

Approach Paper
Energy Efficiency Finance:
An Impact Evaluation of China Utility-Based Energy Efficiency Finance (CHUEE) Program

Independent Evaluation Group – IFC

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A. Overview

Improved energy efficiency reduces operations costs. At the same time, it also cuts power and heat generation-related greenhouse gas and air emissions (particulate matter, sulfur and nitrogen dioxide) that are harmful to the environment and human health. These twin benefits have the potential for win-win (or no regret) solutions with positive economic and environmental impacts. This is why IFC, for more than a decade, has been providing financial support to energy efficiency (EE) projects covering both the demand and the supply side of energy. On the demand side, the aim of IFC-supported energy efficiency projects has been to reduce production-specific power and heat consumption at industrial plants, and energy use in buildings. On the supply-side, projects have been focusing on reducing power and heat generation, and transmission losses.

IFC support to EE started with its advisory services operations and then expanded through partnership programs with commercial banks, utility companies, energy management companies and energy efficiency equipment suppliers. The first such program was launched in Hungary in 1997 through the Hungary Energy Efficiency Co-financing Program (HEECP). Subsequently, these activities were expanded to include similar programs such as Commercializing Energy Efficiency Finance (CEEF) in Eastern European countries, Russia Sustainable Energy Finance (RSEF), China Utility-Based Energy Efficiency (CHUEE) and Philippines Sustainable Energy Finance. IFC is planning to further expand such operations to other countries and regions.

Fundamentally, these programs are aimed at promoting commercial financing of energy efficiency projects through local financial institutions such as banks and leasing companies. The IFC approach is to combine both investment and advisory services operations through provision of: (i) financial products to local financial institutions that make loans for energy efficiency projects, and; (ii) advisory services for capacity-building to financial institutions, their clients and energy service companies (ESCOs). The above programs are typically co-financed by the Global Environment Facility (GEF) and some donor funding.

As IFC is planning to scale up EE business, it is important to review and assess the experience accumulated through past operations. In this regard, IFC commissioned an external evaluation of the first program (HEECP) in 2005, and a mid-term review of the CEEF was done in December 2006. The initial programs in Eastern Europe and Russia were viewed as successful. Some participating banks were nominated for the 2007 Financial Times Emerging Markets Sustainable Bank of the Year award. According to the mid-term review of CEEF, the projects financed through the scheme generated significant annual energy savings of 1,080 terajoules, corresponding to annual cost savings of \$30 million, assuming average electricity price of \$0.1 per kWh. Over the

estimated 10-year life of CEEF-induced efficiency improvements, they are expected to reduce CO₂ emissions by more than 2 million tons. On the other hand, some projects have not been viewed as successful in every country of intervention as two of the five target countries for CEEF have yet to generate traction because demand for energy efficiency finance has not been strong in some markets. Moreover, these reviews have highlighted difficulties of establishing a credible counterfactual of energy savings without IFC interventions. These findings were supposed to be fed into the design of subsequent energy efficiency programs in Russia, China and Philippines. IEG has not yet evaluated these programs, although several Extended Project Supervision reports (XPSRs) were prepared for client financial institutions, which participated in some of them.

Box 1. What is impact evaluation?

Impact evaluation is the counterfactual analysis of the impact of an intervention on final welfare outcomes. Impact evaluation is sometimes narrowly identified (Design 1) as involving randomized *ex ante* assignment of subjects to treatment and control groups. However, Bamberger describes three additional designs for impact evaluation:

Design 2: *Delayed pre-test/post test comparison group design*. Similar to Design 1, except that the evaluation does not begin until the project has been underway for some time, usually as part of the mid-term project review.

Design 3: *Pre- and post-intervention project group and post-intervention comparison group*. In this design, there is no pre-intervention comparison group.

Design 4: *Post-intervention project and comparison groups with no baseline data*. This widely used design defines the post-intervention comparison group as the counterfactual, assuming that any observed differences between the two groups are due to the effects of the project and not to any unobservable pre-intervention differences between the two groups.

As described in section C, the design of this evaluation is similar to design types 3 and 4.

Source: White, H, 2007, "Impact Evaluation – The Experience of the Independent Evaluation Group of the World Bank", Independent Evaluation Group; Bamberger, M. 2006, "Conducting Quality Impact Evaluations Under Budget, Time and Data Constraints", Independent Evaluation Group.

As the first independent evaluation of IFC's EE programs, IEG-IFC will conduct an impact evaluation (see box 1) of the China Utility-Based Energy Efficiency Finance (CHUEE) program. Started in 2006, the program already has some evidence on performance of implemented projects. The evaluation aims at finding drivers for successful and less-successful energy efficiency projects and the program's contribution to the development of sustainable energy finance business in China. It is expected to feed into the ongoing IEG evaluation of climate change, particularly by focusing on the diffusion aspects of financing and industrial technologies related to energy efficiency.

B. The subject of evaluation: The China Utility-Based Energy Efficiency Finance Program (CHUEE)

The CHUEE program was initiated in January 2004 following a request by the Ministry of Finance of the People's Republic of China, which proposed a new private sector initiative aiming at market-based energy efficiency solutions. Accordingly, IFC designed a program for participating commercial banks in China to provide energy efficiency equipment loans to SME energy users and to finance ESCO activities. The program was approved by the Board in May 2006. At the same time, the program also focused on

partnering with gas and electric utilities to market, develop and finance EE projects to their customers. The \$215.5 million-program involves GEF grant of \$16.5 million; IFC investment and advisory services of \$41.1 million, donors contributions (Finland and Norway) \$3 million and Utilities \$4.8 million, with the rest coming from Chinese partner financial institutions.

Energy Efficiency Finance Challenges in China¹

The Chinese government started its policy efforts in energy efficiency through the 2005 Medium- and Long-term Energy Conservation policy. Accordingly, it set target to reduce energy intensity of GDP by 20 percent during the 2006-2010 period. The government moved further ahead in 2007 by strengthening energy saving targets (revision of Energy Conservation Law). At the same time, in its efforts to rein in unbridled expansion of heavy industry, the government barred lending to steel and cement companies. The only exception to this ban is for so-called green projects.

Program Objectives

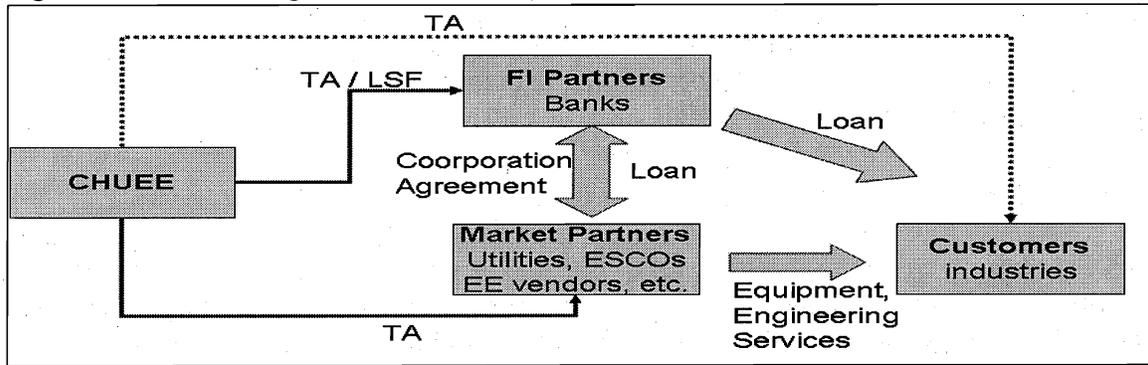
The program's objective is to create effective, commercially sustainable delivery mechanisms for systematically developing, implementing and financing energy efficiency projects with the ultimate purpose of reducing GHG emissions and other adverse environmental impacts. The program was to address barriers to the promotion of energy efficiency in China. The following main barriers have been identified in CHUEE project documents and in the literature on energy efficiency finance more broadly¹. First, there is considerable information asymmetry, which limits the customers' ability to have adequate information or knowledge on energy efficiency technologies and equipments. They are also not confident in ESCO's capability to generate savings. At the same time, the banks are facing some information barriers. They are not familiar with energy efficiency projects or ESCOs, and they normally lend against the balance sheet of the borrower and not against savings coming from the energy efficiency. Collaterals and guarantees are normally required for lending. On top of that, China has its own special barriers in terms of investment controls, incorporation rules, lending rules as well as changing regulations. All these result in high transaction complexity and costs associated with energy efficiency finance, while most of such projects are too small for bank financing under their normal lending practices. Moreover, a cap on interest rates, although less binding in recent years, unintentionally discourages "risk based" lending to industrial energy efficiency projects.

Program Outputs

To overcome such barriers to the energy efficiency investment, the CHUEE program is intended to address two key aspects of the problem—the need for technical assistance in financial engineering and the need for loan guarantees for risk-averse financial institutions, particularly private Chinese banks.

¹ Chander W. and Gwin, H. 2008, *Financing Energy Efficiency in China*, Carnegie Endowment for International Peace.

Figure 1: CHUEE Program Structure



As Figure 1 indicates, there are two main channels of IFC influence in the CHUEE program, under the original structure. One is through the FI partners, which provide loans to the end users. The other channel is through the market partners, which provide energy savings services to the end users. IFC provides a combined package of risk/loss sharing facility (RSF, LSF), technical assistance and advisory services to multiple partners. In particular, IFC cooperates with Chinese commercial banks, offering them a LSF under which it shall bear a certain portion of the loss for all the loans within the energy efficiency financing portfolio. The RSF/LSF is supposed to develop new ways of doing business through energy efficiency financing.

Commercial banks are selected to provide loans for the EE equipment and projects. Bank lending will be supported by an IFC LSF. That facility is designed to partially compensate losses from this line of business for the participating banks. For example, 75 percent of the first 10 percent loss of principal amount will be guaranteed by IFC/GEF, whereas the remaining 25 percent of the loss should be covered by the participating banks. For the remaining portfolio of EE lending (90%), IFC is covering 40 percent of the losses whereas the participating banks should cover the remaining 60 percent. The purpose of the LSF is to provide incentives for participating banks so that they can experiment with EE financing, and also to build their capacity to undertake this kind of business as one of the standard business lines.

Another important channel of influence is through demonstration effects--the program is expected to disseminate information about energy efficiency technology and services, and the benefits of new ways of financing energy efficiency. This is expected to contribute to not just filling the information gap but also to catalyze energy efficiency investment demand for sustainable EE market development.

Expected Outcomes

The specific objectives to be achieved at the end of the program implementation (6 years) are as follows:

- By 2010, 20 million tons of CO₂ and other GHG emission reduction per year;
- The mobilization of RMB 5-10 billion (US\$ 0.7- 1.45 billion) for EE project financing;
- Further development of financing mechanism for environment protection in China;

- Improved private enterprises access to finance in the energy efficiency sector.

Expected Impacts

The ultimate goal of the CHUEE is to help reduce GHG emissions and limit other adverse environmental impacts through transforming the market with the help of energy efficiency equipment and service financing in China. At the same time, it also aims to create a sustainable financing channel for Chinese enterprises and project developers so that they are encouraged to invest in EE projects.

External Assistance to Address Climate Change Issues in China

It is important to note that the IFC's CHUEE program is one of the many programs addressing climate change and energy efficiency in China (see Annex I). For example, IBRD's Energy Conservation projects were working at the same time and in similar markets, approaching barriers to EE through guarantees and technical support to ESCOs rather than banks. The UNDP has also been active in the energy efficiency from different angle. Some players offer some concessional funding for energy efficiency. In CHUEE's absence, these interventions and bilateral donor support would presumably have influenced to some extent the market for energy efficiency finance. These projects may be synergistic or competing with CHUEE. The evaluation will take account of these multiple influences on energy efficiency finance.

Program Performance to date

So far, the first phase of CHUEE program approved 56 projects, with total loan value of US\$ 136 million. The advisory services components of the program provided 17 trainings to bank partners, 31 site visits for energy efficiency marketing and technical supports, 3 industrial and regional energy efficiency opportunities studies and 4 project case studies. The energy efficiency investments under CHUEE I are estimated to have saved 3.36 million tons of CO₂ equivalent per year. The second phase of CHUEE program, which was approved in December 2007, has a pipeline of 40 loans as of April 2009, valued at \$360 million. However, this second phase has just become effective following substantial delays of obtaining approval from Chinese Authority for foreign exchange allocation. The largest share of the portfolio by industry sector is in steel, which accounts for about one-third of the total loan amount, followed by cement (about 25%) and coking.

C. Evaluation of Energy Efficiency Finance in CHUEE: Evaluative Questions and Methodology

The IEG evaluation will focus on efficacy and impacts of the IFC intervention on EE finance in China through the CHUEE program. Since the second phase of the CHUEE has just been approved by the Chinese Authority for the foreign exchange allocation and not yet technically effective, the review focuses on the first CHUEE program. In order to assess the program's performance, this evaluation will focus on comparing the participating CHUEE banks and their clients with similar groups. To assess CHUEE's impact, the evaluation will seek to establish a comparison between what actually

happened and what would have happened in the absence of the intervention². In this evaluation, IEG will select comparison groups which resemble “with-without” scenarios of the intervention in energy finance and will assess the extent to which the program and projects achieved the stated objectives. This will be supplemented by before-after comparison of the participating banks and their borrowers for energy efficiency projects. Only indirectly, by looking at the impact of the program, will the evaluation answer questions on the program’s relevance, effectiveness and efficiency.

Evaluative Questions

The overarching evaluation question for this impact evaluation is: **“Is CHUEE program making progress in achieving its objectives of reducing GHG emissions and other adverse environmental impacts by transforming the market for sustainable energy efficiency financing?”** As the first CHUEE program was approved in 2006 and it is still early in terms of observing the full impact of its intervention, this evaluation is focused on intermediate outcomes and impacts. While it will cover actual levels of GHG emission reductions, its main focus will be on market transformation impacts.

Impacts are expected at two levels: (i) at the level of financial institutions, which adopt and sustain energy efficiency financing on a commercial basis, and (ii) at the level of GHG reducing sub-projects that are financed by the banks. Thus a key question is, is the program successful in removing barriers to energy efficiency investments in China? This evaluation features comparisons of energy efficiency activities and access to finance between treatment groups and comparison groups. Table 1 highlights the approach taken for each group at the different levels and the methodology for data gathering.

Table 1: Treatment and Comparison Groups of various levels

Levels	Treatment Groups	Comparison Groups	Methodology
Financial Institutions	CHUEE participant banks <ul style="list-style-type: none"> Industrial Bank Bank of Beijing 	Non CHUEE participant banks with similar characteristics to CHUEE banks (see Annex II for detailed profile)	<ul style="list-style-type: none"> Interviews surveys on energy efficiency finance among Chinese banks
Sub-projects: Marketing channels	Marketing channels supported by CHUEE	Market channels NOT supported by CHUEE	<ul style="list-style-type: none"> Interviews Survey of ESCOs, in collaboration with the IEG World Bank Climate Change evaluation team and ESCO association
Sub-projects: Industries	Steel or Cement companies obtained loans from CHUEE banks	Comparable companies not receiving loans from CHUEE banks	<ul style="list-style-type: none"> Interviews Survey of steel or cement companies

² IEG, 2007, “Impact Evaluation – the Experience of the Independent Evaluation Group of the World Bank” p. 3.

1) At the level of financial institutions (FIs):

The key questions at the first level are:

- What has been the impact of the CHUEE program on the energy efficiency financing business of participating banks? More specifically, what has been the contribution of the program to the volume/share and quality of energy efficiency financing of participating banks? What is the aggregate GHG reduction of CHUEE-financed EE projects?
- What has been the contribution of CHUEE program to build the capacity of the FI staff to identify, develop and finance EE projects? What is the expected sustainability of staff capacity after the CHUEE program?
- Is risk sharing arrangement more suitable than other types of financial assistance?
- Are there any spillover, demonstration or diffusion effects from the participating banks to other banks or market participants?

According to project documents, the program's objectives include expanding energy efficiency financing by providing incentives to participating banks for greater involvement in the business and building capacity and greater awareness among thousands of loan and credit officers about energy efficiency, carbon footprint and appraising EE projects based on cash-flow projections, in addition to the traditional credit decision-making (Energy cost savings as a part of cash-flow and improved debt service coverage ratios for corporate clients). This is expected to lead to more and better financing for EE projects. Their success, in turn, is expected to encourage other banks to take similar actions through market competition, regulations, staff turnover, and the expansion of the CHUEE program itself. The assumption, here, is that there are certain market imperfections related to the lack of finance, knowledge, and awareness that have limited expansion of EE projects.

The evaluation's focus is on IFC's investment operations (risk-sharing facility), with selected Chinese commercial banks (2 participants), as well as other banks based on information on energy efficiency activities, and availability and access to information.

This evaluation will compare the treatment group and a similar group. As there are similar banks operating in the country in the same market (such as big urban centers), the impact evaluation of the program would involve double-difference approach (before-after, and with-without intervention). This can be achieved by forming treatment group (program participants) and comparison group (non-participants). Because of the timing, differences among CHUEE participant bank joining the program, comparison among participating banks may also provide valuable insights.

Industrial Bank signed risk-sharing agreement in May 2006 and the oldest participant of CHUEE and so far, the source of the most mature results. The bank is one of a medium-size nationwide commercial bank, with 390 branches across China. It focuses on corporate banking business with over 90% of deposits from corporate customers. Its client base has been on large enterprises and had limited experience in SME lending and Energy Efficiency equipment financing.

Bank of Beijing (BOB), joined CHUEE in June 2007 as the second participant, is different from the Industrial Bank as BOB is one of the city commercial bank, with traditional coverage limited to the Beijing Municipality. Its main business has been corporate banking, supplemented by retail banking, consumer banking and fee generating services. Its client base has been large SOEs and large public projects owned by the municipality, but the bank has now started to diversify its portfolio.

Based on the characteristics of these two CHUEE participating banks, the evaluation team identified several comparable banks. Annex II lists the banks and their characteristics. In short, Industrial Bank is compared against the other major joint-stock commercial banks operating on a national scale, with client base of industrial firms. BOB is compared against the other city commercial banks in other major urban centers. Since no baseline data were collected at the beginning of the program (2006), the evaluation team will try to re-construct the information as much as possible to establish the baseline. However, information access to non-client banks would be more limited as IEG relies on voluntary disclosure of their commercial information to the outside parties without legal or other recourses about the accuracy of information. The evaluation will conduct a survey among the non-client banks.

2) At the level of FI clients - Marketing channels network

It is important to separate two types of bank clients, which benefit from the program. One is the marketing channel network including utilities, energy service companies (ESCOs) and equipment vendors. These provide package of services to their end users, including energy audits, energy efficiency project design, financing, procurement, construction, and testing, training and post-project management. Under CHUEE, nearly two-thirds of the marketing channel entities are ESCOs, and 30 percent are equipment vendors. In return, these service providers may collect service fees according to energy and cost savings as agreed in their contracts. The other type is the banks' industrial clients. The banks finance their EE projects, with or without help from these marketing channels.

The decision to finance energy efficiency projects is taken not by random allocation but by credit decision of the client bank. A comparison group could be formed by combining the following methods, as appropriate:

- Pipeline
 - Taking comparison group comprising borrowers, which have been selected to participate in the program, but have not yet received the treatment (intervention). In practice, this is the group of projects or companies identified and judged as financing potential but which have not yet received the finance. In principle, there is, therefore, less of a selectivity bias.
- Matching areas of observations
 - Taking comparison group from geographical location or other characteristics that match with the ones of the treatment group.

For the marketing channels (especially ESCOs), the program is supposed to open access to finance. The assumption is that they often do not have access to loans by the

traditional banks as they are relatively young and typically do not have asset base for collateral. Predictably, the banks see them as too risky to lend. The industrial clients, on the other hand, may already have close business relationship with banks and access to finance, but they may not have the knowledge and capacity to identify and implement EE projects. Their behavioral change to support energy efficiency investments would be critical to achieving the program's overall goal.

The key questions at the second level are:

- Did the program improve access to finance for these marketing channels (especially ESCOs), which were not banked by the commercial banks before?
- Did the program improve demands for such services among the industries?

The impact evaluation will focus on market channels' access to finance, in the market (region/sector) where CHUEE participating banks are active vis-à-vis the other market without CHUEE participating banks. For conducting an impact assessment, a comparison will be made between the treatment group and similar groups. The treatment group is the marketing channel entities, especially ESCOs, which were exposed to a CHUEE bank or other type of intervention by the CHUEE program. The comparison group is consists of similar entities operating in the same market (such as same industry, type of services or geographic areas). The evaluation of the program would involve with-without intervention comparison. The data gathering will be done through interviewing of selected firms, and a wider survey covering the industry through the ESCO association, which was supported by a World Bank program. The survey will focus on the companies' situation in terms of access to finance.

3) At the level of FI clients – Industries

The implicit assumption is that lack of access to finance and low awareness and capacity are binding constraints to the introduction of energy efficient technologies and investments. Alleviating these constraints is, therefore, expected to result in more energy efficiency projects being financed and implemented. The main evaluative questions are:

- Did the program help Chinese industries to invest in EE projects through the participating banks?
- Did the program raise awareness and capacity of the banks' clients to identify and implement EE investments? What is the expected sustainability of clients' capacity after the CHUEE program?

The selection of treatment and comparison group projects will be done in the same region or city, in order to narrow the geographical differences taking into account possible contamination effects.

The impact evaluation will focus on one or two industries active under CHUEE, namely steel and/or cement, the two biggest recipients of CHUEE guaranteed loan. For assessing the impact, a comparison of companies activities and awareness of energy efficiency opportunities will be made between the treatment group and the comparison group. The treatment group consists of firms that have obtained loans from CHUEE banks. The control groups are similar entities operating in the same industry, and similar

characteristics (such as age of facility, geographic location, type of products and technology). The impact assessment would involve with-without intervention comparison. The data gathering will be done through interviewing of firms selected, as well as wider survey of firms identified as good comparators to the treatment group. IEG will explore collaboration with industry associations or marketing companies to conduct a survey.

Comparison with previous IFC Energy Efficiency Programs

The evaluation will use data and findings from previous evaluations of other similar IFC's energy efficiency programs in Eastern Europe and the Former Soviet Union (FSU) as mentioned earlier. This will be complemented by interviews with participating banks and their borrowers and by document reviews of IFC's EE programs in Eastern Europe and Russia. Findings from evaluations conducted by other organizations such as EBRD and ADB will also be brought to bear on this evaluation. Surveys and structured interviews will be used to collect information from CHUEE participating and non-participating banks in China and bank borrowers. Literature review will provide additional theory-based information and empirical evidence. Macro data (at the level of Chinese economy, the banking sector or specific industries where most of the CHUEE clients originate from) will be used to the extent available to provide additional benchmarks.

Addressing possible limitations of the methodology:

Contamination Effects

The program is designed to support the development of a sustainable lending business for participating FIs. If successful, it could encourage other non-participating FIs to enter the EE finance market. This means that the program is expected to influence behavior of non-participating FIs through demonstration effects. The impact evaluation will explicitly look for such spillover effects³ as part of assessing CHUEEs' impacts. Contamination effects if positive will introduce a downward bias in the assessment of CHUEE's impact since the more successful CHUEE was, the less difference we would see between the 'treated' (CHUEE) banks and the 'non-treated' banks, especially in geographic proximity.

Substitution Effects

The Chinese government has emphasized environmental protection in its recent Five-year Environmental Plans. At the same time, several private enterprises, donors and MDBs are also supporting environmental and EE investments, including the energy efficiency program financed by the IBRD. It is very likely that substitutes of CHUEE-type of services exist in the market. The real counterfactual therefore is not a world without CHUEE, but a world with unspecified CHUEE-type of interventions. The estimated

³ In social programs spillover effects are unavoidable "because in a modern economy, outcomes of persons are linked through markets and other forms of social interaction. This gives rise to a distinction between those "directly" affected and those only "indirectly" affected." (Heckman, James, 2005. Micro Data, Heterogeneity, and the Evaluation of Public Policy: Nobel Lecture, 2001. The Journal of Political Economy, Vol. 109, No. 4, p. 713)

effects and impacts will consequently reflect the effect of CHUEE relative to unspecified alternatives that may differ from location to location and types of banks and industrial firms or ESCOs. This may introduce a downward bias in the estimate of the overall CHUEE impact. The evaluation will make an attempt to assess the alternatives available to various types of control groups. Also, when gathering information, the team will constantly request information about other party's relevant activities and factor in as much as possible in the interpretation of the data.

Selection Bias

Selection bias is a universal problem, present both in experimental and non-experimental evaluations. Selection bias arises because of missing data on the common factors affecting participation and outcomes. The most convincing way to solve the selection problem is to collect better data (Heckman and Smith, 1995)⁴. The impact evaluation will attempt to minimize such bias influencing the results by using various methods to establish different control groups and by using additional sources of information including from surveys and interviews.

Small size of the treatment group at the FI level

The small size of the treatment group at the FI level and the significant heterogeneity that exists in terms of project outcomes among participating banks pose limitations on the applicability of quantitative methods. Hence, the methodology needs to be complemented by qualitative methods such as case study approach.

Availability of systematic baseline data before intervention

Before-after comparison can be used to supplement with-without comparison: However, such comparison is only credible if there are systematic data collected on energy efficiency activities before the intervention. The evaluation team will review the available information to assess if any pre-intervention data can be used as the credible benchmark that can be compared to the current situation.

D. Risks to the Evaluation

Main risks relate to the availability of data. Energy efficiency finance is a new area in China and data quality and quantity will reflect this fact. There may be significant differences in the level and type of reporting and information availability between IFC's clients, including CHUEE participants, and other market participants. This may reduce comparability between the two. Furthermore, companies and banks that are not IFC clients will naturally be more reluctant to share information than IFC clients. Environmental issues are a sensitive area in China and this may further complicate data gathering. As this is the first time for IEG to conduct impact evaluation on investment and advisory packaged program, there may be some unforeseen obstacles in conducting this exercise.

⁴ Heckman, James and Jeffrey Smith, 1995. The Case for Social Experiments, *Journal of Economic Perspectives*, vol. 9, No 2, pp. 85-110.

Risks will be mitigated by: (i) relying on IFC's and IBRD's good access to the regulators for industry-wide information; (ii) taking advantage of the breadth of IFC's current portfolio and experience in China as a window into relevant practices in different industries; (iii) use of local surveying firms for conducting the surveys and the interviews; (iv) coordinating the data gathering process with the management's mid-term review of the CHUEE program to avoid duplication of efforts and demands on the same companies or stakeholders.

E. Arrangement and logistics

This evaluation is conducted at the time of;

- 1) Mid-term review of the CHUEE program by IFC management ;
- 2) Possible Country Evaluation by independent evaluation of GEF;
- 3) Climate change evaluation by IEG, with China as one country of focus.

Therefore, close coordination with various parties is required to maximize synergies and avoid duplication of efforts.

Schedule:

The study will be completed by the end of the current FY (June 2009), while some preliminary findings can be fed into the IEG's climate change evaluation in May-June 2009. All mission dates will be subject to detailed coordination with the Mid-term Review by the management, and IEG-WB Climate Change evaluation.

Staffing

This evaluation will be conducted by Hiroyuki Hatashima, Evaluation Officer, IEG-IFC (task manager), with Jouni Eerikainen, Senior Evaluation Officer, IEG-IFC, Cherian Samuel, Evaluation Officer, IEG-IFC and Izlem Yenice, Analyst, IEG-IFC. One consultant will conduct dedicated tasks such as data gathering and surveying in China.

Annex I: Potentially Comparable Major Projects in China's Market (amounts are in US\$ million)

No.	Project Name	Agency	GEF Grant	Cofinancing Total	Approval date	Description	Executing Agency
1	Energy Conservation and Pollution Control in Township and Village Enterprise Industries	UNDP	1.00	0.00	5-Dec-97	The primary objective of the project is to raise the energy efficiency of the rural industrial sector in China by selecting several key Township and Village Enterprises (TVE) to carry out demonstration projects involving improved technologies. Four subsectors targeted: brickmaking, coking, metal casting and cement.	Ministry of Agriculture
2	Efficient Industrial Boilers	IBRD	32.81	68.57	23-Dec-96	This project will reduce greenhouse gas emissions by adapting high efficiency foreign technologies to local conditions for small and medium-sized, coal-fired industrial boilers. To assist the dissemination and effective use of efficient technologies, the project will also strengthen China's industrial-boiler engineering, operations, production management and marketing capabilities, and improve boiler technology exchange domestically. As long-term measures for barrier removal, the project will support related technical and policy studies, public awareness/information dissemination, and strengthened environmental standards for the industrial boiler sector.	Ministry of Machinery Industry
3	Energy Conservation	IBRD	22.70	180.00	26-Mar-98	The project will support the establishment, pilot testing and commercial demonstration of market-oriented Energy Management Companies (EMCs) that will promote investments in energy-efficient technology through energy performance contracting. The project will start in three provinces, and after a pilot phase will be expanded to other parts of the country, and may involve more varied applications such as leasing or Chinese-foreign joint ventures. The project will also develop a national energy conservation information dissemination center to gather information and lessons learned on energy efficiency measures and disseminate information on the technical and financial results of these measures, targeting enterprise managers.	State Economic and Trade Commission
4	Energy Conservation and GHG Emission Reduction in Chinese Township and Village Enterprises (TVE), Phase II	UNDP	8.00	10.55	26-Dec-00	This project will focus on Township-Village Enterprises (TVEs) which constitute a significant share of Chinese economic production. It seeks to reduce GHG emissions in China from the TVE sector by increasing the utilization of energy efficient technologies and products in the brick, cement, metal casting and coking sectors. The project removes key market, regulatory, technological, management and commercial barriers to the production, marketing and utilization of energy efficient technologies and products in these industries.	UNIDO
5	Second Beijing Environment Project	IBRD	25.00	437.00	20-Jun-00	The project's objectives are to: (a) improve the quality of life for the citizens of Beijing by alleviating the city's acute air and water pollution problems; and (b) significantly reduce China's GHG emissions. It has three components: energy conversion and efficiency; wastewater treatment; and environment capacity-building. GEF assistance is requested to remove the barriers to successful implementation of the project's two major energy components. One of these components will convert least 2,500 small (below 20 t/hr), space-heating boilers from coal to natural gas, (small boilers being the largest cause of ambient air pollution), and, by reducing the cost of gas boilers and creating conversion capacity, will indirectly facilitate at least another 2,500 boiler conversions. The second component will improve the energy efficiency of the city's extensive district heating systems.	Beijing Municipal & District Government, Beijing Comprehensive Investment Co.
6	Barrier Removal for Efficient Lighting Products and Systems	UNDP	8.14	18.07	6-Jul-01	The project aims at addressing identified market barriers to wide spread use of energy efficient lighting in China by broadening the China Green Lights start-up efforts. The overall objective of this project is to save energy and protect the environment by reducing lighting energy use in China in 2010 by 10% relative to a constant efficiency scenario. The specific objectives include upgrading of Chinese lighting products; increased consumer awareness of, and comfort with, efficient lighting products and the establishment of a vibrant, self-sustaining market in efficient lighting products and services	State Economic and Trade Commission

No.	Project Name	Agency	GEF Grant	Cofinancing Total	Approval date	Description	Executing Agency
7	Demonstration of Fuel Cell Bus Commercialization in China (Phase II-Part I)	UNDP	5.82	10.12	28-Nov-02	This project will help catalyze the cost-reduction of fuel-cell buses (FCBs) for public transit applications in Chinese cities by supporting significant parallel demonstrations of FCBs and their fueling infrastructures in Beijing and Shanghai. In collaboration with the Chinese national government, the municipal governments of Beijing and Shanghai, and the private sector, the GEF and UNDP will assist the public transit companies of Beijing and Shanghai to obtain 6 FCBs each and to operate these over a combined total of 1.6 million km. The knowledge and experience gained through this project will enable the technology suppliers to identify cost reduction opportunities and the host public transit operators to gain valuable experience needed to adopt larger fleets of FCBs in the future. Additionally, some activities will help build capacity relating to FCBs. Finally, a series of activities will also focus on defining a detailed strategy for large-scale FCB implementation in China, which is planned as a follow-on to this initial project.	State Economic and Trade Commission
8	Energy Conservation Project, Phase II	IBRD	26.00	255.20	24-Oct-02	Phase II of the project is designed to replicate the experience of phase I, especially to support the development of new EMCs in China by strengthening a EMC Service Group which is expected to develop into a self-sustaining EMC Association and by establishing a Guarantee Fund to provide partial risk guarantees to local financial institutions which lend to the EMCs.	State Economic and Trade Commission
9	End Use Energy Efficiency Project	UNDP	17.38	63.00	29-Mar-05	The Chinese government is embarking upon a long-term program to support energy efficiency in the industrial and building sectors. This project supports the first phase (3 years) of that program. The project's purpose is the removal of barriers to the widespread application and practice of energy conservation and energy efficiency in the major energy consuming sectors (buildings and industrial) in China. The project fosters a strategic approach to developing, implementing and enforcing a comprehensive and effective energy conservation policy and regulatory system consistent with the objectives of the Energy Conservation Law of 1998. The project will play a catalytic role in promoting energy efficiency improvement and market development in China. The Chinese government attaches great importance to the project and intends for it to be the overarching framework for international cooperation on end-use energy efficiency.	State Development and Planning Commission
10	Heat Reform and Building Energy Efficiency Project	IBRD	18.35	81.00	17-Mar-05	Project aims to improve the energy efficiency of new building construction in China through a combination of building equipment market transformation and heat supply policy approaches. Promotes demand in the housing sector for more efficient building materials and for more effective heat metering and control equipment. Also promotes new policies and institutions for metering, controlling, and managing centralized heat supply systems. Project is part of a broader program for heat reform and building energy efficiency by the World Bank and China. Concept fits within "efficient product market transformation" strategic priority.	Ministry of Construction (MOC)/CEEB
11	China Utility-Based Energy Efficiency Finance Program (CHUEE)	IBRD/IFC	16.50	130.40	24-Apr-06	This Project will organize and provide marketing, development and financing services to commercial, industrial, and municipal sector energy users to implement energy efficiency (EE) equipment installations ("sub-projects"), including those using high efficiency natural gas equipment.	IFC PMO
12	Energy Efficiency Financing	IBRD	13.50	583.15	27-May-08	The development objective of the proposed project is to improve the energy efficiency of medium and large-sized industrial enterprises, and to reduce their impact of climate change.	National Development and Reform Commission
13	Thermal Power Efficiency	IBRD	20.05	143.80	16-Nov-07	The objective of the proposed Project is to reduce GHG emissions by removing regulatory, institutional and technical barriers to phasing out small inefficient coal-fired units, improving the efficiency of larger units and introducing new generation dispatch models and trading mechanisms to improve the overall efficiency of the power system.	N/A

No.	Project Name	Agency	GEF Grant	Cofinancing Total	Approval date	Description	Executing Agency
14	Promoting Clean Electric Buses for the Beijing Olympics (CEBBO)	UNDP	1.00	12.30	2-May-08	Supporting the Chinese efforts in greening the 2008 Olympic Games in Beijing through the demonstration of electric buses solely powered by Li-ion batteries.	Beijing Municipal Environmental Protection Bureau
15	Phasing-out Incandescent Lamps & Energy Saving Lamps Promotion (PIESLAMP)	UNDP	14.25	70.00	28-Jul-08	Enhanced promotion and implementation of the utilization of energy saving lamps (ESLs) in China through the transformation of the local lighting products market and the phasing-out of incandescent lamp production and sale.	National Development and Reform Commission
16	Promoting Energy Efficient Room Air Conditioners (PEERAC) Project	UNDP	6.36	19.03	13-Nov-08	Reduction of China's future GHG emissions through transformation of the Chinese room air conditioner (RAC) market to production and sale of more energy-efficient RACs.	Ministry of Environmental Protection
17	Provincial Energy Efficiency Scale-Up Program	IBRD	13.64	313.70	Under preparation	The overall development objective of this project is to achieve significant reductions in greenhouse gas (GHG) emissions by establishing suitable provincial level policies, institutional and financial mechanisms to scale up the adoption of energy efficiency practices, technologies and programs.	Shanxi Provincial Government, Jiangxi Provincial Government, Shandong Provincial Government
18	Energy Efficiency Power Plan (EEP) Program	ADB		100 (ADB)	Under preparation	Establishing a special financing fund implemented by provincial government fund manager. Targeting large/medium industrial and large commercial and institutional end users and ESCOs for retrofitting of plants and building.	Guangdong Provincial Government
19	Energy Efficiency Multi-Project Financing Program	ADB			Program concept approved in 2008. Some projects are under discussion.	Partial credit guarantees with partner banks. Will use technical partners to provide technical services for banks and will mobilize equipment vendor co-financing. Focusing on a variety of subsectors, including, among others, district heating, district cooling, and cogeneration projects.	The Chinese Government/Joint Venture Entities
20	GoC Energy Efficiency Incentives and Special Funds	GoC				In 2007 NDRC and MOF created energy efficiency fiscal incentive programs, including incentive payment of 200-250 RMB per annual TCE energy savings (15-20 percent project capital cost). Similar incentive funds set up or being formed at provincial and city levels, e.g., Jiangsu, Guangdong, Hebei, subsidizing 10-30 percent of project costs. Currently the main focus is large projects. A new national government clean energy fund being set up with proceeds from CDM projects.	The Government of China
21	CDM Energy Efficiency Projects	CDM				Since 2006, CDM has financed energy efficiency projects in China. One criteria for CDM project is additionality, implying that they do not include commercially viable projects.	CDM PMO

Source: a) GEF website: <http://projectdatabase.thegef.org>, b) ADB website: <http://www.adb.org/Documents/Periodicals/Clean-Energy/EEI-Update-Issue6.pdf>, c) China Daily website: http://www.chinadaily.com.cn/bizchina/2008-06/20/content_6781657.htm, d) World Bank website: <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20981087~pagePK:34370~piPK:34424~theSitePK:4607,00.html>, and e) John MacLean: "New Development in Energy Efficiency Finance in China." June 4, 2008. Manila, Philippines: ADB Asia Clean Energy Week.

Annex II : Comparison of Chinese Banks (CHUEE banks and Non-CHUEE banks)

Banks	Geographical coverage and Core business	Portfolio/Client Base	Ownership Characteristics	Total Assets	Gross Loans
CHUEE Bank: Industrial Bank	A medium-size nationwide commercial bank, with 390 branches across China. IB focuses on corporate banking business with over 90% of deposits from corporate customers.	Focus on large enterprises. IB has limited experience in SME lending and EE equipment financing, but is committed to develop these businesses.	Non-government bank share listed in 2007. As of mid 2006, the largest shareholders were Finance Bureau of Fujian Province (25.5%), followed by Hang Seng Bank of Hong Kong (15.98%) and GIC of Singapore (5%). IFC had an equity stake of 4%.	RMB 617.5 billion as of end of 2006	RMB 324.4 billion as of year end of 2006.
Non CHUEE Banks for comparison					
Minsheng Bank (IFC Client)	Established branches in major national and regional economic centers all over the country.	Traditionally large enterprises. In the process of serving SMEs since 2006.	Public listed in 2000. Diversified shareholding structure, with New Hope Capital (5.98%) and Orient Group Inc. (4.71%) as its number one and number four largest shareholders as of 2006. Both are IFC's clients. Asian Financial Holdings PTE, Ltd. as a foreign shareholder had a 3.9% stake. IFC had a stake of 0.93%. There was uncertainty related to change in management and a relatively weak corporate governance.	As of end of 2006, RMB700.4 billion.	As of end of 2006, RMB447.4 billion.
Huaxia Bank	Economically developed cities all over the country.	Medium sized enterprises.	Share listed in 2003. Top 4 shareholders as of 2007: Capital Steel: 10.19%, State Power Grid: 8.15%, Hongta Tobacco: 7.13%, Deutsche Bank: 7.02%.	Year end of 2007: RMB592.3 billion; Year end of 2006: RMB444.9 billion.	Year end of 2007: 306.0 billion; Year end of 2006: RMB259.8 billion.
China Citic Bank	Corporate loans accounted for 80.9% of gross loans in 2007.	Focus on large enterprises, but increasingly on SMEs as well. Manufacturing 31.2%, transport, storage and telecommunication 13.5%, power, gas and water 9.5% and wholesale and retail 9.1% as of 2007.	Share listed in 2007. Top 3 shareholders as of end of 2007: Citic (62.33%), Citic International Financial Holdings Ltd (15%) and Hong Securities Clearing Company Limited (12.41%).	Year end of 2007: RMB1011.2 billion; Year end of 2006: RMB706.9 billion.	Year end of 2007: RMB575.2 billion; Year end of 2006: RMB463.2 billion.
China Merchants Bank	Major economic centers around the country	Large enterprises and projects. As of 2007, loans to enterprises in manufacturing, transport and telecommunications, storage, and whole sale and retail accounted for 63.6% of gross loans. In recent years it strengthened loans to SMEs.	Publicly listed company. Top three shareholders as of end of 2007: Hong Securities Clearing Company Limited (17.88%), China Merchants Steam Navigation Company Limited (12.11%) and China Overseas Shipment Co., Ltd (6.44%).	Year end of 2007: RMB1310.6 billion; Year end of 2006: RMB934.1 billion.	Year end of 2007: RMB673.2 billion; Year end of 2006: RMB565.7 billion.

Bank of Communications	Nationwide coverage. Corporate loans accounted for about 85% of gross loans in 2007.	Large enterprises and projects. In 2007 it increased focus on SMEs especially those related to energy efficiency.	Publicly listed. Top 4 shareholders as of 2007: Hong Securities Clearing Company Limited (22.02%), Ministry of Finance (20.36%), HSBC (18.6%) and Central Huijin Investment Co., Ltd (6.12%).	Year end of 2007: RMB2103.6 billion; Year end of 2006: RMB1715.7 billion.	Year end of 2007: RMB1104.5 billion; Year end of 2006: RMB924.3 billion.
Shenzhen Development Bank	Established branches in major economic centers around the country, especially the coastal areas.	Corporate loans accounted for 71.35% of gross loans in 2007. Top sectors include manufacturing (24.98%), social services (12.4%), commerce (11.85%) and real estate (6.5%). In recent years, SMEs have become a target group.	Publicly listed in 1987. Top 3 shareholders as of 2007: NewBridge (16.7%), Shenzhen Zhongdian Investment Shareholding Co., Ltd. (2.9%) and Rongtong New Blue Chip Security Investment Fund (1.93).	Year end of 2007: RMB352.5 billion; Year end of 2006: RMB260.8 billion.	Year end of 2007: RMB221.8 billion; Year end of 2006: RMB182.2 billion.

Banks	Geographical coverage and Core business	Portfolio/Client Base	Ownership Characteristics	Total Assets	Gross Loans
CHUEE Bank: Bank of Beijing	Coverage traditionally limited to Beijing Municipality. Now expanded to nationwide. Main business is corporate banking, supplemented by retail banking, consumer banking and fee generating services.	Traditionally large SOEs and large public projects owned by Beijing Municipality. Now started to diversify.	Non-government bank share listed in 2007. Top 4 shareholders were ING (16.07%), Beijing Municipal Government (10.40%), Government owned Beijing Energy Investment (Group) Co., Ltd. (5.98) and IFC (4.04) as of year end of 2007.	As of year end 2006, RMB 272.8 billion (equivalent to US\$35.1 billion)	RMB 129.6 billion (equivalent to US\$16.7 billion) as of year end of 2006.
Non CHUEE Banks for comparison					
Bank of Nanjing (IFC Client)	Originally Nanjing City Commercial Bank. Mainly local focus. Future goal is Yangtze River Delta.	SMEs.	Share listed in 2007. Top 4 shareholders as of 2006: Nanjing Municipal State Asset Investment Management Co., Ltd: 19.78; BNP Paribas: 19.2%; Nanjing Xingang High-Tech Shareholding Co., Ltd: 17%; IFC: 5%.	As of end of 2006, RMB57.9 billion	RMB 25.5 billion as of end of 2006.
Bank of Shanghai (IFC Client)	Focus on local enterprises and projects, but started to diversify into other parts of the country in 2006.	Large municipal projects as well as SMEs	Co-owned by government and shareholders. Top 4 shareholders: Shanghai Joint Investment Co., Ltd (15.09%), HSBC (8%), IFC (7%), and Shanghai Huangpu District State Asset Management Company (3.08%).	End of 2007: RMB309.0 billion..	End of 2007: RMB149.8 billion.
Bank of Dalian	Originally Dalian City Commercial Bank. Focus on local SMEs. Established Tianjin Branch in 2007 and	SMEs.	Shareholding companies, heavily share controlled by the government. No foreign shareholders.	As of end of 2006, RMB61.0 billion	RMB33.2 billion as of end of 2006

	Beijing Branch in 2008.				
Bank of Jiangsu	Established in January 2007 on the basis of the commercial banks of 10 cities, including Suzhou, Wuxi, Zhengjiang and Changzhou. Cover all Jiangsu Province. Established a branch in Shanghai. Goal is to serve economically developed cities all over the country.	Main focus is SMEs.	Overwhelmingly share controlled by government. No foreign shareholders.	As of end of 2007, RMB182.2 billion.	RMB106.4 billion as of end of 2007.
Bank of Ningbo	Established on the basis of Ningbo City Commercial Bank. Focus on local, with an objective to expand to nationwide. Shanghai branch established in 2007. By 2008, 3 additional branches were established in Hangzhou, Nanjing and Shenzhen respectively.	SMEs.	Share listed in 2007. As of 2006, top three shareholders were Ningbo Financial Bureau: 13.17%; OCBC Group Singapore: 12.20%; and Fubang (Holdings) Group Co Ltd: 8.73%.	As of end of 2006, total assets of RMB56.5 billion.	RMB28.1 billion as of end of 2006.
Bank of Tianjin	Originally city commercial bank. Focus on local area. In 2007 a branch was established in Beijing.	SMEs.	Top three shareholders as of end of 2007: Tianjin Free Trade Zone Investment Co., Ltd (27.47%), Australia and New Zealand Banking Group Limited, Ltd.(20%), and Tianjin Haitai Control Group Co., Ltd.(4.24%).	End of 2007: RMB102.7 billion	End of 2007: RMB41.3 billion

