



## 1. Project Data

**Project ID**

P120932

**Project Name**

China Technology Needs Assessment (TNA)

**Country**

China

**Practice Area(Lead)**

Energy &amp; Extractives

**L/C/TF Number(s)**

TF-12536

**Closing Date (Original)**

30-Nov-2015

**Total Project Cost (USD)**

6,700,000.00

**Bank Approval Date**

29-May-2012

**Closing Date (Actual)**

30-Jun-2016

**IBRD/IDA (USD)**
**Grants (USD)**

Original Commitment

5,000,000.00

5,000,000.00

Revised Commitment

4,489,451.55

4,489,451.55

Actual

4,489,451.55

4,489,451.55

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## 2. Project Objectives and Components

### a. Objectives

As stated in the Grant Agreement on page 5, the Global Environment Objective (GEO) is "to support China's efforts to assess climate mitigation and adaptation technology needs and adopt corresponding global best practices". The Project Development Objective (PDO) is the same as the GEO.

### b. Were the project objectives/key associated outcome targets revised during implementation?



No

**c. Will a split evaluation be undertaken?**

No

**d. Components**

The GEF resources funded the five components as delineated below (activities financed by private investors are not detailed by component in the ICR):

**1. Methodology Development, Technical Oversight, Synthesis and Dissemination (cost at appraisal US\$0.593 million, actual cost US\$0.394 million).** This component was to support (i) methodology development, technical oversight, peer review and synthesis of technology methodologies and assessments; and (ii) workshops and consultations.

**2. Technology Assessments at the Sector and Provincial Levels (cost at appraisal US\$2.332 million; actual cost US\$2.108 million).** This component was to support the technology assessments of identified mitigation and adaptation sectors, as well as of several provinces. The assessments were to cover technology identification and gaps, barriers to technology transfer and deployment, and collection of all data and reports for the compilation of the database and the preparation of the synthesis reports.

**3. Capacity Building to Support Climate Technology Networks: (cost at appraisal US\$0.975 million, actual cost of US\$0.864 million).** This component was to include capacity building activities to support one national center, two sectoral centers, and four provincial networks with their own climate technology databases and personnel to serve as knowledge centers or networks.

**4. Pilot Program to Accelerate Technology Transfer (cost at appraisal US\$0.850 million, actual cost US\$0.910 million).** "Technology Improvement Grants" will be awarded on a competitive and cost-sharing basis to small and medium sized companies for the purpose of supporting enterprise-level efforts to accelerate the process of technology modification, deployment, transfer, and/or diffusion. The grants scheme will be focused on the four provinces targeted by the Technology needs Assessments (TNAs), and not be limited to any predetermined industrial subsector

**5: Project Management Office (cost at appraisal US\$0.250, actual cost US\$0.250 million):** This component was to support the establishment and operation of the Project Management Office (PMO) for purposes of project implementation, management, reporting, monitoring, coordination, and dissemination of project results.

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

**Cost:** Total cost of the project amounted to US\$8.03 million, provided by the GEF grant and the Borrower (Private sector) in the respective contributions of 56 percent and 44 percent.

**Financing:** The only external financing was the GEF grant of US\$5.0 million, of which US\$4.5 million had been disbursed by closure.

**Borrower:** The Borrower had committed to co-finance the project in the amount of US\$1.7 million, but the disbursed amount reached US\$3.5 million at project closure, provided by private investors.

**Dates:** In September 2015, the closing date was extended by seven months from November 30, 2015 to June 30, 2016, in order to catch up with the delays caused by procurement challenges



### **3. Relevance of Objectives & Design**

#### **a. Relevance of Objectives**

The objectives are highly relevant to country strategy. Before project approval, China had already committed to combatting global climate change, as later illustrated by the submission of its Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015, and the ratification of the Paris Agreement in September 2016. The NDC lays out China's ambitious commitment to achieving peak CO2 emissions, lowering CO2 emissions per unit of Gross Domestic product (GDP), increasing the share of non-fossil fuels in primary energy consumption, and increasing the forest stock volume. These commitments build on strong near-term national actions on climate change. The 13th Five-Year Plan (FYP, 2016-2020) includes targets for 2020 to reduce the CO2 intensity of GDP by 18 percent, increase the share of non-fossil fuel in primary energy to 15 percent, and increase the forest stock to 16.5 billion cubic meters. Based on the above, the objective of the project was, and remains highly relevant to the country's development and climate change strategies.

The objectives are also highly relevant to Bank strategy. The World Bank Group's Country Partnership Strategy (CPS) for China for the period 20013-2016 has as its first pillar to "Support Greener Growth." This project supports the strengthening of institutional and financial mechanisms for addressing climate change, and for promoting access to new technologies to address both mitigation and adaptation challenges. The objective of the project continues to be highly relevant to the World Bank and its client strategy.

#### **Rating**

High

#### **b. Relevance of Design**

The objectives were stated as a series of activities leading to the generation of a considerable number of outputs, but with comparatively few anticipated outcomes; there was no "higher level" objective. Outputs generated by the project aimed to feed into the achievement of the two sub-objectives, which were also formulated like a series of outputs. The theory of change linking the project activities, the expected outputs and outcomes, and the project's objectives was logical. The completion of a number of technology needs assessments, the preparation of methodologies and guidelines, establishing an analytical database, and the deployment of technology transfer projects could be expected to contribute to the aim of CO2 reduction by leveraging private sector investment, and savings into the process of such a reduction. In particular, multiple capacity building activities funded by the project could be expected to create a critical mass of expertise in China, capable of tapping global climate change technologies to address gaps and challenges.



Rating  
Modest

## 4. Achievement of Objectives (Efficacy)

### Objective 1

#### Objective

To support China's efforts to assess climate mitigation and adaptation technology needs.

#### Rationale

##### Outputs:

- (i) **A comprehensive and systematic review of the status of key climate change technologies was completed through the implementation of 20 climate TNAs.** Overall, the project identified 12 mitigation sectors, 4 adaptation sectors and 4 provincial areas to analyze specific technology needs to address climate change. Three synthesis reports were completed (1 for mitigation, 1 for adaptation, and 1 for provinces), putting together and disseminating the results from the individual sector technology assessments. □
- (ii) **A systematic analytical methodology and guidelines for technology assessment were developed.** The project helped in assessing 476 technologies, and analyzed in detail 120 priority technologies. 7 workshops were organized, including an overall start-off workshop, 3 interim and 3 dissemination workshops respectively on mitigation, adaptation and provincial assessments and an overall closing workshop. Sector priority technologies were further analyzed with a systematic process to identify gaps and barriers in technology transfer, and each assessment generated a set of relevant policy recommendations. The technical guidelines and the assessments were rolled out in order to update TNAs across the country.
- (iii) **An analytical database was set up in order to inform the country's climate technology and broader policies.** A national capacity building center was established at the National Strategy Research and International Corporation for Climate Change (NCSC), which is supporting the National Development and Reform Commission (NDRC) on the climate policies. Training was provided by the national center to the network members on the operational manual and the use of the database. The provincial and sectoral centers completed data collection and stakeholder identification and the national center has aggregated the data and input at the national database. These centers formed a strong institutional foundation to support future technology adaptation to the country context. A database housing information on priority technologies collected at the sector and provincial levels was developed, and became a rich pool of technology transfer experience, and case studies and data on the implementation, and a national virtual data hub for facilitating the transfer and investment of climate technologies and can be accessed by the public through <http://data.tnachina.org/>.

##### Outcomes:

According to the ICR, the above-mentioned analytical tools, institutions and initial set of systematically organized data have contributed to the formulation of climate technology policies, though no information is provided about the policies in question. The activities have also supported the annual publication of China's Low Carbon Technology Catalogue by the NDRC.



**Rating**  
Modest

## Objective 2

### Objective

To support China's efforts to adopt corresponding global best practices.

### Rationale

#### Outputs:

- (i) Eight technology improvement grants were competitively selected and were fully executed.
- (ii) Capacity building support was implemented, including the launching of initial network of capacity building centers, including a national center with 4 provincial centers in Guangdong, Liaoning, Jiangxi and Shaanxi; and 2 sectoral centers in the power and building sectors were established. There were also 122 training courses offered and 1,983 stakeholders trained.
- (iii) Institutional arrangements were established to facilitate future technology transfer. The project supported the establishment of a network of capacity building centers for technology adaptation, including a national level center established at the NCSC. Two sectoral centers were also established, covering the power sector and the building sector center. The network mechanism is supported by an information technology infrastructure, which consists of an online database and website for data sharing within the network and dissemination of information to broader stakeholders.
- (iv) 20 training courses and six workshops were provided to 1,281 participants. Most of these activities focused on operational manual training, general methodology, local data collection, and stakeholder feedback solicitation.

#### Outcomes:

- (i) The project supported the deployment of eight technology transfer projects which overcame obstacles in implementation. The sub-grants have leveraged US\$3.5 million investment from the private sector at a 1 to 5 ratio. This result reportedly provided important contributions to accelerating deployment of priority technologies in both climate mitigation and adaptation after the project's completion.
- (ii) The evaluation of impacts and the lessons learned related to technology modification, deployments, transfer and/or diffusion found that the program delivered 4.3 million tCO<sub>2</sub>e reduction. Finally, the US\$680,000 grant disbursed leveraged a US\$3.5 million investment, and each ton of CO<sub>2</sub> reduction was accomplished at a reduced cost of **US\$0.97**.

**Rating**  
Substantial



## 5. Efficiency

**Economic and financial efficiency:** There was no economic and financial analysis at appraisal. At closure, a partial economic analysis was conducted, based on the quantifiable economic benefits derived from the Pilot Program of technology transfer projects initiated with project grants. According to the Project Management Office's economic analysis, the project achieved direct lifetime emissions reduction estimated at 4,366,393 tCO<sub>2</sub>e through the sub-grants projects. Based on the total project grant of US\$5 million and the leveraged private sector investment of US\$3.5 million by the pilot program, the project delivered each ton of CO<sub>2</sub> emission reduction at a cost of **US\$1.95**, which is below the current international carbon price of US\$5.3/ton, and significantly below the Bank's shadow price of carbon which is in the range of US\$20/ton.

**Administrative and operational efficiency:** Project delivery was generally efficient. While it took 25 months to prepare a small grant, implementation progressed more rapidly. A dedicated team assumed the workload of processing a large number of small contracts, outsourced the pilot program management in order to leverage external technical capacity, and oversaw complex administrative procedures. The Medium-Term Review (MTR) recommended an extension of 7 months, and a reallocation of resources. At closure, more than 90 percent of the grant resources had been disbursed, and the grant leveraged sector investments in the amount of US\$3.5 million, all of which funded the generation of substantive outputs and some outcomes.

### Efficiency Rating

Substantial

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

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal		0	0 <input type="checkbox"/> Not Applicable
ICR Estimate		0	0 <input type="checkbox"/> Not Applicable

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

## 6. Outcome

Relevance of objectives was high, and that of design modest. With regard to the first of two objectives – assess climate mitigation and adaptation technology needs – efficacy is rated modest. There were a considerable number of outputs, but few identifiable outcomes. Efficacy of the second objective – adoption of global best practices – is rated substantial. Achievements included a leverage of investment from the private sector, and the reduction of CO<sub>2</sub> emissions with substantial saving on costs. Efficiency was substantial, on account of CO<sub>2</sub> reduction below the current international carbon price and significantly below the Bank's shadow price of



carbon, and there were few administrative and operational inefficiencies.

**a. Outcome Rating**

Moderately Satisfactory

## **7. Rationale for Risk to Development Outcome Rating**

The ICR reports that the Government of China has taken a proactive role in international negotiations and climate change efforts. Domestically, the Government continues enhancing actions to put in place fiscal and taxation incentives, funding supports, capacity building and awareness building, and in addressing intellectual property rights. The Government is contributing to finding a common ground through international conventions and cooperation in addressing issues of financing gaps, political support and commercial interests, and technology transfer has been one of the key topics in the international climate change negotiation process. There is a Memorandum of Understanding (MOU) between the Bank and the NRDC, which underscores a commitment to climate change, and there is also a Bank-supported climate change program, involving a substantial portfolio. Considering these factors, the risk to development outcomes achieved with the project's support is rated modest.

**a. Risk to Development Outcome Rating**

Modest

## **8. Assessment of Bank Performance**

**a. Quality-at-Entry**

The project team tapped technical international experience at the time of project design. The project's financial arrangements were consistent with the regulations issued by the Government, and they were specified in the grant agreement. Implementation arrangements included (i) a strong policy leadership and a dedicated project management team to address the very complex administrative procedures, and (ii) the outsourcing of the pilot program management to leverage external technical capacity. However, the preparation of the grant took about 25 months, due to its complexity, and to the fact that no other developing country and as large as China had ever initiated a TNA. Thereafter, the large number of small contracts led to complex procurement arrangements, and this impacted the timeliness of approval and implementation. A different design approach could have emphasized larger but fewer contracts, thereby reducing the process necessary for contracts signature. Moreover, as indicated under Section 3, the statement of objectives could have been clearer, and this would have permitted better M&E arrangements to assess progress toward expected results.





## **Quality-at-Entry Rating**

Moderately Satisfactory

### **b. Quality of supervision**

Supervision relied on biannual missions and monthly visits to the PMO by the country office staff, training and workshop sessions, reviews of semi-annual project progress reports and annual audit financial reports, and monitoring of result indicators. As the original results framework had weaknesses (see Section 10a below), additional reporting formats were adopted by the Bank to allow the PMO to better track progress. Because of procurement challenges identified after project approval, procurement and financial management specialists from the country office met with the PMO whenever guidance was needed. The Bank team also coordinated with the UNFCCC's Climate Technology Center and Network to provide the PMO with the possibility of conducting international dissemination and exchange in the area of technology needs assessments. To address implementation delays, the Bank team used the mid-term review to develop a restructuring that extended the closing date, and reallocated some resources. The Bank's team also ensured smooth communication between the Ministry of Finance and other implementing entities on financial reporting and payment. However, while supervision facilitated implementation, notably by removing obstacles in the financial and procurement transactions, interventions could have taken place earlier at the point when those weaknesses were first recognized.

## **Quality of Supervision Rating**

Moderately Satisfactory

## **Overall Bank Performance Rating**

Moderately Satisfactory

## **9. Assessment of Borrower Performance**

### **a. Government Performance**

The Government has shown strong support to technology measures addressing climate change, as well as technology transfer in the ongoing climate negotiations, as illustrated by the appointment of NDRC qualified experts to lead the climate change negotiation process. The central government performed well in establishing and institutionalizing a climate technology network, composed of a national level center and provincial centers with a database and an information system. However, the Central Government did not support a revision of the results framework that could have permitted a better tracking of the progress toward result, and when the project closed, the PMO was dissolved resulting in challenges to retrieve information for the ICR preparation.

## **Government Performance Rating**

Moderately Satisfactory





## **b. Implementing Agency Performance**

The ICR reports that the PMO provided effective coordination with key stakeholders, and oversaw project execution and monitoring, and reported results in a timely manner. However, the project faced persistent implementation delays after approval, as PMO team members were absorbed by international climate change negotiations. Moreover, protracted approval processes impeded smooth project implementation, and the PMO had to find the best way to overcome such administrative hurdles. The leadership level of the PMO was often vacant, and the PMO lacked the needed coordination and technical leadership to improve project implementation. After the PMO was dissolved, the technical staff was incorporated in the National Strategic Research and International Cooperation Center for Climate Change (NCSC), which continues to coordinate with the provincial and sectoral centers on the technology transfer agenda.

### **Implementing Agency Performance Rating**

Moderately Satisfactory

### **Overall Borrower Performance Rating**

Moderately Satisfactory

## **10. M&E Design, Implementation, & Utilization**

### **a. M&E Design**

The design of the results framework put more emphasis on gauging generated outputs in the areas of technology assessments and capacity building activities than on outcomes. Out of the ten result indicators, only two of them intended to measure outcomes (economic benefits of technology transfers and GHG emissions avoided), the remaining indicators being intermediate benchmarks toward the project objectives. Moreover, the framework could profitably have been more comprehensive in order to underscore and link the activities and the expected outcomes. Some of the indicators had baselines, others did not, though all had annual and final target values. The PMO was in charge of the M&E system through the semi-annual progress reports.

### **b. M&E Implementation**

As the results framework was not effective in guiding implementation, a parallel monitoring tool was developed to allow the PMO and the Bank to better track procurement and the interim disbursement status. The Central Government did not support a revision of the results framework that could have permitted a better tracking of the progress toward outcomes. As the results framework was ineffective as an M&E tool, the Bank team sought to revise it, but the ICR team reported that "the PMO did not support the proposition, arguing that the Government was interested in having all activities completed, and not in a delayed bureaucratic exercise of measuring project performance".

### **c. M&E Utilization**



The Bank used its internal operational system and trust fund portal to confront the resource use and the generation of outputs and outcome.

## M&E Quality Rating

Modest

## 11. Other Issues

### a. Safeguards

The project was classified as Category C for environmental assessment purposes as no adverse environmental impacts were foreseen. No safeguards policies were triggered. ☐

### b. Fiduciary Compliance

**Financial management:** Financial management and reporting were in line with the Government's regulations and the requirements specified in the grant agreement. All the project audit reports had unqualified opinions.  
**Procurement:** ☐ A key challenge consisted in managing the selection process for a large number of small-value consulting contracts, and contract monitoring to ensure that the deliverables were of high quality. This was addressed through hiring individual technical consultants to support preparation of the terms of reference of contracts and management of the technical elements during the procurement process. There were no reported cases of misprocurement.

☐

### c. Unintended impacts (Positive or Negative)

None reported.

### d. Other

None reported.

## 12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
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Outcome	Satisfactory	Moderately Satisfactory	Little concrete evidence of outcomes is provided for the first of two objectives.
Risk to Development Outcome	Modest	Modest	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Borrower Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of ICR		Substantial	---

### Note

When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.

The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

## 13. Lessons

The first three lessons are taken from the ICR, with some adaptation of language, and the other two are drawn by IEG:

- (i) Climate technology transfer requires close collaboration between all stakeholders, primarily the public and private sectors, with an important role to be played by public sector entities, in guiding climate technologies that provide a public good. The public sector resources are necessary to act as a catalyst in leveraging private sector resources to be invested in climate change technology.
- (ii) There is a need for a good balance between technical depth and implementation practicality in the design of the project. Both aspects are indispensable, and there has to be awareness that a technically sound project that is difficult or impossible to implement is not a good project. This project was technically sound, but practical implementation concerns could have been thought through more thoroughly.
- (iii) Getting the procurement process right is critical for smooth implementation. Procurement of goods and services is the process that makes or breaks project implementation. In this case, the multiplicity of small contracts was a major obstacle to rapid project implementation.
- (iv) Attention to project design and development of an adequate results framework are important underpinnings of smooth implementation and of achievement of results. The shortcomings in the design and its results framework of this project led to difficulties in both implementation and performance assessment.
- (v) It is still possible to generate results even with limited resources, as illustrated by the results achieved with a small Trust Fund amount. Despite the design weaknesses, a wide range of outputs was achieved with a limited amount.

□

## 14. Assessment Recommended?



No

## 15. Comments on Quality of ICR

The ICR is comprehensive, covers all aspects of project design, implementation and results, though it could have been more concise (there are 35 main text pages compared to the guideline of 15). Prominent place is given to the presentation of generated outputs rather than outcomes. Identified lessons and findings are relevant and reflect the experience of project design and implementation. More documentation related to the analysis of economic and financial efficiency would have been helpful.

### a. Quality of ICR Rating

Substantial