raised by Borrower, Implementing Agencies and Cofinancier

114. No comments were received on the ICR from the borrower, the PMO, the PFIs, or the GEF.

Annex 1. Project Costs and Financing

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

China Energy Efficiency Financing and Additional Financing - P084874 and P123239			
Components	Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
Component A: Promotion of EE Financing	8.8	8.8	100
Component B: Energy Conservation Investment Lending	999.0	1,417.9 ^b	142
Component C: National Policy Support and Capacity Building	0.0	0.0	
Component D: Project Implementation Support, Monitoring and Reporting	0.3	0.3	100
Total Financing Required	1,008.1	1,427.0	142
China Energy Efficiency Financing - P098916			
Components	Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
Component A: Promotion of EE Financing*	9.9	6.7	67
Component B: Energy Conservation Investment Lending	0.0	0.0	
Component C: National Policy Support and Capacity Building ^a	2.8	5.9	221
Component D: Project Implementation Support, Monitoring and Reporting	0.8	0.8	100
Total Financing Required	13.5	13.4	99
Grand Total	1,021.6	1,440.4	141

^a Funds originally allocated to performance-based grants under Component A were reallocated to policy support and capacity building under Component C.

^b The AF of investments was mainly in the form of equity investments by host enterprises, per Table (b) below.

(b) Financing

P084874 & P123239 - China Energy Efficiency Financing & AF				
Source of Funds		Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
Borrower		6.3	6.3	100
International Bank for Reconstruction and Development Loan		300.0	300.0	100
Borrowing Country's Participating Financial Intermediaries		402.8	416.8	103
Sub-borrowers (Industrial Enterprises)		299.0	703.9	235
Total		1,008.1	1,427.0	142
P098916 - China Energy Efficiency Financing: GEF Grant				
Source of Funds		Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
GEF		13.5	13.4	99
Total		13.5	13.4	99

Annex 2. Outputs by Component

1. The outputs of this project were numerous, and are covered in detail in the Borrowers' ICRs. The following sections provide a brief overview of some of the major outputs, without repeating material in the body of the ICR.

Component A. Promotion of Energy Efficiency Financing

2. This component removed key barriers to developing energy conservation financing businesses in the domestic banking sector primarily for medium and large-size industrial energy conservation investments, expanded under the AF to include the buildings sector and ESCOs.

3. Huaxia's program, for instance, included a number of studies that were crucial to helping it understand unfamiliar market segments (Table 2.1). Notable among these was a series concerned with energy performance contracts (EPCs) and the ESCOs that carry them out. This business is central to scaling up the EE business, and helped build awareness and capability in the one of the commercial banks that will provide much-needed financing. Notably, this project also supported policy development in this arena, a complementary development necessary to build a healthy environment for this segment of the EE business to thrive.

4. The program also encompassed setting up a dedicated EE unit, and holding 30 training sessions at branches around the country, attended by over 2,000 staff during the course of the project (

6. Table 2.2). A number of the trainings served multiple purposes, supporting not-only the World Bank project, but also providing training to staff implementing an AFD-financed project that initially supported lending to EE projects, but later turned toward RE projects, as the market for the former slowed and for the latter accelerated. This is a prime example of how the project's impact was felt beyond the limits of the lending directly supported by CHEEF I.

7. EXIM's shares of expenditures on its corresponding program are show in Figure 2.1. For EXIM, perhaps the most important use of the grant funds was to develop and improve its management system for handling EE projects.

8. As a measure of the confidence gained through this project, both EXIM and Huaxia applied to become implementing agencies of the Green Climate Fund in 2016. Some of Huaxia's GEF-funded activities supported preparation of the World Bank's Program for Results operation to reduce air pollution through deployment of clean energy in the Jing-Jin-Ji region by building a robust pipeline in the target and neighboring regions, and by preparing an OM and independent third party verification protocols.

Table 2.1. Huaxia: GEF-supported Research Activities

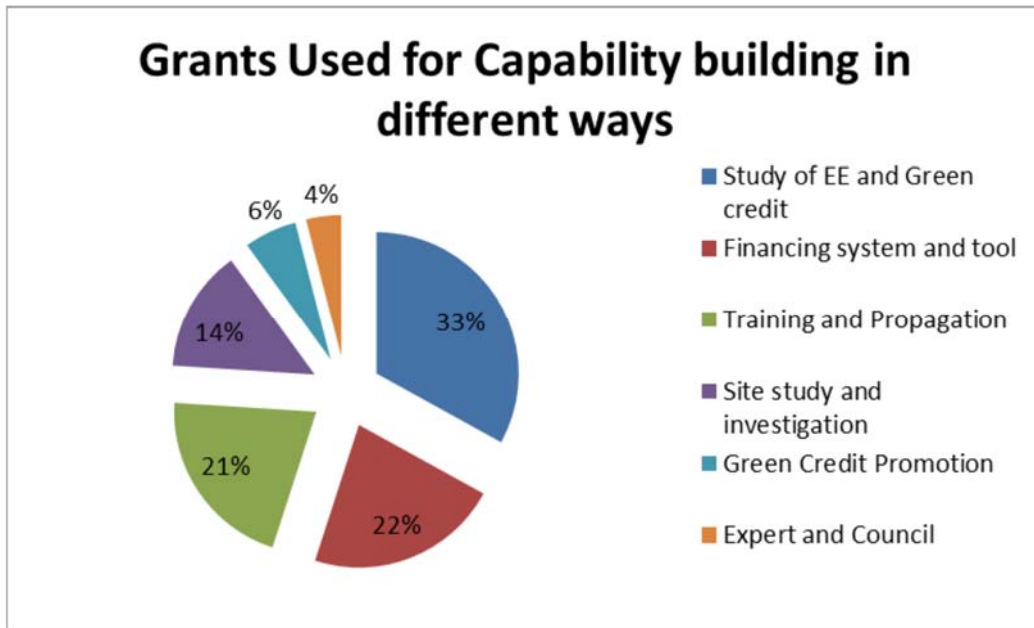
Topic	Date	Details
Opportunities in Developing the Energy Conservation and Environment Protection Industry	Oct. 2015	
Research on Financial Support for the Synergetic Development of Energy Efficiency Industry in Jing-Jin-Ji Region	Dec. 2014	<ol style="list-style-type: none"> 1. Status quo and barriers to developing EE industry in Beijing, Tianjin and Hebei (Jing-Jin-Ji [JJJ] region) 2. Policy support, integrated market mechanism and safeguard measures for development of EE industry in JJJ region 3. Expanding investment portfolio and boosting financial product innovation for typical clients in EE industry
Analysis and Promotion of Asset Securitization of EPC Projects	June 2014	<ol style="list-style-type: none"> 1. Current regulatory system on asset securitization and future development trend 2. Improving awareness and capacity for EPC asset securitization through various business models 3. Strengthening the financial support to ESCO industry through asset securitization 4. Research on current situation of EE industry
Development and Promotion of Financial Products for Low-Carbon Projects	March 2013	<ol style="list-style-type: none"> 1. Recent market dynamics of low-carbon financial products and derivatives 2. Designing and testing low-carbon financial products compliant with regulatory requirement; improving and promoting such products to build low-carbon brand 3. Trainings for Hua Xia staff on banking peer moves, low carbon product features, and risk management, with reference to bank operations, market situation and policy changes
Industrial Analysis and Promotion	Dec. 2010	<ol style="list-style-type: none"> 1. Improving capacity and understanding of iron & steel industry: status, relevant EE technologies, energy saving potential, and economic benefits 2. Disseminating energy saving technologies to iron & steel industry through green lending

Table 2.2. Huaxia: GEF-supported Capacity-building Activities

Year	No.	Province	Department	Trainees	Trainers or Topic
2009	1	National	Credit Examination Center (headquarters & branches), Corporate Banking Dept (branches)	72	First training class for AFD project
	2	Beijing	Credit Examination Center (headquarters & branches), Corporate Banking Dept (branches)	94	PMO, Energy Research Institute, NDRC, Energy Management Company Association
	3	Hebei	Corporate Banking Dept, subsidiary operation units (Shijiazhuang branch), regional Credit Examination Center	98	National Energy Administration, Hebei DRC
	4	Shandong	Corporate Banking Dept, subsidiary operation units (Jinan & Qingdao branches), regional Credit Examination Center	75	Shandong Economic and Information Technology Commission EITC), Shandong Finance Bureau, Shandong industry experts
2010	5	Shaanxi	Corporate Banking Dept, subsidiary operation units (Xi'an branch), regional Credit Examination Center	66	Shaanxi DRC, Shaanxi Xinglong Cogeneration Co. Ltd.
	6	National	Credit Examination Center (headquarters & branches), Corporate Banking Dept (branches)	75	Second training class for AFD project
	7	Hubei	Corporate Banking Dept, subsidiary operation units (Wuhan branch), regional Credit Examination Center	70	Prof. Liu Miao
	8	Shanxi	Corporate Banking Dept, subsidiary operation units (Taiyuan branch), regional Credit Examination Center	131	Shandong EITC, Shanxi DRC
	9	Jiangsu	Corporate Banking Dept, subsidiary operation units (Nanjing, Wuxi, Suzhou & Changzhou branch), regional Credit Examination Center	145	Jiangsu EITC, Jiangsu ERI; Energy and Environment School, Southeast University
	10	Sichuan	Credit Examination Center (headquarters & branches), Corporate Banking Dept (branches)	60	Experts from AFD Beijing Office
	11	Chongqing	Corporate Banking Dept, subsidiary operation units (Chongqing branch), regional Credit Examination Center	107	Chongqing EITC
2011	12	Fujian	Corporate Banking Dept, subsidiary operation units (Fuzhou, Quanzhou & Xiamen branch), regional Credit Examination Center	73	Fujian DRC, Finance Bureau, and Environment Protection Bureau; experts from key industrial sectors
	13	Regional	Promotional activity for Jiangsu key clients	40	Key clients of Huaxia
	14	National	Corporate Banking Dept and Credit Examination Dept (headquarters, branches)	72	Third training class for AFD project
	15	Hunan	Corporate Banking Dept of Changsha branch, regional Credit Examination Center, and branch's subsidiary operation units.	70	Hunan DRC
	16	Guangxi	Corporate Banking Dept, subsidiary operation units (Guangxi branch), regional Credit Examination Center	70	Guangxi DRC, Finance Bureau, and Environment Protection Bureau; experts from key industries
	17	Guangdong	Corporate Banking Dept, subsidiary operation units (Guangzhou, Dongguan & Foshan branch), regional Credit Examination Center	51	Fujian DRC, Finance Bureau, and Environment Protection Bureau; experts from key industries

Year	No.	Province	Department	Trainees	Trainers or Topic
2012	18	Shenzhen		60	ERI, EMCA
	19	Tianjin	Corporate Banking Dept, subsidiary operation units (Tianjin branch), regional Credit Examination Center	60	Tianjin Environment Protection Bureau, Tianjin Industry & Information Technology Committee (IITC)
	20	Liaoning	Corporate Banking Dept, subsidiary operation units (Shenyang branch), regional Credit Examination Center	80	Shenyang DRC; Shenyang IITC
	21	Jilin	Corporate Banking Dept, subsidiary operation units (Changchun branch), regional Credit Examination Center	40	Jilin Environment Protection Bureau, Jilin IITC
	22	Chongqing	Headquarters, and Credit Examination Center at branch level	70	ERI, experts from Chinese Research Academy of Environmental Sciences
	23	Lijiang	Training under AFD Energy Efficiency and Renewable Energy Program	70	ERI
	24	Changsha	Headquarters	50	Corporate Banking Dept, Huaxia headquarters
	25	Shijiazhuang	Headquarters and Corporate Banking Dept at branch level	70	Corporate Banking Dept
2013	26	Shanghai	Corporate Banking Dept, subsidiary operation units (Shanghai branch), regional Credit Examination Center	90	Shanghai DRC, EMCA Shanghai
2014	27	Beijing	Corporate Banking Dept and Marketing Dept at branch level, and key sub-branches	113	Corporate Banking Dept, Huaxia headquarters; Prof. Haipeng NIU, Renmin University; experts, Hengtai Securities
2015	28	Beijing	Corporate Banking Dept and Marketing Dept at branch level, and key sub-branches	100	Training on green lending business throughout Huaxia
2016	29	Zhengzhou	Corporate Banking Dept at branch level, and key sub-branches	50	Training on PforR program and CHEEF
	30	Beijing	Corporate Banking Dept at branch level, and key sub-branches	120	Green lending business
Total				2,342	

Figure 2.1. EXIM's Expenditures of GEF Grant Funds



9. The PFI of CHEEF II (Loan No. 79350, P113766), Minsheng, was the recipient of assistance similar to EXIM and Huaxia. This component strengthened the capacity of Minsheng in: (a) identifying and appraising subprojects and conducting due diligence on subloan beneficiaries; (b) developing credit and risk management processes for EE investments; (c) managing the social and environmental impacts of the Project and its future EE lending portfolio; (d) developing a low-carbon lending business; and (e) exploring the application of the Equator Principles in its lending practices. In the course of this, Minsheng commissioned research reports (Table 2.3) for use in the foregoing activities. The activities were financed by Minsheng with its own resources at US\$0.8 million and by GoC from the GEF grant (US\$0.47 million) under the ongoing World Bank financed CHEEF.

Table 2.3. Minsheng: GEF-supported Research Activities

Topic	Implementing Organization
Recent developments in the ESCO industry and new areas of ESCO services.	China Standards Research Institute & Lurong (Beijing) Investment Consortium
Review of recent studies, reports and industry and market data on solar, wind, energy service and energy conservation industries	Zhongguancun New Century Photovoltaic Tech Alliance
Appraisal of current status and trends of EE in the iron and steel industry	Metallurgy Industry Design Institute
Introduction and application of the Equator Principles in Chinese commercial banks	Beijing Weilafangzhou Consulting
Appraisal of current status and trends of EE in the nonferrous metals sector	Beijing Zero-Carbon Times Management
Appraisal on current status and trend of the gas flaring reduction in the oil and gas industry sector	Dehuitongli (Beijing) Oil Tech Services
Set up projects management information system (MIS) Procurement, finance, documents and Project achievement dissemination	Beijing Yingkangda Tech
Research and Study in China commercial banks' risk portfolio analysis and prevention management in green credit	Beijing North Shibo Investment

Component B: Energy Conservation Investment Lending

10. This component led to investments in 41 subprojects financed by the two PFIs. Funding for these included not only investment lending but also equity investments by beneficiary enterprises. Subprojects financed by Huaxia and EXIM are listed in Table 2.4 and Table 2.5. These represent the direct impact of the project's demonstration of the credit line for EE projects, leveraging public funds (IBRD loan) with both commercial financing (from the PFIs) and equity from the beneficiary enterprises.

Table 2.4. Subproject Loan Disbursements by Huaxia

No.	Subproject Owner	Subproject Category	Investment (CNY 10,000)	CO ₂ Reduction (10,000 tons/year)
1	China Haohua Chemical (Group) Corporation	Technical renovation, chemical manufacturing processes	15,360	17.1
2		Energy system optimization	8,357	15.9
3		Technical renovation, chemical manufacturing processes	46,200	26.4
4	China United Cement Corporation	Power generation with waste heat from cement production line	11,639	8.8
5		Power generation with waste heat from cement production line	6,693	4.6
6		Power generation with waste heat from cement production line	6,123	4.1
7		Power generation with waste heat from cement production line	6,207	3.9
8	China United Cement Lunan	Power generation with waste heat from cement production line	7,225	6.3
9	Sinoma Cement Corporation	Power generation with waste heat from cement production line	10,830	14.9
10	Fujian Xinhai Metallurgy.	Power generation with recovered gas from steel production line	12,000	9.8
11	Wuxi Xielian Thermoelectricity	Heat supply network construction	43,300	45.4
12	Weihai Blue Star Glass Holding	Power generation with waste heat from glass production line	6,607	3.7
13	Taibo Changjiang Glass	Power generation with waste heat from glass production line	4,573	2.0
14	Beijing Taiyanggong Gas & Thermopower	Utilization of waste heat from recirculating cooling system in thermal power plant	11,200	4.6
15	Tangshan Sanyou Thermal Power	Combined heat and power	43,500	17.8
16	Tianji Coal Chemical Group	Denitrification and dedusting renovation	14,000	4.4
17	Chifeng Fulong Thermal Power	Hot water boiler heating	51,386	16.8
Total			305,20	206.4

Table 2.5. Subprojects Loan Disbursement by EXIM

No.	Subproject Owner	Subproject Category	Investment (10,000 yuan)	CO ₂ Reduction (10,000 tons/year)
1	Linglong Chemical	Waste gas power generation	12,016	14.54
2	Hubei Huaxin Cement	waste heat power generation	31,616	26.45
3	Wuhan Iron and Steel	CDQ, heating furnace, steam utilization	35,600	26.96
4	Luquan Dingxin Cement	Cement waste heat Recovery	6,065	8.28
5	Henan Billions Co.,	Gas waste power generation	3,500	3.83
6	Henan Jiyuan Iron and Steel	Gas waste power generation	5,399	15.08
7	Shandong Shiheng Iron and Steel	Gas waste power generation	26,636	29.55
8	Nanjing Iron and Steel	8 projects in furnace heat recovery, waste recovery and device Optimization	40,726	23.9
9	Valin Steel	CDQ and TRT	27,235	20.1
10	TISCO Stainless	Sintering waste	22,815	16.69
11	Tianjin Iron and Steel	Coal injection process	15,980	29.46
12	Henan Zhonglian Glass	Waste heat Recovery	7,153	5.49
13	Chengdu Taibo	Waste heat Recovery	5,437	4
14	Anhui Fangxing Glass	Energy saving and waste heat power generation	14,150	5.86
15	Lafarge Cement	Waste heat recovery	31,150	17.6
16	Qinghai Qiaotou Aluminum Industry	Energy optimization	15,000	16.1
17	Chengming Paper	Energy saving optimization	26,264	13.49
18	Handan Iron and Steel	CDQ waste heat power generation	38,098	18.57
19	Handan Iron and Steel	Gas-steam CCPP	92,164	60.97
20	Qingtongxia Aluminum Industry	Electrolyzers save electricity	17,942	11.04
21	Wuyang Iron and Steel	Energy optimization in steel mills	22,000	13.46
22	State Grid Energy Service Co., Ltd	Power optimization	50,786	20.85
23	Valin Steel	Waste gas power generation	42,687	37.86
24	Benxi Iron and Steel	CCPP	71,100	25.08
Total			661,519	523.5

11. Huaxia’s subprojects were located in most regions of the country, with nearly a third of the nation’s provinces represented (Figure 2.2). By far the largest amount went for investment in power and heat sector projects, such as utilization of waste heat and construction of heating networks, followed by chemicals and cement (Table 2.6).

Figure 2.2. Locations of Subprojects Financed by Huaxia (Share of Total Financing)

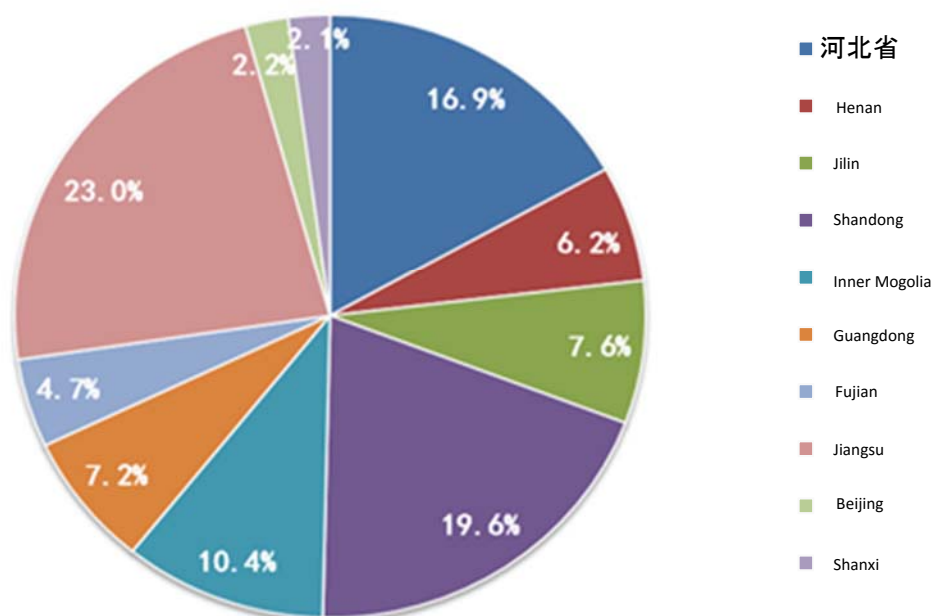


Table 2.6. Industrial Subsectors of EE Subprojects Financed by Huaxia

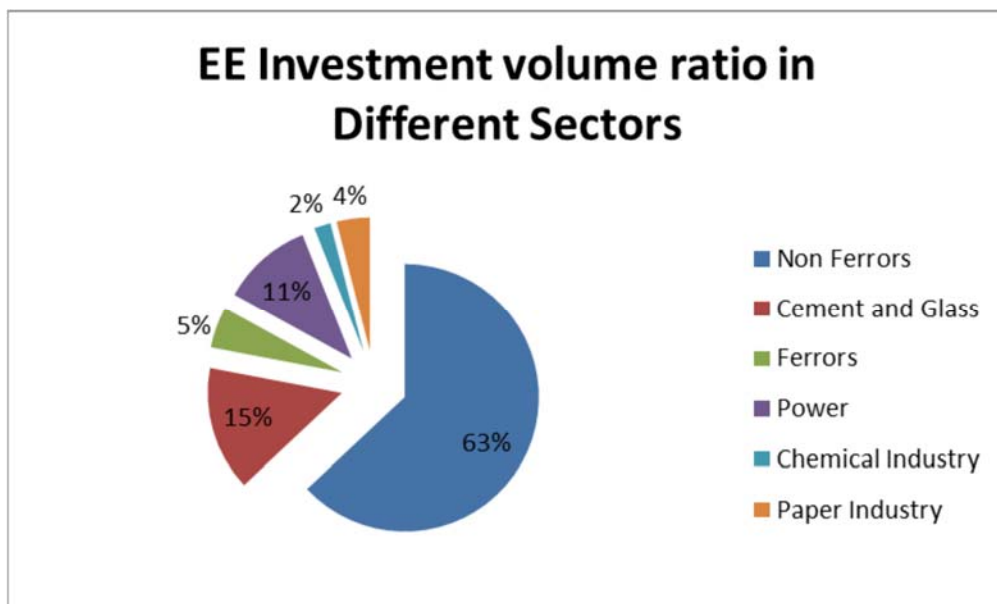
Industry	No. of Sub-Projects	Total Investment (10,000 yuan)	IBRD Funds (10,000 dollars)	Counterpart Funds (10,000 yuan)	Energy Savings (10,000 tce/year)	CO ₂ Reduction (10,000 tons/year)	Investment per Unit of Energy Saving (yuan /tce)
Chemical	3	69,917	1,003	15,045	24.3	59.3	2,877
Cement	6	48,717	3,245	3,945	17.4	42.5	2,794
Iron & Steel	1	12,000	660	4,200	4.0	9.8	3,000
Electricity	4	149,386	4,450	38,517	34.7	84.7	4,303
Glass	2	11,179	637	2,400	2.3	5.6	4,804
Coal	1	14,000	578	5,800	1.8	4.4	7,778
Total	17	305,200	10,573	69,907	84.6	206.4	3,608

12. The locations of subprojects finance by EXIM were also spread across all regions of the country (Figure 2.3). In terms of the portfolio, however the financing of projects was heavily weighted toward the nonferrous metals industry (Figure 2.4), distantly followed by chemicals and electric power generation.

Figure 2.3. Locations of Subprojects Financed by EXIM



Figure 2.4. Industrial Subsectors of EE Subprojects Financed by EXIM (share of total financing)



Component C: National Policy Support and Capacity Building

13. This component strengthened national government capabilities to implement national energy-efficiency policies and programs.

Establish and build capacity of NECC

14. This component helped to establish the NECC in 2010, which then became home to the PMO. It then proceeded to gain capacity continuously throughout the period of the project. It successfully executed its responsibilities for providing support to the PFIs in executing their duties under the project. NECC's capacity was supported through the following activities:

- (a) support to international exchanges such as G20 EE action plan and APEC EE Task Force, and international study tours for NDRC and NECC;
- (b) promotion of Energy Management System and EE technology platform;
- (c) industrial EE diagnosis guidelines; and
- (d) training provided to NECC and local Energy Conservation Centers.

Support for priority EE policies

15. GEF funding has made significant contributions to the implementation of the EE program for the 12th FYP and development of the EE priority programs for the 13th FYP. The policy recommendations from the studies have been translated into many policies and regulations.

16. For the 12th FYP, the project supported:

- (a) development of the 12th FYP priority EE retrofit program, priority EE technology demonstration program, and 12th FYP EE implementation action plan;
- (b) EE assessment for green field investments, where the results from the project supported studies became regulations and standards;
- (c) design of the online energy monitoring platform, which has been adopted by the government and piloted in three provinces, and the scale-up program to nationwide has been approved;
- (d) total energy consumption cap warning system, which has been put into operation;
- (e) the government performance evaluation system incorporating EE as a criterion;
- (f) the improved EE standards and the Top Runner program has resulted in developing and tightening 10 EE standards for appliance and industrial equipment, and government guidelines to implement EE Top Runner Programs and government's publishing Top Runner List of fridges, air conditioners, and televisions. To continue this effort, implementation details on the program and Top Runner lists of other key equipment and appliances are being future developed;

- (g) design of EE trading scheme; and
- (h) EE measurement and verification for the 10,000 priority enterprises.

17. The project has also played an important role in supporting the more recent high-level government priorities and the development of priority EE programs for the 13th FYP:

- (a) Energy Consumption Revolution study, following President Xi Jinping's call for an energy revolution through designing a long term strategy at the national level;
- (b) study on the revision of EC Law, leading to change in energy appraisal procedures for EE projects;
- (c) allocation of the 13th FYP EE target to provinces and the priority 10,000 enterprises;
- (d) development of the 13th FYP energy conservation action plan;
- (e) study on alternative energy to replace decentralized coal burning for heating in countryside; and
- (f) fiscal and financial policy recommendations on how to use government funds to leverage EE financing in the 13th FYP, guiding government's design for a more market based mechanism to support EE investments with government budget.

Developing EE financing policies

18. To enable replication across the banking sector the successful experience of EXIM and Huaxia Bank with the credit line model, which leverages limited government funds, the GEF funding was also used for:

- (a) support to the CBRC to develop incentive policies and guidelines to promote EE financing in the banking sector;
- (b) study of various options using the government budget such as replicating the credit line model, interest rate buy-down, establishing an EE Fund, and so on;
- (c) support the establishment of an EE financing platform as a bridge between the financiers and the enterprises/ESCOs; and
- (d) development of enterprise Green Bonds guidelines.

Component D: Project Implementation Support, Monitoring and Reporting

19. This component, carried out by the PMO, mostly involved the recruitment of consultants and limited incremental operating cost, such as office rental, basic equipment, utilities and travel, and so on. Due to the innovative character, scale and complexity of the project, GEF support was proposed to assist the government in project implementation support, and M&E. The funds were used for assistance in the coordination of TA activities to the banks and the government, as well as organizing project monitoring, evaluation, and reporting activities.

20. The funds also paid for assistance to support the independent verification of energy conservation lending for the allocation of the performance-based GEF grant and to monitor energy savings performance of subprojects financed by the PFIs. These capabilities were essential building blocks for the banks to undertake their entry into green financing, and enabled them to innovate and provide new products for this growing market.

Annex 3. Economic and Financial Analysis

1. **Project efficiency is rated as High**, based on high efficiency of a representative sample of EE investment subprojects, and high implementation efficiency as detailed below. Key indicators are summarized in Table 3.1 below.

Analysis at project appraisal

2. According to the PAD, the project was built on the premise that the expected type of EE subprojects would be economically justified if they were financially viable. The PAD noted that most such investments are economically justified, especially at high energy prices, which were expected to prevail in the medium term. In China, where coal is the dominant fuel, the economic justification would be even stronger because of the significant environmental benefits expected from EE investments. Analyses conducted during project preparation, as outlined below, validated the conclusion that typical subprojects would both be financially viable, and have economic returns exceeding financial returns. For this reason, the PFIs were required to analyze and confirm that selected subprojects were financially viable without necessarily further analyzing expected economic impacts.

3. A preliminary study for CHEEF found that investments in 56 technologies across the iron and steel, chemical, and cement industries had a median FIRR of 27 percent, and a median payback period of 3.3 years. Eight of the technologies had payback periods longer than eight years. To be eligible for financing, subprojects would have to demonstrate a payback period of less than 10 years, based on the cash flow benefits derived from associated energy savings.

4. Further economic and financial analyses were carried out on four representative subprojects, which were part of the first batch of subprojects envisaged for financing under the proposed project. These subprojects included two to recover and utilize waste heat for power generation, one to upgrade fans and pumps, and one to revamp a production line in a petrochemical complex. The financial impacts of the subprojects were analyzed based on the financial benefits, derived mainly from energy savings, and the investment costs and incremental operating costs. Key assumptions are set out in Table 3.1. The analysis at appraisal, excluding income tax, showed that these four subprojects would have an aggregate financial internal rates of return (FIRR) of 28 (ranging from 11 to 48) percent and corresponding payback period of 2.9 (1.6 to 7.0) years thus demonstrating their financial viability.¹¹ The return rates exceed the 8 percent weighted average cost of capital assumed for a typical medium to large commercial enterprise in China. The analysis showed the aggregate EIRR would be 34 (ranging from 13 to 63) percent, accounting environmental benefits from reduced emissions with conservative assumed values of US\$4,978 per ton (t) of particulates, \$218/t sulfur dioxide (SO₂), and US\$10/t carbon dioxide (CO₂). These rates exceed the 12 percent economic discount rate normally applied to Bank projects in China at

¹¹ Analysis at appraisal calculated a median payback period of 2.7 years based on gross cash inflow (excluding operation costs). The value of 2.9 years is a recalculation using net cash flow, to be consistent with the stated FIRR. Assuming tax of 25 percent, the FIRR would be 22 (ranging from 7.4 to 37) percent and payback period 3.9 (2.2 to 9.6) years. Analysis at appraisal also included a scenario of carbon financing, which made the projects more attractive. As no project received carbon finance, that scenario is not reported here.

the time of appraisal, thus demonstrating high economic efficiency.¹² Accounting for CO₂ alone, but using an updated value of the social cost of carbon starting at US\$30/t in 2015, produces similarly high economic rates of return of 40 (16 to 77) percent.

5. The total investment for the four hypothetical subprojects analyzed was CNY344 million (US\$48 million), equivalent to 8.1 percent of the original estimated US\$593.6 million total project finance, or 5.3 percent of the cumulative US\$900 million incremental EE investments expected to be supported by the project, including investments resulting from promotion activities with AF. Equivalent energy savings and emissions reductions were assumed to apply pro rata to other subprojects and investments supported by the project, to derive the original target results of US\$900 million investments with annual energy savings of 2.07 Mtce, and annual emissions reductions of 5.05 million tons of carbon dioxide (Mt CO₂). With AF, the revised target results were for US\$1,328 million investments with annual energy savings of 2.66 Mtce, and annual emissions reductions of 6.49 Mt CO₂.¹³ Neither the AF project paper (2011) nor the restructuring paper (2013) included further economic or financial analysis.

Analysis during implementation

6. The project OM required PFIs to evaluate individual subprojects prior to approving onlending according to a set framework. The framework aimed to ensure, among other things, that the subprojects would be technically feasible, reliable and efficient, in particular, contributing to the improvements in EE and realization of energy savings. To this end, the framework required sub-borrowing enterprises to provide data, including a baseline of quantities and average prices for all forms of energy consumed annually for the most recent two years, and forecast of output production and energy spending (both quantity and price for each energy type) under the first ten years of project implementation, with accompanying assumptions.

7. All 41 financed subprojects are of a similar type to those analyzed at appraisal. All else being equal, this would imply that all subprojects would have economic benefits that exceed financial returns, consistent with the analysis at appraisal.

Analysis at completion

8. The borrower's ICR provides investment size, energy savings and emissions reductions for the 41 financed subprojects (17 by EXIM Bank and 24 by Huaxia Bank). For the purposes of evaluation at completion a representative sample of 9 subprojects have been selected. The sample selection covers the range of industrial sectors, size of investments, and cost per unit of energy

¹² Applying the 2016 guidance note '*Discounting Costs and Benefits in Economic Analysis of World Bank Projects*', suggests a 12 percent social discount rate for China remains appropriate in 2017 based on World Bank China Country Economist estimates that GDP will grow at an average annual rate of 6 percent for the foreseeable future.

¹³ The PAD economic and financial analysis extrapolated the analysis to a lower figure of \$571 million investments (70 percent debt, and 30 percent equity financing in the first five years of project implementation) with overall annual energy savings of 1.5 Mtce, and annual emissions reductions of 3.6 Mt CO₂.

savings found among the 41 subprojects (Figure 3.1). The sample also includes five subprojects from EXIM Bank and four from Huaxia.¹⁴

9. Together, these nine subprojects involve a total of US\$505 million investment, representing 35 percent of final total US\$1,427 million investments supported by the project, and 23 percent of total energy savings supported by the project. Inclusion in the sample of the largest subproject (EXIM No. 19 Handan Iron and Steel), which also happens to be the least cost-effective (US\$1,354/(tce/year)), makes the sample appear less cost-effective than the project as a whole, and thus renders these results conservative.

10. The analysis at completion takes the final reported values of investment amount, energy savings and emissions reductions, and combines these with the cash flows expected according to the feasibility report for the sampled subprojects, to derive internal rates of return and payback periods. Where the feasibility reports have gaps, ambiguities or variations in methodology, the analysis presented in this ICR makes simple, consistent assumptions to allow comparison. Some feasibility reports included sensitivity of findings to key variables, such as fuel prices. Table 3.1 presents key indicators from the feasibility reports aggregated across the sampled subprojects, and the associated assumptions.

11. The analysis suggests an aggregate internal rate of return of at least 35 percent in economic terms (including CO₂ emissions reductions valued at US\$30/t in 2015 rising to US\$65/t in 2040, in accordance with 2015 World Bank guidance), or 16 percent in financial terms (including tax) with a payback period of 5.9 years (Table 3.2). These values are broadly on par with those expectations at appraisal, demonstrating economic and financial viability. The economic rate of return would be higher still including the benefits of reducing local pollutants, which are excluded here for simplicity given that local environmental impacts are not part of the PDO, and that data on local pollutants is not consistently available for subprojects.

12. Extrapolation at completion for remaining subprojects is not attempted due to the complexity of accounting for diverse types of subprojects. However, based on known parameters, the results are likely to be in the same order of magnitude.

13. In summary, the subprojects' designs are in line with the project's intended objectives and, despite the higher unit cost of energy savings, represent a high level of efficiency, similar to what was expected for hypothetical subprojects at appraisal.

Implementation efficiency

14. Implementation efficiency is rated high based on timely and effective implementation. The extension of closing date reflected AF and an expanded scope of activities, notwithstanding initial

¹⁴ A fifth Huaxia subproject was intended to be included in the analysis sample at completion, however insufficient data was available for the original selection (No. 2 Siping Haohua, for which no feasibility report was available) and for a proposed alternative (No. 16 Qinghai Qiaotou, the feasibility report of which did not include financial indicators).

Table 3.1. Input Values and Results for Analyses of 4 Hypothetical Subprojects at Appraisal, and a Sample of 9 Subprojects at Implementation

Row	Parameter	Unit	4 Subprojects at Appraisal	9 Subprojects at Completion
	Assumptions			
1	Exchange rate ¹⁵	CNY/\$	7.15	6.15 to 6.95
2	Electricity tariff (excluding tax) ¹⁶	CNY/kWh	0.378 to 0.560	0.256 to 0.585
3	Value-added tax (VAT) for electricity and coal	%	17	17
4	CO ₂ emissions factor for electricity generation	g/GWh	869.5	Various
5	Unit value of CO ₂ emissions avoided (updated) ¹⁷	\$/t	30	23 to 59
6	Effective subproject lifetime from first year of operation	years	20	20
7	Social discount rate ¹²	%/year	12	12
	Subproject data			
8	Total lending investment	\$ million	48	505
9	Annual energy savings from first year of operation	ktce/year	127	638
10	Average annual net financial benefits to implementing entity (cash flows) ¹⁸	\$ million	17	79
11	Average unit investment cost of annual energy savings ([1]/[7])	\$/tce/year	379	792
12	Annual CO ₂ emissions avoided from first year of operation	kt CO ₂ /year	313	1,925
13	Average emissions intensity of energy savings ([8]/[7])	t CO ₂ /tce	2.46	3.02
14	Average annual economic value of avoided CO ₂ emissions	\$ million	11	50
	Economic and Financial Analysis Results¹⁹			
15	FIRR (including tax)	%/year	22 (7 to 37)	16 (9 to 52)
16	Payback period (including tax)	years	3.9 (2.2 to 9.6)	5.9 (2.4 to 9.4)
17	EIRR (including CO ₂ benefit at updated value, excluding local pollutants)	%/year	40 (16 to 77)	35 (22 to 93)
18	Economic net present value (excluding CO ₂ benefit, with social discount rate)	\$ million	46 (-0.8 to 24)	131 (-2 to 78)
19	Marginal abatement cost (-[18]/([6]x[12]))	\$/t CO ₂	-7 (-12 to 1)	-3 (-15 to 1)

CNY = Chinese Yuan

¹⁵ Analysis at completion uses actual average annual historic exchange rates from 2014 to 2016 as indicated on page i, and 6.89 CNY/US\$ for 2017 onward.

¹⁶ For appraisal, feed-in tariff is 0.378 CNY/kWh and industry consumption tariff is 0.560 CNY/kWh.

¹⁷ World Bank 2015 guidelines recommend US\$30/t in 2015 rising to US\$65/t in 2040 as a base case social cost of CO₂. This is applied with incremental annual values for (re-)analysis of the two effective subprojects' feasibility, for the assumed operation period of 20 years. Re-analysis of the three hypothetical subprojects from appraisal uses a fixed value of US\$30/t, for simplicity. The results are nevertheless comparable.

¹⁸ Net cash flows include benefits from energy savings and costs of operation and maintenance. Average annual net cash flows are inferred from the subproject investment divided by the reported payback period for each subproject.

¹⁹ Appraisal values of FIRR and payback period are based on net cash flows (including operation and maintenance costs) and assume tax of 25 percent. Completion values are based on data and methodologies in the feasibility reports of sampled subprojects, which vary across subprojects. For some subprojects, average annual net cash flow was inferred from the payback periods reported in the feasibility reports.

US\$ = United States Dollar
tce = metric ton of coal equivalent.

Table 3.2. Details of 9 Subprojects Sampled for Analysis at Completion Out of 41 Total Subprojects

Subproject No.	Enterprise Name	Investment			Energy savings (Mtce/year)	CO ₂ emissions saving (Mt CO ₂ /year)	Emissions intensity (tCO ₂ /tce)	Unit cost of energy savings (US\$/tce/year)	EIRR (%)	FIRR (incl. tax) (%)	PBP (incl. tax)
		CNY m	US\$ m	Year							
EXIM 6	Henan Jiyuan Iron and Steel	54	9	2012	0.062	0.151	2.44	138	93	31	3.2
EXIM 16	Qinghai Qiaotou Aluminum Industry	150	23	2011	0.066	0.161	2.44	352	72	52	2.7
EXIM 17	Chenming Paper	263	38	2009	0.058	0.135	2.33	664	24	9	9.3
EXIM 19	Handan Iron and Steel	922	146	2012	0.108	0.610	5.65	1,354	36	16	5.9
EXIM 24	Benxi Iron and Steel	711	113	2015	0.091	0.251	2.75	1,239	24	12	8.0
Huaxia 3	Dezhou Shihua Chemical Co. Ltd. (subsidiary)	462	68	2009	0.108	0.264	2.44	626	25	9	9.2
Huaxia 9	Sinoma Hengda Cement Corporation Ltd. (subsidiary)	108	16	2008	0.061	0.149	2.44	255	76	40	2.5
Huaxia 12	Weihai Blue Star Glass Holding Co. Ltd.	66	11	2013	0.015	0.037	2.47	716	30	27	4.7
Huaxia 17	Chifeng Fulong Thermal Power Co. Ltd.	514	82	2015	0.069	0.168	2.43	1,185	22	9	9.4
Aggregate for sample 9 subprojects		3,250	505	-	0.638	1.925	3.02	792	35	16	5.9
Aggregate for all 41 subprojects		9,667	1,328	-	2.670	6.510	2.44	497	n.a.	n.a.	n.a.
Sample as share of all 41 subprojects		38%	34%	-	24%	30%	124%	159%	-	-	-

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Leiping Wang	Senior Energy Specialist	GEE09	Task Team Leader
Ashok Sarkar	Senior Energy Specialist	GEE05	Energy Efficiency
Bernard Baratz	Consultant	GEEDR	Consultant
Haixia Li	Senior Financial Management Specialist	GGO20	Financial Management
Mei Wang	Senior Counsel	LEGAM	Lawyer
Nancy Chen	Senior Financial Sector Spec.	GFM08	Financial Sector
Nuyi Tao	Senior Carbon Finance Specialist	GCCFM	Carbon Finance
Robert P. Taylor	Consultant	GEE03	Energy Efficiency
Xiaowei Guo	Senior Procurement Specialist	GGOGI	Procurement
Ximing Peng	Senior Energy Specialist	GEE09	Technical
Cristina Hernandez	Program Assistant	GEE02	Assistant
Dan Xie	Program Assistant	EACCF	Assistant
Supervision/ICR			
Xiaodong Wang	Senior Energy Specialist	GEE09	TTL
Yun Wu	Energy Specialist	GEE09	co-TTL
Fang Zhang	Senior Financial Management Specialist	GGO20	Financial Management
Feng Liu	Senior Energy Specialist	GEE03	Technical
Haixia Li	Senior Financial Management Specialist	GGO20	Financial Management
Mei Wang	Senior Counsel	LEGAM	Lawyer
Nancy Chen	Senior Financial Sector Specialist	GFM08	Financial Sector
Nuyi Tao	Senior Carbon Finance Specialist	GCCFM	Carbon Finance
Xiaowei Guo	Senior Procurement Specialist	GGOGI	Procurement
Zheng Liu	Procurement Specialist	GGO08	Procurement
Ximing Peng	Senior Energy Specialist	GEE09	Technical
Jonathan Edwards Sinton	Senior Energy Specialist	GEE05	ICR Author
Alan David Lee	Energy Specialist	GEE09	ICR Team
Takayuki Doi	Senior Power Engineer	GEE09	ICR Team
Shanshan Ye	Team Assistant	EACCF	Assistant
Cristina Hernandez	Program Assistant	GEE02	Assistant
Tianxiu Kang	Program Assistant	EACCF	Assistant
Dan Xie	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		
		128.25 (travel)
		77.10 (consultants)
Total:	49.56	205.35
Supervision/ICR		
		96.14 (travel)
		100.15 (consultants)
Total:	80.21	196.29

Annex 5. Stakeholder Workshop

1. A knowledge exchange workshop was held in Xiamen, Fujian Province on November 7, 2016 (agenda below). It was a joint workshop of CHEEF I and II, and was attended by NDRC, NECC, CBRC, the PMO, the three participating banks (EXIM, Huaxia and Minsheng), and selected grantees for strategic policy studies for developing the 13th FYP (2016-2020), improving the fiscal and taxation policies for EE using public funds, and replacing decentralized coal boilers.
2. During the workshop, key success factors and lessons learned from the project implementation were summarized and shared. Moreover, the participating banks exchanged their experience in deal origination, innovative financing products, and banks' internal organization and incentives. The participants also shared thoughts on the trends and future focus of EE financing in China.
3. As pointed out by the NDRC representative, the CHEEF program was China's first experiment with financing EE through a credit line offered through domestic banks. The results proved successful, and the experience learned has been very valuable to the government's policy making and to the national market for EE market. NDRC is contemplating rolling out a similar credit line with government funds to scale up EE financing.
4. NDRC proposed to organize a high-level project closing workshop will be organized in 2017 to publicize the project impacts and further disseminate the experiences and lessons learned to a broader audience.

Table 5.1. CHEEF Program Knowledge Exchange Workshop Agenda Xiamen, Fujian, China, November 7, 2016

Topic	Presenter(S)
I. Opening Remarks	
Moderator: Xu Zhiqiang, Deputy Director General, NECC	
CHEEF Program: Contributions to China’s Energy Efficiency Program in the 12 th and 13 th FYP	Zhao Huaiyong, Director, NDRC
Green Financing: Ecological Dividend	Ye Yanfei, Deputy Director General CBRC
GEF funding to support China’s EE policy and build capacity	Tian Min, Deputy Director, MoF
CHEEF Program: Contributions to China’s Green Finance and Energy Efficiency Programs	Wang Xiaodong, Task Team Leader for CHEEF I, World Bank
II. CHEEF Program: Progress, Success Experience, and Lessons Learned	
Moderator: Wu Yun, Co-Task Team Leader for CHEEF I, World Bank	
NECC/NDRC/PMO	Zhang Yunpeng, PMO Director
Support to 13 th FYP: Energy conservation action plan	Chinese academy of social sciences
Support to 12 th FYP: fiscal and taxation policies	Central University of Finance and Economics
EXIM Bank	Zhang Ying, Deputy General Manager, EXIM
Hua Xia Bank	Zhang Yunmiao, Deputy General Manager, Hua Xia Bank
Minsheng Bank	Minsheng representative
III. Knowledge Exchange – Bank’s Internal Organization and Deal Origination	
Moderator: Ministry of Finance and China Banking Regulatory Commission	
<ul style="list-style-type: none"> • What is the successful experience? • What are the lessons learned? • What can be done differently? • What are the financial products that are better tailored to the market? • What are the future trends and innovative ideas 	All participants
IV. Knowledge Exchange—Enabling Environment for Scaled up EE	
Moderator: Jiang Jinghao, Deputy Director, NDRC	
<ul style="list-style-type: none"> • What is the successful experience? • What are the lessons learned? • What are the incentive policies to promote EE financing? • What are government’s plan to use public funds to leverage commercial financing for EE? 	All participants
V. Next Steps	
Moderator: Todd Johnson, Task Team Leader for CHEEF II, World Bank	
<ul style="list-style-type: none"> • How to more widely disseminate the knowledge from the CHEEF program • How to further scale up EE in China and internationally • Suggestions on the next steps 	All participants
VI. Closing Remarks	
Closing Remarks	Xu Zhiqiang, Deputy Director General, NECC Wang Xiaodong, Task Team Leader for CHEEF I, World Bank

Annex 6. Summary of Borrower's ICR and Comments on Draft ICR

1. The PMO, EXIM and Huaxia each prepared substantial ICRs. The full reports and annexes are available in WBDocs. The following excerpts of the three Borrower ICRs preserve the wording the original reports with edits for brevity, focusing on passages concerning their evaluation of the project outcomes and lessons. Material presented above in the body of the report is not repeated here

Summary of PMO's ICR

Project Achievement

Promotion of the FYP

2. The project promoted the implementation of energy conservation policies through top-down design and planning. It strongly supported the fulfillment of the EE objectives stated in the 12th FYP (2011-2015). In fact, between 2011 and the end of 2015, energy intensity of GDP fell by 18.2 percent, which exceeded the target of 16 percent for the FYP.

3. The Project focused on the following aspects: putting the plan into practice, carrying out the energy conservation projects, improving the supervision and management system of energy conservation, exploring the marketization of energy conservation mechanism and helping the government with their performance evaluation on energy conservation.

4. The project also supported the 12th FYP with researches about its energy conservation implementation programs, major energy conservation renovation projects, and major energy conservation demonstration projects. An important contribution was made in implementing the 12th FYP, and exceeding the binding objectives and tasks.

5. Meanwhile, in view of China's local evaluation management issues such as lacking of standards, the Project supported the introduction of the national management of fixed asset investment projects, EE assessment and review. It played an important supporting role on promoting the effective assessment and control of energy excessive consumption.

6. In addition, the Project supported the researches about online monitoring of key energy users, transaction on energy conservation, government EE performance management, and marketization of energy conservation management. The government's modern energy conservation management capacity was highly enhanced.

Contribution to the medium and long-term strategy

7. As China is speeding up the construction of ecological civilization and is comprehensively promoting the energy production and consumption revolution, the positions and roles of energy conservation and EE become more vital at the following aspects: reducing pollutant emissions from the source area, slowing down the GHG emissions, improving energy security, cultivating new economic growth. The Project researches focused on decomposition and implementation of the 13th Five-Year energy conservation target and the practicing of major action plans. It offered a decision supporter for introduction relevant policies.

8. At the same time, to mitigate the smog problem, the Project carried out research on reducing coal consumptions in Beijing-Tianjin-Hebei region, and the substitution and clean actions. It became an important reference of promoting the integration of efficient green development in this region.

9. Furthermore, for the long-term strategy and mechanism of energy conservation, the Project carried out researches on energy consumption revolution strategy, EC Law revision, and EE leading action plan. It supported China to develop "Energy Production and Consumption Revolution Strategy (2016-2030) " and "the long-term energy conservation strategic objectives and roadmap". It also built a solid research foundation to promote the legalization of energy conservation constantly.

Development of energy conservation infrastructure and working mechanism

10. The Project has been continuously strengthening the abilities of energy conservation supervision and management, technical services, information dissemination and other basic work, which is the key to implement the energy-saving objectives and tasks and to ensure the relevant laws and regulations have been implemented effectively.

11. The Project pointed at the weakness of energy-saving management foundation in China, and the lack of professionals. It supported the NECC to edit an energy-saving monitoring manual, establish a public service information platform and an energy utilize report platform system of key users, project review management information system and contract energy management platform, and so on. And it started a study on establishing China's independent energy auditor system, which is a decision-making reference for strengthening the grass-roots energy conservation management and professional training.

12. At the meanwhile, the Project actively promoted international EE exchanging and cooperation, supported the research and implementation of G20 Energy Efficiency Lead Programme (EELP), Top 10 energy-saving technologies and best practices ("Double Best Top Ten") and other activities. It provided important support for promoting global EE cooperation and China as a leading role.

13. Besides, during the implementation of programs, the Project also organized a large number of publicity, training, exchange activities, covering energy-saving monitoring and management, technical services, best practice exchanges, international experience sharing, and so on. These activities enhanced China's EE in various fields and helped China increasing its impact in the world.

The allocation of resources and the improvement of the energy conservation financing policy model innovation

14. Financial policy is the most effective tool for enterprises to constantly saving energy and improving EE under the market mechanism conditions. The Project was aimed at the highlight obstacles and weak links in the field of China energy conservation financing. And supported researches and activities such as government funds for lending, green bonds for enterprise and the construction of EE financing service platform, which provided a positive reference for China to improve the green credit, green fund and other related policies.

15. In addition, supporting the onlending bank to carry out energy-saving loan business played a leading role model on continuously expand the scale of banking energy-saving financing and enhanced the level of green financial services.

Project experience and advice

16. The following are key facts to note for similar projects:

- The incentive mechanism of the bank's management system and a professional team are important factors in EE investments.
- The proper planning of technical assessment is critical, especially when using external expert resources.
- Under the conditions of economic slowdown and the increase of energy saving costs per unit, it's hard to maintain a lot of EE investments.
- Medium and small enterprises are struggling with EE investments. The onlending model can effectively enhance the capacity of financial institutions. However, it is difficult to solve the high cost problem of financing. This model could be applied to the 13th edition of the FYP to establish a market-oriented energy-saving mechanism during the early stage.

Evaluation of the World Bank

17. The World Bank team has professional management skills, a lot of knowledge, and they are all hard-workers. They gave us great suggestions to help us improve the implementation of the project and to ensure the results of the Chinese energy-saving financing project were put into effect. The China PMO, NDRC, and project researchers of the project have all gained a great experience from this team. The overall evaluation of the work of the World Bank team is very satisfying.

Sustainability of the Project

18. The project (a) promoted China to strengthen energy conservation continuously and improved EE significantly, (b) ensured that the key energy conservation projects continually play their roles, (c) supported major energy-saving systems and policies to be improved constantly, (d) enhanced the decision supporting capacity and the level of China's energy-saving center system, and (e) promoted international EE cooperation and global EE progress.

Summary of EXIM's ICR

Project Achievement

19. The EXIM developed a large number of projects, which were widely distributed throughout the country. Twenty-three projects were completed in the phase I. The projects selected earlier were mainly waste-heat and residual-gas power generation projects within the steel and the cement industry. At a later period, waste heat power generation projects, power optimization projects

within the glass-building industry were also included. These projects covered different investment capacities. The successful financing of these projects created a good demonstration effect. This project added financial products and expanded financial channels. The details are given in Annex 2.

Energy-saving and emission-reduction results

20. According to the results of the project implemented by the EXIM, the World Bank's EE financing project in China promoted the implementation of the project, which led the EIBC to use foreign capital for energy-saving and emission reduction projects and new mechanisms. Promote energy-saving emission reduction has made a positive demonstration. The detailed results are shown in the Table 6.1.

Table 6.1. Results of EXIM's EE financing

No.	Index	Data	Unit
1	Total investment	66.15	100 million yuan
2	Approved onlending fund	2.78	100 million US dollars
3	Disbursement	2.13	100 million US dollars
4	EXIM approved issuance	20.03	100 million yuan
5	EXIM matched Loan	18.51	100 million yuan
6	Enterprise investment	31.58	100 million yuan
7	Energy saving amount	197	10,000 tons standard coal
8	CO2 emission reduction	523	10,000 tons CO2

Successful Experience

21. The EXIM established a complete system of project reporting, auditing and inspection in line with the World Bank's operation requirements. It smoothly facilitated the implementation and management of this project. Through the project implementation and management, the EXIM's branch offices in China accumulated extensive experience in energy saving projects and finance business developments. The branch offices could innovate and develop new projects and a management mechanism. In addition, it could ensure the rapid development of the project at the local branches and the effective management at the head office.

22. The EXIM has launched a series of training and capacity-building programs by utilizing GEF grants so as to expand business scope, enrich the organization and establish robust management system. Particularly, using domestic and international contract and systematic research makes a full preparation for the development of green credit products.

23. Certain obstacles occurred during the project implementation due to differences in the understanding of several provisions between implementation institutions and the World Bank's interpretation. However, in-depth communication and learning through the project solved these problems. At the same time, this became a solid foundation for the additional finance.

Evaluation of the World Bank team

24. The World Bank, as the leading international financial institution, supported the development of energy saving service industries and created a new mechanism for the contract of energy management services. It effectively promoted the development of energy saving and

emission reduction in China. These activities were conducted in a sustainable manner. Based on the experiences from this project and the World Bank's management mechanism, the EXIM will be able to carry out larger scale projects and make greater contributions for China's energy saving and emission reduction.

Summary of Huaxia's ICR

Project Achievement

25. Under the global background of climate change, the project is the first large-scale and systematic green intermediary lending business in China. It not only brought the internationally advanced financing concepts and green lending system to Chinese commercial banks, but also broadened their visions in credit lending range. In addition, it created a new trend of China to include energy conservation into its medium and long term of social and economic development planning. The most prominent part is that the participating banks widely improved their capability in product development, internal regulation, business management and risk assessment. The project demonstrated a positive effect and boosted public awareness to participate in energy saving. It also contributed to the realization of national target and the tackling of global climate change. The details are given in Annex 2.

Use of GEF Grant

26. Huaxia bank kept on analyzing and trying to solve one problem after another in the process of implementing CHEEF, accumulating experience and making progress step by step. Meanwhile, it also realized that the improvement of its internal condition and capacity became a key factor for the success of project implementation and business transition. Therefore, Huaxia bank fully utilized the GEF grant to support several research. For a solid foundation of business development, it organized 30 times of training participated by 2,342 members of its staff in various forms. The details of the research and trainings are summarized in Table 2.1 and

28. Table 2.2.

Significance of the Project

29. The project ushered Chinese commercial banks into green lending field through means of on-lent funds and TA with advanced experience originated from international financial organizations and foreign governments. By introducing internationally advanced technologies and concepts, commercial banks could effectively improve their business capability, the internal control, their products, and their expertise in greening lending. Moreover, this business model urged commercial banks to take efforts to understand relevant technologies and energy saving market, improve their own systems, and enhance their capacities in business operation through practice. As a result, green lending was fostered into a mature core business in the commercial banks. This promoted the continuous growth and sustainable development of Chinese energy saving industry.

Lessons learned

Sluggish move at the initial stage leading to chance missing at the most rapid period for EE renovation growth

30. As the project was the first on-lent credit facility supported by international financial institution, Huaxia lacked the understanding and capacity at the initial stage. Therefore, the project implementation pace at the initial stage turned out to be slow. This led to missing the chance at the end of the 11th edition of the FYP and the beginning of the 12th edition of the FYP when EE renovation had the most rapid growth and was the most cost-effective.

Narrow investment scope leading to certain difficulty in implementation

31. The investment scope of the project was originally limited to industrial sector. Although it was expanded to all types of EE projects at later stage, this became another factor of the sluggish move at the initial stage. Therefore, the investment area in future program designing should be expanded to some extent as long as it is in line with a specific program objective.

Summary of Minsheng's ICR

32. With the GEF grant support, eight advisory programs were successfully completed as scheduled. These programs covered various areas such as energy saving service, RE, iron and steel, oil and gas, and nonferrous metals industry. The programs also included the Equator Principles, green financing, and information management. The implementation of those topics played a key role in the bank's management enhancement and employees' skill promotion. The topics of research reports commissioned by Minsheng under this project are in Table 2.3.

33. China Minsheng Banking Corp. Ltd. (Minsheng) utilized its entire US\$472,000 allocation of GEF funds. All the expenses were made in compliance with WB procurement requirements. To ensure the quality of sub-projects, Minsheng hired professional procurement and financing staff. Minsheng also invited industry professionals to oversee the production of sub-project deliverables. In addition, Minsheng established a framework to enhance process management.

Annex 7. List of Supporting Documents

- Project Appraisal Document, 38641-CN, 2008
- Implementation Status and Results Reports, Sequence 1-13, 2012-2016
- Aides Memoire, Implementation Support Missions, May 2016 and October 2016
- Loan Agreements, Loans No. 7529-CN and 7530-CN, 2008
- GEF Grant Agreement TF090719, 2008
- Project Agreement, Loans No. 7529-CN and 7530-CN and GEF Grant No. TF090719, 2008
- Additional Financing Project Paper 64561-CN, 2011
- Restructuring Paper, Loans No. 7529-CN and 7530-CN and GEF Grant No. TF090719, 2008, 74654-CN, 2013
- Amendments to Project Agreement, Loans No. 7529-CN and 7530-CN and GEF Grant No. TF090719, 2013
- Amendments to Project Agreement, Loans No. 7529-CN and 7530-CN and GEF Grant Agreement, GEF Grant No. TF090719, 2013
- Borrower Implementation Completion and Results Reports:
 - Project Management Office
 - Hua Xia Bank
 - EXIM Bank
- Presentation: China Energy Efficiency Financing Program, Xiaodong Wang, November 2016

Map. China Provincial Boundaries

