

**DOCUMENT OF
INTERNATIONAL FINANCE CORPORATION**

**CHINA UTILITY-BASED ENERGY EFFICIENCY
FINANCE PROGRAM**

GEF Project Document

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CHINA UTILITY-BASED ENERGY EFFICIENCY FINANCE PROGRAM (CHUEE)

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List of Acronyms

ADB	Asian Development Bank
CBRC	China Banking Regulatory Commission
CEEF	Commercializing EE Finance (Project)
CER	Certified Emission Reduction
CHUEE	China Utility-Based Energy Efficiency Finance Program
CPDF	China Project Development Facility
CSC	utility Customer Service Center
DSM	demand-side management
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EE	energy efficiency
EMC	Energy Management Company
ESCO	Energy Services Company
EU	European Union
FIs	financial institutions
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHGs	greenhouse gases
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit GmbH

HEECP	Hungary EE Co-financing Project
HVAC	heating, ventilation and air conditioning
I&G	China National Investment & Guarantee Co., Ltd.
IA	Implementing Agency
IFC	International Finance Corporation
M&E	monitoring and evaluation
MoC	Ministry of Construction of the PRC
MoF	Ministry of Finance of the People's Republic of China
MTI	Ministry of Trade and Industry, Republic of Finland
NDRC	National Development & Reform Commission of the PRC
NDF	non-deliverable forward
NGO	non-governmental organization
PMO	Program Management Office
PRC	People's Republic of China
RE	renewable energy
RFP	Request for Proposal
RFQ	Request for Qualifications
RMB ¥	Ren Min Bi
SEPA	State Environmental Protection Agency of the PRC
SMEs	small and medium-sized enterprises
SPP	simple payback period
TA	technical assistance
TCE	tons coal equivalent
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

1 Program Summary

Overview. The goal of the China Utility-Based Energy Efficiency Finance Program (“CHUEE” or “Program”) is to reduce emissions of GHGs in the delivery of energy services in China. The Program will organize and provide marketing, engineering, project development, and equipment financing services to commercial, industrial, institutional and multi-family residential sector energy users to directly support implementation of energy efficiency (EE) projects. Implementation of \$150 million in total EE project investments is targeted. This approach is consistent with the GEF strategic priorities *CC-2 Increased Access to Local Sources of Financing for Renewable Energy and Energy Efficiency* and *CC- 1 Transformation of Markets for High Volume Products and Processes*.

The Program leverages the interests of three distinct industries to generate investment through multiple market channels. Energy utilities will be primary marketing partners for the Program, acting as a hub and offering a “one-stop shop” for end-users to develop their EE projects. The utilities will work with (i) a network of EE equipment and service suppliers (“EE Suppliers” or “Network”) who can implement projects with end-users, and (ii) financial institutions (FIs) who will make loans for the EE investments, supported by an IFC risk sharing facility (RSF) to help secure these loans. The Program will also support marketing and origination of EE projects with end-users through partnerships with FIs and EE Suppliers *independent* of the utilities. In addition to directly supporting EE project implementation, the Program will also build capacities of these key market actors -- utilities, EE Suppliers, and FIs -- to replicate Program methods on an on-going commercially sustainable basis.

In designing the Program IFC has built upon its extensive know-how generated from over a decade of developing and managing a portfolio of GEF-supported EE bank finance programs in seven emerging market countries. The primary lesson learned from structuring and operating this wide range of guarantee schemes and technical assistance programs is that banks typically lack the capabilities to generate scalable deal flow in the EE finance sector, thereby not fully leveraging the risk sharing product offered by IFC. The highly divergent and technical nature of EE projects suggests that there would be a role for an intermediary to originate, aggregate and standardize EE investment projects, in an effort to simplify the transaction processes on behalf of the banks. For this reason the Program has selected energy utilities to play this deal originator intermediary role, as they have self-interest to facilitate project financing for end-users of EE equipment if it results in the acquisition of new customers. The defining feature of the utility-based energy efficiency finance model is that IFC is aligning the commercial self interests of three market actors, utilities, banks and EE Suppliers, to cooperate together in building the market for EE. The GEF intervention plays a critical role to catalyze this partnership, one that would not occur unassisted because of market and financial sector barriers, and then develop the capacities of each partner to continue participation in the market on a sustainable basis once the incremental financial support has been expended. A sustainable commercial market for EE projects not only benefits all three market actors by increasing their profits, but also can achieve substantial societal impact; the Program addresses key EE policy objectives of the Chinese government, while reducing the environmental footprint of highly polluting energy users in industrial and commercial sectors.

Need for and Barriers to EE Investment. China is facing severe energy resource shortages and rapidly growing energy demand. Expanded investment in EE projects and equipment is a high Peoples Republic of China (PRC) Government priority for environmental, macro-economic and enterprise competitiveness reasons. The PRC Government seeks to promote market-based methods to deliver and finance EE projects; partnerships with energy utilities can provide a

platform to do so on an accelerated, scalable basis. Despite Government policies in favor of EE, market barriers still limit the use of EE equipment. Marketing capacities for EE equipment are underdeveloped in China. Suppliers of EE products and services often lack strong marketing skills or experience. The process of identifying new customers is slow, and customers lack education on the economic and technical benefits of EE equipment. Further, customers face first-cost financing barriers to acquiring EE equipment.

Overcoming financial barriers. Arranging equipment finance for customers is a central component of the Program which will enable the EE project investments. Initial FI partners will be Chinese commercial banks, which lack experience in EE finance. Banks typically assess risk and make credit risk decisions on the basis of very traditional evaluations of fixed asset collateral as security, valued as high as 200%+ of the loan amount, and often lack experience preparing pro forma documents (business models and financial projections) to assess risks on a project finance and cash flow basis. The Chinese banking sector is characterized as highly liquid, but risk averse. Access to credit is limited, especially for viable small and medium scale enterprises (SMEs) and other institutions that historically have not used loans. In response, a commercial guarantee industry has emerged in China, and banks have grown accustomed to receiving guarantees. These guarantee companies do not currently address the needs of the EE finance market. But, a guarantee or “risk sharing” instrument is a form of credit enhancement which banks readily recognize and which can mobilize local financial resources. In addition to utilizing risk sharing instruments which respond to this convention, the Program will work at the cutting-edge of the fast evolving Chinese capital markets to instill more advanced credit underwriting procedures and build familiarity with EE equipment, project and SME finance.

Program Components: The Program will have four core components of linked, but independent value.

1) Utility Customer Service Centers. The Program design is based on a key finding from EE experience in other countries and market assessments in China: that utilities can be effective agents and aggregators for marketing and delivering EE equipment and projects. Building initially on a dynamic gas utility sector, where private utilities aggressively seek to build load, the Program will create, within each partner utility, a “Customer Service Center” (CSC). The CSC will act as a hub, to develop EE projects for customers in their service territory to be implemented by the suppliers of EE products and services, and financed with loans from partner financial institutions. The utility will provide services to customers over the full EE project cycle, from energy audit and project feasibility studies, through decision-support, equipment procurement and financing. The utility can systematically identify and market to customers within its service territory, and thereby quickly scale up the volume of EE transactions, and aggregate them for financing purposes. A gas utility is expected to be the first partner. For a gas utility, the Program will serve their core objective to build gas loads, supporting investment on the customer side of the meter to afford gas using equipment and enabling the concurrent efficiency investments which can make energy using systems more cost effective. The Program design is potentially applicable to electric utilities, as well; heat utilities will also be explored as potential partners.

2) EE Suppliers Network. The Program will create a Network of qualified EE Suppliers who can deliver necessary EE equipment and services. EE Suppliers will market their EE projects and services to customers, in coordination with the utility. IFC will conduct Request for Qualifications (RFQ) processes to solicit information from equipment and service providers. This information will be used by utilities and provided to customers. The Program will support end-users in making equipment purchase decisions based on equipment life-cycle and energy operating costs, not just low first costs. The Program can recruit new international EE equipment

suppliers to China as part of its market development activities to promote expanded access to EE technology. The Program will seek to develop standard equipment and financing packages that are suitable for common applications in order to build volume. The Program will provide training, capacity building and other business development services to participating EE Suppliers, focusing on marketing and finance. The Project will also work with partner banks and EE Suppliers to develop multiple marketing channels to generate EE project deal flow, in addition to the utility channel.

3) Equipment Loan Mechanism and IFC Risk Sharing Facility (RSF). IFC is establishing partnerships with local commercial banks to participate in the Program. Banks will provide energy equipment loans and related loan origination and administration services. IFC will provide: (i) a RSF¹ to each bank to share with the bank in credit risks of loans which the banks will fund with their own resources, and (ii) substantial TA to improve bank credit risk management practices, support marketing of bank financial services and prepare EE projects for investment. With the IFC RSF, banks will make loans accessible to a broader set of customers and on more attractive terms and tenors of three to five years. Borrowers can be end-users, frequently SMEs, or energy management companies (EMCs) who have long-term service or energy performance contracts with end-users. Other IFC/GEF projects have effectively used GEF funds for credit enhancement to jump-start and expand delivery of EE financial services by local financial institutions. The proposed RSF structure will have first and second loss components with a proposed target risk coverage of US \$50 million, of which approximately US \$10 million of the GEF funds will be allocated to the first loss position. IFC is processing an investment of approximately US \$40 million in the RSF to further leverage GEF funds². Unlike some of the government supported guarantee programs in the China marketplace that offer as high as 90% loan principal coverage, IFC's RSF will be structured on more private sector oriented commercial terms that encourages the development of capital markets to move towards international standards. The strategy is to define first losses at a level slightly higher than the estimated loss rate on the loan portfolio, so as to not distort the market, yet extend the banks' risk frontier and create greater access to equipment loan finance.

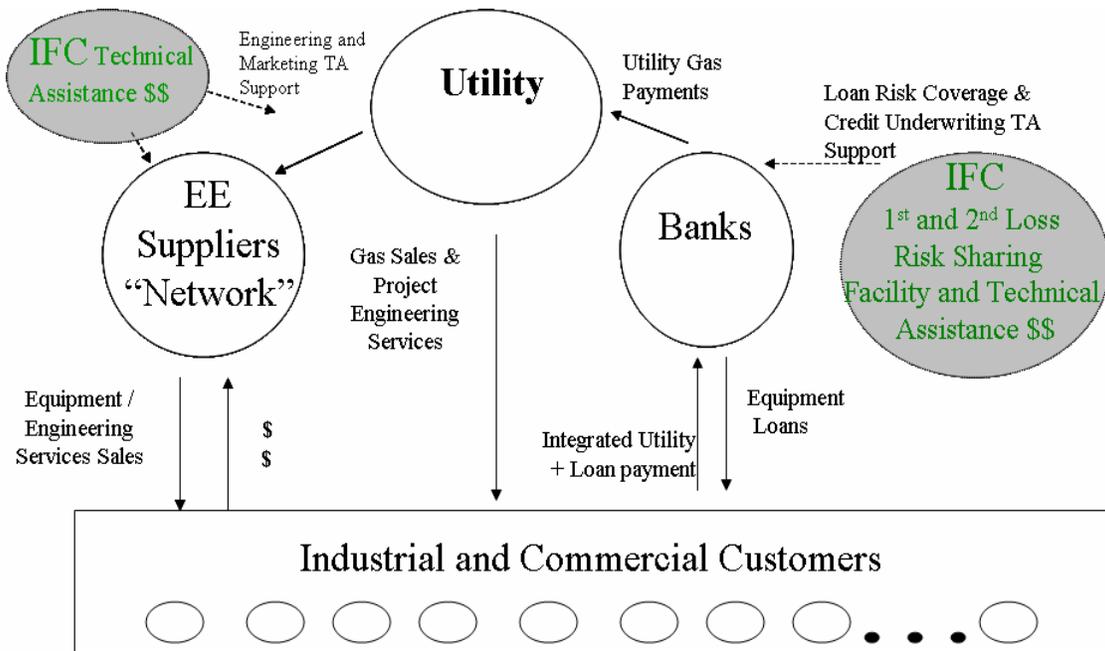
4) Outreach, Dissemination and Replication Program. The Program will disseminate its results and methods to a broad audience of EE market actors who can then implement similar activities without direct Program financial support. Training programs will be conducted, first with direct Program participants, and, later, with a broader audience. In order to recruit additional utility partners, the Program will conduct a utility outreach program. It will also work more closely with select motivated utilities who meet certain criteria (including willingness to co-finance the Program, and commit significant marketing resources to the effort), to train them in setting up a utility-based EE hub and enter into partnership with FIs and EE equipment vendors.

This Program design is illustrated in Figure 1, for one utility; the Program expects to establish partnerships with up to four utilities, including gas, electric and possibly heat utilities.

¹ The RSF will work in many ways like a guarantee, but the term "risk sharing facility" is being used, and other terms of the RSF structured, to comply with regulations in China concerning guarantees, guarantees by foreign entities, and foreign exchange controls.

² While the IFC investment could leverage significant market impact, the Program is designed to also operate without IFC's investment, largely because of the important catalytic role of the relatively small first loss portion of the GEF-supported RSF.

Figure 1: Program Model



Packaging EE Investments with Gas Utilities. China’s energy supply mix relies overwhelmingly on coal, a cheap but highly polluting fuel. China’s government is promoting a rapid increase in natural gas use as an energy supply alternative to address chronic local environmental pollution problems. The Chinese natural gas market is still in its early stages. New gas supplies have just recently come on line. As gas distribution utilities gain new concessions, build out distribution systems and connect new customers, they face a major challenge on the demand side: to build new load, potential customers must design, manage, and finance investments in gas-using equipment on the customer side of the meter. For a gas utility, the Program will provide a set of tools to meet core objectives of building gas loads and strengthening customer relationships. Further, the Program will use the process of investment in gas using systems to promote development and implementation of comprehensive EE investments. Because gas is more expensive than coal, suppliers of gas must promote a package of EE measures with the sale of gas to their customers in order to compete with a cheaper fuel. The Program will exploit these opportunities to leverage the marketing efforts of gas utilities to mobilize investment in end-user EE which otherwise would not be realized.

IFC has identified a strong potential gas utility partner, an IFC investee, willing to act as the initial energy utility in the Program, Xinao Gas Holdings, Ltd., (Xinao), which operates under government gas distribution concessions in 57 cities serving over 35 million people, primarily in middle-size cities in central and eastern China. Xinao estimates a total demand for EE equipment financing in just four of its territories alone in the range of 600-800 million RMB (\$70-95 million). In addition, IFC has identified other utilities, including Wah Sang Gas and Panva Gas to target for its utility outreach and replication program.

Packaging EE Investments with Electric Utilities. The Program will seek electric utility partner(s) and offers an important means to help electric utilities meet China’s energy conservation goals and address power shortages. The Program can provide a delivery mechanism for electric distribution utilities who want to improve customer end-use efficiency and load profiles in ways that create utility system benefits, for example, through power factor correction, load

management controls, peak shaving, and distributed generation. The Program will conduct cost/benefit analyses for prospective electric utility partners to show how EE and demand side management (DSM) can benefit them.

Financial Sector. The findings from IFC's appraisal of the Chinese financial sector, which started in the first quarter of 2004 are that the banking regulatory system is generally liberalizing, while at that same time policy directives and the response by market actors highly variable, and that any risk sharing product and technical assistance program developed by IFC must be flexible enough to adapt to these changing conditions. For example, at the inception of appraisal in early 2004 interest rates for commercial bank loans were collared at a fixed interest rate range by the PRC government. Indications are now that commercial banks can operate outside the collar, and apply risk weighted spreads to their pricing on loans. However, this policy liberalization has not necessarily resulted in a dramatic shift in the loan pricing practices of the commercial banks. IFC's analyzes indicates that the impediments to the commercial banks to adjust to policy liberalization are not only a product of the challenges of market actors adapting to the transition from a command economy system, but also an entrenchment by the commercial banks themselves in outmoded banking practices. The latter, is largely a product of three barriers: (i) technical and human capacity limitations; (ii) gaps in market knowledge and misperceptions of actual market risks; and, (iii) moderate risk appetite for new products and market segments. IFC has designed a technical assistance program and RSF that not only addresses these barriers, but allows for sufficient flexibility to modify Program design and reprogram funding adapting to changing market conditions and the varying responses to these changes of the three key parties in the Program.

Financial Institutions. The equipment loan program must have a strong credit structure that manages customer credit risk so that the participating banks can prudently approve many loans and offer terms that are attractive to customers. IFC is working with banks to adopt new credit risk management methods, including: (i) an additional bank loss reserve for the whole loan portfolio funded from fees charged to equipment suppliers and risk-weighted loan pricing charged to borrowers; (ii) collections of finance payments together with the utility bill; (iii) debt service reserve funds, created by customers for individual loans; and, (iv) security interest in the energy equipment. The loan program credit structure also includes the IFC RSF. IFC conducted a Request for Proposal (RFP) process to solicit proposals from selected IFC investee banks. Industrial Bank Co. Ltd., headquartered in Fuzhou, and China Minsheng Banking Corp. Ltd., headquartered in Beijing, have been selected to participate. These are medium sized private Chinese banks that have a nationwide network of regional offices with independent loan origination capabilities: Minsheng has 23 of these regional offices, while Industrial Bank has 29 of these regional offices. Between both of these banks, there are sufficient number of regional offices to fully cover the initial utility partner's service territory and the credit needs of its customers. Additional banks may be added throughout the Program's duration. IFC is presently in the process of appraising banks for participation, negotiating final terms of the RSF, related loan terms and TA agenda, and processing the IFC RSF investment.

Greenhouse gas emissions reductions. IFC estimates that the Program will directly support financing of US \$150 million in EE projects, which will achieve, in the aggregate, an estimated 4.1 - 8.6 million tons carbon equivalent emissions reductions. The GEF's cost per ton of CO₂ GHG emissions reductions achieved by EE projects directly supported by the Program is estimated to be between \$1.29 and \$4.02³. This cost range reflects, amongst other key variables,

³ GHG emissions reductions resulting from the lower carbon intensity of natural gas fuel directly substituting for other fuels, e.g., coal, in EE projects will be monitored by the Program's M&E plan because they are expected to be

(i) the volume of EE projects ultimately implemented with Program support, which directly affects the amount of emissions reductions achieved, and (ii) loan payment performance, which affects actual expenditure of GEF funds used for RSF reserves.

Reducing Severe Local Air Pollution. In the cities where it will operate, the Program will make a significant contribution toward China's goal of reducing severe local air pollution. Replacing highly polluting coal with more extensive use of natural gas, combined with comprehensive EE improvements, results in cleaner air and reduced damage to public health, agricultural productivity and infrastructure as well as reduced GHG emissions. Program operations will target medium size cities where local pollution impacts are very high and development needs greater. For example, one of the first cities for Program implementation with the initial partner utility is Shijiazhuang in Hebei province, population approximately 4 million, an industrialized city 200 km southwest of Beijing ranked by the China's State Environmental Protection Agency as the seventh most polluted city in China. The EE projects which the Program will support will significantly help city officials achieve their local pollution reduction objectives, and thus contribute to improving the lives, health and economic conditions of city residents.

Sustainability. The Program is expected to be highly sustainable, because it will establish within the partner utilities a CSC which is highly complementary to their core business, can be rolled-out throughout its service territory and can continue to operate economically after the Program is completed. The Program similarly builds on the inherent self-interest of each of the Program partners, including FIs, EE Suppliers and end-users to adopt Program methods as a core business competency, thus ensuring sustained impact. The Program seeks to demonstrate viable methods of energy equipment lending by partner banks which then can expand and continue without IFC/GEF support, and lead to more direct cooperation with the EE suppliers as the banks become more comfortable with the technologies and vendor financing practices.

Replication. The Program will seek to replicate its methods in additional service areas of partner utilities, through direct financial support with a select set of additional utilities, and through education and training with a broader set of utilities. Likewise, the Program will pursue replication of Program methods through the branch offices of partner FIs. The Program also has replication potential with FIs and energy distribution utilities globally through the portfolios of the IFC Infrastructure and Global Financial Markets Departments. IFC has a strategic interest in replicating the model in other market segments, particularly targeting SMEs in China.

Carbon Credits and Performance Incentives. IFC will also develop other innovative performance-based incentives to further promote EE project investments. IFC will seek to assist the Program partners to verify and monetize carbon credits, Certified Emissions Reductions (CERs). The CERs could be bundled and sold by the utilities or banks, generating additional revenue streams for the Program partners, thereby further increasing their incentives to generate and finance EE projects. Another performance-based incentive being considered by IFC is to offer the banks financial rewards for meeting EE project lending targets. The financial reward could be structured in the RSF agreement as a bonus to the banks for achieving EE lending.

significant but they will be *counted and reported separately for GEF purposes and are not relied on for determining GEF cost-effectiveness*. GHG emissions reductions resulting from EE gains achieved by the EE projects supported directly by the Program will be counted. See Annex A - Incremental Cost Analysis in the Project Document for a more detailed description of these calculations.

2 Program Development Objective

2.1 GEF Strategic Priorities

The Program is being submitted under *GEF OP 5, Removal of Barriers to Energy Efficiency and Energy Conservation*. Its approach is consistent with the GEF strategic priorities *CC-2 Increased Access to Local Sources of Financing for Renewable Energy and Energy Efficiency* and *CC- 1 Transformation of Markets for High Volume Products and Processes*.

2.2 Program Development Objective

The Program's development objective is to create effective, commercially sustainable delivery mechanisms for systematically developing, implementing and financing EE projects, via partnerships with: (i) private sector energy utilities to act as the lead marketing partners, facilitators and aggregators for EE projects; (ii) FIs to provide the local financing to EE projects; (iii) EE Suppliers to supply equipment and engineering services; (iv) end-users to purchase EE equipment and services.

The Program also has several additional objectives:

- (i) promote the entry of new EE technology into the Chinese market, including efficient gas-using technologies;
- (ii) promote the growth and business development of EE project, equipment and service companies in China;
- (iii) build the capacities and experience of local FIs in EE project finance, provide more favorable credit conditions to borrowers, and promote financial innovation in this market;
- (iv) provide practical demonstrations and develop effective methods for how utilities can serve as a platform for marketing and delivering EE projects and services in ways that benefit the customer, the utility and the general economy and society;
- (v) provide experience with utility-based EE finance methods that can be replicated by IFC with distribution utilities and FIs in other countries;
- (vi) educate energy users on the benefits of EE systems and technologies and how to use them economically;
- (vii) reduce local environmental pollution.

3 Strategic Context and Program Rationale

3.1 Country Eligibility

The People's Republic of China ratified the UNFCCC on January 5, 1993.

3.2 Country Drivenness

Chinese Government Support, and consultations with Chinese actors. The Program is a product of a request made by the Ministry of Finance (MoF), GEF Focal Point to IFC to design and implement a new private-sector based EE and/or renewable energy finance initiative, to be supported by GEF funds under the Climate Change focal area. On-going dialogue between IFC, the MoF and several motivated private sector actors, including utilities, FIs, equipment suppliers and service providers, has enabled IFC to develop a country driven project, which: (i) addresses and is aligned with the Government's strategic priorities for energy and environment as set-forth by the National Development Reform Commission (NDRC), Eleventh Five-Year Plan Proposal and the Energy Conservation Law; (ii) operates on a commercial basis with existing, viable private sector market actors; (iii) responds to existing EE marketing and finance barriers; and, (iv) supports the Government's priorities for accelerating the use of cleaner burning natural gas. At each stage of development of the Program IFC has been in communication with the MoF, which endorses the Program representing the PRC Government.

3.3 Brief Review of Chinese Government Policies Related to the Proposed Program

This section briefly reviews the major relevant Government policies related to the Program.

10th Five-year Plan. The current Five-year Plan (2001-2005) sets goals of improving the energy infrastructure, increasing the share of energy provided by natural gas, and reducing coal use through various measures, including energy conservation and efficiency.

11th Five-year Plan. It is expected that the 11th Five-year Plan will call for a tripling of China's natural gas use, from 34 (2003 level) to 100 billion cubic meters. Other anticipated elements of the 11th Five-year Plan that are related to the Program include energy conservation and efficient energy management practices.

Energy Conservation Law. China's Energy Conservation Law, promulgated in 1997, was formulated to facilitate energy savings, improve efficiency of energy use, protect the environment, and guarantee national economic and social development. It calls for increased efficiency of energy use and encourages the development and use of new sources of energy. Accordingly, energy-using entities must "strengthen energy management, and formulate and implement technical measures for energy savings."

National Communications to the UNFCCC. China's Initial National Communication to the UNFCCC (Oct 2004), states that "A key component of China's industrial policies is to reduce consumption of energy and other resources, improve the comprehensive utilization and efficient use of energy and other resources, promote cleaner production, and prevent and control industrial pollution. (...)" Furthermore, "the Chinese government has all along attached great importance to international cooperation in the field of climate change (...)"

Municipal regulations. In order to combat the pollution caused by coal combustion, administrative orders in Beijing and Shanghai have banned the use of coal in new applications, encouraging the use of gas instead. Similar measures have been adopted by many cities, including the target cities considered for this Program.

Achieving local environmental objectives. As the International Energy Agency points out in its review of China’s gas market, “Even though China has put in place a range of environmental laws and regulations on air pollution, the lack of adequate means for implementation makes most of them ineffective.”⁴ Therefore, market mechanisms, such as those provided by this Program, are needed to help energy users to make investments in EE projects and equipment, including conversions to natural gas use, as a means to help them comply with environmental regulations.

3.4 Background on China’s Energy Sector

Recent growth puts strain on China’s energy supply. China ranks as the world’s second largest energy consumer and the second largest national source of greenhouse gas emissions, mainly as a result of fossil fuel combustion. China’s energy-related carbon dioxide emissions in 2001 totaled nearly 870 million tons of carbon. The nation’s per capita energy use and emissions are just over half that of the world average.

Chinese leaders have for decades combined population planning, economic reform, and energy-efficiency policies to hold the GDP elasticity of energy demand well below one, meaning that energy use has grown only about 60 percent as fast as the economy.⁵ However, recent data indicate that energy demand grew perhaps one-third faster than GDP in 2002-2003, as production of energy-intensive materials such as steel, cement, and chemicals expanded at extraordinarily high rates. Electricity shortages occurred in late 2002 and intensified during 2003. Current power shortages are estimated at over 20 Gigawatts despite the rapid addition of new capacity.

Coal: the main source of energy, but also pollution. Two-thirds of China’s energy use is now supplied by coal (see Table 1). The local, regional and global environmental problems caused by the use of coal seriously impede future development prospects. The State Environmental Protection Agency estimates that health and property damage attributable to coal combustion costs the Chinese economy over \$13 billion per year. The current Five-year plan sets to reduce coal use in percentage terms through various measures, including increasing the share of energy provided by natural gas. Natural gas, which was ignored throughout much of modern China’s history, has now been allocated priority.

Table 1 Chinese Energy Use by Fuel Type

Year	Total Energy Consumption Billion Tons Coal Equivalent (EJ)	Energy Consumption Mix (%)			
		Coal	Oil	Natural Gas	Hydro & Nuclear
1980	0.6 (15 EJ)	72	21	3	4
1990	1.0 (24 EJ)	76	17	2	5
2002	1.5 (36 EJ)	66	24	3	8

Source: Battelle 2004.

⁴ Developing China’s Natural Gas Market: The Energy Policy Challenges”, Executive Summary, International Energy Agency, December, 2002.

⁵ William Chandler, Holly Gwin, Yu Cong, Xiong Huawen, Zhang Shuang, Zhou Fu Qiu, Zhu Yuezhong. “Private Sector Solutions to Renewable Energy and Energy Efficiency Technology Commercialization, An Assessment of China’s Market Structure, Government Policy, and Potential Private Sector Business Initiatives”, Beijing, China, May 2004.

Energy, environmental and economic benefits of natural gas. The range of energy-related measures for reducing carbon emissions is large. Economic restructuring, efficiency technology, natural gas substitution, and renewable energy options contribute in roughly equal proportions to potential carbon mitigation estimated at more than 800 million tons by 2030. A study conducted for the Pew Center on Global Climate Change concluded that natural gas is perhaps the most-overlooked mitigation potential in China because this low-carbon fuel was ignored for many decades by Chinese planners.⁶

Increased natural gas use has other benefits besides the reduction of CO₂ emissions. Most importantly, it will help reduce severe local environmental pollution. The replacement of coal-fired equipment with equipment that runs on natural gas will also allow the modernization of industrial activities, making them more competitive.

3.5 Current State of Chinese Natural Gas Market and Barriers to Expansion

Nascent supply infrastructure: a “supply push” for the natural gas market. In its 10th Five-year Plan for the energy sector, the Chinese government confirmed its determination to increase the share of natural gas in the country’s energy supply mix within the next five years and beyond. Evidence of this determination includes the construction of the country’s first LNG import terminal in Guangdong and the decision to build the 4000- km long “West-East Pipeline” to bring natural gas from the country’s far west to Shanghai in its far east. The target is to double the share of natural gas in China’s total primary energy supply by 2010 from the current level of 3 per cent, and to build a well interconnected national gas supply network by 2020.⁷

Other major new projects to import liquefied natural gas (LNG) have been launched and more are in the planning stage. This gas will be used directly in power generation and will also feed high pressure gas supply lines for distribution to residential, commercial and industrial sectors. Many cities have established concessions for development of gas distribution systems, and investment is proceeding rapidly in the build-out of the distribution network. Current gas consumption in China is highly concentrated with a few industries and power plants. The broader consumer market for gas and gas-using equipment is very young in China, and the market trend for broader gas use is not yet well-established.

What’s needed now: a “demand pull” on the use of natural gas. To date, China’s strategy and actions to develop its gas market have been mainly “supply-push”. Presently, the most critical issue restraining China’s gas sector is the development of end-use gas market demand. Indeed, the International Energy Agency’s assessment of the Chinese gas market concludes that to achieve the desired target of doubling the share of natural gas in China’s energy supply mix within the decade, “...the challenge is in the downstream sector. In most parts of China, gas will find it hard to compete against coal in power generation. In local gas distribution, much needs to be done to ... introduce commercial marketing and management.”

The report further finds that “[China]...undoubtedly offers huge market potential for natural gas, driven by the size of its population, economic growth, and the increasing need for cleaner energy. But this potential may remain only theoretical if Chinese policy-makers do not take into account the *relatively poor competitiveness of natural gas vis-à-vis* alternative fuels, the *marketing efforts*

⁶ William Chandler, Roberto Schaeffer, Zhou Dadi, PR Shukla, Fernando Tudela, Ogunlade Davidson, Sema Alpan-Atamer, *Climate Change Mitigation in Developing Countries: Brazil, China, India, Mexico, South Africa, and Turkey*, Pew Center on Global Climate Change, Washington, October 2002.

⁷“Developing China’s Natural Gas Market: The Energy Policy Challenges”, Executive Summary, International Energy Agency, December, 2002.

required of gas sellers/distributors, and the realistic estimation of major challenges that must be overcome to build up the demand for gas. Consequently, gas market development must, in the first instance, rely to an extent on *a multitude of small and medium-sized consumer entities* who must be convinced one by one to opt, willingly and happily, for natural gas as the fuel of choice and to pay for the cost of conversion.” (Emphasis added).

Finally, a joint Sino-US report on expanding China’s natural gas market notes that “China will need to train thousands of specialists over the coming decade if it is to boost natural gas use significantly. . . . Chinese natural gas specialists are often well equipped with analytical and technical skills, but *lack skills in business planning and finance* that help create successful business models.”⁸ (Emphasis added).

To summarize: EE investments including increased use of natural gas hold great potential for reducing China’s CO₂ emissions and alleviating its energy supply crisis. The market for end-use of natural gas is still evolving, and faces certain barriers:

- Gas is frequently more expensive in many applications when compared to coal.
- EE and gas equipment sellers often lack capacities to market EE equipment effectively.
- Gas utilities have a low level of marketing and finance skills to work on the customer side of the meter.
- The multitude of potential customers with varying equipment type and size needs creates high transaction costs for EE projects.

The economics of natural gas use in China. Economically, the main competitor to natural gas is coal. Coal costs approximately 50% less than gas on an energy unit basis (although coal prices are rising more rapidly than gas). EE investments undertaken in conjunction with gas retrofits enable gas to compete with coal. This is an essential feature of the Program when working with gas utilities: co-marketing EE investments with new gas-using energy systems. The Program will offer end-users EE improvements as an integral part of package that can include gas-using equipment.

A primary gas application is for boilers for heating and industrial process. Coal dominates the boiler market. Industrial boilers in environmentally sensitive urban areas are being converted to gas, or, in many cases, simply shut down and moved to outlying areas. For urban residential applications, conversions from coal to gas are being driven by environmental regulations. The Program will address all these markets.

Gas use *is* frequently economically attractive now when substituting for peak and partial peak electricity. Many electric utilities have time-of-use power tariffs and, particularly for commercial sector customers, on-peak and partial-peak power can range from USD 7-11 cents per kwh. Gas-fired distributed generation, including small scale cogeneration and tri-generation (power, heat and cooling), is a field ripe with opportunity. Economic applications, with simple paybacks in the 2.5 to 4 year range, include air conditioning, refrigeration, cogeneration, and small power generation applications, especially for commercial sector customers (e.g., office buildings, hotels, and hospitals). IFC’s market research has identified many such projects, with multiple equipment suppliers and project developers pursuing these markets.⁹

⁸ Pacific Northwest Laboratories, University of Petroleum, Beijing. *Expanding Natural Gas Use in China*, April 2002.

⁹ These EE equipment and project companies include Cummins, PowerU, Sebesta, Shuang Liang Air Conditioning, Energy Net, Broad Air Conditioning, and Opra.

Further, many industrial gas applications are economic now, when gas quality brings added benefits. The flexibility and premium clean energy qualities of gas are beneficial for industrial processes such as glass manufacture, pharmaceuticals, electronics, and food processing. The economic benefits of these gas applications include improved product quality, reduced waste and lower operational and maintenance costs.

Every potential investment in gas end-use equipment is an opportunity for promoting EE that should not be squandered. Once a customer has installed new equipment, that equipment is likely to be in place for 5-30 years, depending on the end use. The Program can help lock in EE projects *now* whose benefits will last long into the future. If EE upgrades are not incorporated, the inefficient equipment will remain in place for years to come, and an opportunity for affordable EE upgrades will have been lost.

An additional Program objective is to assure that the gas equipment used is the most efficient possible, reflecting best available technology. Development of the gas equipment industry, including assistance in bringing new EE/gas technologies and firms to China, and supporting development of joint ventures between domestic firms and international firms to sell and subsequently manufacture equipment in China, will be one aspect of the Program's TA program working with EE Suppliers and utilities. For example, one such case between a Dutch manufacturer of gas cogeneration and absorption chiller equipment and the initial partner utility is already under development. Fostering incremental improvements in the efficiency of gas-using equipment is an important secondary objective of the Program. In the first instance, however, the Program's primary objective is to implement an effective marketing and delivery mechanism for EE and gas-using equipment, in partnership with the utilities. The Program addresses marketing and finance barriers to implementing EE and gas-using projects. The Program will help assure that these barriers to expanded gas use on the customer side of the meter are overcome so that gas sales targets of partner utilities can be accomplished, and, further, that, in the process of making investments in gas-using equipment, end-users also implement other cost-effective EE investments.

3.6 EE Equipment Finance: Its Roles and Related Barriers

EE equipment and projects are capital intensive and costly. Customers needing to make these investments frequently face first cost barriers and need financing; yet, financing is not organized and readily available to support EE equipment/project sales. Principle financial market barriers to EE equipment and project implementation which are most acute and relevant in China include the following.

Lack of Bank Experience with EE and Project Finance. Banks lack experience in EE finance. Banks and other FIs typically assess risk and make credit risk decisions on the basis of very traditional evaluations of fixed asset collateral as security and often lack experience preparing *pro forma* documents (business models and financial projections) to assess risks on a project finance and cash flow basis.

End-user Credit Risks and Need for Credit Enhancement. The Chinese banking sector is characterized as highly liquid, but risk averse. Access to credit is limited, especially for viable small and medium scale enterprises (SMEs) and other institutions who historically have not used loans. In FI interviews and assessments IFC has conducted, some of which included 5-6 meetings with the same FI to explore finance structure options in depth, all FIs have inquired insistently regarding the source and level of risk sharing for securing the EE equipment loans. China's FIs typically assess risk and make credit lending decisions on the basis of fixed asset

collateral and often require collateral valued as high as 200%+ of the loan amount. Some borrowers are willing and able to provide necessary collaterals, but many will not. Further, EE equipment tends to have low collateral value. To complicate the picture further, potential borrowers often are borrowing for the first time, and therefore do not have a credit history or other information available on which lenders can make credit decisions. A barrier specific to China is the fact that national banking regulations cap or collar interest rates, limiting banks' ability to charge risk-weighted interest rates. In response, a commercial guarantee industry has emerged in China, and banks have grown accustomed to receiving guarantees. These guarantee companies do not currently address the needs of the EE finance market. But, a guarantee or "risk sharing" instrument is a form of credit enhancement which banks readily recognize.

Small Size Projects. Banks typically prefer large loan amounts, e.g., above 20+ million RMB (\$2.5 million) whereas gas and EE projects tend to be relatively small, with many projects in the 2-10 million RMB (\$250,000-\$1,250,000 range). IFC discussions with banks to date indicate that market aggregation could overcome this small project size barrier and make equipment lending more attractive to participating banks.

Lack of Medium and Long-term Financing. Though some banks have medium and long-term resources to lend, tenors on loans to SMEs and other small borrowers still tend to be very short (one to two years), due to short risk horizons. Availability of longer term financing, even three to five years, will further open the market for EE projects and equipment. Addressing end-user credit risk barriers can help banks use their existing resources to make medium term loans.

3.7 Marketing Barriers to the Increased Use of EE Equipment

In addition to the equipment finance barriers discussed above, EE in China also faces some more general marketing barriers. Customers, suppliers of EE products and services, and utilities each face their own barriers that impede the wider uptake of EE equipment.

End-User's Perspective (1): Need for End-User Education. In the rapidly evolving Chinese business environment, there is a tremendous on-going need to educate energy users on the opportunities for and benefits of EE investment.

End-user's Perspective (2): Complexity is Discouraging. Development of EE projects is a service intensive task, with multiple steps required for their effective preparation. Customers often lack the technical engineering skills needed to develop projects on their own. These barriers are compounded by the relatively high pre-investment transaction and development costs and risks of preparing EE projects. It can remain daunting for an end-user to develop an EE project; the end-user must meet with one or more suppliers, assess their proposals (without outside support), oversee installation contracting, and handle the financing. Thus, the Program is designed to provide end-users with a comprehensive implementation and financing program that offers "one-stop shopping" arrangement for developing EE projects.

EE Supplier's Perspective (1): Lack of marketing, project development skills and complete EE solutions. EE Suppliers typically lack the sales and marketing skills that would enable them to tell a compelling EE savings story to potential customers. In addition, EE Suppliers often do not offer a full suite of EE equipment and services that can be sold as a complete EE package that address all of the end-users needs. Thus, the end-user is in the difficult position to select equipment from multiple suppliers, and then take responsibility for integrating different equipment vendor products into an upgraded energy system.

EE Supplier's Perspective (2): Fragmented end-user market. EE Suppliers generally do not have an existing relationship with their potential customers due to underdeveloped distribution and sales channels. EE equipment sales and installation requires the packaging of engineering services as part of the transaction. The transactions are often too complex for an off-the-shelf retail approach to marketing, and too small in economic value, and the end-user market too fragmented, to be sold on a scalable commission-based sales agent basis.

Utility Perspective: Little Experience with Customer Outreach & Marketing. Gas utilities have relatively little experience in marketing to customers. Their marketing to date has focused on marketing to cities looking to establish gas distribution system concessions, and advocating local government policies supporting gas use. Active marketing of gas-using equipment and provision of customer technical services to create and implement site-specific solutions, while logical and natural functions of gas utilities, have not yet been done simply because the industry is so new. The gas industry is only now at the stage where these capacities are needed and their development is now absolutely timely.

4 Program Description

This Section describes the Program's methods, starting with an overview of target markets and types of EE projects and equipment the Program will support. It then provides detailed descriptions of each Program component:

- EE project marketing strategy,
- the utility marketing and project development mechanism,
- the EE Suppliers Network,
- the equipment loan mechanism, including the credit structure of the loan program and the IFC RSF which will help address and overcome credit risk barriers,
- outreach program to recruit and select additional utility partners,
- performance-based incentives and carbon credits.

In the descriptions, the roles of the main actors -- utilities, banks, and EE equipment and service providers -- are presented. The TA program will work with all key parties -- utilities, EE Suppliers and FIs -- to build their capacities to market, develop and finance EE projects and to prepare projects for investment. TA funds will also be used for monitoring implemented EE projects. The TA program will organize and apply tools over the full project development cycle, with an emphasis on marketing, engineering and finance.

4.1 Target Markets and Types of EE Projects & Equipment

The Program will target commercial and industrial customers in the service areas of partner utilities. As a secondary priority, municipal/institutional sector customers, e.g., hospitals and government buildings, and multi-family residential sector may also be targeted. The ultimate sectoral focus will be determined by market dynamics.

The range of EE equipment to be promoted and financed by this Program is broad and will include, for example: boilers, cogeneration, small power generation, air conditioning, heating systems, refrigeration, lighting, motors, controls, and other industrial process improvements such as heat recovery. Typical EE projects will consist of a package of equipment and systems, including engineering, installation, and the ancillary project development activities. The Program will work to streamline and scale-up the financing of EE projects in two ways: (1) standardize the processes for originating, engineering, applying and securing financing for EE projects; and, (2) organizing equipment and engineering services into standardized packages. In order to make it simple and quick for the utility to sell and the customer to undertake EE improvements, the Program will assemble a set of basic packages that meet a set of commonly-found applications, such as heating and cooling systems for commercial, institutional and multi-family residential users. The packages will be designed in partnership with the EE Suppliers, and will use readily available high-quality energy efficient equipment, for example, tri-generation equipment (heat, cold, and power) for hotels and commercial buildings, or new boilers for industrial SMEs and multi-family housing.

EE project sizes are expected to range from 500,000-1 million RMB (\$40,000-100,000) at the small end to 16-40+ million RMB (\$2-5 million) at the large end with an average expected of about 2-4 million RMB (\$250-500,000). Loans can be to the end-users or energy management companies (EMCs) with long-term service contracts with end-users. IFC targets directly supporting over one billion RMB (\$150 million) in loans and 350-400 transactions over the six year life of the Program.

Geographically, the Program will focus mainly in the service areas of partner utilities and can also support EE equipment loans identified by participating Banks and EE Suppliers nationally, wherever they have projects and transactions needing support.

4.2 EE Project Marketing

For development programs such as CHUEE, a central challenge in promoting EE is not just creating access to financing but also creating *systems* to generate substantial deal flow, to market and prepare EE projects for investment at the scale that EE's economic and environmental benefits warrant. The EE market consists of large numbers of relatively small, distributed projects. The "Achilles' heel" of the EE industry is the long sales process with end-users. Each EE project involves complex site-specific and customer-specific technical and financial details. Selling an EE product customer-by-customer has high transaction costs and can be very time consuming. To address this challenge, the Program will support EE project sales and investments originated through *multiple channels* and will organize and apply capacities and tools to work the full range, and at various steps as needed, of the EE project development cycle.

The primary marketing channels being innovated and developed by the Program are partnerships with utilities. A main thesis of The Program, supported by international experience and models,¹⁰ is that utilities can be effective marketing partners and aggregators. The utility partnerships are designed to create an effective scalable mechanism for marketing and delivering EE projects, leveraging the utilities' self-interest to overcome existing market barriers, accelerate the project marketing process, develop projects efficiently and systematically at high levels of market penetration in a given area, and aggregate the market for financing.

In addition to working through the utility partnerships, The Program will support marketing and origination of EE projects through partnerships with banks and EE equipment and service providers. This can be done in conjunction with *and also independent of* the utility channels.

- *Banks* have indicated strong interest in promoting EE projects to their existing clients, in which the bank would take on additional credit exposure with The Program support. The Program will support this process with TA, by helping to develop the EE projects, and facilitating links between banks and appropriate EE Suppliers.
- *EE equipment and service companies* have their own marketing efforts; The Program will assist them by arranging financing for their sales, e.g., via vendor finance programs with participating banks.

The objective of using multiple channels is to assure an adequate volume of EE projects, to meet Program targets. The Program design maintains *flexibility* to be fully responsive to opportunities and commercial requirements of the various parties and to deploy Program tools in various ways to achieve this objective. The Program has capacity and tools to work at every stage of the EE project development cycle. The Program will set up systems, relationships and framework agreements between the various parties that will generate a flow of EE projects.

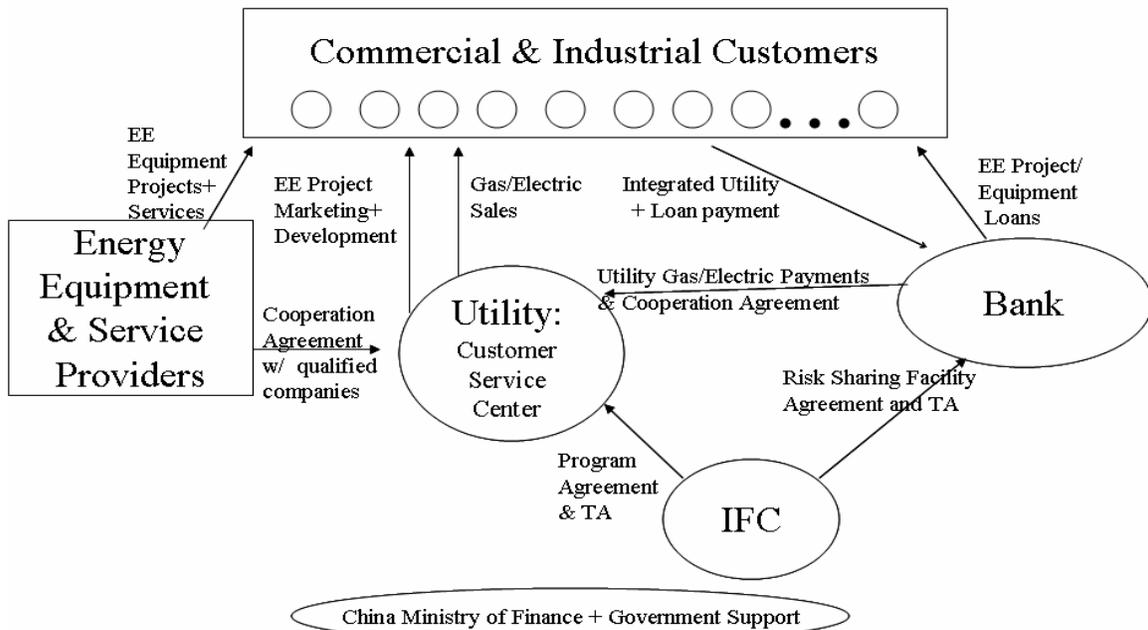
¹⁰ Consumer centers, similar in design to the Program's Client Service Center, are developed in many European cities, for example, "Copenhagen Energy" has established one in Copenhagen, "Stadtwerke Leipzig" in Leipzig.

4.3 The Utility Partnership

The basic scheme of the utility partnership is summarized in Figure 2, which depicts the Program's design as it will function for one utility, including the different operating agreements between the Program participants.

In each target market, (typically, a medium to large city), a utility partner will take advantage of its customer base and service territory to systematically identify customers, mainly in the industrial and commercial sectors. The utility will market the program and offer engineering and decision-support services to the customers to develop projects, starting with audits and feasibility studies. The utility will work cooperatively with selected EE Suppliers to offer suitable equipment and services. Partner banks will offer loans to customers to finance the projects. IFC will provide a RSF to help secure the loans, facilitating and increasing access to finance.

Figure 2: Basic Scheme of CHUEE Utility Partnership



Currently an end-user might have been approached by one or several suppliers of energy equipment and engineering services with which it had no relationship. The supplier typically would face high costs and difficulties to gain the customer's attention and present a compelling offer. If a customer is persuaded to implement an EE project, finding finance would be complex and discouraging, and the EE retrofit would often not take place. Further, this process would occur technology-by-technology and EE supplier-by-supplier, so the customers would have a fragmented rather than comprehensive treatment of their EE potential.

With the Program, the customer is approached by a known business entity in the community, the utility. The utility is a credible "one-stop shop"; it presents the customer with economic and engineering analyses that clearly show the advantages of an EE project, develops an EE package for the customer, and helps arrange financing for the project. The use of standardized equipment

and finance packages makes it easy for the utility to scale up the project and generate a high volume of projects.

4.3.1 *Utility Role: Developing EE Projects with Customers*

In the basic scheme, the utility will have the lead role in marketing, managing the customer relationship, and providing technical guidance and support services to help customers develop their EE projects. The typical steps required for customers to develop EE projects are outlined below.

Project identification.

- Marketing and customer education.
- Desk-level assessment and screening of EE and greenhouse gas emission reduction potential.

Project preparation: technical and economic.

- Site assessment, identifying EE opportunities and applications and making initial economic (cost and benefit) estimates and financing options.¹¹
- Customer decision on what applications to further develop.
- Further preparation of EE project feasibility study (economic/engineering analysis) and investment plan.
- Customer management decision on which projects to implement.

Project preparation: financial.

- Credit screening of customer.
- Preparation of finance package for the customer, in cooperation with participating bank.

Project engineering and installation

- Full engineering and permitting for the project.
- Procurement of equipment and installation contractor.
- Completing legal contracts for project implementation including financing.
- Project installation and commissioning.

Project operation and monitoring

- Project operations, including ongoing maintenance and optimization.
- Independent collection of performance data for Monitoring and Evaluation.

The utility will have the lead role assisting the customer through this process; it will work with the customer on marketing and education, identification and assessment of energy project investments, preparation of feasibility studies and investment plans, and facilitation of customer decisions. The utility will use expert engineering sub-contractors to provide on-site services to customers. The utility will also assist the FI partner to make the project financing arrangements. The Program will be designed so that it can be scaled up in volume, so as to take the greatest advantage of the utility's central role as a project aggregator.

Overall, the utility will support the customer to make decisions on what projects and equipment to implement, using a combination of its own marketing and engineering staff and services from

¹¹ This step also includes collection of data on the energy performance of existing equipment, to be used for the calculation of GHG emission reductions.

outside engineering firms. The utility will then assist the customer to procure the EE projects from qualified EE Suppliers.

Utilities may also have program agreements with specific EE equipment companies whereby the utility: (i) promotes the specific technology package and equipment of selected EE companies, and/or (ii) authorizes selected EE companies to market the utility's program in its service territory to its customers, with the utility providing some of the TA tools (e.g., audit and feasibility study support) to the selected EE companies. These approaches harness the marketing power and initiative of the participating EE companies and accelerate market penetration, instead of solely relying on the utility to initiate and manage the customer marketing process.

By performing integrating roles -- systematically marketing to customers, identifying potential EE projects, developing the projects with input from the EE Suppliers, and arranging finance through participating FIs -- the utility will introduce efficiencies into the EE market. This will result in a significant increase in EE project volume in the utility service areas where the Program operates.

4.3.2 *Utility "Customer Service Center" and Business Plan*

To manage its roles, the utility will establish a "customer service center" ("CSC") and knowledge center at its headquarters. The CSC will work with the marketing departments in each of the utility's service areas. The CSC, which will have knowledge of EE equipment and applications, will manage the relationships with the EE Suppliers, and will be able to perform engineering studies to advise customers. GEF funds will be used by the Program team to train the partnering CSCs in delivering these services. GEF and other donor funds will also be used to co-fund delivery of engineering services to customers through the project development cycle, as needed.

To develop its program, a participating utility must prepare a business plan for its CSC operations. Initial work includes research and compilation of data on its target city markets and conducting surveys of customers to identify their EE equipment project and finance needs. IFC will assist participating utilities to prepare business plans for their CSC. The Xinao Gas business plan for program implementation is in draft stage at the present, and the subject of development jointly with IFC. The utility business plan will define: target markets, services the utility will offer customers over the full EE project development cycle, how to deliver these services, staffing plan, staff training plan, use of outside consulting engineers, development and use of the EE Suppliers Network, budget and funding, reporting, and EE project monitoring. Utilities are expected to provide at minimum 50/50 cost sharing for program implementation in the first two years, and larger shares thereafter. These commitments will be formalized in a Program Agreement between IFC and each utility.

4.3.3 *Utility Technical Assistance Program*

TA support for utilities is expected to include:

- cost sharing (up to 50% expected) for certain dedicated full-time utility CSC professional staff at utility headquarters and initial cities during the program start-up period, for two to three years;
- consulting engineering services for development of specific customer projects (mainly for audits and feasibility studies),
- consulting engineering to help assemble the EE Suppliers network and conduct technology reviews
- staff training, on engineering, marketing and project finance;
- overall strategic support at both headquarters and city operations levels.

TA will be delivered in-kind and with direct cost-sharing funds support. IFC's PMO, including full-time local staff and international consultants, will provide significant support in-kind to participating utilities on program development and operations, staff training and liaison with partner banks.

4.3.4 *Engineering Services*

The TA program will have a substantial engineering component. The engineering work scope includes the following services, which will be deployed by the IFC PMO and made available to end-users, banks, utilities and EE Suppliers.

- a) *Energy audits.* Standardized auditing methods will be developed and used. Utilities will provide data on existing customers to expedite audits. Customer energy cost and consumption and end-use system inventory information surveys will be prepared so that customers provide basic data as a condition of the audit. Overtime, audits will be performed more by utility staff and less by consulting engineers. Industrial customers with more complex energy systems will continue to require specialized expertise.
- b) *Feasibility studies* for selected energy equipment applications and projects. Through the audit process, specific EE projects will be selected for feasibility studies. The studies will assess the economics of EE investment options and support customer decision-making on which measures to implement.
- c) *Project development services*, following feasibility studies, to support customer decision-making, prepare investments plans, and advise on engineering specifications and procurement of project equipment.
- d) *Engineering due diligence reviews* for participating banks, and to confirm estimates of EE project energy and emissions savings.
- e) *Development of standardized equipment solutions* for common applications, e.g., air-conditioning in commercial buildings and gas-boilers for building space heating.
- f) *Engineering advice on the Equipment Suppliers Network*, including quality and technical criteria, equipment assessments, and preparation of marketing information which properly emphasizes life-cycle and energy operating costs.
- g) *Training* for engineering and marketing staff of partner utilities to build their engineering-related capacities to implement the Program, including performing customer assessments for standard applications, and selling EE projects and services.
- h) *Utility cost/benefit analysis* to be used for recruiting utilities to participate in the Program and to quantify the utility system benefits that can be generated by demand management and EE investments.
- i) *Post-installation monitoring and evaluation.* Estimates of energy savings and GHG emissions reductions associated with projects will need to be validated through post-installation monitoring and verification.

In addition, the Program will conduct market research on co- and tri-generation and heating systems. IFC expects that co- and tri-generation systems and building heating and cooling

systems will represent significant energy savings applications to be promoted, developed and financed with Program support. Economics, applications and market barriers for expanded use of these systems where they offer economic benefits will be assessed, and related policy recommendations for the PRC Government will be formulated, (e.g., establishment of in-feed tariffs for grid sales of power and heat from distributed combined heat and power stations, and, expanded use of “Nordic-style” district heating systems), in a special report to be prepared. IFC will promote the report’s findings and recommendations to the PRC Government and other relevant parties through appropriate channels, including the Program Advisory Committee.

4.4 EE Equipment & Service Suppliers and Their Roles

4.4.1 Creation of an EE Suppliers Network

An open Network of EE equipment and service suppliers will be developed to cooperate with participating PROGRAM utilities and deliver equipment and services to end-users. The categories of EE Suppliers in the Network will include: engineering companies, mechanical and electrical contractors, equipment manufacturers and suppliers, operations contractors, and full service energy management companies (EMCs). The EE Suppliers Network will be available for use by participating utilities. EE Suppliers will also market their EE projects and services to customers, in coordination with the utility.

The EE Suppliers Network provides a route to market for the participating EE Suppliers. They will benefit from marketing support, capacity building and significantly greater deal flow than they would be able to obtain on their own. Customers will benefit from access to pre-qualified Suppliers and more comprehensive EE project offerings available from the Network. By putting projects out to bid through the Network, the utility can secure low prices for customers. Were the customers to implement the projects on their own, they would likely pay higher prices in addition to incurring substantially higher transaction costs. The Network leverages competitive market forces to bring down prices and project costs.

IFC has begun building a database of EE Suppliers and conducting interviews to assess their capacities. IFC will continue to build and maintain the database through Program development and operations. The Program can recruit new international EE equipment suppliers to China as part of its market development activities to promote the most technologically advanced EE equipment. Research to date indicates that this activity will be needed for certain types of gas-using equipment.

4.4.2 Market-based Purchase Decisions by Customers & Customer Education

IFC must maintain a neutral position in the marketplace and not directly promote any particular EE Supplier. End-users (customers) will make their purchase decisions on a market basis. The Program’s role is to provide thorough information to customers on energy savings benefits of various energy equipment and system options. The Program will educate customers to make their purchases based on life-cycle and energy operating costs, not just lowest first costs.

Utilities can assist end-users in procurement of equipment and services. Customers will be provided with lists of companies selling equipment and services relevant to their projects. End-users can choose suppliers on a sole source, negotiated or competitive bidding basis. Utilities may also develop agreements with preferred equipment suppliers who offer economic technology solutions to common customer applications.

4.4.3 *Request for Qualifications Process*

Information will be sought from equipment and service companies on: their products and services, specifications of their equipment, prices, equipment track record, equipment efficiency over a range of operating patterns and configurations, reference projects and case studies including sample project economics from the customer's viewpoint, their response to proposed Program business terms, including willingness to pay small fees (2%) for the finance mechanism, provide remarketing/repurchase commitments for their equipment, extended equipment warranties and performance guarantees, co-marketing activities with utilities and banks, etc. To gather information, the Program will conduct a series of Request for Qualifications (RFQ) processes to solicit information from EE Suppliers. This information will be made available to customers. The RFQ will solicit information in a format suitable for prospective customers, emphasizing customer economics and energy savings benefits.

The RFQ will also explain the Program and outline TA services the project can offer to the EE Suppliers. The Program's main benefit for Suppliers is marketing, in collaboration with utilities, and marketing and access to equipment financing, in collaboration with banks. Other forms of training and business development services can also be offered. Through training and other events, the Program's activities will build capacities of the EE Suppliers to market and sell their equipment and services; this will be one aspect of the Program's market development objectives and activities.

The RFQ process will be conducted at the beginning of the Program, and repeated periodically thereafter as a marketing tool to attract new EE Suppliers. Further, the Network will be left open to allow EE Suppliers to join the Network at any time. In addition, customers who want to choose equipment outside the Network can do so. EE projects supported by the Program will be the subject of feasibility studies and technical reviews. Thus, new equipment suppliers can enter the Network as part of the loan application process.

4.4.4 *Other Marketing Channels*

The normal sequence for making an EE project sale through the utility partnership process is as follows: utility contacts the customers; utility helps the customer develop an EE investment program (with audits, feasibility studies, etc.); the customer procures equipment (through competitive bid, sole source, etc.), and utility may help customer with the procurement. The Program will also support development and financing of EE projects initiated through other channels, *independent of the utility*. The Program will facilitate relationships between banks and EE Suppliers whereby: (i) EE Suppliers can offer their EE equipment and services to customers identified by the bank; and, (ii) banks can provide financing to customers identified and developed by the EE Suppliers. The sequence of steps for generating an EE project sale may thus begin with either the bank relationship with the customer, or the EE Supplier's direct marketing. The Program will develop tools, work primarily contracted through engineering consultants to assist in development of EE projects however they are initiated. These tools will be applied at various steps of the EE project development cycle, as needed. The objective of using multiple channels is to assure adequate deal flow to meet Program targets and respond to commercial opportunities however they arise. Banks and EE Suppliers have identified such opportunities, and requested this flexibility during the Program appraisal.

4.4.5 *EE Suppliers Technical Assistance Program*

The TA component of the Program dedicated to EE Suppliers concerns marketing and finance and will be delivered in the context of developing specific EE projects. For EE Suppliers, the Program will:

- provide marketing, customer education, engineering and project development services to get customers “decision ready” to make EE investments and thereby create direct opportunities for equipment and service sales;
- create new marketing channels for energy equipment, through participating utilities and banks;
- facilitate financing of EE projects and equipment.

The Program may also provide additional training and business development services to select EE Suppliers, similar to what IFC has done in other EE finance programs, including training and business development services.

4.5 Equipment Finance & Credit Enhancement Mechanism

4.5.1 Basic Structure of Financing Mechanism

IFC is establishing partnerships with local commercial banks to participate in The Program. Banks will provide energy equipment loans (“Loans”) and related loan origination and administration services. IFC will provide: (i) a RSF to each bank to share with the bank in credit risks of Loans which the banks will fund with their own resources, and (ii) substantial TA to improve bank credit risk management practices and support marketing of bank financial services and preparation of EE projects for investment. In addition, certain bank performance incentives arrangements are being considered to create extra incentives for banks to achieve Program targets.

The IFC RSF investment is targeted for commitment in March of 2006. IFC is presently in the process of appraising banks for participation, negotiating final terms of the RSF, related loan terms and TA agenda, and processing the RSF investment. IFC conducted a Request for Proposal (RFP) process to solicit proposal from selected banks. Industrial Bank Co. Ltd., headquartered in Fuzhou, and China Minsheng Banking Corp. Ltd., headquartered in Beijing, have been selected to participate; other banks may be added throughout the Program’s duration. Because both banks are IFC investees, IFC has a good quality and high-level relationship with these banks; this knowledge has allowed the process with banks to advance more quickly. IFC has a good understanding of the credit underwriting practices of these banks as a result of the extensive due diligence that IFC has performed on them to date. IFC has strong relationships with their senior managers, and is in a position to engage them on an on-going basis to enter this market with innovative financial products and credit risk management tools, and achieve Program objectives.

The next sections describe key aspects of the equipment loan and RSF program.

4.5.2 Estimated Loan Terms

Loan terms are being negotiated with the banks to match the needs of this market; these terms are expected to include: loans in RMB; tenors of 3 to 5 years; customer down payments of 20-30% of total project costs; monthly loan payment schedules, with principal amortized monthly, mortgage-style; grace periods of up to 6 months, covering the project/equipment construction period; and, interest rate and pricing, on commercial terms, determined by Bank. Borrowers can be both end-users and energy management companies (EMCs). Many loan origination functions can be performed by the utility, thus reducing bank transaction costs. Other key terms concern required bank loan security and underwriting criteria, discussed below.

4.5.3 Eligible Equipment

“Eligible equipment” will be defined in the IFC Risk Sharing Agreement in two ways. First, an extensive list of energy equipment will be provided covering a range of equipment types, from

boilers, motors, industrial process, cogeneration, heat recovery, refrigeration, heating and cooling systems, etc. This list will be an attachment to the RSF Agreement between IFC and banks and can be added to during Program operations. Second, *minimum* efficiency standards for eligible equipment must be established. These standards must be consistent with Chinese law and practices. The Program must collaborate with appropriate Chinese agencies and design institutes in this regard. IFC will not certify or qualify equipment, but will defer to and cooperate with the Chinese agencies regarding setting minimum standards. IFC is exploring cooperation with the NDRC's Energy Conservation Information and Dissemination Center to assist with and coordinate this task.

4.5.4 *Credit Structure of the Equipment Loan Program*

The equipment loan program must have a strong credit structure that manages customer credit risk so that the banks can prudently approve many loans on terms that are attractive to many customers. The credit structure includes the IFC RSF. Other credit enhancement methods are also proposed to be incorporated into the loan program, including: an added loss reserve for the whole portfolio, funded from fees charged to equipment suppliers and borrowers; collections of finance payments together with the utility bill; debt service reserve funds, created by customers for individual loans; and, security interest in the energy equipment. These methods are briefly described below.

- **Additional loss reserve.** IFC is encouraging banks to charge risk weighted interest rates to borrowers and finance fees to equipment suppliers equal to 2-3% of the value of their equipment. The spread and fees earned would accrue to an additional loss reserve fund held by the bank and used to cover loan losses, in combination with the IFC RSF. IFC will assist the banks in negotiating these arrangements with the utilities, customers and equipment suppliers.
- **Collection of loan payments integrated with the utility bill** is being explored. There is considerable international experience with this model¹² demonstrating that it can strengthen the loan credit structure. Collections would be monthly. The bank will perform the collections and act as collections agent for the utility and pass through gas/electric payments to the utility. In this arrangement, if the customer does not make its loan payment, its gas (or electric, as applicable) service is cut-off. This enhances the customer willingness to pay. The Bank/Borrower loan agreements and the Bank/Utility Program agreements will include provisions to effect this arrangement. Further legal research is needed on applying this method. Precedents exist for bank collections of utility payments in China. Xinao will pursue this arrangement and has concluded that it should be legal, provided it is undertaken on a voluntary basis by customers as part of the equipment loan agreement and is consistent with local regulation, which will dictate the minimum number of days past due on utility bills, e.g., 60 days, before the utility is allowed to suspend utility service.
- **Debt Service Reserve.** In addition, borrowers could be required to establish a debt service reserve fund, e.g., equal to 2 month's debt service, as additional security. Customers can also be required to open accounts with the bank as a condition for the loan, and the bank can be given preferred drawing rights on this account for collections purposes.

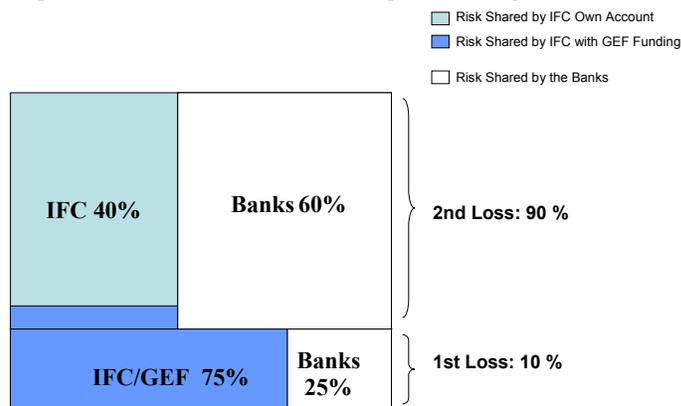
¹² Examples of utilities using this method include Pacificorp (USA), Comision Federal de Electricidad (Mexico), Electrite du France (Martinique), Ahmedabad Electric (India), Ceylon Electric Board (Sri Lanka).

- **Security Interest in Energy Equipment.** Security interest in equipment being financed can be obtained. Collateral value of this equipment may be relatively low, but the equipment is typically essential to the customer’s operations, so they can not function without it, e.g., a hotel can not operate without its air conditioning and heating system, and a dairy plant can not operate without its boilers used for pasteurization. This “essential use” characteristic of energy equipment, and the threat of losing use of the equipment, enhances a borrower’s willingness to pay. Equipment repurchases or remarketing agreements from equipment suppliers will also be explored as a means to liquidate repossessed equipment.

4.5.5 Risk Sharing Facility Terms

The proposed IFC RSF will have “First Loss” and “Second Loss” components. “First Losses” will be defined as a percentage, e.g., 10%, of the original principal amount of all equipment loans in the loan portfolio; and, for an individual Loan, a limit will be placed on the amount qualifying as “First Losses”, e.g., 8 million RMB (approximately \$1 million), to assure proper diversification of loan portfolio risks. The First Loss Risk Sharing (FLRS) would pay for a large portion, e.g., 75%, of all First Losses. The FLRS would cover principal only, not accrued interest. IFC intends that First Losses will be defined at a level higher than the estimated loss rate on the loan portfolio in order to extend the banks’ risk frontier and create greater access to equipment loan finance. The bank would cover First Losses from a combination of the IFC FLRS plus additional loss reserves raised from fees charged to borrowers (via increased loan margin) and equipment suppliers. “Second Losses” are expected to be defined as losses in excess of the First Losses. IFC would share risk with the Bank in all Second Losses on a *pari passu* basis. The *pari passu* risk sharing percentage would be in the range of 40% of the Second Losses. The *pari passu* Second Loss Risk Sharing (SLRS) and FLRS would be combined in a single product and be the subject of a Risk Sharing Facility Agreement between IFC and each bank. The target risk coverage is approximately US \$50 million, of which approximately US \$10 million of the GEF funds will be allocated to the first loss position and US \$40 million of IFC investment to the second loss position. The general RSF structure as presently contemplated by IFC is illustrated in Figure 3.

Figure 3: Risk Sharing Facility



The terms of the RSF are the subject of current discussion and negotiations with banks and will be concluded early in Program operations and made subject of a Risk Sharing Facility Agreement between IFC and each participating bank.

4.5.6 Loan Underwriting Guidelines

Loan Underwriting Guidelines, defining requirements that each individual borrower must meet, will be developed in consultation with banks. IFC expects that one general set of Loan Underwriting Guidelines will be agreed at the beginning of RSF operations. Subsequently, because the Program will serve several customer sectors with a range of credit characteristics, additional Loan Underwriting Guidelines can be developed appropriate for each market segment. This can be done as Program operations proceeds, and based on experience. IFC will provide TA to assist banks in this regard to develop the underwriting guidelines and improve their internal risk assessment and management procedures. In practice, the banks will control their loan credit decisions. The IFC RSF coverage will be automatically available for loans meeting the agreed underwriting guidelines.

4.5.7 Loan Origination, Marketing and Utility/Bank Program Agreement

In the basic scheme of the utility partnership, the utility will have the lead role in EE project marketing, managing the customer relationship, and providing technical services to assist customers to develop their project, including identifying and assessing energy project investments, preparing feasibility studies and investment plans, and procuring equipment and services. With respect to the equipment loan program, the utility may have the following roles: (i) marketing the loan program and educating customers on the loan offers, using information approved by the Bank; (ii) assistance in loan origination, e.g., collecting customer credit information, providing customer utility bill payment history (as one aspect of customer credit analysis), assisting the customer to fill out loan applications, providing technical due diligence on EE projects being proposed for loan financing; and, (iii) cooperation with the bank to integrate collections of loan payments with the utility bills, agreement to suspend utility service in event of loan default, and cooperation with the bank in default situations, subject to applicable utility regulation and loan agreement terms with customers.

The Bank will provide: (i) equipment loans, according to the agreed range of terms, and subject to credit approval; (ii) staffing both headquarters and branch levels to market, originate loans and service the program, in cooperation with utility; (iii) customer credit pre-screening services, so that the utility focuses its EE project development efforts with creditworthy customers; and, (iv) collections services, acting as collections agent for the utility and pass through utility payments to the utility. The Bank/Utility Equipment Loan Program Agreement will address these topics and the respective roles of the utility and Bank in program marketing, loan origination, collections and loan administration.

Banks may also market EE project and equipment financial services direct to other customers, and originate loans with IFC RSF support, outside of the utility relationships. Both Minsheng and Industrial Bank have expressed interest and capacities to do this. Some of this marketing may occur in cooperation with EE Suppliers; IFC PMO will facilitate relationships between banks and EE Suppliers for this purpose.

4.5.8 Developmental Objectives of the Equipment Loan Program

China's FIs are very risk averse. Small and medium size businesses especially face major barriers to receiving loans for new plant and equipment investments. Current commercial bank lending and risk management practices are characterized as follows:

- banks require high levels (up to 200%) of fixed asset collateral as security for loans, which potential borrowers may lack;
- tenors for loans tend to be one year; loan payment schedules typically have balloon payments rather than installment payments of principal; loans are underwritten like working capital loans;
- while interest rates have been largely liberalized, banks generally do not charge risk weighted spreads (interest rates) on their loans;
- strong preference is given for larger borrowers and larger loans, typically US\$5-10 million; customers demanding smaller loans are often ignored.
- highly centralized loan approval procedures, impedes branch offices from making expedient credit decisions or applying innovative practices that meets local needs for SMEs

A key Program objective is to improve access to equipment loans and make loan terms and security requirements attractive to borrowers. Specifically, the Program and IFC RSF will promote banks to:

- Assess risk and underwrite loans more on the basis of borrower cashflow and ability to pay, including the economic merits (energy cost savings) of the project being financed;
- Apply risk-weighted pricing and use extra spread to cover additional risk;
- Offer three to five year loan tenors (for equipment that has useful lives of 10-20+ years) and amortize loans with installment payments of principal, which reduces bank risk on the medium term balloon payment loans, and reduces borrower total interest costs;
- Apply other credit enhancement methods, e.g., collections of loan payments together with utility bills with the threat of suspending utility service in loan default, debt service reserves for individual loans, and additional bank loss reserves.
- Maintain centralized credit standards, but move the banks towards more decentralized, delegated loan approval authority.

There is a large and relatively untapped market for energy equipment loans that can be offered on these terms. Overall, the IFC wants to design the RSF to support the banks to expand their energy equipment loan business, prudently test innovative risk management practices, and offer more attractive loan terms, with longer tenors, to customers, especially in under-served SME segments. The Program envisions a clear pathway to commercialization whereby banks can employ the credit risk management methods on a profitable, sustainable basis without the IFC risk sharing support once the Program is concluded.

4.5.9 *Bank Technical Assistance Program*

IFC, through its PMO and other bank specialists, will provide TA funding and direct TA support to participating banks to start up and operate the equipment loan program. TA for banks could include and support:

- Training in energy equipment finance for bank headquarters covering introduction to energy savings technologies, economics of energy savings equipment, structuring energy equipment loans, marketing bank EE equipment financial services, and other topics.
- Training and monitoring components, to improve credit underwriting, risk assessment and portfolio management and reporting practices, and to implement procedures for equipment lending, including application of the credit enhancement methods indicated above.
- Creation of a special unit within the Bank for this program and development and implementation of a marketing and operations plan for this unit.

- Development of new loan products for this type of equipment lending, targeted to distinct priority customer market segments.
- Training for bank branch office staff, designed to implement this program.
- Development of relationships between bank and EE Suppliers and utilities who provide a channel for generating loan demand and marketing loan services, and preparing methods for marketing and origination of loans through these channels.
- Engineering due diligence on EE projects during loan origination.
- Engineering assistance to evaluate and assemble standard energy savings equipment solutions for targeted customers, e.g., hotels and commercial buildings, which in turn can be marketed to bank customers.
- Market research to segment the market and identify target industry sectors.

4.6 Utility Outreach, Recruitment of Participating Utilities and Replication

4.6.1 Dissemination of Program Methods

As part of the Program, IFC will conduct an outreach program to utilities. This program will have two goals: to identify potential utility partners, and to widely disseminate the Program's methods. Initial elements of the outreach program will begin early in Program operations. The objective of this early activity will be to qualify a set of new utilities interested in implementing one or more of the Program's components.

As Program methods and tools are developed and proven with the initial utility partner, the outreach program will disseminate these tools to other utilities. A range of education and dissemination methods -- workshops, trainings, staff exchange programs and conferences to share experience and case histories, pairing staff from new utilities with staff of existing utility participants -- will be used, as appropriate.

IFC expects that some utilities may adopt and apply Program tools and methods -- e.g., the financing mechanism, the EE Suppliers Network, or creation of a CSC -- selectively and independently without implementing the full set of Program activities and without direct Program financial support. Some new utilities may ask for assistance from existing participating utilities to implement Program methods on an outsourced basis; this can represent a new line of business for existing participating utilities, and a form of Program replication.

A request for proposal process may be used to solicit and/or qualify utility partners. Selection criteria include: (i) market readiness and potential in their service areas, (ii) senior management commitment, (iii) staffing, management and technical capacities to implement the program and operate a CSC, and, (iv) willingness and ability to make the in-kind and financial commitments required under the program.

IFC anticipates having up to four utilities participate with full Program support, which includes co-financing of program operations, TA for development of customer projects, and use of the Program's equipment financing and credit enhancement mechanism. As the Program's outreach program will disseminate the Program's methods broadly, IFC expects that various Program methods will be used by utilities that are not Program partners.

4.6.2 Recruitment of Gas Utilities

For a gas utility, the Program's activities will serve core objectives of building gas loads and strengthening customer relationships. Gas utilities are, therefore, well-motivated to participate, and IFC expects one to be the first utility partner.

The initial utility partner is expected to be Xinao Gas Holdings, Ltd., (Xinao). Xinao, (an IFC investee), operates in over 57 cities serving over 35 million people. Xinao's service territory is primarily in middle-size cities (2 million inhabitants) in central and eastern China, so the environmental and developmental benefits of this program will reach these populations. Xinao senior management has indicated strong interest and commitment to the Program. Detailed discussions with Xinao are underway and are providing an essential means to refine the Program's design and methods, adapted to Chinese conditions. Through this initial partnership, IFC will develop and refine Program methods that can be applied to subsequent utilities.

To date IFC has identified two potential utilities, Wah Sang Gas and Panva Gas as targets for the utility marketing and outreach program and will continue to identify other potential gas utility partners during Program development and operations. IFC has carried-out initial discussions with Panva Gas concerning future participation in the Program. Panva have expressed a strong interest to participate in the Program, potentially as the "second" utility. IFC will conduct an outreach program early in Program operations to educate prospective utility partners and qualify a set of interested utilities for potential participation.

4.6.3 *Recruitment of Electric Utilities*

The Program can be an important means to help electric utilities meet China's energy conservation goals and address power shortages. The Program can provide a delivery mechanism for electric distribution utilities who want to improve customer end-use efficiency and load profiles in ways that create utility system benefits. These measures can avoid load problems at much lower cost than new power plant construction, avoiding capital investments in new generation and, in some cases, transmission and distribution. These types of EE/DSM projects have been developed by electric utilities in other countries with great success and have proven to create economic benefits to the utilities.

IFC has not thoroughly researched opportunities with or pursued recruitment of electric utility partners but will do so once Program operations commence. These efforts may not succeed, as, in general, utilities are more oriented to supply rather than demand side programs. As part of the utility outreach and replication program, the Program can perform preliminary cost/benefit analyses, from the utility perspective, of EE and other "customer side of the meter" measures, e.g., power factor correction, load management controls, peak shaving, and distributed generation. These analyses will investigate the cost effectiveness and system benefits of EE/DSM. The Program will present the resulting economic data to utility managers and policy makers, so they can be aware of the benefits of using EE/DSM as one important and cost-effective means to develop their power system and alleviate power shortages.

China's State Power Economic Research Center has an indicative target to achieve 100 GW in power savings, equal to 5% of electricity production and 5% of peak load, through demand side management programs.¹³ Hubei province has also developed lighting DSM programs. System benefit charges, which would create a stable source of revenue for distribution utilities to pursue DSM programs, are being considered on a pilot basis.¹⁴ The potential for DSM is illustrated by a 300 MW pilot "energy efficiency power plant" (EEPP) program under development by the Jiangsu Provincial Electricity Board ("Jiangsu") in cooperation with the Asian Development Bank and the State Grid Corporation DSM Instruction Center. The program will deliver a

¹³ "Opportunities for Energy Efficiency in China", Dr. Hu Zhaoguang, Chief Economist and Deputy Director, State Power Economic Research Center, presentation to Asian Development Bank EE Consultative Workshop, November 22, 2005

¹⁴ *ibid*

portfolio of efficiency measures to be implemented on the customer side of the meter. Total investment cost is estimated at \$142 million, less than one-half the cost of an equivalent new power station, and can be implemented faster, in approximately two years. Efficiency measures will be chosen which have a high coincidence with peak demand and a capacity factor similar to a new power plant. Industry consumes 70% of all power in Jiangsu, and over 60% of industrial power use is in motor systems, so efficient motors, with proper controls and variable speed drives that efficiently match the motor drive power with the precise momentary demands of the given application, will make up a large component of the program. The utility will benefit in the form of avoided/lower new generation and transmission/distribution investments. End-users will benefit through cost savings. A recent feasibility study¹⁵ looked at the potential for a sustained effort, beyond the pilot, and estimates that Jiangsu can achieve 42,373 GWh and 15,335 MW in cumulative annual electricity savings by implementing a ten-year portfolio of eight demand-side initiatives investing in EE improvements throughout the province's industrial, commercial/institutional and residential markets. Total electric energy savings represent the generation output (in GWh) equivalent of 24 new coal-fired plants.¹⁶ These efficiency resources would contribute 11% toward Jiangsu's projected growth in electricity energy requirements and 24% of peak demand growth. The weighted average life-cycle cost of saved electricity from the initiatives to Jiangsu's utility is 12 fen/kWh (1.5 US cents/kWh). This compares to the cost of new power supply in the range of 35-45 fen per kWh.

4.6.4 *Work with Heat Utilities*

The Program will also explore partnerships and projects with district heating/cooling utilities. These may be organized as municipal enterprises serving city districts, or organized privately serving multi-family, commercial or mixed use real estate developments. In some cases, there may be collaboration between gas utilities where gas is used as a fuel by the district heating utilities. Because the maximum loan size supported by the IFC risk sharing facilities will be in the range of USD\$5 million, IFC expects that The Program supported heating projects will be mainly end-use efficiency investments along with smaller scale heating/cooling generation plants and distribution system upgrades.

4.7 **Performance-based Incentives and Carbon Credits**

4.7.1 *Capturing the Value of GHG Emissions Reductions*

The Program will explore methods, consistent with GEF policies, to assist participants to capture and monetize the value of GHG emissions reductions created by the EE projects supported by the Program. If and as methods are determined, then the TA program can include assistance to participants to create Certified Emissions Reductions (CERs) and arrange for sale of them. All such actions will be undertaken in coordination with the appropriate PRC designated national authorities.

4.7.2 *Bank Incentives*

Another financial tool IFC is considering to deploy is performance-based incentives to the banks, to complement the risk mitigation tools of the RSF and the technical and human capacity building activities of the TA program. EE project lending targets will be established for the banks. A performance incentive could then be provided to further motivate bank management and staff to achieve these targets. Performance based incentives link the actual decision-makers to the overall

¹⁵ Report titled "DSM Strategic Plan for Jiangsu Province: Economic, Electric and Environmental Returns from an End-use Efficiency Investment Portfolio in the Jiangsu Power Sector", prepared by Optimal Energy, Inc. and State Grid Corporation DSM Instruction Center, February 11, 2005

¹⁶ Assuming a coal plant capacity at 300 MW with a 70% capacity factor, in terms of capacity in MW, this is the equivalent of 52 coal-fired plants.

performance of the Program, and could prove to be a powerful incentive mechanism for bank management to motivate its staff to accelerate the adoption of the EE lending practices and originate deal flow through the established marketing channels.

5 Stakeholder Participation

The Program is designed to engage different stakeholders by building on their own self-interest, taking advantage of their strengths, and making it as simple as possible for them to participate. The Program design itself is the outcome of extensive meetings with stakeholders to date.

5.1 Energy End-users

Types of end-users targeted include industrial, commercial, SME, municipal/institutional, and multi-family residential sector customers seeking to develop, finance and implement EE projects in their facilities to minimize their energy costs.

A typical end-user might be Shijiazhuang Steel Company. The Company is preparing a project to substitute gas for coal in their kiln producing lime for steel manufacture; this project has an estimated 2.5 year payback period and will save considerably on coal processing and kiln equipment maintenance costs, as well as produce a purer lime that will improve the steel quality and reduce waste steel product. This steel company is also considering gas conversions for their steel rolling furnace and has a further (non-gas) heat recovery project under development, all of which could benefit from this Program's TA and financing services.

5.2 Utilities

The utility partners will play a market aggregator role, systematically identifying potential EE projects within a service territory, and offering the end-users EE services, including equipment and finance packages designed to meet typical energy use needs. The introduction of utility hubs into the Chinese EE market can bring about large-scale transactional efficiencies, as the utility can take advantage of its relationships with customers to market EE to them, and can act as a "one-stop shop" to provide ready access to EE engineering and financing.

5.3 EE Equipment and Service Suppliers

Companies, who manufacture, sell and deliver EE products and services (e.g., EMCs) will have critical roles in marketing, in alliance with the utilities, and delivering the EE projects and services. They will benefit from increased sales of their products facilitated through the aggregation of customers, enhanced access to finance for EE projects, and the support of their development provided by GEF supported TA for capacity building of these companies. An example of a typical EE equipment supplier is Jiangsu Shuangliang AC Co. Ltd. They supply gas-fired absorption coolers and other large-scale air-conditioning equipment. Their clients (e.g., commercial buildings, hotels, hospitals, airports), have high-volume needs. They have some limited experience with equipment finance, and have provided some financial guarantees to support sales of their equipment.

5.4 Financial Institutions

Commercial banks will be selected to provide loans for the EE equipment and projects. Bank lending will be supported by an IFC RSF. The Program will build EE finance capacities and experience within its partner FIs. The sustainability of the Program will be linked in part to the Program's success in helping the FIs develop sustainable lending businesses for EE projects. IFC has extensive experience in training and capacity building of FIs for EE, SME and environmental finance, including in its Chengdu based office, China Project Development Facility (CPDF), targeting SME capacity building in southwest China. IFC will engage a senior bank specialist to provide TA to partner banks.

5.5 Local and National Government

The MoF, which has endorsed the Program, will be the primary point of contact between the PRC Government and the Program. The Environment and Recourses Department of the National Development and Reform Commission (NDRC), has government responsibility for energy conservation policy and programs, and would be represented on the Program Advisory Committee. IFC has met with them and received their input on Program design. IFC will continue to work with them on a consultative basis, especially to develop strategies to recruit electric utility partners.

Local governments play an important role in utility oversight and management; they are also involved in establishing market targets and plans for gas distribution utilities through concession contracts. The Program will therefore coordinate with local officials in its target cities. IFC has met with local officials in Shijiazhuang, a potential target city, for example, to discuss and coordinate concerning the Xinao Gas program in Shijiazhuang.

The Program will not rely on potential policy changes to help create a market, as there are sufficient projects available under current regulatory conditions. However, the Program will identify any policy barriers, e.g., co-generated power utility buyback rates, and will inform the relevant authorities on why the barriers impede the greater uptake of beneficial EE projects, and how the barriers might be addressed.

5.6 Energy Efficiency or Industry Organizations (NGOs)

NGOs and industry associations currently supporting or implementing EE promotional activities will be engaged in Program implementation, especially in establishing the Network of EE equipment and service providers and in marketing outreach activities. They will also be invited to serve on the Program Advisory Committee. IFC has met with leading EE organizations such as the Energy Research Institute, Beijing Energy Conservation Center, the Global Environmental Institute (GEI) to gain their inputs on EE market opportunities and Program design aspects.

5.7 Other Donors

IFC has arranged bi-lateral donor funds from the Finland Ministry of Trade and Industry. Other donors, mainly bi-lateral agencies, may be sought by IFC to co-finance the TA program. There are many opportunities for technology transfer and business development in China's EE sector for international firms, which bilateral donor agencies frequently seek to promote.

To prepare this Program IFC has communicated with staff from World Bank/GEF China Heat Reform and Building Energy Efficiency project, the UNDP/GEF China End-Use Energy Efficiency Project, World Bank/GEF Efficient Industrial Boiler Project, World Bank/GEF Energy Conservation Project, GTZ's "Energy Efficiency through Modernisation of Existing Buildings, P.R. China" and "Energy Saving" projects and the French GEF (Fond Francais Pour L'environnement Mondial) which supports several activities around EE in the Chinese building sector. See Section 6.7 for more detail.

5.8 Program Advisory Committee

At inception, the Program will establish a Program Advisory Committee whose members will be recruited to represent the various Program stakeholders, such as: utilities, end-users (via associations), EE Suppliers, EE NGOs, relevant Government agencies including MoF, and most likely, NDRC, State Environmental Protection Administration (SEPA), China Banking Regulatory Commission (CBRC), Ministry of Construction (MoC), local and provincial

governments, FIs, donors and other donor-supported EE programs. Each representative will provide a channel for communications with their respective constituencies. All partner utilities and FIs will be represented on the Program Advisory Committee (PAC). The PAC will be chaired by an appointee of the MoF and organized by the Program Manager. The PAC may be divided into sub-committees to address more specific matters as identified throughout the duration of the Program.

The main role of the PAC will be to provide advice and feedback on the Program design and implementation, in order to support Program operations. The PAC is also a potential forum for the advancement of EE finance and market development as many of its participants play important roles in promoting and sustaining a favorable policy environment for EE investments. The PAC will advise and provide guidance to the PMO on Program strategy and especially specific topics related to dissemination, outreach and replication and coordination with other national initiatives and policies. The PAC can also play an advocacy role to support Program implementation by addressing critical EE business related policy and strategy issues at the Government policy and commercial market levels. Beyond the annual PAC meetings, the Program management and implementation team may contact the Committee members to seek advice on issues raised during day to day Program operations. The PAC will be convened annually.

6 Implementation Arrangements

6.1 Program Management Office

A Program Management Office (PMO) will be established to act as the local implementation body for the Program. PMO staff will be hired as employees of IFC. The PMO will be co-located with IFC's Beijing office and will liaise directly with the Government's MoF, International Department. Because the Program is first and foremost a private-sector finance and marketing program, and because IFC has an established relationship with MoF working on such issues as private sector investment in the financial sector and new financing instruments, the MoF has agreed that it shall be IFC's primary point of contact with the Government.

IFC's technical assistance management facility based in China, the China Project Development Facility (CPDF), will provide in-country management, administration and operational support to the PMO. Initial staffing for the PMO team will consist of five to six staff that includes one Program Manager, one EE Engineer, one Analyst and one to two Administrative Staff, and one to two Banking Specialists. The Banking Specialists may be co-located with the banks to provide a substantial portion of bank TA. Additional staff may be hired and Program operations will be expected to expand and/or evolve in response to Program learning and changing market needs.

Consulting engineering services will be retained and organized by the PMO and would primarily consist of Finnish and local engineers. Additional international and local experts, as needed, will be hired using IFC/GEF funds. The consultants will work in close collaboration with the engineering teams provided by participating utilities. These engineering consultant teams would be managed by the IFC PMO and coordinate with participating utilities and banks.

Figure 4 below depicts the Program's Management Scheme. There are three tiers in the implementation of the Program: program management, program partners and end-users. The first tier, the PMO, is responsible for the overall operations and administration of the Program, while the second tier consists of the Program partners, who are the primary market actors and beneficiaries of the TA, risk management and performance-based incentive tools. Lastly, the end-users, the down stream target of the Program, carry-out the EE projects in their facilities, which results in GHG and other pollutant emissions reductions. The MoF and PAC participate in the Program in an advisory role, and provide an important channel of communication to the PMO to address policy and regulatory issues.

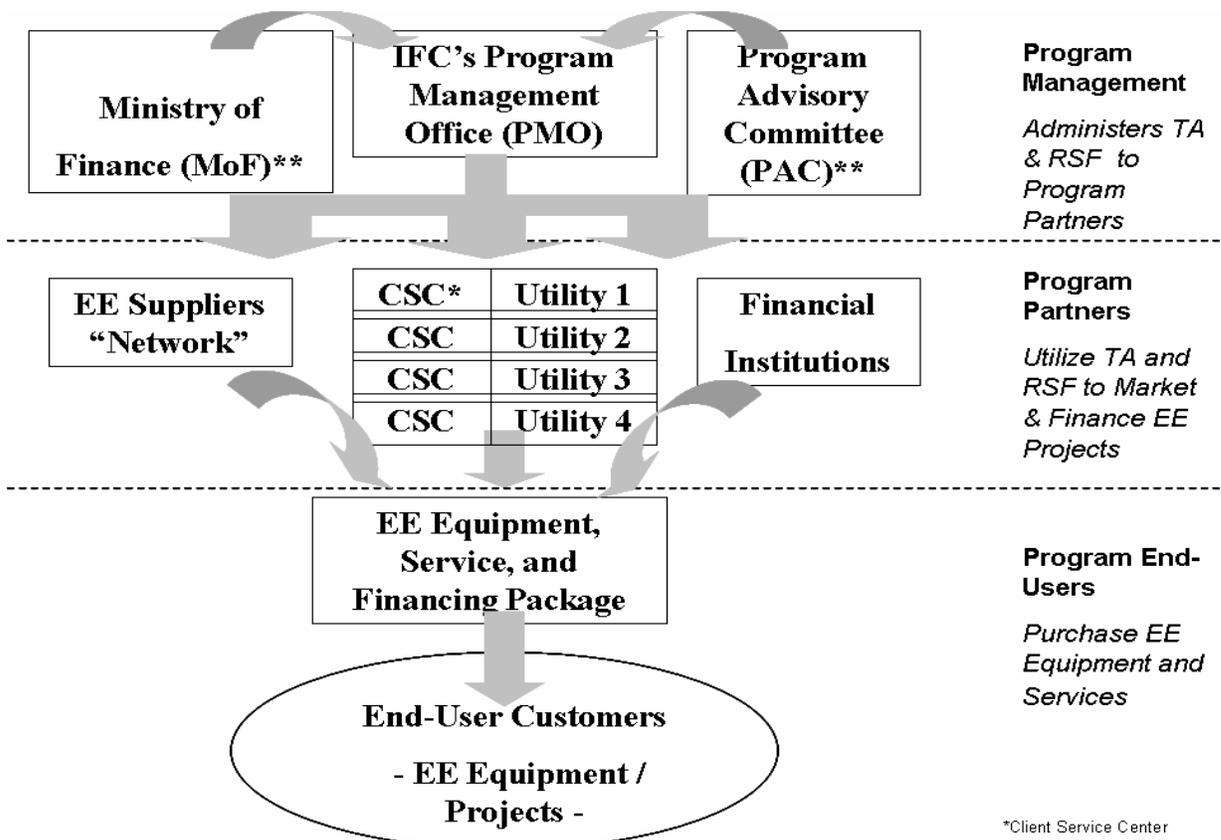
The PMO will play a central role in the Program management and delivery of TA. Its functions include the following:

- work with partner utilities to implement the Program, especially during the start-up phase when Program methods are being developed; start-up work will include the establishment of the utility CSC, the EE Suppliers Network, and the RSF operations;
- procure and manage external consultants -- both national and international -- involved in the TA program, including for Program start-up;
- assist in development and structuring of EE project transactions;
- provide the leadership and hands-on operational guidance to maintain, further develop and adapt the Program's vision and strategy during the start-up and operations period; the PMO will be expected to be particularly responsive to changes in market conditions or to findings of the mid-term process evaluation;
- recruit new utility partners and conduct the outreach program in all its dimensions, including replication of Program methods and start-up of Program operations with subsequent utilities;

- manage other donor funds and provide reports to donors as required;
- organize and implement the monitoring and evaluation of the Program and procure and manage external evaluation consultants;
- coordinate the Program’s multiple stakeholders;
- organize and conduct meetings of the PAC;
- liaise with and provide reports to relevant government agencies of the PRC;
- and, prepare reports as required for internal IFC, GEF and donor purposes.

The Program will require the active support of and close cooperation from the MoF throughout Program development and execution. The MoF further will nominate an official to liaise directly with the PMO and also to chair the PAC.

Figure 4: CHUEE Program Management and Implementation Flow Chart



**The MoF and PAC will have an advisory role in the Program.

6.2 Management of GEF Funds

CPDF has an established track record managing and delivering TA programs in China to SME’s, supported by IFC and donor funds. For this reason, CPDF will take a lead role in managing the TA, and operational and administrative components of the Program. IFC’s Environment and Social Department, responsible for the overall management of the Program, has developed a number of similar EE finance programs in other IFC client countries, including the Czech Republic, Hungary, Poland, and Russia, and thus will play a strategic management and technical advisory role in implementing the Program.

Reprogramming. IFC has budgeted a contingency of approximately 9% of the total GEF funds to be reprogrammed between TA, PMO administration and operations, RSF reserves, and performance incentives, depending on operational and market needs. In addition, IFC intends to include claw-back provisions in the RSF agreements with the partner FIs to allow for the reprogramming of RSF funds in case the RSF capacities are not fully utilized. This flexibility of reprogramming RSF funds improves IFC's leverage with the partner FIs to incentivize them to utilize the RSF, and allows IFC to select more motivated partner FIs in the case of inaction by the existing partners. IFC may seek additional funds from non-GEF donors and Program partners.

Currency Risk. IFC is currently impeded from converting US \$ into the Chinese currency, the RMB ¥, because of the non-convertibility of the RMB ¥ and WB currency account restrictions. These limitations could cause a mismatch between the US \$ denominated RSF and the RMB ¥ denominated bank loans, resulting in currency pricing risk. In the case of RMB appreciation against the US \$, which is a likely scenario in the near future, the total coverage under the US \$ denominated RSF will fall against the RMB ¥ denominated loans, thereby proportionately reducing the risk coverage that the RSF provides to the partner FIs. Because exchange rate fluctuations can adversely affect the total level of RSF coverage provided to banks' EE loan portfolios, IFC is developing a currency hedging strategy for the RSF, using such financial instruments as non-deliverable forward contracts (NDFs). A currency hedging instrument, such as an NDF, would allow IFC to transform, the US \$ denominated RSF to a RMB ¥ denominated facility (fixing the RMB ¥ conversion rate and thereby eliminating risks of currency exchange rate fluctuation for the partner FIs). In this case the currency risk will be borne by GEF, for the benefit of the partner FIs. The costs associated with managing currency risk, if any, are budgeted under the "Contingency" cost center.

6.3 Normal Program Expenditures

GEF funds for normal Program expenditures -- TA, incremental Program operations costs, monitoring and evaluation -- will be disbursed to IFC and then managed and expended by IFC as expenditures are incurred, as per normal practice.

6.4 Risk Sharing Facility Reserves

The RSF will be operated by IFC. GEF funds will be used as RSF reserves. These funds must be readily available to make risk sharing claims. IFC proposes that these funds be disbursed to IFC in one tranche; IFC would then deposit the funds in an appropriate account throughout the Program operational period.

6.5 Program Term and "Exit Strategy" for GEF Funds

The Program operations period, during which new EE project financings will be originated, is scheduled for six years to allow sufficient time to originate EE projects and engage multiple utilities. Many TA activities will be front-end loaded during the first two to three years of this period to support start-up of utility operations and generate project deal flow. The operations period is the "availability period" during which new EE projects will be prepared and loans originated with RSF coverage. Even after new loans cease to be originated, the RSF must continue to operate until all RSF liabilities and underlying loans have matured; IFC will assure proper management of the RSF after completion of the Program operations period.¹⁷

¹⁷ Please note that IFC's management costs for performing this function are not yet included in the estimates of IFC in-kind contribution to Project management.

GEF "exit strategy" refers to the plan for final disposition of unexpended GEF funds used as RSF reserves. The best case exit strategy for GEF RSF funds is for these funds to be permanently granted for continuation of the RSF operations. This decision would be made after appropriate evaluation and subject to good performance of the RSF and continued demand for the EE loan risk sharing product, and a plan would be developed following the mid-term evaluation. Other exit strategies can be developed in consultation with the MoF. These may include reprogramming of the GEF funds to other climate change activities approved by the MoF and IFC.

6.6 Utility CSC Operations

Participating utilities will establish their CSC as a headquarters function. The CSC will be the knowledge center to coordinate implementation of the program for the utility, in concert with their local service area marketing departments. Staff for each of these operating units will be trained as part of the Program's start-up support and TA activities. Each utility will enter into Cooperation Agreements with participating EE Suppliers.

6.7 Institutional Coordination and Support

In developing this Program, IFC interviewed officials from the MoF, National Development and Reform Commission Energy Efficiency Division, State Environmental Protection Agency, State Agency for Foreign Exchange, China Banking Regulatory Commission, Energy Research Institute, Beijing Energy Conservation Center, and Energy Management Company Association amongst others to review this Program concept and has reviewed related activities of other donor agencies including the GEF and World Bank. In general, donors have only recently shifted their attention to the importance of developing markets and technologies for use of natural gas in China. ADB has conducted one fact-finding mission on this topic, (concerning a Beijing-Shanxi gas distribution line), but has initiated no projects. GEF sponsored projects include one ongoing project – the *Second Beijing Environment Project* (fuel switching in space heating boilers) – and one recently closed project – *Sichuan Gas Transmission and Distribution Rehabilitation* – with a specific focus on natural gas. Several GEF-sponsored projects on increased end use EE could similarly have the effect of increasing substitution of natural gas for coal (e.g., in cogeneration projects) but have not focused specifically on leveraging the dynamic of increasing gas usage in order to mobilize additional EE investment that otherwise would not occur – as is the case here. Opportunities exist for coordination in particular with the prior World Bank program on coal-to-gas boiler conversions in Beijing, which can offer insights into gas market and economics, particular for the boilers market. IFC has consulted the GTZ office in Beijing. The Program may have close links to the GTZ Projects “Energy Efficiency through Modernisation of Existing Buildings, P.R. China” and “Energy Saving”.

Special opportunities for coordination exist with the on-going World Bank GEF Energy Conservation Phase II Project, which promotes energy management companies (EMCs) and notably includes a loan guarantee program supporting loans to EMCs. First, implementing EE involves a wide variety of possible equipment; hence the EMCs which have been developing in China with leadership and support of the World Bank Energy Conservation Phase II Project could be involved in developing and implementing Program projects. A range of EE projects, including, for example, gas-fired air conditioning have been implemented by EMCs participating in the WB program. The EMCs would work with and be promoted by the partner utility, which could help develop customer relationships and project leads and feasibility studies that lead to EMC projects. A good example of IFC building on the work of the WB occurred recently during the Program appraisal; IFC selected an EMC on a competitive bid basis, Liaoning Energy Conservation and Planning Design Research Institute, to perform the feasibility studies for the initial set of Program

projects. Liaoning is one of the EMCs that was created by the WB Energy Conservation Projects. In addition, IFC is in close contact with the WB's Efficient Industrial Boiler project team, and will continue to coordinate with them on disseminating their findings from the boiler technology transfer sub-projects supported by their program.

Second, the WB Phase II guarantee program offers valuable prior experience. China National Investment & Guarantee Company Ltd. (I&G) is the guarantor for the WB Phase II program and may be able to provide loan guarantees in cases where, under the Program, projects are implemented using loans to EMCs. Note that the WB Phase II program only provides guarantees on loans where the EMC is the borrower and does *not* provide guarantees on EE project loans made to end-users. The Program is designed to support both loans to end-users and EMCs. In the case where the EMC is a borrower, it may be possible to work cooperatively with I&G. Discussions with the World Bank regarding these possibilities are underway and a final determination will be made concerning more formal arrangements during the early stages of Program implementation.

IFC is also in contact with staff for the UNDP/GEF China End-Use Energy Efficiency Project. Several areas of potential cooperation exist between the two projects. First, the UNDP project will be developing standards and labels for the cement and petrochemicals industries. To the extent that the Program works end-users in the UNDP's target industries, the Program will take note of those standards and promote and incorporate them into the EE packages developed in conjunction with the Network of EE Suppliers and Utility CSCs. Second, the UNDP project will support Voluntary Agreements for EE within the chemical and cement industries; if there is geographic overlap, the Program could help industries targeted by UNDP to finance EE investments. The UNDP projects' pilot cities are Beijing, Shanghai, Chongqing, and Shenzhen. Finally, the UNDP project has an activity entitled "Policy Development on EE Financing Options." Thus, as the Program proceeds in implementation, the two projects can share information, experience and methods regarding EE finance.

Staff for these and other relevant GEF and donor projects will be further consulted during preparation and operations of this Program, and opportunities to collaborate with their programs will continue to be explored.

6.8 IFC's Comparative Advantage

IFC was specifically asked by the PRC MoF to develop a new private sector RE and/or EE finance initiative in China. IFC has actively coordinated the development and design of this Program with the PRC MoF and GEF Focal Point from its inception. IFC has a proven track record cooperating with the Chinese government, and specifically the MoF, in establishing and operating new, innovative projects. IFC successfully established the SME oriented TA management facility CPDF in Chengdu in 2001, which is one of the few satellite project offices operated independently by a multilateral institution. CPDF is committed to provide management, personnel and administrative support to the Program and a critical link to donor fund-raising.

Since 1985, IFC has made over 70 private sector investments in China totaling \$2.0 billion for its own account and an additional \$542 million in syndications. Investments include FIs, heavy industry such as cement, chemicals and automotive companies, manufacturing, energy utilities and power projects, and private equity funds. The pace of investment has been accelerating; from 2002 to the present, with total IFC investments exceeding \$978 million. In 2005, IFC committed over US \$400 million to 21 projects in China. Further, IFC has undertaken several TA programs and distributed tens of millions of dollars in TA funds, notably targeting SME business

development and improving access to finance for SMEs through CPDF. IFC offices in Beijing, Chengdu and Hong Kong, have over 150 local and expatriate professional staff. IFC has a proven track record of effectively selecting, evaluating and implementing successful development projects throughout China.

IFC has an established track record in the Chinese financial sector investing over US \$200 million dollars in commercial banks (debt and equity), and over \$250 million dollars in other financial markets companies such as insurance, mortgage, distressed assets, credit rating, investment banking, asset management and private equity. IFC has invested in 6 banks, many of which are city commercial banks, who are active in the SME sector. IFC is actively working with its investee banks to develop and improve their SME lending practices. IFC works closely with the MoF in developing new financial instruments, including the recent issuance of the “Panda Bond”, which was the first local currency denominated bond to be issued by a foreign institution in China. Thus, IFC is well positioned to work with the government to resolve any legal, policy, and regulatory issues pertaining to the structuring and operations of the RSF.

Through its experience with HEECP, CEEF, ELI and other EE finance and market development programs supported by the GEF and other donors, IFC has developed a good understanding of how to structure and operate guarantee schemes to stimulate increased investment in EE. This Program will build on the technology, procedures, and know-how from the current portfolio of IFC GEF-supported programs. Further, IFC has extensive investment experience in distribution utilities, including a gas utility in China.

The development of solid local FIs and promotion of investments with sound environmental benefits is an integral part of IFC’s overall strategy. IFC will seek opportunities to replicate Program methods within its portfolio of distribution utility and FI investments in other countries.

7 Program Budget, Financial Modalities, Financial Plan and Cost Effectiveness

7.1 Program Budget & Use of GEF Funds

The Program's budget is divided into the following nine categories:

1. Technical Assistance & Incremental Operations Costs : Utility Customer Service Centers
2. Technical Assistance: EE Project Development Engineering Services
3. Technical Assistance: Program Engineering Services
4. Technical Assistance to Banks
5. Outreach Program to Utilities and Replication
6. Incremental IFC Program Management Operations Costs
7. RSF Reserves
8. Monitoring & Evaluation
9. Contingency: RSF Reserves, TA and Bank Incentives
10. Capital Costs for Implementation of EE Projects

GEF funds will not be allocated to capital costs of EE project equipment and installation; some GEF funds will be used to co-finance EE project development costs.

An explanation for each budget category is provided below and covers uses and sources of funds, including GEF and related co-financing. A summary budget and estimated use of GEF funds is provided in Table D-1; a summary budget and estimated uses of funds for the full Program budget including all co-financing is provided in Table D-3. IFC has developed a Program that is both innovative in design and adaptive in implementation in response to a Chinese economy growing at a sustained record pace, (e.g., GDP growth rate exceeding 8% for the past ten years). These budgets are estimates, as IFC maintains the flexibility to reprogram funds as needed to adapt to the ever changing market conditions in China.

7.2 Utility Customer Service Centers

The Program will work with participating utilities to develop and start up their CSC. The CSC will be the knowledge center on all aspects of developing energy projects with customers and will coordinate with the various headquarters departments and the participating utility city subsidiaries. Utility CSC staff and related marketing staff will be trained to perform their functions.

It is expected that each participating utility will hire: (i) a full-time CSC Director based at headquarters, responsible for program management; coordination across all utility departments; leadership and coordination with city subsidiaries in all marketing, sales and finance functions, and liaison with and reporting to IFC; (ii) a lead Senior Engineer, responsible for all engineering services, organizing and coordinating consulting engineers, conducting technology reviews, organizing the equipment suppliers and services network, and training of all engineering staff; (iii) Lead Engineers, responsible for delivering engineering services to customers, located in each operating city, and working with utility marketing departments; and, (iv) additional sales engineers, as needed, as the program grows. Program activities will be integrated into the marketing departments of the local branch offices, and include training to the customer account representatives, who would be enlisted to sell the program to customers. A Marketing Director in this department will have a lead role supporting customer decision making on finance matters. Appropriate support personnel will be included in the utility program, plus support from senior managers in key departments: legal, administration and billing, marketing, finance, etc.

The Program will provide budget support to participating utilities to share costs (25-50% expected) of full-time dedicated personnel working on the program for the first two to three years of operations and for certain marketing costs and staff training. Direct GEF budget support for utility CSC operations, excluding EE project engineering services, is estimated at \$500,000 for the first utility and between \$200,000 - \$500,000 for subsequent utilities; these amounts may be supplemented by contingency funds, if necessary. Bilateral donor funds will be used for EE project development and engineering services. The budget for the subsequent utilities has a wide range in values, because utilities may join the Program on a staggered basis, and that the Program will be able to deliver the TA more effectively in the later implementation stages as the methods are improved. These figures are based on an estimated average costs for use in building an aggregate budget. IFC fully anticipates varying the expenditures on a per utility basis in response to need, opportunity, and effectiveness.

Partner utilities will make significant in-kind contributions in staff and support services to the CSC operations, covering full-time staff, part-time and support staff, overhead and marketing costs. These contributions are valued in the overall Program budget at an average of \$300,000 per operating year (including project engineering services), but could well grow higher. If the program is successful, utilities may roll out the program in additional cities in their service area at their own expense, using Program tools and methods. For example, Xinao has stated an ambitious intention to expand the program in approximately 20 cities by early 2008.

Final budget for Xinao's participation in the Program is presently being negotiated and is expected to be finalized by April, 2006. Replication with up to three additional utilities is budgeted. The work with the initial utility partner will develop methods that can be applied, adapted and replicated with subsequent utility partners. Thus, the budget for establishing the initial CSC is higher. Table D-2 estimates the number of years in aggregate which participating utilities will operate their CSC programs. A total of 16 utility operating years is estimated. This value is used to estimate the value of the utilities' in-kind contributions to operate the CSCs.

A large portion of staff training will be delivered in-kind by the PMO. International and national consultants as well as PMO staff will be engaged to provide necessary TA to participating utilities during their start-up and operations periods.

7.3 Technical Assistance: EE Project Development Engineering Services

Developing EE projects with customers requires work through the full project cycle, from marketing, to audits, feasibility studies, full engineering, investment planning, procurement and financing. These functions will be managed by the utility's CSC. Marketing functions will be performed by utility staff. Finance and investment planning functions will be performed by the utility staff, chiefly the marketing director, in conjunction with the lead engineer and the participating bank. The PMO will work closely with the utility team to train them to perform these functions.

Engineering functions will be performed by utility staff and outside consulting engineers, including both international and local experts. Outside consulting engineers will be relied upon more in the first one to two years of program operations. Part of their work scope will be to train the utility engineers to perform many basic engineering tasks, especially for smaller customers who have standard EE projects and applications, and to develop standard technology solutions. The Program will maximize use of local consulting engineers to reduce costs, build local capacities and to function effectively in Chinese language. The IFC PMO will include an engineer to coordinate, assist and provide quality control and management.

Table D-4 provides an estimated budget breakdown of EE project engineering costs through the key stages of EE project development: audit, feasibility study engineering and investment planning. Four categories of projects are indicated, broken down by average size:

- “small” projects, with average size of \$250,000
- “medium” projects, with average size of \$750,000
- “large” projects, with average size of \$2,000,000
- “very large” projects, with average size of > \$4,000,000.

This same breakdown of EE project sizes is used to construct a hypothetical portfolio of projects and for sizing the finance and RSF mechanism; (see Table D-5).

The Program will pay for only a portion of project development costs; the balance of these costs will be paid by the customer directly or by the EE Supplier. Customer payment for project development costs can be made either at each stage of project development, or reimbursed to the Program (CSC) contingent on and at the financial closing for the project. Various methods will be tested.

The Program’s goal is to promote development of projects through marketing and audits, but then allow the customers and other commercial parties to pay for the balance of project development costs themselves, as the projects are economic and commercially viable on their own without Program subsidy. Therefore, in general, the Program will pay for: 100% of marketing costs; a high portion (75-100%) of audit costs; and, a lesser share, e.g., 0-50% of subsequent full project engineering and investment planning development costs. This contribution share will likely decrease throughout the life of the Program.

The Program has budgeted \$1.65 million for EE project development engineering services delivered by outside consulting engineering services. Utilities are expected to roughly match this amount, both in cash and in-kind. Program funding for engineering services will be provided primarily by bi-lateral donors.

7.4 Technical Assistance: Program Engineering Services

Engineering services are also required for several other key Program functions: development of standardized equipment solutions for common applications; engineering advice on development of the Equipment Suppliers Network; training for engineering and marketing staff of partner utilities; the co-generation and heat systems market and policy study; utility cost/benefit analysis to be used for recruiting utilities to participate in the Program; and, post-installation monitoring and evaluation. This TA agenda is outlined in Section 4.3.4.

These services will be delivered by the PMO staff engineer and contracted consultants and funded primarily by bi-lateral donors. An additional \$250,000 is budgeted for these functions to supplement funds for contracted consulting engineers for utility cost/benefit and the co-generation and heat systems market and policy studies (included in the Utility outreach and replication program budget line) and funds for post-installation EE project monitoring and evaluation (included in the M&E budget line).

7.5 Technical Assistance to Banks

The TA agenda for banks is outlined in Section 4.5.9. Approximately \$200,000 per bank is budgeted per bank using IFC funds to support credit policy TA activities. These funds will be used in part to support senior banking specialist(s). This amount will be funded by IFC and is exclusive of engineering support costs. Engineering support, e.g., for technical due diligence on

EE projects, will be funded primarily by bi-lateral donors. Additional GEF funds of approximately US \$150,000 per bank is allocated to market development, including market analysis, training and other capacity building activities to supplement the work of the PMO staff and banking specialist(s). GEF funds allocated to the PMO operations may also be used for TA to the banks, dedicated primarily to training and consulting engagements to supplement the activities of the banking specialist(s). These figures are based on an estimated average costs for use in building an aggregate budget. IFC fully anticipates varying the expenditures on a per bank basis in response to need, opportunity, and effectiveness.

7.6 Outreach to Utilities and Replication

The Outreach program has three main components:

- identifying and recruiting new gas and electric utility partners,
- disseminating Program methods, i.e., sharing a broad set of educational and promotional activities, and
- training select utilities on Program methods, which is a more intensive activity with motivated utilities interested in implementing one or more Program methods.

Most outreach activities will be performed by PMO staff. Therefore, the budget for dissemination and training activities are estimated at \$150,000 each, mostly for direct incremental costs for items like workshops, trainers, printing, mailings, etc. A key tool for recruiting utilities will be performing cost/benefit analysis of EE/DSM measures and estimating system benefits to the given utility, especially potential electric utility partners; \$200,000 is budgeted for this activity. This work will be contracted to qualified experts.

7.7 Program Management Costs

A budget for six years of operations for the PMO is included in Annex D. Incremental IFC PMO costs will be funded primarily from GEF funds (\$3,000,000 budgeted) and from a portion of bi-lateral donor funds (\$700,000). The PMO will have an annual operating budget of approximately US \$500,000 – 600,000. The operating budget of the PMO will likely be front-loaded for the first few years, reflecting the need for senior-level staff and highly skilled technical specialists to incubate the Program in the early stages of the Program's development. The PMO staff engineer primarily using bilateral donor funds and the bank specialist(s) will be hired primarily using IFC funds.

Because the PMO will be so central to the Program's success, providing strategic guidance to all parties especially utilities during Program operations, IFC deems it critical to recruit a senior level Program Manager, and to have the budget available for this purpose. As most PMO costs will be incurred in RMB, the PMO budget will suffer in the event of dollar devaluation against the RMB. Therefore, IFC may draw upon the contingency fund (see below, Section 7.10) to supplement the PMO budget, if needed.

IFC will also provide in-kind operation cost support in several key ways. First will be professional staff contributions from Legal Department and relevant mainstream investment Departments: Financial Markets, Infrastructure, General Manufacturing, and SMEs. These staff have already provided assistance to development of the Program and are available to continue to do so during Program operations. Further, the IFC Beijing office will house the Program PMO, provide office, meeting and conference space and certain office support. CPDF will provide management, administrative and operational support to the PMO. The value of all this support taken together is estimated at \$750,000 over six years. Finally, IFC will cover the cost of overseeing the administration of the loans covered under the RSF still outstanding at the close of

the Program. As the maximum loan time is expected to be five years, this activity can be expected to continue for up to five years after new loans covered under the RSF cease to be made.

7.8 Finance Plan for Capital Costs of EE Projects and Risk Sharing Facility Reserves

The Program energy equipment finance mechanism and RSF will support financing of approximately \$150 million in EE projects. This calculation is provided in Table 2; it is based on current RSF and financing terms.

Table 2: Estimate of Total EE Projects & RSF Liabilities

CHUEE IFC Risk Sharing Facility				
Liability Limit Illustration			RMB	\$
1	\$/RMB =		¥8.09	\$1.00
2	Total Loan portfolio target		¥930,350,000	\$115,000,000
3	Definition of First Losses (<i>to be negotiated</i>)	10.00%		
4	IFC share First Losses (<i>to be negotiated</i>)	75.00%		
5	IFC First Loss Risk Sharing Liability Limit		¥69,776,250	\$8,625,000
6	Second loss exposure		¥837,315,000	\$103,244,760
7	IFC Second Loss Risk Sharing % (<i>to be negotiated</i>)	40.00%		
8	IFC SLRS Facility Liability Limit		¥334,926,000	\$41,297,904
9	Loan as a % of total project/equipment cost	75.00%		
10	Total value of projects supported		¥1,240,466,667	\$153,333,333

Key assumptions underlying this calculation are explained immediately below; they remain subject to change as the RSF terms get finalized.

- IFC will undertake RSFs with two to three banks. As described in Section 4.5, the RSF will have both First Loss and Second Loss components. IFC will cover its First Loss liabilities with GEF funds. A budget in the range of \$8.625 million is estimated for this purpose. Assuming and given this level of First Loss coverage which IFC can offer to the banks, and given an expected First Loss formula where First Losses are defined as 10% of the total loan portfolio and IFC covers 75% of First Losses, the RSF will have capacity to support maximum total outstanding loans of \$115 million.
- If EE projects are financed with a combination of 75% debt and 25% equity, (70/30 debt/equity is more typical in China), with equity contributed by the customers or their EMC contractors, then the total value of projects supported with \$115 million in debt would be \$153.33 million.

Project volume could be lower, depending on demand, or potentially higher if the RSF capacity rolls over during the six year Program operations period. This is possible because the loan tenors will likely be in the three to five year range, so, as outstanding principal is repaid on the loans, this will free RSF capacity to make further subsequent loans during the Program's six year operations period. Also, over time, with successful loan repayment performance, the lending banks may be willing to make loans with a lower level of RSF coverage, and the RSF terms can change, accordingly, allowing a larger amount of loans to be supported with a given level of RSF reserves. The RSF Agreement will include provisions to review and possibly revise the RSF risk sharing formula every two years.

7.8.1 Use of GEF Funds for RSF Reserves

IFC will use GEF funds as reserves against its RSF liabilities. Ten million dollars (\$10 million) in GEF funds are budgeted for this purpose. With these reserves, IFC, based on currently contemplated RSF terms, would assume up to \$50 million in RSF liabilities. The budget for GEF funds also includes a contingency, (see below, section 7.10), the use of which could include increase of the RSF reserves.

7.8.2 Hypothetical Loan Portfolio

A hypothetical portfolio of EE projects is illustrated in Table D-5; explanation of key points from Table D-5 follow.

- Types of EE projects are broken down by average size, as described above.
- Loans are expected to cover 75% of total project costs; the balance will be contributed by the customer (or an EMC, if applicable) as a down payment or equity contribution.
- Overall, the average loan size is \$469,000 equivalent.
- The hypothetical portfolio consists of 245 project loans, broken down as indicated, with a total portfolio of \$115 million in loans.
- For larger loans, the RSF coverage will be reduced so as to avoid too great a concentration of credit risk for a single transaction. The maximum IFC RSF liability per single loan will be in the range of \$1.25 million.

7.9 Monitoring & Evaluation

Engineering evaluation of implemented EE projects will be conducted by engineering consultants paid from GEF and bi-lateral donor funds. Information on the energy savings performance of the EE projects will be gathered by the project participants, including the utility, EE Supplier and customer, in coordination with the consulting engineers and the PMO. Protocols and training to gather this data will be included in the training agenda. All other monitoring and evaluation costs will be paid from GEF funds. Mid-term and final impact evaluations are planned. Monitoring and evaluation will be conducted by independent external consultants procured and managed by IFC and the PMO. Four hundred thousand dollars (\$400,000) is budgeted for this purpose.

7.10 Contingency & Bank Incentives

Budget for use of GEF funds includes a contingency of \$1.5 million. These funds would be used potentially for: TA, RSF reserves, PMO costs and/or bank incentives. Having a contingency will give IFC flexibility to respond to Program operating and changing market conditions as they develop. In addition, any costs associated with hedging currency exchange risk would be included in the contingency line item of the budget.

IFC is contemplating use of some portion of GEF funds as performance incentives for participating banks to achieve lending targets to be established in the RSF Agreements. Because of the central role which banks play, it is important to provide them with incentives to perform these roles effectively and aggressively. Earning profit from booking new loan assets, developing profitable new lines of business, establishing new client relationships and new business marketing channels, improving their risk management practices through the TA program -- these are all incentives that are built into the Program design presently. Additional cash performance incentives may also be useful, and, at the margin, economic to provide, to gain attention of bank managers and staff and motivate effective performance. For these reasons, IFC wants to maintain the option of include some bank performance incentives in the Program plan. Various incentive formulas are being explored, and could include, for example, extra “spread”, i.e., a small percentage (0.5%) per year earned on loans booked above a target level.

7.11 Co-Financing and Leveraged Resources

Program participants -- IFC, utilities, EE Suppliers, banks and end-users -- will each contribute directly to Program costs in several forms, as discussed above. Leverage of GEF funds is discussed below in two categories: (i) capital investment in EE projects, and (ii) Program operations and TA costs.

7.11.1 IFC Investment & Leverage of GEF Funds for Implementation of EE Projects

IFC is targeting to commit approximately \$40 million to the RSF, four times the amount of GEF funds used for the RSF. The RSF, in turn, will leverage up to an estimated \$115 million in EE project loans. Capital costs of EE projects are estimated to total \$150 million, of which \$115 million will be funded by commercial bank loans and \$35 million by project sponsor equity investments. These investments are calculated as part of the co-financing package¹⁸ and will be mobilized during Program operations as EE projects are developed and implemented. Thus, \$10 million in GEF funds will result in up to \$150 million in EE project investments, providing good leverage of GEF resources. There are good prospects also that the GEF RSF reserves will not all be spent on RSF claims payments, thus further improving the effective leverage of GEF funds.

“Leveraged resources” are defined as “...additional resources -- beyond those committed to the Program itself ... that are mobilized later as a direct result of the Program, e.g. for further replication or through programmatic influence.”¹⁹ The initial set of participating utilities are expected to replicate Program methods in other service areas of their utility without full Program financial support. Also, the Program plan includes an outreach program to educate and train utilities on Program methods, so that they can replicate them themselves without the levels of Program financial support which the initial set of utilities will receive. Thus, IFC believes it is reasonable to expect replication through the Program’s influence, market development and demonstration effects, and, therefore, for related additional resources to be mobilized. Assuming replication in three to four additional service areas of participating utilities and replication in two additional new utilities, these additional “leveraged resources” are estimated to be in the range of \$60 million; this is deemed a conservative estimate. This value is listed in the Executive Summary under “leveraged resources”. These impacts will be tracked and estimated as part of the Program Monitoring and Evaluation program. (See Section 10 and Annex E.)

¹⁸ Consistent with definition of co-financing in Annex C: Co-financing Policy for GEF Projects, http://thegef.org/Operational_Policies/Eligibility_Criteria/templates.html.

¹⁹ *ibid.*

7.11.2 Bi-lateral Donor Funds & Co-financing of Program Operations & TA Costs

IFC has arranged \$3 million in bi-lateral donor funds for Program operations from the Finland Ministry of Trade & Industry. (See Annex G for evidence of this commitment.) These funds will be used primarily for consulting engineering services, and also for other TA and PMO operations. IFC may seek other bi-lateral donor funding also to supplement the budget for engineering and financial advisory services.

IFC's in-kind contribution to Program operations is estimated at \$750,000. IFC will provide US \$200,000 per bank in TA support and funding.

Participating utilities will contribute significant resources in cash and in kind to implementation of programs in their service areas, at least matching Program resources provided from GEF and bi-lateral donor funds. If the Program proves successful, IFC expects participating utilities to replicate application of Program methods without Program support.

7.12 Program Cost Effectiveness and Estimation of GHG Emissions Reductions to be Achieved by the Program

Program cost-effectiveness is measured by the amount of GEF expenditures per ton of CO₂ equivalent GHG emissions reduction achieved by EE projects directly supported by the Program.

Based on the hypothetical project portfolio illustrated in Table D-5, IFC estimates a total of 4.1 – 8.6 million metric tons of CO₂ equivalent emission reductions will be achieved by projects directly supported by the Program. These calculations do not include further emissions reductions achieved by additional projects indirectly supported by the Program, e.g., through the outreach program, or implemented by virtue of the Program's demonstration and market transformation effects.

7.12.1 Net GEF Expenditures & Cost Effectiveness Calculation

Because most GEF funds for this Program are budgeted to support the RSF mechanism, final Program GEF expenditures will be a function of project loan collections performance. The expected default rate on the loan portfolio is in the range of 4%. If the actual default rate is 4%, then, given the financial plan and mechanism indicated above, GEF expenditures for RSF claims would be \$4.6 million. The maximum GEF expenditure for RSF would be \$10-11.2 million (with the higher value based on use of most of the contingency funds for RSF reserves). Table 3 illustrates the GEF cost-effectiveness calculation based on these two varying levels of GEF RSF expenditures and range of GHG emissions reductions estimates. It indicates a GEF cost per ton of CO₂ avoided of between \$1.29 to \$4.02. Please see Annex A for further explanation of these calculations.

Table 3: GEF Cost-effectiveness Calculations

GEF Cost-effectiveness Calculations	Base Case Volume and Defaults	Base Case Volume and High Defaults	Low Volume, Base Case Defaults	High defaults, Low Volume
Total EE Sub-projects implemented	\$150,000,000	\$150,000,000	\$75,000,000	\$75,000,000
GEF expenditures, excluding RSF Reserves	\$6,500,000	\$5,300,000	\$6,500,000	\$5,300,000
Actual default rate	4.00%	10.00%	4.00%	10.00%
GEF RSF Reserve expenditures	\$4,600,000	\$11,200,000	\$2,300,000	\$11,200,000
Total GEF Expenditures	\$11,100,000	\$16,500,000	\$8,800,000	\$16,500,000
Metric Tons CO2 emissions avoided by Project, estimated	8,593,750	8,207,031	4,296,875	4,103,516
GEF cost per metric ton CO2	\$1.29	\$2.01	\$2.05	\$4.02
Lifetime Tons CO2 reduced per \$1 million capital investment (Base Case)	57,292			
Added discounting of emissions reductions for high default case	4.50%			

8 Sustainability and Replication

8.1 Sustainability

Gas utilities are naturally highly motivated to undertake this Program insofar as they can be shown that it offers a means to build gas loads and increase sales. IFC will select partners and design the TA so as to ensure that the Program's methods will become part of mainstream market operations. The CSC will be designed to become a permanent feature of partner utilities' operations, and to be able to implement transactions on commercial terms. Utility partners will devote considerable resources to this Program, including in-kind senior management and staff resources during Program development, marketing and implementation. That commitment will be a precondition for utility company participation in the Program, and a major criterion in the selection of utility partners.

IFC's experience with other financial guarantee and risk sharing programs, such as HEECP or CEEF, has shown that a GEF-backed financial guarantee or risk sharing facility can be an effective tool to introduce EE lending practices into a national market. Loan financing will be provided by the local FI partner(s) on normal commercial terms, supported by the IFC RSF. The Program envisions a clear pathway to commercialization whereby banks can employ the credit risk management methods on a profitable sustainable basis without the IFC risk sharing once the Program is concluded. IFC experience indicates that this learning -- and weaning from a dependency on GEF-supported risk sharing tools -- occurs quickly in commercial banks. The EE projects themselves are expected to be economic for the end-users, or are otherwise motivated by requirements to comply with environmental regulations.

8.2 Replication: Overview

The Program is in part a market transformation project, addressing GEF *Strategic Priority CC-1, Transformation of Markets for High Volume Products and Processes*. Replication is central to the design concept of any market transformation program, because these programs rely on replication to enlarge their sphere of influence from selected transactions to entire markets. As befits a market transformation program, The Program is intended to catalyze far-reaching change in Chinese EE markets, at several levels: within an industry sector, through increased activities by EE Suppliers and FIs, through the branch offices of FIs, within a utility's service territory, among non-participating utilities and their service territory, and, through IFC's Infrastructure and Global Financial Markets Departments in China and other countries.

IFC has pursued a strategy to target utilities and commercial banks with national service coverage in China, as opposed to local or regional commercial banks, or utilities with a limited number of municipal concessions. The comparative advantage of this approach in terms of replication impact is that national commercial banks and utilities can rapidly roll-out the Program methods on a country-wide scale through their branch offices and service territory.

8.3 Replication within Industry Sectors and Other Market Segments

In industries where EE affects competitiveness, it is reasonable to expect that as a few industry leaders increase the efficiency of their equipment, others will follow. This is particularly true in the case of gas-based projects. Gas is a high-quality fuel. Its combustion is reliable and easily controlled, and remains so even at a low load factors. Even when gas equipment is not operating at peak load, its output remains efficient and steady for a range of part load conditions. These qualities of gas appeal to industries where loads vary and product quality depends on a steady supply of heat. For example, manufacturers of glass for television and computer screens can

lower the number of rejects by using gas-fired ovens, and steel manufacturers can improve quality and reduce waste by using gas-fired kilns to produce lime for steel manufacture. Other affected industries include pharmaceuticals, food processing, and electronics.

The Program will undertake several activities to facilitate replication within an industry sector. The Program will target industrial end-use partners across a range of industries, rather than concentrating on one or two industries. The Program will also prepare industry-specific brochures and seminars. Finally, the Program will work together with industry association to disseminate EE information.

The Program presents a number of commercial opportunities for IFC to develop financial products that reach deeper into the China capital markets. One of the primary end-users of the Program's RSF are SMEs, and thus the RSF structure can be adapted to financial products targeting other segments of the SME market besides EE equipment.

8.4 Replication Through EE Equipment Suppliers

The Program will organize a Network of EE equipment suppliers and service providers to offer packages of EE measures integrated by the utility. Equipment suppliers are highly motivated to increase market penetration on a national scale. The Program will thus seek to leverage this interest by building the capacities of equipment suppliers to market and offer financing for their equipment. Such a collaboration with equipment suppliers can be an important element of the strategy for replicating the model throughout the country.

8.5 Replication Within a Utility

China's gas utilities have vast service territories. For example, Xinao operates in 57 cities with a population of over 35 million. Regardless of which utilities the Program works with, it will not be able to launch immediately within the company's entire service territory upon Program inception. The PMO, in consultation with the utility partner, will select several service territories as priority markets, based on the size of the potential EE markets, presence of local finance partners, availability of high-quality equipment, and the capacity of local partners. Once the Program's methods are proven, the utility can then replicate them in their other service territories.

The economic rationale for a gas utility to conduct customer-side equipment finance and EE programs is compelling. Equipment efficiency is a key component of the economics of a new gas installation, so EE should become part of a gas utility's sales pitch as it seeks to expand its customer base. It is reasonable to predict that once the gas utility has gained experience with EE through the Program, that it will integrate EE into its business development strategy.

The Program will do its utmost to facilitate transfer of EE activities throughout the service territories of its partner utilities. A wide geographical service territory is one of the criteria which the Program will use in selecting its utility partners. Software, manuals, databases and other tools developed with partner utilities will be designed to be easily transferable from one service territory to another; these capacities will remain in the China market. The Program will also conduct "train the trainer" events to empower managers within one CSC to impart their know-how to other branches of the utility.

8.6 Replication Amongst Non-participating Utilities

The Program resources will cover the establishment of direct partnerships with up to four Chinese utilities. Outreach to other utilities is an integral part of the Program's mission and is covered in

the GEF budget, “Outreach to Utilities”. The Program will hold meetings in industrial areas of China, to introduce the concept of the utility as market aggregator for EE, to share examples of win-win projects for both gas and electric utilities, and to introduce the tools developed under the Program. In follow-up events, the Program will offer training to interested utility staff on using the Program tools – databases, manuals, software. It is possible that one or more partner utility sets up a subsidiary that offers other utilities its services as an EE market aggregator. This approach would effectively enable non-participating utilities to outsource their CSC to partner utilities. One such market niche would be for a partner utility to outsource the services of its CSC to a municipal utility that does not have the resources or mandate to undertake private-sector-based EE projects on its own.

8.7 Replication in Other Countries

IFC views this Program as a very important incubator to test, prove, and draw lessons from the use of gas utilities to systematically deliver EE to end-users in their service territories. Assuming the Program performs well, IFC’s Infrastructure Department is prepared to mainstream its methods with other IFC portfolio gas and electric distribution utility companies as well.

The Program concept is already being developed on a smaller scale in Egypt, under the IFC/GEF Environmental Business Finance Program. Egyptian FIs would finance EE improvements for SME customers of a partner gas utility. GEF resources would be used for TA and credit enhancement. IFC’s Infrastructure Department is following the Egypt and China projects closely.

IFC’s Infrastructure Department has a portfolio of gas distribution company investments whose sponsors would be natural partners for replicating the Program model. Environmental sustainability is a priority for the Infrastructure Department, and the Program model offers a way to integrate EE concerns into the expansion of the gas market. Therefore, the Infrastructure Department has committed to using experience gathered through GEF projects to mainstream, within IFC’s gas sector investment strategy, the approach demonstrated in the Program. This would enable IFC to roll out a sustainability-focused financial product that will leverage large-scale end-user EE investment as an integral part of the expansion of natural gas utilities. The potential for replicating the Program model in other countries is therefore quite significant, as IFC has investments in gas utilities throughout its client regions.

IFC has already demonstrated effective mainstreaming of financial products developed through partnership with GEF in the HEECP, CEEF and the Russia Sustainable Energy Project. In these cases, GEF leveraged substantial IFC investment in EE; additionally, the investment models piloted in these specialized facilities have been replicated in new products being disseminated (without GEF support) in other markets. On the basis of experience gained through GEF projects, IFC established a Financial Markets Sustainability Group within the Global Financial Markets Department, which now has 25 staff-members and implements mainstream EE (and biodiversity) lending. IFC’s current efforts to roll out innovative EE finance products targeting the housing sectors in Latin America are also direct result of the housing products developed for and piloted in Hungary through the IFC/GEF HEECP program. (See also discussion under Section 6, Implementation Arrangements.)

9 Risk Management

Table 4: Summary of Program Risks and Mitigating Factors

Type of Risk	Mitigating Factors
Non-Program Risks	
Policy Risk	
<p>National and local environmental policy and efforts to reduce air pollution provide an incentive for EE sales. Changes in environmental policy, or, more likely, lax enforcement due to high costs, will affect the demand for EE equipment.</p>	<p>Further enforcement of environmental policies, even in medium size cities, appears to be a priority for Chinese officials. This Program will provide tools and delivery mechanisms to help them accomplish their goals. The Program does not rely on environmental regulation to drive the EE project market. Many EE projects are very attractive economically based on cost savings and improved gross margins.</p>
Economic Risks	
<p>Financial regulators in China are attempting to “cool down” the economy by restricting lending; this and other macro-economic factors could negatively affect the lending environment. Changes in macro-economic policy and/or conditions could adversely affect the Program. For example, lending restrictions could reduce the tenor of loans available to the Program’s target borrowers. Or, reduced rates of economic growth could reduce the demand for capital investment of all kinds.</p>	<p>The Program will select quality implementation partners with financial strength, skilled management, and ability to respond to changing market conditions. Program mechanisms will also be designed to be adaptive to market demands. Market interest rates are still in a range to be attractive to borrowers.</p>
Market Risks	
<p>It is always possible that significant changes may occur in the market, which would then threaten effective implementation of the Program.</p>	<p>IFC can draw upon its experience with HEECP, CEEF, and the Russia Sustainable Energy Project, and with other credit enhancement projects and EE investments in order to respond nimbly to unforeseen market changes. In addition, IFC is planning for contingencies by structuring the TA and RSF to be adaptable to changing market conditions, allowing for flexible reprogramming and redeployment of GEF and donor funds as needed.</p>

Devaluation of the Dollar against the Yuan	
<p>The Yuan will likely appreciate during the Program operations period, increasing the dollar value of Program operations costs and reducing the Yuan value of dollar denominated GEF funds, affecting the RSF capacities.</p>	<p>IFC will consider some currency conversion and/or hedging strategies to mitigate this risk. IFC is working with banks to define how they will manage this risk related to the value of the RSF coverage. IFC can also have flexibility to reprogram use of GEF funds to compensate; the contingency fund will be available for this, amongst other purposes.</p>
Program Related Risks	
Credit Risks and Financial Institution Partner	
<p>The Program relies on its FI partners to deliver the EE loans. While IFC provides risk sharing through the RSF, credit decisions will be made by the partner banks. There is a risk that banks will continue to be risk adverse, will reject many potential borrowers, and that the RSF and other credit enhancement methods being deployed by the Program will not succeed in mobilizing local banks loans on terms that are needed by and attractive to borrowers.</p>	<p>IFC has a multi-tiered strategy for creating creditworthy EE loan transactions, including not only the GEF supported RSF. In the first instance, credit enhancement is provided by the integrated loan and utility bill collections, security interest in project equipment, and loan-specific debt reserves. (See Section 4.5.4 for discussion of these.) IFC believes the RSF, with its substantial “first loss” risk coverage will be sufficient to support banks to take more aggressive lending decisions, approve many loans, and test new credit risk management practices being promoted by the Program. The RSF design allows for renegotiating the risk sharing formula and a claw-back provision, if needed, in case the banks don’t fully utilize the RSF capacities. IFC anticipates that the risk sharing can be reduced over time; but, if necessary, it could be increased. IFC has deep relationships with FIs in China from its investing activities and will be actively involved with the partner banks through the TA program.</p>
Loan Performance	
<p>There is a risk associated with the payment performance of loans supported by the Program, and defaults/losses associated with these loans. Higher loan loss rates will increase the effective costs of the Program. Loan payment could be poor and loss/default rates higher than estimated, and/or moral hazards associated with and the RSF could materialize, leading to higher than estimated loan default rates, leading to a reduction or lack of lending.</p>	<p>The Program, through its credit enhancement mechanism, will provide TA in loan structuring to reduce defaults. Further, EE equipment, while having low collateral value, is essential to the customers’ operations, which enhances willingness to pay, and saves in operating costs, which enhances ability to pay. Mortgages on the EE equipment will be obtained as part of loan security.</p>

Underperformance of Selected Technologies	
<p>The chosen technology will not provide the expected savings.</p>	<p>Program will promote proven technologies. Technical reviews will be conducted for EE projects. A set of standard equipment packages will be developed to meet typical application needs. Regular data reporting will allow the Program to track equipment performance. Any underperformance can be quickly identified and remedied.</p> <p>The TA program provides market analysis on the performance and EE savings of equipment, as well as dissemination of this information to the market.</p>
Poor Economics for Gas-using Projects	
<p>Gas prices are high relative to coal, which constrains the demand for gas and related gas-using equipment. A significant portion of the gas market is driven by national and local environmental policy and efforts to reduce air pollution. Changes in environmental policy, or, more likely, lax enforcement due to high costs, will delay energy market penetration by gas and affect the demand for gas equipment, impacting the Program.</p>	<p>IFC has identified a number of gas-using projects which are economic now. Comprehensive EE projects are very economic in China and will be developed in tandem with gas-using projects; this combination will improve the overall economics of EE/gas projects for the end-users. Gas-using equipment also generates other economic benefits, such as improved product quality for certain industries. Environmental regulation as a market driver will not be relied upon, but it is expected to continue.</p>
Utility Implementation Partner	
<p>Chinese utilities have limited experience with marketing on the customer side of the meter and packaging EE measures with gas sales. A great deal of work and planning is needed to create an effective Customer Service Center and related marketing program. There are risks associated with successful effective implementation with any given utility partner. Further, there is a risk that IFC will not be able to recruit electric utility partners.</p>	<p>A potential initial partner, Xinao Gas, is very motivated to undertake this Program; and additional utility partners will be selected through the planned outreach program. IFC will assist in preparing the detailed strategy and plans for the Customer Service Centers for all participating partner utilities. Program marketing will also occur via the EE equipment suppliers, so multiple marketing channels will be used. IFC will retain an active role managing the TA program and overseeing implementation by the utilities, so on-going guidance to the utilities will be provided. The Program will conduct cost/benefit analysis for prospective electric utility partners to show how EE/DSM can benefit them.</p>

Gas Supply Risks	
<p>The gas industry is very young in China and gas supply and distribution systems are still being built out. There is a risk that gas supply shortages could occur and that this will dissuade potential end-users from undertaking gas-using projects, which, in turn, would reduce the potential success in partnering with gas utilities.</p>	<p>IFC and its utility partners will carefully choose cities for Program operations where gas supply is well-established and available, and at the most attractive costs, so as to avoid this risk. Further, new gas supplies are being developed rapidly. The Program will seek electric and district heating utility partners, and work through multiple marketing channels, and thus, does not rely exclusively on gas utilities or gas using applications.</p>
EE Project Deal-flow	
<p>A primary concern for an EE finance program of this nature is development of a sufficient volume of equipment and project financings to meet program targets. End-users may find means to finance equipment without loans or otherwise the finance terms offered by participating FIs may not be sufficiently attractive for potential borrowers to utilize the Program.</p>	<p>The Program will support development of EE projects through its TA program even if customers do not use the Program's financing mechanisms. Further, the financing mechanism will be adapted to market conditions and demands during Program operations. The deal-flow risk will also be mitigated by establishing business relationships with a diversified set of utility partners and EE Suppliers, and by developing a diversified set of EE marketing activities in various market niches. Multiple marketing channels will be developed, in addition to the utility channels. (See Section 4.2 for discussion of EE project marketing strategies.)</p>
Program Management and Implementation	
<p>An additional key risk associated with implementation success concerns finding, retaining and training quality staff and managers in key positions in the CSCs, RSF and PMO.</p>	<p>Identifying and hiring highly skilled staff is a primary focus of Program start-up activities. The PMO is offering market-rate, competitive salaries and career opportunities for its staff, and is securing formal staffing commitments from the Program partners to implement their activities.</p>

10 Monitoring and Evaluation

The Monitoring and Evaluation Plan (M&E) will be integral to the Program's implementation and will require involvement of the various Program participants. For the most part, the Program partners do not have the systems and procedures for the collection and analysis of the majority of the information and data to be processed by the Program. These systems and procedures will be developed and integrated into the partners' Program activities. A mid-term evaluation will assess the Program's progress and test key assumptions in the Program design to determine the Program's direct and indirect impacts on its target markets and its greenhouse gas emissions reductions. The M&E information will enable capacity-building on EE technologies and project economics, fine-tuning of the standard EE packages prepared for end-users, improved performance through the enhancement of incentives for the Program partners and rapid understanding and application of lessons learned during the course of the Program's operations. A final impact evaluation will also be conducted at the end of the Program. Whereas the mid-term evaluation will primarily serve to identify any difficulties and suggest mid-course corrections, the final impact evaluation will emphasize lessons learned and market impacts. Its conclusions on which Program elements were most effective will be widely disseminated in China and abroad. Thus, the Program's M&E framework will serve several purposes:

- monitor progress towards Program objectives;
- strengthen Program performance and management by providing feedback on implementation;
- provide a base for technical and financial accountability;
- disseminate lessons learned to a wider audience to promote replication of Program methods.

The M&E will evaluate the Program's direct impacts -- starting with total EE projects supported by the Program and their related GHG emissions reductions -- and indirect market transformation impacts. Other key indicators or measures of direct and indirect Program performance and impacts are listed in Annex E Monitoring and Evaluation Plan.

In order to capture market transformation effects, the M&E will also assess the Program's indirect impacts and demonstration effects. To this end, the Program will also periodically visit non-participating utilities, equipment suppliers, and FIs so as to get a sense of the evolution of EE activity taking place outside of the Program. A key first stage indicator of indirect impacts of market transformation will be to use the Program's target cities as a control group, and measure the rate growth of the EE equipment finance business (i.e., in terms of quantity of EE equipment loans and the resulting GHG emissions reductions) in cities outside of the control group; these would be cities in which one of the Program partners with national reach has a branch office or service territory. The next tier of measuring market transformation would be to compare the increase in EE equipment loans, and the resulting GHG emission reductions, in cities outside of the Program partners' service territories generated by non-Program participating utilities and FIs.

Building on the Log Frame (see Annex B), the M&E plan will identify appropriate indicators to assess the Program's financial/business, energy, and environmental outputs, as well as its outcomes and impacts.

The M&E process will promote stakeholder ownership of the Program by directly involving program participants in data collection. Additional data will come from implementation team records and from research by third parties. IFC will employ a third party M&E contractor to provide independent verification, analysis and reporting of findings.

The key M&E deliverables are:

- Data collection tools, and training on using them
- Baseline data and market assessments
- Annual feedback to Program management
- Midterm evaluation during the third year of operation
- Final impact evaluation (including direct and indirect impacts) at Program close

Key market development and transformation objectives to be assessed include the following. The Program seeks to:

- (i) promote the entry of new EE technology into the Chinese market, including efficient gas-using technologies;
- (ii) promote the growth and business development of EE project, equipment and service companies in China;
- (iii) build the capacities and experience of local FIs in EE project finance, provide more favorable credit conditions to borrowers, and promote financial innovation in this market;
- (iv) provide practical demonstrations and develop effective methods for how utilities can serve as a platform for marketing and delivering EE projects and services in ways that benefit the customer, the utility, local community and the general economy and society; and,
- (v) provide experience with utility-based EE finance methods that can be replicated by IFC with distribution utilities and FIs in other countries.

A more detailed M&E Plan is included as Annex E.